





Vendor: 	EPC Contractor :  	HENGAM FERTILIZER PROJECT		Owner: 
Job No.	Project No. : 1208	Control valve Data sheet		Project No. :
		Doc. No.: VD-1208-605-DSH-001	Rev. : 01	

VENDOR : Nihon Koso Co., Ltd

REQ. NO. : 1208-00-IN-REQ-605

ITEM NO. : -

ITEM DESCRIPTION : Filled-in data sheets /Calculation sheets

PURCHASER DOC. NO. : VD-1208-605-DSH-001

VENDOR DOC. NO. : _

TOTAL PAGES : 191


- NO COMMENT:** Documents/ Drawings Were Checked By Purchaser And Further Steps Can Be Followed.
- COMMENTS AS MARKED:** Documents/Drawings Were Checked By Purchaser And Marked Comments Must Be Considered By Vendor. Vendor Shall Revise Documents/ Drawings As Per Comments And The New Revision Of Documents/ Drawings Must Be Reissued Prior To Fabrication.
- REJECTED:** Documents/ Drawings Were Checked And It Is Not Comply With Purchase Order Requirements At All.
- ACCEPTABLE WITH COMMENTS:** Documents/Drawings Were Checked By Purchaser And Comments Must Be Considered By Vendor. Fabrication Can Proceed Accordingly. Revised Document To Be Issued Either For Review Or As Final Certified. However Purchaser Will Check The Revised Document For Proper Incorporation Of Comments.
- NOT RETURNED:** Document Was Received For Information And Not Returned To The Vendor.

Name :	Req. No.:	Seq. No.:
Signature :		
Date:		


Purchaser review & comments does not absolve the vendor of the responsibility for the correct design, manufacturing and operation of the equipment

DE	EXT					
Eng. Phase	Purpose of Distribution (POD)	Purpose of Issue (POI)	Purchaser's Action			
00	7/26/18	Issued for Approval	Sh.G	S.G	S.G T . Nanzaki	
Rev.	Date	Description	Prepared by	Checked by	Approved by	Authorized by


Comments Resolution Sheet (CRS)

Customer Name:		Petrochemical Industries Design & Engineering Co.							
CVTS., Rev, Date		520000518 REV.03 DT 20.07.2018							
CRS Ref. :		0							
Sr. No.	Section / Tag	KOSO Valve Serial No.	Customer Comments	Koso Response	Status (Open / Close)		Price Implication		
					Koso	Customer			
1	Cover page of Datasheet	NA	Please insert the fluid phase for each tag No	For identifying the fluid phase kindly refer to the flow rate given in process condition : 1.For liquid phase :Liquid Flow Rate is provided 2.For gas phase :Gas Flow Rate is provided			-		
2			SIL certificate for body/actuator as well as electronic parts to be provided,	We have already informed that ABB positioner doesn't have the SIL certificate for FF positioners.However we have agreed to offer SIL certificate for valves.			-		
3			Please inform us about any piping requirement for the tag No's that you have quoted a valve larger than pipe size such as FV-3022/PV-4011... Is it required to consider any upstream/downstream for these valves?	Please note the below tags where valve size is more than given line size, Kindly take the necessary action for piping form your end. FV-3022 PV-4011 HV-2062 50-FV-5012			-		
4			Refer to the quoted material for packing,KOSO confirms the suitability of packing material quoted TEF/Chevron instead of PTFE and sup graph instead of graphite.	Yes, we confirm that offered packing is suitable for given temperature.			-		
5			In some cases, such as PV-5023 packing material is quoted as supagraph while the min temperature is -33.Does KOSO confirm the material is suitable.	Yes, we confirm that offered packing is suitable for given temperature.			-		
6			Sizing for 20-HV-2541/2542/2551 and 50-HV-5501 shall be provided	Gestra tags.			-		
7			Complete accessories based on ASME requirements shall be supplied for volume tanks.	Noted, We will provide the same.			-		
8			please find attached the datasheet for 00-PCV-0020 which shall be amended to this POR.	Noted, Please refer to revised CVTS.(DOWN STREAM CONTROL)			YES		
9			Cobalt based alloys must not be used for hard facing in boiler feed water system.	Noted, we will revise the same but please be noted that there shall be price implication for change in Trim Materials.			YES		
10			Please insert a general note in document stating"KOSO approves controllability of the valve through 10%~90% opening).	Noted.			-		
11			It is assumed that pipe inlet and outlet velocity value are the same for liquid services. Can you provide us any value for outlet velocity in flashing service?	It is not available in our Software.			-		
12			In case of any modification, please insert revision mark.	Noted, Please refer revised sizing sheet.			-		
13			Please note that at present there we have not received any catalogue to check the model No of the quoted accessories. It is concluded that KOSO has proposed the most suitable one based on pidec requirements .Verification of the ordering code to pidec requirements is part of KOSO responsibility	Noted, We will provide the same.			-		
14			Please inform us regarding your general criteria for flow over or flow under design	<u>This is our General selection criteria for flow direction as below (but not limited) :</u> 1.Cage guided valves : Liquid service : Flow over the plug Gas service : Flow under the plug 2.Top guided valve it will be always flow to open/flow under. (we follow the above until unless our detailed engineering team suggest to change.)			-		
15			PIDEC NOTE:	NA	As both CVDS and GAD shall conform to each other, please also recheck the content with any comment inserted on VD-1208-605-GAD-001 (especially for vector type valve and baffle plates) .	Noted.			-
16			20.FV.2016	520000518001	General Comment: Please note that min air supply in this project is 4.7 barg and max is 8.7 barg.Please clarify about the max operating pressure value for this tag Nos. How do you protect the valve actuator regarding any overpressure.	Please be noted that AFR will be there to maintain set the pressure at downstream.			-


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Sr. No.	Section / Tag	KOSO Valve Serial No.	Customer Comments	Koso Response	Status (Open / Close)	Price Implication
17	20-FV-2016	SNS20000518001	General Comment: Please confirm the quoted model for solenoid conform to barrier model catalogue (HIC2871) submitted in KOM	Confirmed.		-
18			General Comment: The unit for the inlet /outlet/shutoff pressure is bara	We have considered unit in barA only.		-
19	20-FV-2016	SNS20000518001	Please clarify the term sys outlet velocity	This is for internal purpose only, Also please be noted that for Gas/Steam service we follow the Mach No. / Noise level criteria.		-
20	20-FV-2017	SNS20000518002	Please note PIDEDEC requires EXT bonnet. General Comment: Please confirm by normalizing bonnet,KOSO indicates that bonnet is EXT type.	We confirm that offered bonnet is Extended (Normalising in KOSO terminology).		-
21			Please confirm the quoted material is superior than SS316 as requested by PIDEDEC	Yes, we confirm that quoted material is superior than SS316.		-
22	20-FV-2035	SNS20000518003	PIDEDEC requested for a Hard Faced Guide Bush material. Please clarify?	Our offered Guide Bush material is Gr.6 Stellite,which is already hardened material and no need to provide any additional hardfacing.		-
23	20-FV-2076	SNS20000518004	Please note that as it was requested in 1208-IN-605-TQ ,FV-2076 shall be full trim.	We have offered full size trim only i.e. 6" inch valve size=6" inch trim size (refer to trim size ref. for same)		-
24			General Comment: Cobalt-based alloys must not be used for hard-facing in boiler feed water service	Noted, we will revise the same but please be noted that there shall be price implication for change in Trim Materials.		YES
25	20-HV-2062	SNS20000518005	It is concluded that HV-2062 line size is 10" but KOSO recommends to increase line size to 12"	Noted.		-
26			The sch of inlet/outlet is S80	Noted, please refer to revised valve sizing.		-
27	20-PV-2002	SNS20000518008	Please note that PV-2002 shall be full trim.	We have offered full size trim only i.e. 6" inch valve size=6" inch trim size (refer to trim size ref. for same)		-
28			Flow rate changed for max and min condition as 65082 & 29054 respectively.	Noted, please refer to revised valve sizing.		-
29			Inlet Wall thickness:50.8 mm Wall thickness:81 mm	Noted,we have considered pipe thickness 50.8 mm & 81 mm which is nothing but the schedule 160 .		-
30			Please clarify about this term "Pressure Sealed bonnet"and be noted that PIDEDEC has requested for an extended bonnet.	Yes, This is as per PIDEDEC requirement, The term Pressure Sealed bonnet used for Higher Rating/Size valves for internal reference.		-
31	20-PV-2029	SNS20000518009	Please recheck the quoted trim material. As per PIDEDEC datasheets,min material shall be equivalent or superior than SS316.	We confirm that offered trim material is suitable for given process condition.		-
32			Actuator fail safe position shall be stayput to close	Fail Safe Position is FLC, This is higher size Globe valve with double acting piston actuator hence fail safe position will be in FAIL LOCK (Stayput)only. Hence FLC will not be applicable for double Acting Actuator. This term is applicable for Spring Return type actuator.		-
33			Please note that mating flange drawings shall be sent for pidec review.	Refer GA drawing for same.		-
34	20-HV-2553	SNS20000518017	Please note that for HV-2553 a 6" full trim valve shall be provided.	We have offered full size trim only i.e. 6" inch (refer to trim size ref. for same)		-
35			Pidec has not already specified a flow rate value in this regard in datasheets.	Noted, please refer to revised Sizing sheet process data ahs been removed.		-
36	30-FV-3022	SNS20000518023	Please note that the inlet/outlet line size is 10, sch S80.	10" Valve is not suitable that's why we have offered 12" Valves..		-
37	30-HV-3031	SNS20000518026	Please note that HV-3031 shall be full trim	Noted,we have offered full Cv for offered trim model.		-
38	30-LV-3012A / 30-LV-3012B	SNS20000518028-029	Please be informed that the inlet/outlet size is revised to 28",sch S10	Noted, please refer to revised valve sizing.		-
39	30-LV-3027C / 30-LV-3027D	SNS20000518031-032	Inlet/outlet size is 26" and wall thickness is 15.88	Noted, please refer to revised valve sizing.We have considered thickness 15.88,which is noting but the schedule 30.		-
40	30-PV-3036	SNS20000518035	Inlet Pressure value is changed to 33.37 bara	Noted, please refer to revised valve sizing.		-
41			Please note that as per basic document,cv required for PCV-3574 shall be limited to 5.8	Selected Cv shall be 5.8		-
42	30-PCV-3574	SNS20000518-037	Please specify the values in bara as per pidec datasheets.	Set Range shall be 1.009 to 1.014 Bara		-
43			Characteristic shall be linear	Characteristics shall be modified %age. Linear characteristics shall not be possible as this is a Self Actuated Pressure Control Valve and it responds to the change in controlled pressure.		-
44			All the requires fittings and tubes to be provided	Confirmed.		-


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Sr. No.	Section / Tag	KOSO Valve Serial No.	Customer Comments	Koso Response	Status (Open / Close)	Price Implication
45	40-PV-4011	SN520000518038	Please recheck the quoted material. As per PIDECE datasheets, min material shall be equivalent or superior than SS316.	We confirm that offered trim material is best suitable for given process condition.		-
46	40-PV-4012A	SN520000518039	In/Out Pipe Schedule is S80	Noted, please refer to revised valve sizing.		-
47	40-PV-4024	SN520000518041	Outlet pipe schedule is S20	Noted, please refer to revised valve sizing.		-
48			Please clarify what you mean by pilot balanced	It is special design trim for high temp service valve.		-
49	40-PV-4027	SN520000518042	Please be noted that air failure for PV-4027 is changed to FO	Noted, please refer to revised valve sizing.		YES
50	50-FV-5012	SN520000518045	extended bonnet is required.	Noted, please refer to revised valve sizing.		-
51			packing Material contradicts to LV-5023 and PV-5023	Noted, please refer to revised valve sizing.		-
52			Please note that based on pidedc dtasheets,vapor pressure is 3.7 bara but the gas and liquid portion in inlet and outlet is specified and relevant flow rate in inlet is considered by KOSO .Is any confirmation from pidedc side still required?	Please be noted that vapour pressure shoul be 3.3 bara.		-
53	50-FV-5012	SN520000518045	Based on pidedc datasheet the inlet fluid is in two phase and it is expected to submit sizing for two phase flow. Please clarify what you mean by the fluid state in normal?	We have performed the valve sizing considering two phase only (GAS+LIQUID);Refer to description in process condition, where there are two flows i.e. Liquid Flow Rate and gas flow rate as well as its properties. Fluid state normal means there is no any remedies present inside the valve i.e. cavitation/flashing/choked flow etc.		-
54			As per basic document trim type for this tag No shall be energy absorbing trim. At present the value for trim exit velocity or pressure head is not specified.	Since the given flow is in mixed phase, the result will be separate for each phase; Hence, for trim exit velocity, kindly refer to outlet velocity of given phase as specified in sizing calculation.		-
55	50-FV-5054	SN520000518049	Please consider a solenoid valve as 50-FY-5054A for this control valve	Noted, please refer to revised valve sizing.		YES
56	50-LV-5012A / 50-LV-5012B	SN520000518050-051	Please consider a Minimum case in below condition for this control valve too: Flow:45826 kg/h upstream pressure: 183.5 barg downstream pressure:35 barg	Noted, please refer to revised valve sizing.		-
57	50-LV-5013	SN520000518052	As pe pidedc datasheet for LV-5013 downstream density :liquid:623 kg/m3-Gas :5.12 kg/m3. Please recheck whether this comment has any effect on your calculations	There will not be any major impact on valve & trim size.		-
58	50-LV-5014	SN520000518053	As pe pidedc datasheet for LV-5014 downstream density :liquid:644 kg/m3-Gas :2.99 kg/m3. Please recheck whether this comment has any effect on your calculations	There will not be any major impact on valve & trim size.		-
59	50-LV-5015	SN520000518054	Please note that based on pidedc datasheets, vapor pressure is 6.5 bara but the gas and liquid portion in inlet and outlet is specified and relevant flow rate in inlet is considered by KOSO .Is any confirmation from pidedc side still required?	Vapour pressure shoul be 5 bara.		-
60			Based on pidedc datasheet the inlet fluid is in two phase and it is expected to submit sizing for two phase flow. Please clarify what you mean by the fluid state in normal?	We have performed the valve sizing considering two phase only (GAS+LIQUID);Refer to description in process condition, where there are two flows i.e. Liquid Flow Rate and gas flow rate as well as its properties. Fluid state normal means there is no any remedies present inside the valve i.e. cavitation/flashing/choked flow etc.		-
61			As per basic document trim type for this tag No shall be energy absorbing trim. At present the value for trim exit velocity or pressure head is not specified.	Since the given flow is in mixed phase, the result will be separate for each phase; Hence, for trim exit velocity, kindly refer to outlet velocity of given phase as specified in sizing calculation.		-
62			As pe pidedc datasheet for LV-5015 downstream density :liquid:644 kg/m3-Gas :2.99 kg/m3. Please recheck whether the note has any effect on your calculation or not	There will not be any major impact on valve & trim size		-
63	50-LV-5018	SN520000518056	As pe pidedc datasheet for LV-5018 downstream density :liquid:623 kg/m3-Gas :5.13 kg/m3. Please recheck whether this comment has any effect on your calculations	There will not be any major impact on valve & trim size		-


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Sr. No.	Section / Tag	KOSO Valve Serial No.	Customer Comments	Koso Response	Status (Open / Close)	Price Implication
64	50-LV-5022B	SN520000518058	As pe pidec datasheet for LV-5022B downstream density :liquid:681 kg/m3-Gas :0.93 kg/m3. Please recheck whether this note has any effect on calculation or not	There will not be any major impact on valve & trim size		-
65	50-LV-5023	SN520000518059	<u>General Comment:</u> Is Supagraf material suitable for temp below 0.	Yes it is suitable for temperature below 0 °C.		-
66	50-LV-5032	SN520000518060	As pe pidec datasheet for LV-5032 downstream density :liquid:644 kg/m3-Gas :2.99kg/m3. Please recheck whether this comment has any effect on your calculations	There will not be any major impact on valve & trim size		-
67	50-LV-5033	SN520000518061	As pe pidec datasheet for LV-5033 downstream density :liquid:635 kg/m3-Gas :5.2kg/m3 and there is a 0.7% flashing for this tag No Please recheck whether this comment has any effect on your calculations. At present fluid state for this tag No is normal	There will not be any major impact on valve & trim size		-
68			In case of flashing, note that the value of Trim Exit Velocity shall be less than 23	Noted.		-
69	50-LV-5050	SN520000518064	As pe pidec datasheet for LV-5050 downstream density :liquid:923 kg/m3-Gas :2.17 kg/m3. Please recheck whether this comment has any effect on your calculations.	There will not be any major impact on valve & trim size		-
70	50-PV-5023	SN520000518068	Please recheck the packing material Supagarf.	We confirm that offered packing material Supagraf is suitable for given temperature.		-
71	50-PV-5043	SN520000518071	outlet pipe size is 4",sch 540	Noted, please refer to revised valve sizing.		-
72	50-HV-5502	SN520000518075	Design Pressure pressure should be 216 barA.	Noted, please refer to revised valve sizing.		-
73	70-HV-7011A	SN520000518079	Please note that refer to TQ in bid stage, this tag No shall be quoted as Full trim	Noted, offered valve is full size trim only. i.e. valve 4" size= trim 4" size		-
74	70-HV-7011B	SN520000518080	Outlet pipe schedule should be 80S.	Noted, please refer to revised valve sizing.		-
75	85-PV-8503	SN520000518087	Please recheck the material as you have quoted supagraph in temperature below zero for LV-5023/PV-5023.	Noted, please refer to revised valve sizing.		-
76			inlet pressure for minimum flow condition is 5.7 barA	Noted, please refer to revised valve sizing.		-
77	85-TV-8506	SN520000518088	Please change the body/bonnet material to A216 WCB	Noted, please refer to revised valve sizing.		YES
78			Due to our PR dept. comment ,please add provide max. stop for related valve around 13000 kg/hr "to limit the flow and avoid high ammonia vapor release to flare line in case of valve 100% opening	Noted, please refer to revised valve sizing.		YES
79	95-FV-9503	SN520000518091	Please change normal flow to 1992902 kg/hour	Noted, please refer to revised valve sizing.		-
80	95-LV-9501	SN520000518092	Please change normal flow to 839657 kg/h	Noted, please refer to revised valve sizing.		-

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Sr. No.	Section / Tag	KOSO Valve Serial No.	Customer Comments	Koso Response	Status (Open / Close)	Price Implication
1	20-PV-2076A	SNS20000518012	<p>Pipe material is "ASTM A335 GR.P11" Please clarify what you mean by "N/A" Bonnet type shall be EXT Please clarify why the value is 12 to 20 in this field but number of stages in field 12 is 6 Disk Stack & Stem material - Why these parts are not quoted as stellited Volume Tank - Required accessories shall be supplied by KOSO Can you provide us a side mounted handwheel Please note that min air pressure is 4.7barG and Actuators shall be sized for this min value. Please note that a 16" S40 valve has OD:406.41mm, ID: 381mm, What you mean by 400 Please note that a 18" S40 valve has OD:457mm, ID: 442.3mm, What you mean by 450 As you have quoted a 16"x18" control valve, please clarify the difference between valve outlet velocity and Pipe outlet velocity</p>	<p>Noted & the Pipe material is updated in the CVDS accordingly. Firstly please take note that the "End Extension" means it is the Expander/reducer connected to the valve ends in order to match the Customer given Line size. Since for this Tag there is no expander/reducer offered hence we have specified "N/A" which means "Not Applicable" for your information. We have offered Standard Bonnet for this Vector valve & this point was already discussed & closed in the TQ stage itself. Please refer to Item/Point 17 in the TQ document for easy understanding. Firstly please take note that in field 12, the no. of stages indicated represents the minimum no. of stages required to meet the Kinetic Energy criteria & not noise criteria. Further in field/row 31 the no. of stages indicated represents the actual supplied no. of stages required to meet both noise & Kinetic Energy criteria for your information. Please take note that the 316 SS cage is made from a stack of EDM plates with flow paths consisting of multiple turns/stages to reduce the fluid velocity to the point where Stellite is not needed. Further the Stem does not see any high fluid velocities hence a hard Chrome plating is sufficient to protect the surafes and Stellite is not needed. Volume Tank - KOSO confirms that all the required accessories will be supplied along with the Volume Tank. We have offered Top mounted-Side access Handwheel for this Vector Valve & this point was already discussed & closed in the TQ Stage itself along with the sample figure. Please refer to Item/Point 155 in the TQ document for easy understanding. KOSO confirms the actuator is sized for a 80% of 4.7 barG air pressure for modulating/fully stroking the Valves and has margin on top of this. Further as per the given enquiry datasheet we understand the Available Air supply pressure is 7.4barG & the Maximum supply pressure is 8.7barG & the Min is 4.7barG The "Nominal Pipe Sizes" of 16"(400mm) & 18" (450mm) are NOMINAL sizes. The 400mm & 450mm represent the Nominal Pipe (DN) sizes. These Nominal values are used to look up the actual pipe dimensions that you have noted which are then used in calculations. Further w.r.t Valve, the actual valve outlet ID will be based on the nominal size and ASME pressure rating as dictated in ANSI B16.34. The calculation was based on a 16" valve outlet so the velocities are</p>	Closed	-
2	20-PV-2076B	SNS20000518013	<p>Pipe material is "ASTM A335 GR.P11" Please clarify what you mean by "N/A" Bonnet type shall be EXT Please clarify why the value is 12 to 20 in this field but number of stages in field 12 is 6 Disk Stack & Stem material - Why these parts are not quoted as stellited Volume Tank - Required accessories shall be supplied by KOSO Refer to recent revision of cause & Effect, please provide us SIL1 certificate for body, actuator and electronic parts of PV-2076B Can you provide us a side mounted handwheel Please note that min air pressure is 4.7barG and Actuators shall be sized for this min value. Please note that a 16" S40 valve has OD:406.41mm, ID: 381mm, What you mean by 400 Please note that a 18" S40 valve has OD:457mm, ID: 442.3mm, What you mean by 450 As you have quoted a 16"x18" control valve, please clarify the difference between valve outlet velocity and Pipe outlet velocity</p>	<p>Noted & the Pipe material is updated in the CVDS accordingly. Firstly please take note that the "End Extension" means it is the Expander/reducer connected to the valve ends in order to match the Customer given Line size. Since for this Tag there is no expander/reducer offered hence we have specified "N/A" which means "Not Applicable" for your information. We have offered Standard Bonnet for this Vector valve & this point was already discussed & closed in the TQ stage itself. Please refer to Item/Point 17 in the TQ document for easy understanding. Firstly please take note that in field 12, the no. of stages indicated represents the minimum no. of stages required to meet the Kinetic Energy criteria & not noise criteria. Further in field/row 31 the no. of stages indicated represents the actual supplied no. of stages required to meet both noise & Kinetic Energy criteria for your information. Please take note that in a Disk Stack the fluid velocities is restricted using multistages hence there is no need for Stelling. Further the Stem does not see any high fluid velocities hence there is no need for Stelling of the same. Volume Tank - KOSO confirms that all the required accessories will be supplied along with the Volume Tank. We observe that for the Tag PV-2076B the SIL1 Certificate requirement is informed only now, hence we will check the feasibility & get back to you on the same. We have offered Top mounted-Side access Handwheel for this Vector Valve & this point was already discussed & closed in the TQ Stage itself along with the sample figure. Please refer to Item/Point 155 in the TQ document for easy understanding. KOSO confirms the actuator is sized for a 80% of 4.7 barG air pressure for modulating/fully stroking the Valves and has margin on top of this. Further as per the given enquiry datasheet we understand the Available Air supply pressure is 7.4barG & the Maximum supply pressure is 8.7barG & the Min is 4.7barG The "Nominal Pipe Sizes" of 16"(400mm) & 18" (450mm) are NOMINAL sizes. The 400mm & 450mm represent the Nominal Pipe (DN) sizes. These Nominal values are used to look up the actual pipe dimensions that you have noted which are then used in calculations. Further w.r.t Valve, the actual valve outlet ID will be based on the nominal size and ASME pressure rating as dictated in ANSI B16.34. The calculation was based on a 16" valve outlet so the velocities are</p>	Closed	-

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Sr. No.	Section / Tag	KOSO Valve Serial No.	Customer Comments	Koso Response	Status (Open / Close)		Price Implication
3	40-PV-4012B	SNS20000518040	Bonnet - EXT type to be quoted Trim materials - Please confirm the quoted material is superior than SS316 as requested by PIDEDEC. Please confirm by HT, you mean hardened material Please clarify and note that actuator shall be size for 4.7 barg value.	Bonnet - We have offered Standard Bonnet for this Vector valve & this point was already discussed & closed in the TQ stage itself. Please refer to Item/Point 17 in the TQ document for easy understanding. Trim materials - We confirm the quoted 410SS,HT material meets all the process parameters & is superior than SS316 as requested by PIDEDEC HT means - Heat Treated for your information. KOSO confirms the actuator is sized for a 80% of 4.7 barG air pressure for modulating/fully stroking the Valves and has margin on top of this. Further as per the given enquiry datasheet we understand the Available Air supply pressure is 7.4barG & the Maximum supply pressure is 8.7barG & the Min is 4.7barG	Closed		-
4	50-PV-5042	SNS20000518070	Please recheck with any comment on VD-1208-605-GAD-001 Pipe material - API 5L GR.B SMLS	We have not received any document with "VD-1208-605-GAD-001". Please advise Noted & the Pipe material is updated in the CVDS accordingly.	Closed		-
5	50-HV-5013	SNS20000518074	Pipe material - ASTM A106 GR.B SMLS Design Pressure is 216barA Please note the actuators shall be sized for min. air pressure which is 4.7barG	Noted & the Pipe material is updated in the CVDS accordingly. Noted & the Design Pressure is updated in the CVDS accordingly KOSO confirms the actuator is sized for a 80% of 4.7 barG air pressure for modulating/fully stroking the Valves and has margin on top of this. Further as per the given enquiry datasheet we understand the Available Air supply pressure is 7.4barG & the Maximum supply pressure is 8.7barG & the Min is 4.7barG	Closed		-
Application Dept.		Project / Sales Dept.					

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	1	1	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518001	20-FV-2016

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	44.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	44.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @60psi	345 cc/min
Max/Min Temp	210.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.34 ltr/min
Line Fluid	PROCESS AIR			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	120	Trim Size Ref.	3
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-JS0SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS
I.6	Limit Switch (Qty: 2)	P&F (Rotex Enclosure)	Limit Switch Model	DXLW3A2-3M

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <20 SEC.
- SIL1 CERTIFICATE TO BE PRPVIDED FOR BODY AS WELL AS ELECTRONICS PARTS.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	1	1	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518001	20-FV-2016

Valve Design Details

Valve	Series 1200 Globe	Design CV	120
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	44.00 bar
Body Rating	ANSI 300	Line Fluid	PROCESS AIR
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	6.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	Nm³/hour	29400	24500	12250
Inlet Pressure	bar	38.8	38.8	38.9
Outlet Pressure	bar	21.1	21.1	21
Pressure Drop	bar	17.7	17.7	17.9
Inlet Temperature	°C	182	182	182
Outlet Temperature	°C	182	182	182
Molecular Weight		28.88	28.88	28.88
Ratio Of Specific Heats		1.39	1.39	1.39
Compressibility		1	1	1

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.2	1.2	1.2
Inlet Spec Volume	m³/kg	0.0338	0.0338	0.0337
Calculated CV	US Units	78.18	64.54	31.58
Valve Opening	%	82	74.8	50.3
Gas Recovery Factor		0.744	0.747	0.757
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	76.9	75.4	70
Body Inlet Velocity	m/sec	77.9	64.9	32.4
Body Outlet Velocity	m/sec	143.2	119.4	60
Body Outlet Mach No.		0.3046	0.2538	0.1275
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	143.2	119.4	60
Sys. Outlet Mach No.		0.3357	0.2798	0.1405
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.7718	0.6432	0.3251
Velocity Head	bar	12.971	13.217	13.869
Specific Volume In	m³/kg	0.0338	0.0338	0.0337
Specific Volume Out	m³/kg	0.0621	0.0621	0.0624
Min DP 100% Open		7.126	4.937	1.229
Max Flow 100% Open		45126.9	45552.4	46551.9

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
338.55 lbf	456.47 lbf	2.25 in	2.81 in	6.63 in²	7.07 in²	0.31 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	44	44	38.8	38.8	38.9
Outlet Pressure	bar	1	1	21.1	21.1	21
Unbalanced Force	lbf	-76.13	195.74	172.6	172.6	173.1
Min Air Required	lbf/in2	13.92	10.04	34.37	34.37	34.36
Min Spring Setting	lbf/in2	10.27	7.63	7.3	7.3	7.31
Stem Stress	lbf/in2	1,351.63	1,741.50	1666	1666	1668
Stability	1/16 inch			0.18	0.18	0.18
Mod. Stability	Ratio			1.28	1.28	1.28

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	2	2	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518002	20-FV-2017

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	10.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	10.00 inch / 80	Seat Lk @60psi	1868 cc/min
Max/Min Temp	425.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		1.87 ltr/min
Line Fluid	MP STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	8 x 8 x 8 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	420 St.St.	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 St.St.	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 St.St.	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	650	Trim Size Ref.	8
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	4 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150D-B00SCE3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Opens	Actuator Action	Direct
A.3	Manual Override	None	Min. Operating Pressure	4.00 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Closes Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <14 SEC.
- SIL1 CERTIFICATE TO BE PRPVIDED FOR BODY AS WELL AS ELECTRONICS PARTS.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	2	2	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518002	20-FV-2017

Valve Design Details

Valve	Series 1200 Globe	Design CV	650
Valve Size (in x cm x out)	8 x 8 x 8 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	MP STEAM
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	10.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	10.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	kg/hour	80400	67000	33500
Inlet Pressure	bar	44.5	44.6	44.7
Outlet Pressure	bar	38.6	38.6	38.5
Pressure Drop	bar	5.9	6	6.2
Inlet Temperature	°C	385	385	385
Outlet Temperature	°C	385	385	385
Molecular Weight		18.02	18.02	18.02
Ratio Of Specific Heats		1.22	1.22	1.22
Compressibility		0.93	0.93	0.93

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.1	1.1	1.1
Inlet Spec Volume	m³/kg	0.0634	0.0633	0.0632
Calculated CV	US Units	328.9	271.3	133.3
Valve Opening	%	72.2	64.8	43.1
Gas Recovery Factor		0.747	0.752	0.76
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	73.8	71.9	70
Body Inlet Velocity	m/sec	45.1	37.5	18.7
Body Outlet Velocity	m/sec	52.1	43.4	21.7
Body Outlet Mach No.		0.0854	0.0712	0.0357
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	52.1	43.4	21.7
Sys. Outlet Mach No.		0.0855	0.0713	0.0357
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.8855	0.7494	0.3871
Velocity Head	bar	3.89	3.969	4.124
Specific Volume In	m³/kg	0.0634	0.0633	0.0632
Specific Volume Out	m³/kg	0.0731	0.0731	0.0733
Min DP 100% Open		1.5	1.041	0.2603
Max Flow 100% Open		158906.8	160510	163403.8

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
663.96 lbf	1,241.87 lbf	4 in	3.56 in	49.09 in²	50.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	52	52	44.5	44.6	44.7
Outlet Pressure	bar	1	1	38.6	38.6	38.5
Unbalanced Force	lbf	-276.2	592.19	506.8	507.9	509.1
Min Air Required	lbf/in2	32.77	32.77	38.36	38.37	38.38
Min Spring Setting	lbf/in2	6.72	0.51	1.12	1.11	1.11
Stem Stress	lbf/in2	1,197.05	1,599.38	1491	1492	1494
Stability	1/16 inch			0.42	0.42	0.42
Mod. Stability	Ratio			0.35	0.35	0.35

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	3	3	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518003	20-FV-2035

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	61.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	3.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	61.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	3.00 inch / 80	Seat Lk @60psi	39 cc/min
Max/Min Temp	150.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.04 ltr/min
Line Fluid	HYDROGEN GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1.5 x 1.5 x 1.5 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	Gr.6 Stellite	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	13.5	Trim Size Ref.	1
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <20 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	3	3	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518003	20-FV-2035

Valve Design Details

Valve	Series 10 Globe	Design CV	13.5
Valve Size (in x cm x out)	1.5 x 1.5 x 1.5 inch	Shut Off Pressure	61.00 bar
Body Rating	ANSI 600	Line Fluid	HYDROGEN GAS
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	3.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	3.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	Nm³/hour	3614	3012	1513
Inlet Pressure	bar	51.9	51.9	52
Outlet Pressure	bar	45.5	45.5	45.5
Pressure Drop	bar	6.4	6.4	6.5
Inlet Temperature	°C	49	49	49
Outlet Temperature	°C	49	49	49
Molecular Weight		8.71	8.71	8.71
Ratio Of Specific Heats		1.41	1.41	1.41
Compressibility		1.02	1.02	1.02

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.1	1.1	1.1
Inlet Spec Volume	m³/kg	0.0604	0.0604	0.0603
Calculated CV	US Units	5.334	4.441	2.207
Valve Opening	%	62.9	56.9	37.2
Gas Recovery Factor		0.681	0.685	0.707
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	20.7	17.2	8.6
Body Outlet Velocity	m/sec	23.6	19.6	9.9
Body Outlet Mach No.		0.0325	0.0271	0.0136
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	23.6	19.6	9.9
Sys. Outlet Mach No.		0.0358	0.0298	0.015
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0158	0.0132	0.0067
Velocity Head	bar	6.376	6.388	6.528
Specific Volume In	m³/kg	0.0604	0.0604	0.0603
Specific Volume Out	m³/kg	0.0689	0.0689	0.0689
Min DP 100% Open		0.9952	0.6907	0.1736
Max Flow 100% Open		9146.3	9155.6	9254.8

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	127.86 lbf	1.125 in	2.12 in	0.52 in²	0.00 in²	0.20 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	61	61	51.9	51.9	52
Outlet Pressure	bar	1	1	45.5	45.5	45.5
Unbalanced Force	lbf	455.6	455.6	177.8	177.8	178.6
Min Air Required	lbf/in²	4.18	4.18	30.16	30.16	30.16
Min Spring Setting	lbf/in²	5.6	4.69	2.7	2.7	2.71
Stem Stress	lbf/in²	3,342.29	3,342.29	1928	1928	1932
Stability	1/16 inch			0.05	0.05	0.05
Mod. Stability	Ratio			3.6	3.6	3.58

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	4	4	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518004	20-FV-2076

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	181.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	8.00 inch / 140	Hydro Test Pressure	5575 psig
Shut Off Pressure	181.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	8.00 inch / 140	Seat Lk @60psi	1149 cc/min
Max/Min Temp	160.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		1.15 ltr/min
Line Fluid	BFW			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 1500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finish	H - CLA 63 u in
V.6	Inlet Rating	ANSI 1500	Outlet Rating	ANSI 1500
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	420 St.St. R01	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 St.St. R01	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 St.St. R01	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 St.St. R01	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	400	Trim Size Ref.	6
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150D-BS0SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Stay Put (Tend to Open)	Actuator Action	Direct
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	4.00 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Closes Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 2)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000
I.6	Air Lock (Qty: 1)	KOSO	Air Lock Model	PA121211

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <12 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	4	4	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518004	20-FV-2076

Valve Design Details

Valve	Series 1200 Globe	Design CV	400
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	181.00 bar
Body Rating	ANSI 1500	Line Fluid	BFW
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	8.00 inch / 140
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	8.00 inch / 140

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	142486	118739	59370
Inlet Pressure	bar	121	121	121
Outlet Pressure	bar	120.5	120.5	120.5
Pressure Drop	bar	0.5	0.5	0.5
Inlet Temperature	°C	132	132	132
Specific Gravity		0.939	0.939	0.939
Vapour Pressure	bar	6.18	6.18	6.18
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.211	0.211	0.211

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	243.2	202.2	100.7
Valve Opening	%	79.3	72.1	49
Pressure Recovery Factor		0.946	0.948	0.954
Cavitation Index		-97.12	-97.53	-98.77
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.4	2	1
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0021	0.0018	0.0009
Trim Exit Velocity	m/sec	8.541	8.563	8.6
Min DP 100% Open		0.182	0.126	0.032
Max Flow 100% Open		234318.2	234918.2	235937.3

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.5	0.5	0.5
Cavitation Index	1	-97.1	-97.5	-98.8

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
1,045.77 lbf	927.71 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	1.23 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Unbalanced Force	lbf	2,311.96	17.79	2144	2144	2144
Min Air Required	lbf/in2	53.98	53.98	52.79	52.79	52.79
Min Spring Setting	lbf/in2	-9.04	7.34	-7.85	-7.85	-7.85
Stem Stress	lbf/in2	2,736.12	866.67	2599	2599	2599
Stability	1/16 inch			0.57	0.57	0.57
Mod. Stability	Ratio			1.44	1.44	1.44
Inlet Pressure	bar	181	181	121	121	121
Outlet Pressure	bar	1	1	120.5	120.5	120.5

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	5	5	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518005	20-HV-2062

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	40.50 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	12.00 inch / 80	Hydro Test Pressure	2250 psig
Shut Off Pressure	40.50 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	12.00 inch / 80	Seat Lk @ 40.5 bar	3.49 cc/min
Max/Min Temp	410.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	PROCESS GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A217 WC6	Body Overlay	NONE
V.3	Body Size (in/cm/out)	12 x 12 x 12 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A217 WC6	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B16
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Stellite
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Pilot Balanced	Plug Seal	Alloy 25
T.7	Design CV	1350	Trim Size Ref.	12
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	6 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-HSASCG3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.21 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Baffles

Plate Number	Baffle ID	Pipe Size	CV	Type
1	MB3	300	1500	Valve Outlet Baffle

Technical Comments

- Max. adjustable mechanical Limit stopper to be provided at given design CV. (CV value shall be confirm by PIDECC).
- STROKING TIME <16 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	5	5	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518005	20-HV-2062

Valve Design Details

Valve	Series 1200 Globe	Design CV	1350
Valve Size (in x cm x out)	12 x 12 x 12 inch	Shut Off Pressure	40.50 bar
Body Rating	ANSI 600	Line Fluid	PROCESS GAS
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	12.00 inch / 80 R01
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	12.00 inch / 80 R01

Process Conditions

Description	UOM	MAX
Gas Flow Rate	kg/hour	50000
Inlet Pressure	bar	6
Outlet Pressure	bar	1.1
Pressure Drop	bar	4.9
Inlet Temperature	°C	360
Outlet Temperature	°C	360
Molecular Weight		18.02
Ratio Of Specific Heats		1.31
Compressibility		0.99

Calculated Values

Description	UOM	MAX
Expansion Factor		1.1
Inlet Spec Volume	m³/kg	0.4819
Calculated CV	US Units	1159.4
Valve Opening	%	81.1
Gas Recovery Factor		0.744
Fluid State		Normal
Predicted Noise Level	dBA	79.8
Body Inlet Velocity	m/sec	95.7
Body Outlet Velocity	m/sec	129.3
Body Outlet Mach No.		0.2069
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	129.3
Sys. Outlet Mach No.		0.2091
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	1.1679
Velocity Head	bar	1.078
Specific Volume In	m³/kg	0.4819
Specific Volume Out	m³/kg	0.6513
Min DP 100% Open		1.151
Max Flow 100% Open		58217.6

Silencer Calculated Values

Description	UOM	MAX
Baffle Plate Number	1	0
Baffle CV	1,500.00	0
Baffle Pipe Size	300	0
Baffle Inlet Pressure	bar	4.439
Baffle Pressure Ratio		4.035
Outlet Spec Volume	m³/kg	2.628
Outlet Velocity	m/sec	623.4
Mach Number		1.01
Baffle Noise	dBA	79.7
Est System Noise	dBA	0
Limiting CV		3020
Back Pressure	bar	4.439

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
501.65 lbf	3050.94 lbf	6 in	3.56 in	110.75 in²	113.10 in²	1.23 in²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	40.5	40.5	6
Outlet Pressure	bar	1	1	1.1
Unbalanced Force	lbf	-1090	-1030	-1020
Min Air Required	lbf/in2	3,192.12	139,292.58	139000

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	6	6	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518006	20-LV-2055

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	181.00 barg	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 160	Hydro Test Pressure	5575 psig
Shut Off Pressure	181.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 160	Seat Lk @60psi	144 cc/min
Max/Min Temp	330.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.14 ltr/min
Line Fluid	BFW			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	4 x 3 x 4 inch	Body Rating	ANSI 1500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finish	H - CLA 63 u in
V.6	Inlet Rating	ANSI 1500	Outlet Rating	ANSI 1500
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	420 ST.ST. R01	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 ST.ST. R01	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 ST.ST. R01	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 ST.ST. R01	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	50	Trim Size Ref.	3
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-JS0SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <20 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	6	6	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518006	20-LV-2055

Valve Design Details

Valve	Series 1200 Globe	Design CV	50
Valve Size (in x cm x out)	4 x 3 x 4 inch	Shut Off Pressure	181.00 bar
Body Rating	ANSI 1500	Line Fluid	BFW
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 160

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	135840	113200	56600
Inlet Pressure	bar	143.3	143.3	143.3
Outlet Pressure	bar	119.57	119.5	119.37
Pressure Drop	bar	23.73	23.8	23.93
Inlet Temperature	°C	291	291	291
Specific Gravity		0.739	0.739	0.739
Vapour Pressure	bar	75.52	75.52	75.52
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.1	0.1	0.1

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	37.87	31.45	15.63
Valve Opening	%	68.7	57.6	31.9
Pressure Recovery Factor		0.95	0.953	0.959
Cavitation Index		-34.38	-34.68	-35.29
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	7.2	6.5	4.2
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.1222	0.102	0.0511
Trim Exit Velocity	m/sec	66.462	66.69	67.093
Min DP 100% Open		13.44	9.333	2.333
Max Flow 100% Open		179363.6	179979.5	181065.1

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	23.7	23.8	23.9
Cavitation Index	1	-34.3	-34.6	-35.3

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
574.39 lbf	456.47 lbf	2.25 in	2.81 in	6.63 in ²	7.07 in ²	0.44 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	182	182	143.3	143.3	143.3
Outlet Pressure	bar	1	1	119.6	119.5	119.4
Unbalanced Force	lbf	1,150.75	6.41	766	765.5	764.7
Min Air Required	lbf/in ²	6.08	9.89	31.36	31.36	31.37
Min Spring Setting	lbf/in ²	7.27	1.94	4.47	4.47	4.46
Stem Stress	lbf/in ²	3,904.93	1,314.66	3034	3033	3031
Stability	1/16 inch			0.07	0.07	0.07
Mod. Stability	Ratio			2.38	2.38	2.39

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	7	7	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518007	20-LV-2056

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	181.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	12.00 inch / 160	Hydro Test Pressure	5575 psig
Shut Off Pressure	181.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	12.00 inch / 160	Seat Lk @60psi	575 cc/min
Max/Min Temp	330.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		0.57 ltr/min
Line Fluid	BFW			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	8 x 6 x 8 inch	Body Rating	ANSI 1500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finish	H - CLA 63 u in
V.6	Inlet Rating	ANSI 1500	Outlet Rating	ANSI 1500
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagarf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	420 ST.ST. R01	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 ST.ST. R01	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 ST.ST. R01	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 ST.ST. R01	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	200	Trim Size Ref.	6
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-HS0SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Stay Put (Tend to Close)	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000
I.6	Air Lock (Qty: 1)	KOSO	Air Lock Model	PA121211

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <30 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	7	7	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518007	20-LV-2056

Valve Design Details

Valve	Series 1200 Globe	Design CV	200
Valve Size (in x cm x out)	8 x 6 x 8 inch	Shut Off Pressure	181.00 bar
Body Rating	ANSI 1500	Line Fluid	BFW
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	12.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	12.00 inch / 160

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	543328	452773	226387
Inlet Pressure	bar	143.3	143.3	143.3
Outlet Pressure	bar	119.57	119.5	119.37
Pressure Drop	bar	23.73	23.8	23.93
Inlet Temperature	°C	291	291	291
Specific Gravity		0.739	0.739	0.739
Vapour Pressure	bar	75.52	75.52	75.52
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.1	0.1	0.1

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	151.9	126	62.54
Valve Opening	%	68.9	57.7	31.9
Pressure Recovery Factor		0.95	0.953	0.959
Cavitation Index		-34.38	-34.68	-35.29
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	7.6	6.6	4.8
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.4902	0.4086	0.2045
Trim Exit Velocity	m/sec	66.286	66.568	67.062
Min DP 100% Open		13.44	9.332	2.333
Max Flow 100% Open		715549	718600.1	723933.2

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	23.7	23.8	23.9
Cavitation Index	1	-34.3	-34.6	-35.3

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
1,045.77 lbf	927.71 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	1.23 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	181	181	143.3	143.3	143.3
Outlet Pressure	bar	1	1	119.6	119.5	119.4
Unbalanced Force	lbf	2,311.96	17.79	2128	2126	2124
Min Air Required	lbf/in2	15.78	23.43	36.39	36.4	36.41
Min Spring Setting	lbf/in2	14.28	3.55	10.58	10.57	10.57
Stem Stress	lbf/in2	2,736.12	866.67	2586	2585	2583
Stability	1/16 inch			0.34	0.34	0.34
Mod. Stability	Ratio			2.33	2.33	2.33

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	8	8	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518008	20-PV-2002

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	70.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	12.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	70.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	12.00 inch / 80	Seat Lk @60psi	776 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		0.78 ltr/min
Line Fluid	NATURAL GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	270	Trim Size Ref.	6
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-J00SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <12 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	8	8	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518008	20-PV-2002

Valve Design Details

Valve	Series 1200 Globe	Design CV	270
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	70.00 bar
Body Rating	ANSI 600	Line Fluid	NATURAL GAS
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	12.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	12.00 inch / 80

Process Conditions

Description	UOM	MIN	NORM	MAX
Gas Flow Rate	Nm³/hour	29054	58109	65082
Inlet Pressure	bar	54.8	54.8	54.8
Outlet Pressure	bar	46.3	46.3	46.3
Pressure Drop	bar	8.5	8.5	8.5
Inlet Temperature	°C	37	37	37
Outlet Temperature	°C	37	37	37
Molecular Weight		17.26	17.26	17.26
Ratio Of Specific Heats		1.28	1.28	1.28
Compressibility		0.92	0.92	0.92

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.1	1.1	1.1
Inlet Spec Volume	m³/kg	0.0251	0.0251	0.0251
Calculated CV	US Units	48.13	96.6	108.3
Valve Opening	%	39.7	59.8	63.4
Gas Recovery Factor		0.761	0.753	0.752
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70	70.7	72.1
Body Inlet Velocity	m/sec	8.5	17.1	19.1
Body Outlet Velocity	m/sec	10.1	20.2	22.6
Body Outlet Mach No.		0.0239	0.0477	0.0535
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	10.1	20.2	22.6
Sys. Outlet Mach No.		0.0231	0.0462	0.0518
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.1413	0.2826	0.3165
Velocity Head	bar	5.707	5.666	5.654
Specific Volume In	m³/kg	0.0251	0.0251	0.0251
Specific Volume Out	m³/kg	0.0297	0.0297	0.0297
Min DP 100% Open		0.2696	1.08	1.355
Max Flow 100% Open		162998.9	162423	162245.1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
646.74 lbf	927.71 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Stem Stress	lbf/in2	928.17	1,838.45	1618	1618	1618
Stability	1/16 inch			0.18	0.18	0.18
Mod. Stability	Ratio			2.81	2.81	2.81
Inlet Pressure	bar	70	70	54.8	54.8	54.8
Outlet Pressure	bar	1	1	46.3	46.3	46.3
Unbalanced Force	lbf	-82.25	797.18	624.1	624.1	624.1
Min Air Required	lbf/in2	10.43	7.5	32.08	32.08	32.08
Min Spring Setting	lbf/in2	4.97	4.81	4.24	4.24	4.24

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
Approved Date
Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	9	9	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518009	20-PV-2029

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	131.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	14.00 inch / 160	Hydro Test Pressure	9375 psig
Shut Off Pressure	131.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	24.00 inch / 160	Seat Lk @60psi	1178 cc/min
Max/Min Temp	540.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		1.18 ltr/min
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A217 WC9	Body Overlay	NONE
V.3	Body Size (in/cm/out)	12 x 10 x 12 inch	Body Rating	ANSI 2500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	CLA 63 u in	Outlet Connection Finish	CLA 63 u in
V.6	Inlet Rating	ANSI 2500	Outlet Rating	ANSI 2500
V.7	Bonnet Material	ASTM A217 WC9	Bonnet Form	Pressure Sealed
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B16
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	2.1/4Cr.1Mo	Guide Finish/Overlay	Gas Nitrided
T.3	Plug Material	2.1/4Cr.1Mo	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	2.1/4Cr.1Mo	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	431 ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	410	Trim Size Ref.	8
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	5 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	1.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	D300B-0SASCF4-B	Actuator Type	Piston Double Acting
A.2	Fail Mode Plug Type	Stay Put	Actuator Action	Direct
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	4.10 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Closes Valve
A.5	Material	Standard	Max. Operating Pressure	6.20 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	None
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.4.5.0.00.1-M5 R01
I.4	Air Set (Qty: 2)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 2)	KOSO	Volume Booster Model	VB1000
I.6	Air Lock (Qty: 1)	KOSO	Air Lock Model	DCV-02

Additional Instrumentation Features:

Baffles

Plate Number	Baffle ID	Pipe Size	CV	Type
1	MB1	400	1900	Silencer Baffle
2	MB1	300	1000	Silencer Baffle

Technical Comments

- BAFFLE (12" + 16") & EXPANDER (12"x16" + 16"x24") WILL BE IN KOSO SCOPE.
- MATING FLANGES SHALL BE IN KOSO SCOPE.
- STROKING TIME <65 SEC.
- Max. adjustable mechanical LIMIT STOPPER TO BE PROVIDED AS GIVEN DESIGN Cv (Cv VALUE SHALL BE CONFIRM BY PIDECE).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	9	9	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518009	20-PV-2029

Valve Design Details

Valve	Series 1200 Globe	Design CV	410
Valve Size (in x cm x out)	12 x 10 x 12 inch	Shut Off Pressure	131.00 bar
Body Rating	ANSI 2500	Line Fluid	STEAM
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	14.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	24.00 inch / 160

Process Conditions

Description	UOM	MAX
Steam Flow Rate	kg/hour	120000
Inlet Pressure	bar	46
Outlet Pressure	bar	2.5
Pressure Drop	bar	43.5
Inlet Temperature	°C	515

Calculated Values

Description	UOM	MAX
Expansion Factor		1.4
Inlet Spec Volume	m³/kg	0.0781
Calculated CV	US Units	321.6
Valve Opening	%	71.8
Gas Recovery Factor		0.787
Fluid State		Normal
Predicted Noise Level	dBA	80.5
Body Inlet Velocity	m/sec	69.2
Body Outlet Velocity	m/sec	176.4
Body Outlet Mach No.		0.1984
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	176.4
Sys. Outlet Mach No.		0.2586
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	10.0743
Velocity Head	bar	1.322
Specific Volume In	m³/kg	0.0781
Specific Volume Out	m³/kg	0.1993
Min DP 100% Open		17.07
Max Flow 100% Open		152975.5
Outlet Temperature		502.19
Inlet Saturated Temp		259.1
Outlet Saturated Temp		207.3
Dryness Fraction		1

Silencer Calculated Values

Description	UOM	MAX
Baffle Plate Number	1	0
Baffle CV	1,900.00	0
Baffle Pipe Size	400	0
Baffle Inlet Pressure	bar	9.493
Baffle Pressure Ratio		3.797
Outlet Spec Volume	m³/kg	1.467
Outlet Velocity	m/sec	587.3
Mach Number		0.86
Baffle Noise	dBA	80.1
Est System Noise	dBA	0
Limiting CV		3645
Baffle Plate Number	2	0
Baffle CV	1,000.00	0
Baffle Pipe Size	300	0
Baffle Inlet Pressure	bar	18.06
Baffle Pressure Ratio		1.903
Outlet Spec Volume	m³/kg	0.388
Outlet Velocity	m/sec	248.6
Mach Number		0.36
Baffle Noise	dBA	67.8
Est System Noise	dBA	0
Limiting CV		955.6

Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	9	9	0	1			

Back Pressure bar 18.06

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area				Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
1,248.40 lbf	1,241.87 lbf	5 in	5.75 in	49.09 in ²	50.27 in ²	2.41 in ²						

Description	UOM	Closed	Cracked	MAX								
Inlet Pressure	bar	131	131	46								
Outlet Pressure	bar	1	1	2.5								
Unbalanced Force	lbf	2,355.28	4,568.83	1604								
Min Air Required	lbf/in ²	16.15	12.01	9.51								
Stem Stress	lbf/in ²	1,498.24	2,418.52	1186								
Stability	1/16 inch			0.38								
Mod. Stability	Ratio			0								

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	10	10	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518010	20-PV-2046A

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	51.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	3.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	51.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	8.00 inch / 80	Seat Lk @60psi	60 cc/min
Max/Min Temp	100.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.06 ltr/min
Line Fluid	FUEL GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	21	Trim Size Ref.	2
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <8 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	10	10	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518010	20-PV-2046A

Valve Design Details

Valve	Series 1200 Globe	Design CV	21
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	51.00 bar
Body Rating	ANSI 600	Line Fluid	FUEL GAS
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	3.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	8.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	Nm³/hour	8843	7369	3685
Inlet Pressure	bar	44.6	44.9	45.3
Outlet Pressure	bar	6.41	6.41	6.41
Pressure Drop	bar	38.19	38.49	38.89
Inlet Temperature	°C	50	50	50
Outlet Temperature	°C	50	50	50
Molecular Weight		17.26	17.26	17.26
Ratio Of Specific Heats		1.24	1.24	1.24
Compressibility		0.95	0.95	0.95

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.5	1.5	1.5
Inlet Spec Volume	m³/kg	0.0331	0.0329	0.0326
Calculated CV	US Units	11.91	9.81	4.854
Valve Opening	%	69.8	62.3	41.4
Gas Recovery Factor		0.787	0.795	0.798
Fluid State		Choked	Choked	Choked
Predicted Noise Level	dBA	74.1	72.2	70.4
Body Inlet Velocity	m/sec	13.7	11.4	5.6
Body Outlet Velocity	m/sec	95.6	79.7	39.9
Body Outlet Mach No.		0.1976	0.1646	0.0823
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	95.6	79.7	39.9
Sys. Outlet Mach No.		0.2178	0.1815	0.0907
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.4522	0.3779	0.1897
Velocity Head	bar	3.594	3.678	3.757
Specific Volume In	m³/kg	0.0331	0.0329	0.0326
Specific Volume Out	m³/kg	0.2306	0.2306	0.2306
Min DP 100% Open		10.64	7.34	1.819
Max Flow 100% Open		15593.4	15775	15941.7

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
315.59 lbf	299.39 lbf	2.25 in	2.81 in	2.85 in²	3.14 in²	0.31 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	51	51	44.6	44.9	45.3
Outlet Pressure	bar	1	1	6.41	6.41	6.41
Unbalanced Force	lbf	17.81	226.88	198.4	199.7	201.5
Min Air Required	lbf/in2	10.13	8.63	32.84	32.83	32.81
Min Spring Setting	lbf/in2	4.52	3.87	3.67	3.68	3.69
Stem Stress	lbf/in2	1,086.70	1,768.16	1675	1680	1686
Stability	1/16 inch			0.09	0.09	0.09
Mod. Stability	Ratio			4.05	4.03	3.99

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	11	11	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518011	20-PV-2046B

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	51.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	51.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	18.00 inch / 80	Seat Lk @60psi	216 cc/min
Max/Min Temp	100.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		0.22 ltr/min
Line Fluid	FUEL GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	75	Trim Size Ref.	4
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-J00SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- Stroking time shall be 12 sec.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	11	11	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518011	20-PV-2046B

Valve Design Details

Valve	Series 1200 Globe	Design CV	75
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	51.00 bar
Body Rating	ANSI 600	Line Fluid	FUEL GAS
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	18.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	Nm³/hour	26527	22014	11053
Inlet Pressure	bar	45.2	45.2	45.4
Outlet Pressure	bar	6.41	6.41	6
Pressure Drop	bar	38.79	38.79	39.4
Inlet Temperature	°C	50	50	50
Outlet Temperature	°C	50	50	50
Molecular Weight		17.26	17.26	17.26
Ratio Of Specific Heats		1.24	1.24	1.24
Compressibility		0.95	0.95	0.95

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.5	1.5	1.5
Inlet Spec Volume	m³/kg	0.0327	0.0327	0.0326
Calculated CV	US Units	35.1	29.07	14.49
Valve Opening	%	62.3	56.3	36.6
Gas Recovery Factor		0.795	0.798	0.803
Fluid State		Choked	Choked	Choked
Predicted Noise Level	dBA	83.3	81.9	78.8
Body Inlet Velocity	m/sec	10.2	8.4	4.2
Body Outlet Velocity	m/sec	71.7	59.5	31.9
Body Outlet Mach No.		0.1686	0.1399	0.075
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	71.7	59.5	31.9
Sys. Outlet Mach No.		0.1633	0.1355	0.0727
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	1.3641	1.1321	0.5852
Velocity Head	bar	3.724	3.739	3.984
Specific Volume In	m³/kg	0.0327	0.0327	0.0326
Specific Volume Out	m³/kg	0.2306	0.2306	0.2463
Min DP 100% Open		7.408	5.102	1.28
Max Flow 100% Open		56687.9	56803.2	57228

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
530.85 lbf	613.55 lbf	3.5 in	3.56 in	11.98 in²	12.57 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	51	51	45.2	45.2	45.4
Outlet Pressure	bar	1	1	6.41	6.41	6
Unbalanced Force	lbf	157.63	580.8	514.8	514.8	517
Min Air Required	lbf/in2	10.67	7.64	32.11	32.11	32.1
Min Spring Setting	lbf/in2	9.3	7.94	7.47	7.47	7.48
Stem Stress	lbf/in2	876.6	1,415.39	1331	1331	1334
Stability	1/16 inch			0.37	0.37	0.37
Mod. Stability	Ratio			1.14	1.14	1.14

CONTROL VALVE DATA SHEET




PROJECT	HENGAM FERTILIZER PROJECT		DATA SHEET	1	OF	1
CUSTOMER	PIDEC		SO No.	5200000518		
P.O.	1208-00-IN-POR-605		TAG #	20-PV-2076A		
INQUIRY	Email	REV	DATE	19-Jun-18	ITEM #	12
PROPOSAL	QNE002377	REV	DATE	20-Jul-18	QTY	1
SERVICE	PG Vent to Flare		Sl. No.	SN520000518012		

SERVICE CONDITIONS	Fluid	Gas - Process Gas		Crit Press, Pc	barA	Crit Temp, Tc	deg C	
		Units	Max Flow					
	Gas Volume Flow Rate	Nm3/h	206031					
	Inlet Pressure	barA	33.4					
	Outlet Pressure	barA	1.52					
	Inlet Temperature	deg C	227					
	Molecular Weight		15.82					
	Ratio of Specific Heat		1.32					
	Compressibility Factor		0.99					
	Flow Coefficient	Cv	397.61					
	Travel	%	86					
	Predicted SPL	dBA	85					
Number of Stages Needed		6						
LINE		INLET	OUTLET	51	Type	Pneumatic Double-Acting Piston		
	Pipe Size / Sch	in. 16 / Sch 40	18 / Sch 40	52	Mfr & Model	KOSO &	6345LA	
	Pipe Material	ASTM A335 GR.P11	ASTM A335 GR.P11	53	Size	43.5 cm	Eff Area 1490 cm2	
	Pipe Line Insulation	N/A		54	Fail Pos / Pwr	Closed	/ Air Tank (ASME)	
	Valve Size	in. 16	18	55	Supply Type	Pneumatic		
	Design Press	barA 40.5	40.5	56	Customer Supply Max / Min	barG 8.7	/ 4.7	
	Max Design T	deg C 300	300	57	Actuator Orientation	Vertical Up		
	Rating(s)	ASME 300	300	58	Handwheel Type	Top mounted-Side access		
	Connections	RF Flange	RF Flange	59	Shut-Off Pressure	bar 40.5		
	End Extension	N/A	N/A	60	Input Signal	Foundation Fieldbus		
	End Material	N/A	N/A	61	Type	Electro-Pneumatic		
	Body Type	Globe		62	Mfr & Model	ABB &	V18347.10.4.1.4.5.0.00.1-M5	
Mfr & Model	KOSO	&	530D	63	Increasing Signal	To Open the Valve		
Body/Bnt Mat'l	A217-WC6	/	A217-WC6	64	Gauges	Yes Bypass No		
Flow Direction	Flow to Open (FTO)		65	Cam Characteristics	N/A			
Type of Bonnet	Bolted-Standard		66	Aluminium Enclosure,Exia, Elect conn. M20x1.5mm	R01			
Lube & Iso Valve	No	Lube	No	67				
Pkg Type / Mat'l	Standard	/	Grafoil	68				
Type	VECTOR Multi-Path, Multi-Stage		69					
Number of Pressure Reducing Stages	12 to 20		70					
Nominal Size / Travel	in. 10	/	250mm	71				
Characteristic	Mod. Linear		72					
Balanced/Unbalanced	Balanced		73	Mfr & Model	KOSO &	PRS 815-4-100		
Rated Cv	492	FL	1 XT 1	74	Set Pressure	barG 6		
Plug / Ball /Disk Mat'l	316SS,Stellited		75	Filter	Yes	Gauges Yes		
Seat Material	316SS,Stellited		76	Aluminium MOC, Manual Drain,1/2" NPT	R01			
Cage / Stack / Guide Mat'l	316SS		77	Hydro Press.	barG	As per ASME Standard		
Stem Material	316SS		78	Seat Leakage	ANSI/FCI Class V			
			79	Open Time(s)	<18 sec modulating			
			80	Close Time(s)	<18 sec modulating			
			81					
VALVE BODY / BONNET				Rev	Date	Description	Orig	App
	Elect. Cert.	IP-65		0	15-May-18	Released		
	Position Feedback	Yes Built-In Positioner		1	22-May-18	Line 16,21,22 updated		
	I-P Transducer	Yes Built-In Positioner		2	22-Jun-18	Line 72 updated		
	Solenoid Valve(s)	N/A		3	29-Jun-18	Line 62, 66 updated		
	KOSO Standard Painting is applicable.			4	20-Jul-18	Line 14 updated		
	KOSO Standard ITP is applicable.							
	316SS Tubing & Fittings-Swagelok, Tubing standard -Imperial,Tubing size 1/2" NPT.							
	2 Qty Volume Boosters - KKI Series 1000, 1/4" AI MOC							
	Snap Acting Relay-KOSO DCV-01, 1/4" AI MOC							
	Check Valve-KOSO Standard 1/2", AI MOC							
	60L Volume Tank in Carbon Steel & sized for 2 full strokes							
Mechanical adjustable Limit stopper to be provided at given Design Cv (Cv value shall be confirm by PIDEc).								
Commissioning Spares - 1set of Complete Trim softgoods kit per Valve is included & 2 year spares as per Project's Attachment-04								

R01

R01

R01

	PROJECT	HENGAM FERTILIZER PROJE	UNIT	DATASHEET	OF	
	CUSTOMER	PIDEC		SO No.	5200000518	
	P.O.	1208-00-IN-POR-605		TAG #	20-PV-2076A	
	INQ / REV	Email	DATE	20-Jul-18	ITEM #	12
	PROP / REV	QNE002377 Rev 4	DATE	20-Jul-18	QTY	1
	SERVICE	PG Vent to Flare			DRAWING	

OPTION DESCRIPTION	OPTIONS
Application	Other
Type of Gas	Custom Gas
Flow Rate Type	Volume Flow Rate
Method of Specifying Density	Calculate from MW
Compressibility Option	Direct Input
Valve Type	530D/540D, Custom Vector

Body Type	Globe		
Flow Direction	Flow to Open (UTP)		
Flow Distributor Design	None		
Pipe Correction Factor Option	Calculate Correction		
PIPE SIZE, SCHD & DIMS	UNITS	INLET	OUTLET
Method of Specifying Pipe		NPS & Schd	NPS & Schd
Nominal Pipe Sizes		16in (400mm)	18in (450mm)
Pipe Schedules		40	40

Nominal Valve Sizes		16in (400mm)	18in (450mm)
Valve ASME Pressure Rating		300	300
VALVE SIZING TERMS	UNITS	SUG'D	ACTUAL
Relative Capacity	Cd	Kv/mm2	0.0107
Terminal Press Drop Ratio	Xt		1
Liq Press Recovery Factor	FL		1
Number of Flow Passages	Np	Calc'd	Calc'd
Over Capacity Margin	OCM		0%

OPERATING CONDITIONS	UNITS	CONDITION VALUES	
Condition Set			
Condition Label		MAX. FLOW	
Gas Volume Flow Rate	Nm3/h	206031	
Inlet Pressure	barA	33.4	
Outlet Pressure	barA	1.52	
Inlet Temperature	deg C	227	
Molecular Weight		15.82	
Compressibility Factor		0.99	
Ratio of Specific Heats		1.32	
Req'd Valve Flow Coefficient	Cv	397.61	

VALVE TRIM	UNITS	CONDITION VALUES	
Number of Stages, Suggested		6	
Number of Stages, Used		20	
Fluid Kinetic Energy Exiting Stack	bar	1.38	
Trim Sound Pressure Level, (Bare Pipe)	dBa	85.0	

To meet KE, not noise

PLUG SIZE	UNITS	SUG'D	ACTUAL
Minimum Plug Size, Energy	in.	4.8	
Minimum Plug Size, Cv	in.	5.8	
Actual Plug Size	in.		10

Assumes BF = 21

DIAMETER INTO OUTLET PIPE	UNITS	SUG'D	ACTUAL
Minimum Valve Outlet Run ID	in.	17	17

VALVE OUTLET/FLOW DISTRIB. DETAILS	UNITS	SUG'D	ACTUAL
Entrance Dia to Outlet Pipe	in.	17	17.00
No. of Holes in FD Outlet		1	1

Just Upstream of Final Piping

VALVE OUTLET TO OUTLET PIPE DETAILS	UNITS	CONDITION VALUES	
Gas Velocity, Valve Outlet	m/s	472.26	
Mach Number, Valve Outlet		0.81	
Gas Kinetic Energy, Valve Outlet	bar	0.65	
Gas Velocity, Outlet Pipe	m/s	457.9	
Mach Number, Outlet Pipe		0.78	
Gas Kinetic Energy, Outlet Pipe	bar	0.61	

ADDITIONAL NOISE ASSUMPTIONS	UNITS	SUG'D	ACTUAL
Lagging Credit	dBa	0	0
Credit for Spraywater Injection	dBa	0	0

NOISE RESULTS	UNITS	CONDITION VALUES	
Overall System Noise	dBa	85.0	

+0/-5 dBA

CONTROL VALVE DATA SHEET



PROJECT	HENGAM FERTILIZER PROJECT	DATA SHEET	1	OF	1
CUSTOMER	PIDEC	SO No.	5200000518		
P.O.	1208-00-IN-POR-605	TAG #	20-PV-2076B		
INQUIRY	Email	REV	19-Jun-18	DATE	13
PROPOSAL	QNE002377	REV	4	DATE	20-Jul-18
SERVICE	PG Vent to Flare	QTY	1		
		Sl. No.	SN520000518013		

1		Fluid	Gas - Process Gas		Crit Press, Pc	barA	Crit Temp, Tc	deg C		
			Units	Max Flow						
2		Gas Volume Flow Rate	Nm3/h	206031						
3		Inlet Pressure	barA	33.1						
4		Outlet Pressure	barA	1.59						
5		Inlet Temperature	deg C	227						
6		Molecular Weight		15.82						
7		Ratio of Specific Heat		1.32						
8		Compressibility Factor		0.99						
9		Flow Coefficient	Cv	401.21						
10		Travel	%	87						
11		Predicted SPL	dBA	85						
12		Number of Stages Needed		6						
13	SERVICE CONDITIONS	LINE		INLET	OUTLET	51	ACTUATOR			
14		Pipe Size / Sch	in.	16 / Sch 40	18 / Sch 40	52	Type	Pneumatic Double-Acting Piston		
15		Pipe Material		ASTM A335 GR.P11	ASTM A335 GR.P11	53	Mfr & Model	KOSO &	6345LA	
16		Pipe Line Insulation		N/A		54	Size	43.5 cm	Eff Area	1490 cm2
17		Valve Size	in.	16	18	55	Fail Pos / Pwr	Closed	/ Air Tank (ASME)	
18		Design Press	barA	40.5	40.5	56	Supply Type	Pneumatic		
19		Max Design T	deg C	300	300	57	Customer Supply Max / Min	barG	8.7	/ 4.7
20		Rating(s)	ASME	300	300	58	Actuator Orientation	Vertical Up		
21		Connections		RF Flange	RF Flange	59	Handwheel Type	Top mounted-Side access		
22		End Extension		N/A	N/A	60	Shut-Off Pressure	bar	40.5	
23		End Material		N/A	N/A	61	Input Signal	Foundation Fieldbus		
24		Body Type		Globe		62	Type	Electro-Pneumatic		
25	Mfr & Model		KOSO	&	63	Mfr & Model	ABB &	V18347.10.4.1.4.5.0.00.1-M5		
26	Body/Bnt Mat'l		A217-WC6	/	64	Increasing Signal	To Open the Valve			
27	Flow Direction		Flow to Open (FTO)		65	Gauges	Yes	Bypass	No	
28	Type of Bonnet		Bolted-Standard		66	Cam Characteristics	N/A			
29	Lube & Iso Valve	No	Lube	No	67	Aluminium Enclosure, Exia, Elect conn. M20x1.5mm				
30	Pkg Type / Mat'l		Standard	/	68					
31	Type		VECTOR Multi-Path, Multi-Stage		69					
32	Number of Pressure Reducing Stages		12 to 20		70					
33	Nominal Size / Travel	in.	10	/	71					
34	Characteristic		Mod. Linear		72					
35	Balanced/Unbalanced		Balanced		73	Mfr & Model	KOSO &	PRS 815-4-100		
36	Rated Cv	493	FL	1	74	Set Pressure	barG	6		
37	Plug / Ball / Disk Mat'l		316SS, Stellite		75	Filter	Yes	Gauges	Yes	
38	Seat Material		316SS, Stellite		76		Aluminium MOC, Manual Drain, 1/2" NPT			
39	Cage / Stack / Guide Mat'l		316SS		77	Hydro Press.	barG	As per ASME Standard		
40	Stem Material		316SS		78	Seat Leakage	ANSI/FCI Class V			
41	Elect. Cert.		IP-65		79	Open Time(s)	<18 sec modulating			
42	Position Feedback		Yes Built-In Positioner		80	Close Time(s)	<18 sec modulating			
43	I-P Transducer		Yes Built-In Positioner		81					
44	Solenoid Valve(s)		N/A		Rev	Date	Description	Orig	App	
45	KOSO Standard Painting is applicable.				0	15-May-18	Released		<i>sewanya</i>	
46	KOSO Standard ITP is applicable.				1	22-May-18	Line 16,21,22 updated		<i>sewanya</i>	
47	316SS Tubing & Fittings-Swagelok, Tubing standard -Imperial, Tubing size 1/2" NPT.				2	22-Jun-18	Line 72 updated		<i>sewanya</i>	
48	2 Qty Volume Boosters - KKI Series 1000, 1/4" AI MOC				3	29-Jun-18	Line 62, 66 updated		<i>sewanya</i>	
49	Snap Acting Relay-KOSO DCV-01, 1/4" AI MOC				4	20-Jul-18	Line 14 updated		<i>sewanya</i>	
50	Check Valve-KOSO Standard 1/2", AI MOC									
50A	60L Volume Tank in Carbon Steel & sized for 2 full strokes									
50B	Mechanical adjustable Limit stopper to be provided at given Design Cv (Cv value shall be confirm by PIDECC).									
50C	Commissioning Spares - 1set of Complete Trim softgoods kit per Valve is included & 2 year spares as per Project's Attachment-04									

R01

R01

R01

KOSO	PROJECT	HENGAM FERTILIZER PROJE	UNIT	DATASHEET	OF	
	CUSTOMER	PIDEC		SO No.	5200000518	
	P.O.	1208-00-IN-POR-605		TAG #	20-PV-2076B	
	INQ / REV	Email	DATE	20-Jul-18	ITEM #	13
	PROP / REV	QNE002377 Rev 4	DATE	20-Jul-18	QTY	1
	SERVICE	PG Vent to Flare			DRAWING	

OPTION DESCRIPTION	OPTIONS
Application	Other
Type of Gas	Custom Gas
Flow Rate Type	Volume Flow Rate
Method of Specifying Density	Calculate from MW
Compressibility Option	Direct Input
Valve Type	530D/540D, Custom Vector

Body Type	Globe		
Flow Direction	Flow to Open (UTP)		
Flow Distributor Design	None		
Pipe Correction Factor Option	Calculate Correction		
PIPE SIZE, SCHD & DIMS	UNITS	INLET	OUTLET
Method of Specifying Pipe		NPS & Schd	NPS & Schd
Nominal Pipe Sizes		16in (400mm)	18in (450mm)
Pipe Schedules		40	40

Nominal Valve Sizes		16in (400mm)	18in (450mm)
Valve ASME Pressure Rating		300	300
VALVE SIZING TERMS	UNITS	SUG'D	ACTUAL
Relative Capacity	Cd	Kv/mm2	0.0107
Terminal Press Drop Ratio	Xt		1
Liq Press Recovery Factor	FL		1
Number of Flow Passages	Np	Calc'd	Calc'd
Over Capacity Margin	OCM		0%

OPERATING CONDITIONS	UNITS	CONDITION VALUES	
Condition Set			
Condition Label		MAX. FLOW	
Gas Volume Flow Rate	Nm3/h	206031	
Inlet Pressure	barA	33.1	
Outlet Pressure	barA	1.59	
Inlet Temperature	deg C	227	
Molecular Weight		15.82	
Compressibility Factor		0.99	
Ratio of Specific Heats		1.32	
Req'd Valve Flow Coefficient	Cv	401.21	

VALVE TRIM	UNITS	CONDITION VALUES	
Number of Stages, Suggested		6	
Number of Stages, Used		20	
Fluid Kinetic Energy Exiting Stack	bar	1.37	
Trim Sound Pressure Level, (Bare Pipe)	dBa	85.0	

To meet KE, not noise

PLUG SIZE	UNITS	SUG'D	ACTUAL
Minimum Plug Size, Energy	in.	4.8	
Minimum Plug Size, Cv	in.	5.9	
Actual Plug Size	in.		10

Assumes BF = 21

DIAMETER INTO OUTLET PIPE	UNITS	SUG'D	ACTUAL
Minimum Valve Outlet Run ID	in.	17	17

VALVE OUTLET/FLOW DISTRIB. DETAILS	UNITS	SUG'D	ACTUAL
Entrance Dia to Outlet Pipe	in.	17	17.00
No. of Holes in FD Outlet		1	1

Just Upstream of Final Piping

VALVE OUTLET TO OUTLET PIPE DETAILS	UNITS	CONDITION VALUES	
Gas Velocity, Valve Outlet	m/s	451.47	
Mach Number, Valve Outlet		0.77	
Gas Kinetic Energy, Valve Outlet	bar	0.62	

Gas Velocity, Outlet Pipe	m/s	437.8	
Mach Number, Outlet Pipe		0.75	
Gas Kinetic Energy, Outlet Pipe	bar	0.59	

ADDITIONAL NOISE ASSUMPTIONS	UNITS	SUG'D	ACTUAL
Lagging Credit	dBa	0	0
Credit for Spraywater Injection	dBa	0	0

NOISE RESULTS	UNITS	CONDITION VALUES	
Overall System Noise	dBa	85.0	

+0/-5 dBA

CONTROL VALVE DATASHEET



PROJECT	HENGAM FERTALIZER PROJECT	UNIT	DATA SHEET	1	OF	1
CUSTOMER	Hengam Petrochemical	SPEC				
P.O.	TBA	TAG # 20-HV-2541				
INQUIRY	Email	REV	DATE	25-Jun-17	ITEM #	16
PROPOSAL	QNE002377	REV	DATE	5-Jul-17	QTY	1
SERVICE	BLOW DOWN VALVE OF 20-V-201					DWG

1		Fluid	Water	Crit Press, Pc	barA	Crit Temp, Tc	deg C
2			Units	Cond.1	Cond. 2		
3	SERVICE CONDITIONS	Mass Flow Rate	kg/h	9100	4528		
4		Inlet Pressure	barA	119.7	119.7		
5		Outlet Pressure	barA	5.5	5.5		
6		Inlet Temperature	deg C	324	324		
7		Inlet Density	kg/m3	685	685		
8		Viscosity	cP	0.1	0.1		
9		Vapor Pressure	barA	118	118		
10							
11							
12							

13	LINE	Pipe Size / Sch	in.	2" / Sch 160	3" / Sch 160	51	ACTUATOR	Type	
14		Pipe Material				52		Mfr & Model	&
15	Pipe Line Insulation			N/A		53		Size	Spring Range
16	Valve Size	in.	1"	1"	54	Fail Pos / Pwr		N/A / N/A	
17	Design Press	barG	132.0	132.0	55	Supply Type		N/A	
18	Design Temp	deg C	331.0	331.0	56	Supply Max / Min		barG /	
19	Rating(s)	ASME	1500	1500	57	Actuator Orientation			
20	Connections		RTJ Flange	RTJ Flange	58	Handwheel Type		Rotating lever	
21	End Extension				59	Shut-Off Pressure		bar	
22	End Material				60	Input Signal			
23	Body Type	Globe - Split body			61	POSITIONER	Type		
24	Mfr & Model	BA 210			62		Mfr & Model	&	
25	Body/Bnt Mat'l	1,0460	/	1,0460	63		Increasing Signal	N/A	
26	Flow Direction	Flow to Open (FTO)			64		Gauges	N/A Bypass No	
27	Type of Bonnet	Bolted-Standard			65		Cam Characteristic		
28	Lube & Iso Valve	Lube			66				
29	Pkg Type / Mat'l		/	Graphite	67	SWITCHES	Type	N/A Quantity	
30	Type				68		Mfr & Model	&	
31	Number of Pressure Reducing Stages				69		Rating / Contact	/ N/A	
32	Nominal Size / Travel	mm	/	mm	70	Actuation Points	N/A / N/A		
33	Characteristic	Modified Linear			71				
34	Balanced/Unbalanced	Unbalanced			72	AIRSET	Mfr & Model	&	
35	Rated C _v	F _L		X _T	73		Set Pressure	barG	
36	Plug / Ball / Disk Mat'l	X8 Cr Ti 17 (1,4510)			74		Filter	N/A Gauge N/A	
37	Seat Material	G-X-22 Cr Mo V12 1			75				
38	Cage / Stack / Guide Mat'l				76	TESTS	Hydro Press.	barG	
39	Stem Material	G-X-22 Cr Mo V12 1			77		Seat Leakage	Class IV	
40					78		Open Time(s)	≤	
41	Elect. Cert.	N/A			79	Close Time(s)	≤		
42	Position Feedback	N/A			80				
43	I-P Transducer	N/A			81				

44	SPECIALS / ACCESSORIES	Solenoid Valve(s)	N/A		Rev	Date	Description	Orig	App
45									
46		Refer to BA 210 documentation							
47									
48									
49									
50									

CONTROL VALVE DATASHEET



PROJECT	HENGAM FERTALIZER PROJECT		UNIT	DATA SHEET	1	OF	1
CUSTOMER	Hengam Petrochemical			SPEC			
P.O.	TBA			TAG #	20-HV-2542		
INQUIRY	Email	REV	DATE	25-Jun-17	ITEM #	17	
PROPOSAL	QNE002377	REV	DATE	5-Jul-17	QTY	1	
SERVICE	INTERMITTENT BLOW DOWN VALVE OF			DWG			

1	SERVICE CONDITIONS	Fluid Water		Crit Press, Pc	barA	Crit Temp, Tc	deg C		
2			Units	Cond.1					
3			Mass Flow Rate	kg/h	4528				
4			Inlet Pressure	barA	119.9				
5			Outlet Pressure	barA	1.7				
6			Inlet Temperature	deg C	324				
7			Inlet Density	kg/m3	658				
8			Viscosity	cP	0.1				
9			Vapor Pressure	barA	118				
10									
11									
12									
13	LINE		INLET	OUTLET	51	ACTUATOR	Type		
14		Pipe Size / Sch	in.	2" / Sch 160	3" / Sch 160		52	Mfr & Model	&
15	Pipe Material				53		Size	Spring Range	
16	Pipe Line Insulation		N/A		54		Fail Pos / Pwr	N/A / N/A	
17	VALVE BODY / BONNET	Valve Size	in.	1"	1"		55	Supply Type	N/A
18		Design Press	barG	132.0	132.0		56	Supply Max / Min	barG / 5.0
19		Design Temp	deg C	331.0	331.0		57	Actuator Orientation	
20		Rating(s)	ASME	1500	1500		58	Handwheel Type	HAND LEVER with Spring
21		Connections		RTJ Flange	RTJ Flange		59	Shut-Off Pressure	bar
22		End Extension					60	Input Signal	
23		End Material					61	POSITIONER	Type
24		Body Type	Globe				62		Mfr & Model
25		Mfr & Model			PA 110	63	Increasing Signal		N/A
26		Body/Bnt Mat'l	13 CR Mo 4-5		/	64	Gauges		N/A Bypass No
27		Flow Direction	Flow to Close (FTC)			65	Cam Characteristic		
28		Type of Bonnet	Bolted-Standard			66			
29	Lube & Iso Valve	Lube			67	SWITCHES	Type	N/A	Quantity
30	Pkg Type / Mat'l			Graphite	68		Mfr & Model	&	
31	Type				69		Rating / Contact	/	N/A
32	Number of Pressure Reducing Stages				70	Actuation Points	N/A	/	N/A
33	Nominal Size / Travel	mm	/	mm	71				
34	Characteristic	Quick Opening			72	AIRSET	Mfr & Model	&	
35	Balanced/Unbalanced	Unbalanced			73		Set Pressure	barG	
36	Rated C _v	F _L	X _T		74		Filter	N/A	Gauge
37	Plug / Ball / Disk Mat'l	X6Cr Ni Mo Ti 17-12-2			75	TESTS	Hydro Press.	barG	
38	Seat Material	X6Cr Ni Mo Ti 17-12-2			76		Seat Leakage	Class IV	
39	Cage / Stack / Guide Mat'l				77		Open Time(s)	≤	
40	Stem Material	X6Cr Ni Mo Ti 17-12-2			78		Close Time(s)	≤	
41					79				
42	SPECIALS / ACCESSORIES	Elect. Cert.	N/A		80				
43		Position Feedback	N/A		81				
44		I-P Transducer	N/A		Rev	Date	Description	Orig	App
45		Solenoid Valve(s)	N/A						
46		Refer to PA 110 documentation							
47									
48									
49									
50									

CONTROL VALVE DATASHEET



PROJECT	HENGAM FERTALIZER PROJECT	UNIT	DATA SHEET	1	OF	1
CUSTOMER	Hengam Petrochemical	SPEC				
P.O.	TBA	TAG #				
INQUIRY		Email	REV	DATE	25-Jun-17	ITEM #
PROPOSAL		QNE002377	REV	DATE	5-Jul-17	QTY
SERVICE		INTERMITTENT BLOW DOWN FROM 20-E-210				DWG

1		Fluid	Water	Crit Press, Pc	barA	Crit Temp, Tc	deg C
2			Units	Cond.1			
3	SERVICE CONDITIONS	Mass Flow Rate	kg/h	2500			
4		Inlet Pressure	barA	119.9			
5		Outlet Pressure	barA	1.7			
6		Inlet Temperature	deg C	324			
7		Inlet Density	kg/m3	685			
8		Viscosity	cP	0.1			
9		Vapor Pressure	barA	118			
10							
11							
12							
13	LINE		INLET	OUTLET	51	Type	
14		Pipe Size / Sch	in. 2" / Sch 160	3" / Sch 160	52		
15		Pipe Material			53	Mfr & Model	
16		Pipe Line Insulation	N/A		54	Size	
17	VALVE BODY / BONNET	Valve Size	in. 1"	1"	55	Spring Range	
18		Design Press	barG 132.0	132.0	56	Fail Pos / Pwr	
19		Design Temp	deg C 331.0	331.0	57	N/A / N/A	
20		Rating(s)	ASME 1500	1500	58	Supply Type	
21		Connections	RTJ Flange	RTJ Flange	59	N/A	
22		End Extension			60	Supply Max / Min	
23		End Material			61	barG / 5.0	
24		Body Type	Globe		62	Actuator Orientation	
25		Mfr & Model	PA 110		63	Handwheel Type	
26		Body/Bnt Mat'l	13 CR Mo 4-5 /		64	HAND LEVER with Spring	
27	Flow Direction	Flow to Close (FTC)		65	Shut-Off Pressure		
28	Type of Bonnet	Bolted-Standard		66	bar		
29	Lube & Iso Valve	Lube		67	Input Signal		
30	Pkg Type / Mat'l	/ Graphite		68	Type		
31	VALVE TRIM	Type			69	Mfr & Model	
32		Number of Pressure Reducing Stages			70	&	
33		Nominal Size / Travel	mm / mm		71	Increasing Signal	
34		Characteristic	Quick Opening		72	N/A	
35		Balanced/Unbalanced	Unbalanced		73	Gauges	
36		Rated C _v	F _L	X _T	74	N/A Bypass No	
37		Plug / Ball / Disk Mat'l	X6Cr Ni Mo Ti 17-12-2		75	Cam Characteristic	
38		Seat Material	X6Cr Ni Mo Ti 17-12-2		76		
39		Cage / Stack / Guide Mat'l			77	Type	
40		Stem Material	X6Cr Ni Mo Ti 17-12-2		78	N/A Quantity	
41	SPECIALS / ACCESSORIES	Elect. Cert.	N/A		79	Mfr & Model	
42		Position Feedback	N/A		80	&	
43		I-P Transducer	N/A		81	Rating / Contact	
44		Solenoid Valve(s)	N/A		82	Actuation Points	
45					83	N/A / N/A	
46		Refer to PA 110 documentation			84	Mfr & Model	
47					85	&	
48					86	Set Pressure	
49					87	barG	
50					88	Filter	
					89	N/A Gauge N/A	
					90	Hydro Press.	
					91	barG	
					92	Seat Leakage	
					93	Class IV	
					94	Open Time(s)	
					95	≤	
					96	Close Time(s)	
					97	≤	
					98		
					99		
					100		

Rev	Date	Description	Orig	App

CONTROL VALVE DATASHEET



PROJECT	HENGAM FERTALIZER PROJECT	UNIT	DATA SHEET	1	OF	1
CUSTOMER	Hengam Petrochemical	SPEC				
P.O.	TBA	TAG #				
INQUIRY		Email	REV	DATE	25-Jun-17	ITEM #
PROPOSAL		QNE002377	REV	DATE	5-Jul-17	QTY
SERVICE		INTERMITTENT BLOW DOWN FOR 50-E-501				DWG

1		Fluid	Water	Crit Press, Pc	barA	Crit Temp, Tc	deg C
2			Units	Cond.1			
3	SERVICE CONDITIONS	Mass Flow Rate	kg/h	2000			
4		Inlet Pressure	barA	121			
5		Outlet Pressure	barA	1.7			
6		Inlet Temperature	deg C	324			
7		Inlet Density	kg/m3	657			
8		Viscosity	cP	0.082			
9		Vapor Pressure	barA	119			
10							
11							
12							
13	LINE		INLET	OUTLET	51		
14		Pipe Size / Sch	in. 2" / Sch 160	3" / Sch 160	52		
15		Pipe Material			53		
16		Pipe Line Insulation	N/A		54		
17	VALVE BODY / BONNET	Valve Size	in. 1"	1"	55		
18		Design Press	barG 131.0	131.0	56		
19		Design Temp	deg C 331.0	331.0	57		
20		Rating(s)	ASME 1500	1500	58		
21		Connections	RTJ Flange	RTJ Flange	59		
22		End Extension			60		
23		End Material			61		
24		Body Type	Globe		62		
25		Mfr & Model	PA 110		63		
26		Body/Bnt Mat'l	13 CR Mo 4-5 /		64		
27	Flow Direction	Flow to Close (FTC)		65			
28	Type of Bonnet	Bolted-Standard		66			
29	Lube & Iso Valve	Lube		67			
30	Pkg Type / Mat'l	/ Graphite		68			
31	VALVE TRIM	Type			69		
32		Number of Pressure Reducing Stages			70		
33		Nominal Size / Travel	mm / mm		71		
34		Characteristic	Quick Opening		72		
35		Balanced/Unbalanced	Unbalanced		73		
36		Rated Cv	FL	XT	74		
37		Plug / Ball / Disk Mat'l	X6Cr Ni Mo Ti 17-12-2		75		
38		Seat Material	X6Cr Ni Mo Ti 17-12-2		76		
39		Cage / Stack / Guide Mat'l			77		
40		Stem Material	X6Cr Ni Mo Ti 17-12-2		78		
41	SPECIALS / ACCESSORIES	Elect. Cert.	N/A		79		
42		Position Feedback	N/A		80		
43		I-P Transducer	N/A		81		
44		Solenoid Valve(s)	N/A				
45							
46		Refer to PA 110 documentation					
47							
48							
49							
50							
				51	ACTUATOR	Type	
				52		Mfr & Model	&
				53		Size	Spring Range
				54		Fail Pos / Pwr	N/A / N/A
				55		Supply Type	N/A
				56		Supply Max / Min	barG / 5.0
				57	Actuator Orientation		
				58	Handwheel Type	HAND LEVER with Spring	
				59	Shut-Off Pressure	bar	
				60	POSITIONER	Input Signal	
				61		Type	
				62		Mfr & Model	&
				63		Increasing Signal	N/A
				64		Gauges	N/A Bypass No
				65		Cam Characteristic	
				66			
				67	SWITCHES	Type	N/A Quantity
				68		Mfr & Model	&
				69		Rating / Contact	/ N/A
				70	Actuation Points	N/A / N/A	
				71			
				72	AIRSET	Mfr & Model	&
				73		Set Pressure	barG
				74		Filter	N/A Gauge N/A
				75			
				76	TESTS	Hydro Press.	barG
				77		Seat Leakage	Class IV
				78		Open Time(s)	≤
				79		Close Time(s)	≤
				80			
				81			
				Rev	Date	Description	Orig
							App

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	12	14	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518014	20-PV-2102

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	61.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	3.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	61.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	3.00 inch / 80	Seat Lk @60psi	92 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.09 ltr/min
Line Fluid	HYDROGEN GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	2 x 2 x 2 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	Gr.6 Stellite	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	32	Trim Size Ref.	1.5
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-MS0SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.75-1.45 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	12	14	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518014	20-PV-2102

Valve Design Details

Valve	Series 10 Globe	Design CV	32
Valve Size (in x cm x out)	2 x 2 x 2 inch	Shut Off Pressure	61.00 bar
Body Rating	ANSI 600	Line Fluid	HYDROGEN GAS
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	3.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	3.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	Nm³/hour	3614	3012	1506
Inlet Pressure	bar	52.7	52.7	52.7
Outlet Pressure	bar	52.3	52.3	52.3
Pressure Drop	bar	0.4	0.4	0.4
Inlet Temperature	°C	49	49	49
Outlet Temperature	°C	49	49	49
Molecular Weight		8.71	8.71	8.71
Ratio Of Specific Heats		1.41	1.41	1.41
Compressibility		1.02	1.02	1.02

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1	1	1
Inlet Spec Volume	m³/kg	0.0595	0.0595	0.0595
Calculated CV	US Units	20.17	16.77	8.353
Valve Opening	%	80.6	73.7	50.1
Gas Recovery Factor		0.673	0.673	0.688
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	11.5	9.5	4.8
Body Outlet Velocity	m/sec	11.5	9.6	4.8
Body Outlet Mach No.		0.0181	0.0151	0.0075
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	11.5	9.6	4.8
Sys. Outlet Mach No.		0.0175	0.0146	0.0073
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0009	0.0008	0.0004
Velocity Head	bar	0.388	0.389	0.392
Specific Volume In	m³/kg	0.0595	0.0595	0.0595
Specific Volume Out	m³/kg	0.0599	0.0599	0.0599
Min DP 100% Open		0.1566	0.1088	0.0272
Max Flow 100% Open		5734.4	5747.2	5769.4

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	206.25 lbf	1.125 in	2.12 in	1.35 in²	0.00 in²	0.20 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	61	61	52.7	52.7	52.7
Outlet Pressure	bar	1	1	52.3	52.3	52.3
Unbalanced Force	lbf	1,180.83	1,180.83	156.8	156.8	156.8
Min Air Required	lbf/in2	4	4	21.31	21.31	21.31
Min Spring Setting	lbf/in2	11.34	9.87	2.55	2.55	2.55
Stem Stress	lbf/in2	7,035.87	7,035.87	1820	1820	1820
Stability	1/16 inch			0.42	0.42	0.42
Mod. Stability	Ratio			8.54	8.54	8.54

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	13	15	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518015	20-PV-2104

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	61.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	3.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	61.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	3.00 inch / 80	Seat Lk @60psi	23 cc/min
Max/Min Temp	150.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.02 ltr/min
Line Fluid	HYDROGEN GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1.5 x 1.5 x 1.5 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	Gr.6 Stellite	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	8	Trim Size Ref.	3/4
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-U00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.3 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	13	15	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518015	20-PV-2104

Valve Design Details

Valve	Series 10 Globe	Design CV	8
Valve Size (in x cm x out)	1.5 x 1.5 x 1.5 inch	Shut Off Pressure	61.00 bar
Body Rating	ANSI 600	Line Fluid	HYDROGEN GAS
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	3.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	3.00 inch / 80

Process Conditions

Description	UOM	MAX
Gas Flow Rate	Nm³/hour	3379
Inlet Pressure	bar	52.3
Outlet Pressure	bar	33.7
Pressure Drop	bar	18.6
Inlet Temperature	°C	49
Outlet Temperature	°C	49
Molecular Weight		8.71
Ratio Of Specific Heats		1.41
Compressibility		1.02

Calculated Values

Description	UOM	MAX
Expansion Factor		1.2
Inlet Spec Volume	m³/kg	0.0599
Calculated CV	US Units	3.275
Valve Opening	%	40
Gas Recovery Factor		0.702
Fluid State		Normal
Predicted Noise Level	dBA	70
Body Inlet Velocity	m/sec	19.2
Body Outlet Velocity	m/sec	29.8
Body Outlet Mach No.		0.041
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	29.8
Sys. Outlet Mach No.		0.0452
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	0.0472
Velocity Head	bar	19.959
Specific Volume In	m³/kg	0.0599
Specific Volume Out	m³/kg	0.093
Min DP 100% Open		3.113
Max Flow 100% Open		8253

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	127.86 lbf	1.125 in	2.12 in	0.52 in²	0.00 in²	0.20 in²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	61	61	52.3
Outlet Pressure	bar	1	1	33.7
Unbalanced Force	lbf	455.6	455.6	236.3
Min Air Required	lbf/in2	10.36	10.36	32.49
Min Spring Setting	lbf/in2	11.2	9.38	6.24
Stem Stress	lbf/in2	3,342.29	3,342.29	2225
Stability	1/16 inch			0.12
Mod. Stability	Ratio			3.3

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
Approved Date
Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	14	19	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518016	20-HV-2552

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	10.00 inch / 80	Seat Lk @60psi	302 cc/min
Max/Min Temp	425.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		0.3 ltr/min
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	420 ST.ST.	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 St.St.	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 ST.ST.	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	105	Trim Size Ref.	4
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Manual

A.1	Model Number	MO-0DCHS	Actuator Type	Gear Operator
A.2	Handwheel Type	Side Mounted Handwheel	Limit Stop	Maximum
A.3	Material	Standard	Paint	System C

Additional Actuator Features:

Technical Comments

- Max. adjustable mechanical Limit stopper to be provided at given Design CV. (CV Value shall be confirm by PIDECC).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	14	19	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518016	20-HV-2552

Valve Design Details

Valve	Series 1200 Globe	Design CV	105
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	STEAM
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	10.00 inch / 80

Process Conditions

Description	UOM	MAX	MIN
Steam Flow Rate	kg/hour	19000	19000
Inlet Pressure	bar	44.5	44.5
Outlet Pressure	bar	36.5	6
Pressure Drop	bar	8	38.5
Inlet Temperature	°C	385	385

Calculated Values

Description	UOM	MAX	MIN
Expansion Factor		1.1	1.5
Inlet Spec Volume	m³/kg	0.0652	0.0652
Calculated CV	US Units	68.37	45.81
Valve Opening	%	76.5	59.7
Gas Recovery Factor		0.787	0.798
Fluid State		Normal	Choked
Predicted Noise Level	dBA	70	84.1
Body Inlet Velocity	m/sec	18.9	18.9
Body Outlet Velocity	m/sec	23	140.5
Body Outlet Mach No.		0.038	0.2366
Mach No. Condition		OK	OK
Sys. Outlet Velocity	m/sec	23	140.5
Sys. Outlet Mach No.		0.0368	0.2292
Sys Mach No. Condition		OK	OK
Pipework Correction Factor		1	1
Energy Conversion	MW	0.2967	2.457
Velocity Head	bar	0.292	3.926
Specific Volume In	m³/kg	0.0652	0.0652
Specific Volume Out	m³/kg	0.0795	0.4856
Min DP 100% Open		3.397	6.52
Max Flow 100% Open		29181.5	43554.1
Outlet Temperature		378.24	352.96
Inlet Saturated Temp		257	257
Outlet Saturated Temp		244.8	158.3
Dryness Fraction		1	1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
532.64 lbf	613.55 lbf	3.5 in	3.56 in	11.98 in²	12.57 in²	0.79 in²		1,124.83	1,738.38

Description	UOM	Closed	Cracked	MAX	MIN
Inlet Pressure	bar	52	52	44.5	44.5
Outlet Pressure	bar	1	1	36.5	6
Unbalanced Force	lbf	160.56	592.19	506.8	506.8
Stem Stress	lbf/in2	882.61	1,432.18	1323	1323

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
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 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	15	20	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518017	20-HV-2553

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	40.50 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	40.50 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @ 40.5 bar	1.73 cc/min
Max/Min Temp	300.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	PROCESS GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A217 WC6	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A217 WC6	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B16
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Stellite
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Pilot Balanced	Plug Seal	Alloy 25
T.7	Design CV	425	Trim Size Ref.	6
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Manual

A.1	Model Number	MO-ODCHS	Actuator Type	Geared Operator
A.2	Handwheel Type	Side Mounted Handwheel	Limit Stop	None
A.3	Material	Standard	Paint	System C

Additional Actuator Features:

Technical Comments

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	15	20	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518017	20-HV-2553

Valve Design Details

Valve	Series 1200 Globe	Design CV	425
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	40.50 bar
Body Rating	ANSI 300	Line Fluid	PROCESS GAS
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	Condition 1										
Liquid Flow Rate	kg/hour	-										
Inlet Pressure	bar	-										
Outlet Pressure	bar	-										
Pressure Drop	bar	-										
Inlet Temperature	°C	-										
Specific Gravity		-										
Vapour Pressure	bar	-										
Critical Pressure	bar	-										
Viscosity	Centi-Poise	-										

Calculated Values

Description	UOM	Condition 1										
Calculated CV	US Units	-										
Valve Opening	%	-										
Pressure Recovery Factor		-										
Cavitation Index		-										
Fluid State		-										
Predicted Noise Level	dBA	-										
Body Inlet Velocity	m/sec	-										
Pipework Correction Factor		-										
Viscosity Correction Factor		-										
Energy Conversion	MW	-										
Trim Exit Velocity	m/sec	-										
Min DP 100% Open		-										
Max Flow 100% Open		-										

Pressure Drop and Cavitation

Description	Stage	Condition 1										
Pressure Drop	1	-										
Cavitation Index	1	-										

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area				Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
567.35 lbf	2,864.08 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	0.79 in²					1,082.18	3,946.26

Description	UOM	Closed	Cracked	Condition 1								
Inlet Pressure	bar	40.5	40.5	25								
Outlet Pressure	bar	1	1	20								
Unbalanced Force	lbf	514.83	11.39	227.8								
Stem Stress	lbf/in2	1,377.88	736.88	1012								

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	16	21	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518018	20-HV-2576

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	61.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	61.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 80	Seat Lk @60psi	4.31 cc/min
Max/Min Temp	150.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0 ltr/min
Line Fluid	RECYLCE GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	2S Mspline	No. of Stages	2
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	Gr.6 Stellite	Seat Finish/Overlay	None
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	1.5	Trim Size Ref.	No 0
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Manual

A.1	Model Number	MO-OAHS	Actuator Type	Operator
A.2	Handwheel Type	Hand Mounted Handwheel	Limit Stop	None
A.3	Material	Standard	Paint	System C

Additional Actuator Features:

Technical Comments

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	16	21	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518018	20-HV-2576

Valve Design Details

Valve	Series 1200 Globe	Design CV	1.5
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	61.00 bar
Body Rating	ANSI 600	Line Fluid	RECYLCE GAS
Trim Design	2S Mspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	2.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM
Gas Flow Rate	Nm³/hour	800	800
Inlet Pressure	bar	52	37.2
Outlet Pressure	bar	8	8
Pressure Drop	bar	44	29.2
Inlet Temperature	°C	69	45
Outlet Temperature	°C	69	45
Molecular Weight		8.71	8.71
Ratio Of Specific Heats		1.41	1.41
Compressibility		1.02	1.02

Calculated Values

Description	UOM	MAX	NORM
Expansion Factor		1.5	1.5
Inlet Spec Volume	m³/kg	0.064	0.0832
Calculated CV	US Units	0.6944	0.9374
Valve Opening	%	68.6	80.3
Gas Recovery Factor		0.752	0.75
Fluid State		Choked	Choked
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	10.9	14.2
Body Outlet Velocity	m/sec	70.9	66
Body Outlet Mach No.		0.1079	0.1041
Mach No. Condition		OK	OK
Sys. Outlet Velocity	m/sec	70.9	66
Sys. Outlet Mach No.		0.1046	0.1008
Sys Mach No. Condition		OK	OK
Pipework Correction Factor		1	1
Energy Conversion	MW	0.0415	0.0331
Velocity Head	bar	8.272	5.908
Specific Volume In	m³/kg	0.064	0.0832
Specific Volume Out	m³/kg	0.4162	0.387
Min DP 100% Open		8.399	10.92
Max Flow 100% Open		1728.1	1280.1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	78.54 lbf	1.125 in	2.12 in	0.79 in²	0.00 in²	0.11 in²		675.61	168.54

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	61	61	52	37.2
Outlet Pressure	bar	1	1	8	8
Unbalanced Force	lbf	-585.61	-585.61	-417.8	-273
Stem Stress	lbf/in2	6,117.04	6,117.04	4598	3286

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	17	22	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518019	20-HV-2577

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	4.00 inch / 80	Seat Lk @60psi	216 cc/min
Max/Min Temp	425.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.22 ltr/min
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagarf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	420 ST.ST.	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 St.St.	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 ST.ST.	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	75	Trim Size Ref.	3
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Manual

A.1	Model Number	MO-OCBHS	Actuator Type	Geared Operator
A.2	Handwheel Type	Side Mounted Handwheel	Limit Stop	None
A.3	Material	Standard	Paint	System C

Additional Actuator Features:

Technical Comments

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	17	22	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518019	20-HV-2577

Valve Design Details

Valve	Series 1200 Globe	Design CV	75
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	STEAM
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	4.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	4.00 inch / 80

Process Conditions

Description	UOM	MAX
Steam Flow Rate	kg/hour	4017
Inlet Pressure	bar	41
Outlet Pressure	bar	40.5
Pressure Drop	bar	0.5
Inlet Temperature	°C	410

Calculated Values

Description	UOM	MAX
Expansion Factor		1
Inlet Spec Volume	m³/kg	0.0745
Calculated CV	US Units	57.67
Valve Opening	%	69.9
Gas Recovery Factor		0.749
Fluid State		Normal
Predicted Noise Level	dBA	70
Body Inlet Velocity	m/sec	18.2
Body Outlet Velocity	m/sec	18.5
Body Outlet Mach No.		0.0262
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	18.5
Sys. Outlet Mach No.		0.0288
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	0.0042
Velocity Head	bar	0.325
Specific Volume In	m³/kg	0.0745
Specific Volume Out	m³/kg	0.0754
Min DP 100% Open		0.2933
Max Flow 100% Open		5223.9
Outlet Temperature		409.66
Inlet Saturated Temp		251.9
Outlet Saturated Temp		251.1
Dryness Fraction		1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
349.31 lbf	456.47 lbf	2.25 in	2.81 in	6.63 in²	7.07 in²	0.31 in²		580.64	1,037.11

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	52	52	41
Outlet Pressure	bar	1	1	40.5
Unbalanced Force	lbf	-91.12	231.32	182.4
Stem Stress	lbf/in2	1,435.58	1,892.59	1733

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
Approved Date
Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	18	24	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518020	30-FV-3002

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	11.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	12.00 inch / 10S	Hydro Test Pressure	425 psig
Shut Off Pressure	11.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	12.00 inch / 10S	Seat Lk @60psi	9138 cc/min
Max/Min Temp	110.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		9.14 ltr/min
Line Fluid	MDEA SOLUTION			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	None
V.3	Body Size (in/cm/out)	18 x 18 x 18 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	3180	Trim Size Ref.	18
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	9 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	1.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	C300R-700SCK4-B	Actuator Type	Piston Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	4.10 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	6.90 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.2-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.6	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <18 SEC.
- KOSO recommend to revise line size to 18" as required calculated Cv can be meet with 18" valve only.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	18	24	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518020	30-FV-3002

Valve Design Details

Valve	Series 1200 Globe	Design CV	3180
Valve Size (in x cm x out)	18 x 18 x 18 inch	Shut Off Pressure	11.00 bar
Body Rating	ANSI 150	Line Fluid	MDEA SOLUTION
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	12.00 inch / 10S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	12.00 inch / 10S

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	730800	609000	304500
Inlet Pressure	bar	4.74	4.74	4.76
Outlet Pressure	bar	4.62	4.61	4.61
Pressure Drop	bar	0.12	0.13	0.15
Inlet Temperature	°C	77	77	77
Specific Gravity		1.055	1.055	1.055
Vapour Pressure	bar	1.7	1.7	1.7
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	1.4	1.4	1.4

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	2559.6	1994.9	896.3
Valve Opening	%	85.3	74.8	46.8
Pressure Recovery Factor		0.945	0.948	0.955
Cavitation Index		-2.46	-2.47	-2.5
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	1.2	1	0.5
Pipework Correction Factor		1.1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0025	0.0022	0.0012
Trim Exit Velocity	m/sec	3.705	3.961	4.409
Min DP 100% Open		0.067	0.047	0.012
Max Flow 100% Open		907926.6	970797.8	1080375

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.12	0.13	0.15
Cavitation Index	1	-2.45	-2.47	-2.5

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
962.26 lbf	2,807.80 lbf	9 in	5.75 in	250.95 in ²	254.47 in ²	2.41 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Min Spring Setting	lbf/in2	14.39	3.32	3.74	3.74	3.74
Stem Stress	lbf/in2	626.88	414.56	467.1	466.9	466.9
Stability	1/16 inch			0.12	0.12	0.12
Mod. Stability	Ratio			25.68	25.74	25.74
Inlet Pressure	bar	11	11	4.74	4.74	4.76
Outlet Pressure	bar	1	1	4.62	4.61	4.61
Unbalanced Force	lbf	545.57	34.88	161.1	160.8	160.8
Min Air Required	lbf/in2	18.39	20.09	42.67	42.67	42.67

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	19	25 / 26	0	2	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518021-022	30-FV-3021A / 30-FV-3021B

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	53.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	24.00 inch / 80	Hydro Test Pressure	2175 psig
Shut Off Pressure	53.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	24.00 inch / 80	Seat Lk @60psi	9138 cc/min
Max/Min Temp	110.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		9.14 ltr/min
Line Fluid	MDEA SOLUTION			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	None
V.3	Body Size (in/cm/out)	20 x 20 x 20 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	3180	Trim Size Ref.	20
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	10 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	2 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	D300B-0S0S-L4-B	Actuator Type	Piston Double Acting
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	4.10 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	6.20 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	None
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.4.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.6	Volume Booster (Qty: 2)	KOSO	Volume Booster Model	VB3000
I.7	Air Lock (Qty: 1)	KOSO	Air Lock Model	DCV-02
I.8	Volume Tank (Qty: 1)	KOSO	Volume Tank Model	STD

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16SEC.
- VOLUME TANK ARRANGMENT ALONG WITH ALL NECESSARY ACCESSORIES TO BE PROVIDED TO ACHIEVE THE FAIL SAFE POSITION. VOLUME TANK CAPACITY - 200 LITER.
- Volume Tank MOC : CS;

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	19	25 / 26	0	2	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518021-022	30-FV-3021A / 30-FV-3021B

Valve Design Details

Valve	Series 1200 Globe	Design CV	3180
Valve Size (in x cm x out)	20 x 20 x 20 inch	Shut Off Pressure	53.00 bar
Body Rating	ANSI 600	Line Fluid	MDEA SOLUTION
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	24.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	24.00 inch / 80

Process Conditions

Description	UOM	MAX1	NORM1	MIN1	MAX2	NORM2	MIN2
Liquid Flow Rate	kg/hour	1776000	1480000	740000	1776000	1480000	740000
Inlet Pressure	bar	37.45	37.46	37.47	37.45	38	37.47
Outlet Pressure	bar	36.51	36.47	36.4	36.51	37.46	36.4
Pressure Drop	bar	0.94	0.99	1.07	0.94	0.54	1.07
Inlet Temperature	°C	77	77	77	78	77	77
Specific Gravity		1.054	1.054	1.054	1.054	1.054	1.054
Vapour Pressure	bar	1.8	1.8	1.8	1.8	1.8	1.8
Critical Pressure	bar	221	221	221	221	221	221
Viscosity	Centi-Poise	1.4	1.4	1.4	1.4	1.4	1.4

Calculated Values

Description	UOM	MAX1	NORM1	MIN1	MAX2	NORM2	MIN2
Calculated CV	US Units	2075	1683.5	808.6	2075	2282.7	808.6
Valve Opening	%	82	74.1	49.3	82	85.9	49.3
Pressure Recovery Factor		0.945	0.948	0.954	0.945	0.944	0.954
Cavitation Index		-29.3	-29.46	-29.77	-29.3	-30.11	-29.77
Fluid State		NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70	70	70	70
Body Inlet Velocity	m/sec	2.4	2	1	2.4	2	1
Pipework Correction Factor		1	1	1	1	1	1
Viscosity Correction Factor		1	1	1	1	1	1
Energy Conversion	MW	0.0442	0.0388	0.0209	0.0442	0.0212	0.0209
Trim Exit Velocity	m/sec	11.118	11.42	11.887	11.118	8.422	11.887
Min DP 100% Open		0.398	0.277	0.069	0.398	0.277	0.069
Max Flow 100% Open		2721731.7	2795613	2910132	2721731.7	2061798.1	2910132

Pressure Drop and Cavitation

Description	Stage	MAX1	NORM1	MIN1	MAX2	NORM2	MIN2
Pressure Drop	1	0.94	0.99	1.07	0.94	0.54	1.07
Cavitation Index	1	-29.3	-29.5	-29.8	-29.3	-30.1	-29.8

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
1,468.21 lbf	3,112.93 lbf	10 in	5.75 in	308.45 in ²	314.16 in ²	3.14 in ²			

Description	UOM	Closed	Cracked	MAX1	NORM1	MIN1	MAX2	NORM2	MIN2
Inlet Pressure	bar	53	53	37.45	37.46	37.47	37.45	38	37.47
Outlet Pressure	bar	1	1	36.51	36.47	36.4	36.51	37.46	36.4
Unbalanced Force	lbf	4,348.82	45.55	1663	1661	1658	1663	1706	1658
Min Air Required	lbf/in ²	29.77	19.39	10.44	10.43	10.42	10.44	10.58	10.42
Stem Stress	lbf/in ²	1,851.62	481.85	996.7	996.2	995.2	996.7	1011	995.2
Stability	1/16 inch			1.01	1.01	1.01	1.01	1.01	1.01
Mod. Stability	Ratio			0	0	0	0	0	0

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	20	27	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518023	30-FV-3022

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	56.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	12.00 inch / 80	Hydro Test Pressure	2175 psig
Shut Off Pressure	56.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	12.00 inch / 80	Seat Lk @60psi	4195 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		4.2 ltr/min
Line Fluid	MDEA SOLUTION			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	12 x 12 x 12 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	1460	Trim Size Ref.	12
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	6 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-RSASCG3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	0.85-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.
- Max. adjustable mechanical Limit Stopper to be provided at given design CV. (CV value shall be confirm by PIDECE).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	20	27	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518023	30-FV-3022

Valve Design Details

Valve	Series 1200 Globe	Design CV	1460
Valve Size (in x cm x out)	12 x 12 x 12 inch	Shut Off Pressure	56.00 bar
Body Rating	ANSI 600	Line Fluid	MDEA SOLUTION
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	12.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	12.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	676800	564000	282000
Inlet Pressure	bar	38.93	38.95	38.99
Outlet Pressure	bar	38.21	38.02	37.7
Pressure Drop	bar	0.72	0.93	1.29
Inlet Temperature	°C	51	51	51
Specific Gravity		1.022	1.022	1.022
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	2.4	2.4	2.4

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	915.3	671.1	284.9
Valve Opening	%	80.4	68.3	41.9
Pressure Recovery Factor		0.946	0.95	0.956
Cavitation Index		-32.29	-32.38	-32.48
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.6	2.2	1.1
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0133	0.0143	0.0099
Trim Exit Velocity	m/sec	9.906	11.259	13.26
Min DP 100% Open		0.283	0.196	0.049
Max Flow 100% Open		1079621.1	1227025.6	1445152.6

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.72	0.93	1.29
Cavitation Index	1	-32.3	-32.4	-32.5

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
917.14 lbf	1,865.32 lbf	6 in	3.56 in	110.75 in ²	113.10 in ²	1.23 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	56	56	38.93	38.95	38.99
Outlet Pressure	bar	1	1	38.21	38.02	37.7
Unbalanced Force	lbf	1,887.07	17.79	679.9	676.5	670.8
Min Air Required	lbf/in ²	8.77	15	29.79	29.8	29.82
Min Spring Setting	lbf/in ²	15.57	3.12	5.32	5.31	5.29
Stem Stress	lbf/in ²	2,285.08	761.85	1301	1299	1294
Stability	1/16 inch			0.69	0.69	0.69
Mod. Stability	Ratio			3.95	3.97	4

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	21	28	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518024	30-FV-3023

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40S	Hydro Test Pressure	2175 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40S	Seat Lk @60psi	9.2 cc/min
Max/Min Temp	130.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.01 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	None
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	GR.6 STELLITE	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	3.2	Trim Size Ref.	3/8
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-BSASCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.
- Max. adjustable mechanical Limit stopper to be provided at given design CV. (CV value shall be confirm by PIDECE).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	21	28	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518024	30-FV-3023

Valve Design Details

Valve	Series 10 Globe	Design CV	3.2
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	PROCESS CONDENSATE
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	2.00 inch / 40S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40S

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	2700	1334
Inlet Pressure	bar	42.69	42.71
Outlet Pressure	bar	37.64	37.57
Pressure Drop	bar	5.05	5.14
Inlet Temperature	°C	100	100
Specific Gravity		0.96	0.96
Vapour Pressure	bar	1.013	1.013
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.3	0.3

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	1.424	0.6968
Valve Opening	%	67.1	44.7
Pressure Recovery Factor		0.902	0.915
Cavitation Index		-20.38	-21.04
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	1.6	0.8
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.0004	0.0002
Trim Exit Velocity	m/sec	30.048	30.338
Min DP 100% Open		0.998	0.244
Max Flow 100% Open		6067.7	6126.3

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	5.05	5.14
Cavitation Index	1	-20.4	-21

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	46.89 lbf	1.125 in	2.12 in	0.28 in ²	0.00 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	52	52	42.69	42.71
Outlet Pressure	bar	1	1	37.64	37.57
Unbalanced Force	lbf	208.6	208.6	80.78	81.03
Min Air Required	lbf/in ²	4.31	4.31	30.13	30.13
Min Spring Setting	lbf/in ²	4.94	4.27	2.44	2.44
Stem Stress	lbf/in ²	2,703.61	2,703.61	1546	1549
Stability	1/16 inch			0.05	0.05
Mod. Stability	Ratio			4.09	4.07

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Tuesday 08 May 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	22	29	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518025	30-HV-3022

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	41.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	12.00 inch / STD	Hydro Test Pressure	1125 psig
Shut Off Pressure	40.50 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	12.00 inch / STD	Seat Lk @ 40.5 bar	2.91 cc/min
Max/Min Temp	120.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	PROCESS GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	12 x 12 x 12 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-3	No. of Stages	3
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	540	Trim Size Ref.	10
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	6 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	6345LA	Actuator Type	Double Acting Piston Actuator
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	4.00 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	5.00 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C		
A.8	Thrust (Max) Nm			
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.4.5.0.00.1-M5 R01
I.4	Air Set (Qty: 2)	KOSO R01	Air Set Model	FRS-M6 + PRS315-2-100 R01
I.5	Volume Booster (Qty: 2)	KOSO R01	Volume Booster Model	VB3000

Additional Instrumentation Features:

Baffles

Plate Number	Baffle ID	Pipe Size	CV	Type
1	MB3	300	1500	Valve Outlet Baffle

Technical Comments

- STROKING TIME <16 SEC
 -Volume Tank arrangement along with all necessary accessories to be provided, Volume tank size: 200 liter.
 Volume Tank MOC : CS, Volume tank Trip Valve: make - KOSO, Model No.: DCV02 QTY-1 Nos.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Tuesday 08 May 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	22	29	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518025	30-HV-3022

Valve Design Details

Valve	Series 1200 Globe	Design CV	540
Valve Size (in x cm x out)	12 x 12 x 12 inch	Shut Off Pressure	40.50 bar
Body Rating	ANSI 300	Line Fluid	PROCESS GAS
Trim Design	HFL-3	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	12.00 inch / STD
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	12.00 inch / STD

Process Conditions

Description	UOM	MAX
Gas Flow Rate	Nm ³ /hour	130000
Inlet Pressure	bar	20.96
Outlet Pressure	bar	3.9
Pressure Drop	bar	17.06
Inlet Temperature	°C	75
Outlet Temperature	°C	75
Molecular Weight		15.17
Ratio Of Specific Heats		1.37
Compressibility		1

Calculated Values

Description	UOM	MAX
Expansion Factor		1.4
Inlet Spec Volume	m ³ /kg	0.091
Calculated CV	US Units	363.7
Valve Opening	%	61.1
Gas Recovery Factor		0.797
Fluid State		Normal
Predicted Noise Level	dBA	79.4
Body Inlet Velocity	m/sec	30.5
Body Outlet Velocity	m/sec	100.2
Body Outlet Mach No.		0.2023
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	100.2
Sys. Outlet Mach No.		0.196
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	4.7432
Velocity Head	bar	0.194
Specific Volume In	m ³ /kg	0.091
Specific Volume Out	m ³ /kg	0.299
Min DP 100% Open		6.614
Max Flow 100% Open		193027.2

Silencer Calculated Values

Description	UOM	MAX
Baffle Plate Number	1	0
Baffle CV	1,500.00	0
Baffle Pipe Size	300	0
Baffle Inlet Pressure	bar	6.378
Baffle Pressure Ratio		1.635
Outlet Spec Volume	m ³ /kg	0.489
Outlet Velocity	m/sec	163.7
Mach Number		0.32
Baffle Noise	dBA	76.9
Est System Noise	dBA	0
Limiting CV		1137
Back Pressure	bar	6.378

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
778.37 lbf	4,803.86 lbf	6 in	3.56 in	77.07 in ²	78.54 in ²	1.23 in ²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	40.5	40.5	20.96
Outlet Pressure	bar	1	1	3.9
Unbalanced Force	lbf	-121.05	720.66	373
Min Air Required	lbf/in ²	23	20.19	41.35

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	23	30	00	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518026	30-HV-3031

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	38.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 80	Hydro Test Pressure	2250 psig
Shut Off Pressure	37.50 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	2.00 inch / 80	Seat Lk @ 37.5 bar	0 cc/min
Max/Min Temp	450.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		
Line Fluid	PROCESS GSS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A217 WC6	Body Overlay	NONE
V.3	Body Size (in/cm/out)	2 x 2 x 2 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A217 WC6	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B16
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Microspline	No. of Stages	1
T.2	Guide Bush Material	None	Guide Finish/Overlay	None
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	3	Trim Size Ref.	No 0
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075D-NS0SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Opens	Actuator Action	Direct
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	4.00 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Closes Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.75-1.5 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	23	30	00	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518026	30-HV-3031

Valve Design Details

Valve	Series 10 Globe	Design CV	3
Valve Size (in x cm x out)	2 x 2 x 2 inch	Shut Off Pressure	37.50 bar
Body Rating	ANSI 600	Line Fluid	PROCESS GSS
Trim Design	Microspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	2.00 inch / 80
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	2.00 inch / 80

Process Conditions

Description	UOM	MAX
Gas Flow Rate	Nm³/hour	2170
Inlet Pressure	bar	32.8
Outlet Pressure	bar	2.9
Pressure Drop	bar	29.9
Inlet Temperature	°C	299
Outlet Temperature	°C	299
Molecular Weight		0.97
Ratio Of Specific Heats		1.4
Compressibility		1.01

Calculated Values

Description	UOM	MAX
Expansion Factor		1.5
Inlet Spec Volume	m³/kg	1.5097
Calculated CV	US Units	1.284
Valve Opening	%	65.7
Gas Recovery Factor		0.752
Fluid State		Choked
Predicted Noise Level	dBA	70
Body Inlet Velocity	m/sec	19.4
Body Outlet Velocity	m/sec	219.8
Body Outlet Mach No.		0.0866
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	219.8
Sys. Outlet Mach No.		0.0839
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	0.226
Velocity Head	bar	12.782
Specific Volume In	m³/kg	1.5097
Specific Volume Out	m³/kg	17.0749
Min DP 100% Open		4.518
Max Flow 100% Open		5070.2

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	600.00 lbf	1.125 in	2.12 in	0.31 in²	0.00 in²	0.20 in²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	37.5	37.5	32.8
Outlet Pressure	bar	1	1	2.9
Unbalanced Force	lbf	-55.61	-55.61	-39.63
Min Air Required	lbf/in2	24.07	24.07	24.3
Min Spring Setting	lbf/in2	3.66	3.66	3.43
Stem Stress	lbf/in2	1,305.16	1,305.16	1224
Stability	1/16 inch			-0.07
Mod. Stability	Ratio			-14.37

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	24	31	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518027	30-LV-3001

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	60.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 80S	Hydro Test Pressure	2175 psig
Shut Off Pressure	60.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 80S	Seat Lk @60psi	833 cc/min
Max/Min Temp	120.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		0.83 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8M	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8M	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	290	Trim Size Ref.	6
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-U00SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.3 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <12 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	24	31	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518027	30-LV-3001

Valve Design Details

Valve	Series 1200 Globe	Design CV	290
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	60.00 bar
Body Rating	ANSI 600	Line Fluid	PROCESS CONDENSATE
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 80S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 80S

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	91873	76561	38281
Inlet Pressure	bar	46.69	46.7	46.71
Outlet Pressure	bar	46.34	46.21	46.01
Pressure Drop	bar	0.35	0.49	0.7
Inlet Temperature	°C	75	75	75
Specific Gravity		0.976	0.976	0.976
Vapour Pressure	bar	17.7	17.7	17.7
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.4	0.4	0.4

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	182.3	128.4	53.72
Valve Opening	%	57.6	42.7	21.3
Pressure Recovery Factor		0.952	0.956	0.963
Cavitation Index		-24.61	-24.69	-24.86
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	1.5	1.2	0.6
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0009	0.0011	0.0008
Trim Exit Velocity	m/sec	7.068	8.363	9.995
Min DP 100% Open		0.138	0.096	0.024
Max Flow 100% Open		146113.1	172885.3	206639.4

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.35	0.49	0.7
Cavitation Index	1	-24.6	-24.7	-24.9

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
619.83 lbf	927.71 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	60	60	46.69	46.7	46.71
Outlet Pressure	bar	1	1	46.34	46.21	46.01
Unbalanced Force	lbf	763.36	11.39	527.7	526.3	524
Min Air Required	lbf/in2	13.52	16.03	33.31	33.31	33.32
Min Spring Setting	lbf/in2	7.7	2.1	3.83	3.82	3.81
Stem Stress	lbf/in2	1,761.13	803.69	1461	1459	1456
Stability	1/16 inch			0.23	0.23	0.23
Mod. Stability	Ratio			6.78	6.8	6.83

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	25	32 / 33	0	2	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518028-029	30-LV-3012A / 30-LV-3012B

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	11.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	28.00 inch / 10	Hydro Test Pressure	425 psig
Shut Off Pressure	11.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	28.00 inch / 10	Seat Lk @60psi	8994 cc/min
Max/Min Temp	120.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		8.99 ltr/min
Line Fluid	MDEA SOLUTION			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	None
V.3	Body Size (in/cm/out)	18 x 18 x 18 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	3130	Trim Size Ref.	18
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	9 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	1.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	C300D-7S0SCK4-B	Actuator Type	Piston Spring Return
A.2	Fail Mode Plug Type	Stay Put (Tend to Open)	Actuator Action	Direct
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	4.10 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Closes Valve
A.5	Material	Standard	Max. Operating Pressure	6.90 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.2-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.6	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000
I.7	Air Lock (Qty: 1)	KOSO	Air Lock Model	PA121211

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	25	32 / 33	0	2	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518028-029	30-LV-3012A / 30-LV-3012B

Valve Design Details

Valve	Series 1200 Globe	Design CV	3130
Valve Size (in x cm x out)	18 x 18 x 18 inch	Shut Off Pressure	11.00 bar
Body Rating	ANSI 150	Line Fluid	MDEA SOLUTION
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	28.00 inch / 10
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	28.00 inch / 10

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	2180400	1817000	908500
Inlet Pressure	bar	5.93	5.94	5.95
Outlet Pressure	bar	4.94	4.94	4.94
Pressure Drop	bar	0.99	1	1.01
Inlet Temperature	°C	84	84	84
Specific Gravity		1.068	1.068	1.068
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	1.3	1.3	1.3

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	2486.2	2054.5	1016.5
Valve Opening	%	73	59.7	32.9
Pressure Recovery Factor		0.948	0.952	0.959
Cavitation Index		-3.99	-4.03	-4.1
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	73.9	72.3	70
Body Inlet Velocity	m/sec	3.6	3	1.5
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0569	0.0477	0.024
Trim Exit Velocity	m/sec	11.242	11.337	11.457
Min DP 100% Open		0.611	0.425	0.106
Max Flow 100% Open		2744981.6	2768125.2	2797359.8

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.99	1	1.01
Cavitation Index	1	-3.99	-4.03	-4.1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
962.26 lbf	2,807.80 lbf	9 in	5.75 in	250.95 in ²	254.47 in ²	2.41 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Min Air Required	lbf/in ²	45.03	45.03	43.78	43.78	43.78
Min Spring Setting	lbf/in ²	1.39	3.09	2.63	2.63	2.63
Stem Stress	lbf/in ²	626.88	414.56	471.7	471.7	471.7
Stability	1/16 inch			0.14	0.14	0.14
Mod. Stability	Ratio			24.02	24.02	24.02
Inlet Pressure	bar	11	11	5.93	5.94	5.95
Outlet Pressure	bar	1	1	4.94	4.94	4.94
Unbalanced Force	lbf	545.57	34.88	172.3	172.3	172.3

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	26	34	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518030	30-LV-3019

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	12.50 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 10S	Hydro Test Pressure	425 psig
Shut Off Pressure	12.50 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	1.50 inch / 40S	Seat Lk @60psi	60 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	I		0.06 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1.5 x 1.5 x 1.5 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	GR.6 STELLITE	Guide Finish/Overlay	None
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	21	Trim Size Ref.	1.25
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-J00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- Stroking Time <4 Sec.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	26	34	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518030	30-LV-3019

Valve Design Details

Valve	Series 10 Globe	Design CV	21
Valve Size (in x cm x out)	1.5 x 1.5 x 1.5 inch	Shut Off Pressure	12.50 bar
Body Rating	ANSI 150	Line Fluid	PROCESS CONDENSATE
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 10S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	1.50 inch / 40S

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	9826	8188	4094
Inlet Pressure	bar	7.66	7.69	7.76
Outlet Pressure	bar	7.07	6.72	6.17
Pressure Drop	bar	0.59	0.97	1.59
Inlet Temperature	°C	49	49	49
Specific Gravity		0.989	0.989	0.989
Vapour Pressure	bar	1.6	1.6	1.6
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.6	0.6	0.6

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	15.2	9.773	3.792
Valve Opening	%	65.4	44.6	20.9
Pressure Recovery Factor		0.904	0.916	0.946
Cavitation Index		-3.12	-2.86	-2.54
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.2	1.8	0.9
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0002	0.0002	0.0002
Trim Exit Velocity	m/sec	9.941	12.886	16.608
Min DP 100% Open		0.298	0.207	0.052
Max Flow 100% Open		13572.6	17593.5	22674.8

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.59	0.97	1.59
Cavitation Index	1	-3.12	-2.85	-2.54

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	166.98 lbf	1.125 in	2.12 in	0.89 in ²	0.00 in ²	0.20 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	12.5	12.5	7.66	7.69	7.76
Outlet Pressure	bar	1	1	7.07	6.72	6.17
Unbalanced Force	lbf	150.83	150.83	27.72	31.61	38.03
Min Air Required	lbf/in ²	8.71	8.71	34.47	34.41	34.32
Min Spring Setting	lbf/in ²	7.41	5.02	3.26	3.32	3.41
Stem Stress	lbf/in ²	1,790.14	1,790.14	1163	1183	1216
Stability	1/16 inch			0.03	0.03	0.03
Mod. Stability	Ratio			12.96	11.37	9.45

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	27	35 / 36	0	2	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518031-032	30-LV-3027C / 30-LV-3027D

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	39.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	26.00 inch / 30	Hydro Test Pressure	1100 psig
Shut Off Pressure	38.50 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	26.00 inch / 30	Seat Lk @60psi	2371 cc/min
Max/Min Temp	120.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		2.37 ltr/min
Line Fluid	MDEA SOLUTION			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	None
V.3	Body Size (in/cm/out)	14 x 14 x 14 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	827	Trim Size Ref.	12
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	7 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	1.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-JS0SCH4-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <60 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	27	35 / 36	0	2	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518031-032	30-LV-3027C / 30-LV-3027D

Valve Design Details

Valve	Series 1200 Globe	Design CV	827
Valve Size (in x cm x out)	14 x 14 x 14 inch	Shut Off Pressure	38.50 bar
Body Rating	ANSI 300	Line Fluid	MDEA SOLUTION
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	26.00 inch / 30
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	26.00 inch / 30

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	2182800	1819000	909500
Inlet Pressure	bar	34.03	34.05	34.09
Outlet Pressure	bar	7.04	7.02	7.02
Pressure Drop	bar	26.99	27.03	27.07
Inlet Temperature	°C	85	85	85
Specific Gravity		1.068	1.068	1.068
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	1.3	1.3	1.3

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	473	393.5	196.3
Valve Opening	%	53	45.5	25.7
Pressure Recovery Factor		0.98	0.98	0.99
Cavitation Index		-5.86	-5.84	-6.07
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	84.3	83.5	78.5
Body Inlet Velocity	m/sec	5.9	4.9	2.5
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	1.5407	1.2846	0.6423
Trim Exit Velocity	m/sec	26.891	26.935	26.996
Min DP 100% Open		8.82	6.125	1.531
Max Flow 100% Open		3807129.6	3813415.4	3822115.1

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	21.6	21.6	21.7
Cavitation Index	1	-9.37	-9.35	-9.99
Pressure Drop	2	5.4	5.41	5.41
Cavitation Index	2	-5.86	-5.84	-6.07

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
923.28 lbf	1,865.32 lbf	7 in	5.75 in	110.75 in ²	113.10 in ²	1.77 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	38.5	38.5	34.03	34.05	34.09
Outlet Pressure	bar	1	1	7.04	7.02	7.02
Unbalanced Force	lbf	-288	986.51	872	872.5	873.5
Min Air Required	lbf/in2	12.04	7.79	32.17	32.17	32.17
Min Spring Setting	lbf/in2	8.34	6.37	5.98	5.99	5.99
Stem Stress	lbf/in2	685.45	1,080.72	1016	1016	1017
Stability	1/16 inch			0.83	0.83	0.83
Mod. Stability	Ratio			1.69	1.69	1.69

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	28	37	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518033	30-LV-3038

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	51.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40S	Hydro Test Pressure	2175 psig
Shut Off Pressure	51.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40S	Seat Lk @60psi	39 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.04 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A351 CF8M	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1.5 x 1.5 x 1.5 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8M	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	GR.6 STELLITE	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	13.5	Trim Size Ref.	1
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-US0SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.3 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	28	37	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518033	30-LV-3038

Valve Design Details

Valve	Series 10 Globe	Design CV	13.5
Valve Size (in x cm x out)	1.5 x 1.5 x 1.5 inch	Shut Off Pressure	51.00 bar
Body Rating	ANSI 600	Line Fluid	PROCESS CONDENSATE
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 40S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40S

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	2026	1688	844
Inlet Pressure	bar	34.02	34.02	34.02
Outlet Pressure	bar	33.97	33.97	33.96
Pressure Drop	bar	0.05	0.05	0.06
Inlet Temperature	°C	45	45	45
Specific Gravity		0.991	0.991	0.991
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.6	0.6	0.6

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	10.58	8.81	4.016
Valve Opening	%	71.7	59.4	30.6
Pressure Recovery Factor		0.9	0.907	0.929
Cavitation Index		-20.56	-20.88	-21.9
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	0.5	0.4	0.2
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0	0	0
Trim Exit Velocity	m/sec	2.939	2.941	3.225
Min DP 100% Open		0.031	0.021	0.005
Max Flow 100% Open		2584.9	2586.7	2836.9

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.05	0.05	0.06
Cavitation Index	1	-20.6	-20.9	-21.9

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	127.86 lbf	1.125 in	2.12 in	0.52 in ²	0.00 in ²	0.20 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Outlet Pressure	bar	1	1	33.97	33.97	33.96
Unbalanced Force	lbf	380.14	380.14	97.09	97.09	97.14
Min Air Required	lbf/in ²	11.44	11.44	34.48	34.48	34.48
Min Spring Setting	lbf/in ²	10.12	8.3	4.25	4.25	4.25
Stem Stress	lbf/in ²	2,957.98	2,957.98	1516	1516	1517
Stability	1/16 inch			0.12	0.12	0.12
Mod. Stability	Ratio			8.03	8.03	8.02
Inlet Pressure	bar	51	51	34.02	34.02	34.02

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	29	38	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518034	30-PV-3014

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	11.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	3.00 inch / 10S	Hydro Test Pressure	425 psig
Shut Off Pressure	11.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	3.00 inch / 10S	Seat Lk @ 11 bar	0.23 cc/min
Max/Min Temp	120.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		
Line Fluid	HYDROGEN GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	None
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	120	Trim Size Ref.	3
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-VSASCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <8 SEC.
- Max. adjustable mechanical Limit stopper to be provided at given design CV. (CV value shall be confirm by PIDEDEC).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	29	38	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518034	30-PV-3014

Valve Design Details

Valve	Series 1200 Globe	Design CV	120
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	11.00 bar
Body Rating	ANSI 150	Line Fluid	HYDROGEN GAS
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	3.00 inch / 10S
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	3.00 inch / 10S

Process Conditions

Description	UOM	MAX	NORM
Gas Flow Rate	Nm³/hour	5520	2760
Inlet Pressure	bar	6.23	6.74
Outlet Pressure	bar	3.6	3.1
Pressure Drop	bar	2.63	3.64
Inlet Temperature	°C	84	84
Outlet Temperature	°C	84	84
Molecular Weight		29.96	29.96
Ratio Of Specific Heats		1.29	1.29
Compressibility		0.99	0.99

Calculated Values

Description	UOM	MAX	NORM
Expansion Factor		1.2	1.3
Inlet Spec Volume	m³/kg	0.1574	0.1455
Calculated CV	US Units	83.24	36.15
Valve Opening	%	62.8	30.9
Gas Recovery Factor		0.752	0.766
Fluid State		Normal	Normal
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	70.8	32.7
Body Outlet Velocity	m/sec	122.4	71.1
Body Outlet Mach No.		0.3107	0.1804
Mach No. Condition		OK	OK
Sys. Outlet Velocity	m/sec	122.4	71.1
Sys. Outlet Mach No.		0.3425	0.1989
Sys Mach No. Condition		OK	OK
Pipework Correction Factor		1	1
Energy Conversion	MW	0.1037	0.0716
Velocity Head	bar	1.905	2.433
Specific Volume In	m³/kg	0.1574	0.1455
Specific Volume Out	m³/kg	0.2724	0.3164
Min DP 100% Open		1.245	0.3293
Max Flow 100% Open		7957.8	9161.4

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
294.15 lbf	985.75 lbf	2.25 in	2.81 in	6.63 in²	7.07 in²	0.31 in²			

Description	UOM	Closed	Cracked	MAX	NORM
Mod. Stability	Ratio			9.59	8.87
Inlet Pressure	bar	11	11	6.23	6.74
Outlet Pressure	bar	1	1	3.6	3.1
Unbalanced Force	lbf	-14.29	48.93	27.71	29.98
Min Air Required	lbf/in2	12.41	11.5	35.81	35.77
Min Spring Setting	lbf/in2	18.08	4.9	4.6	4.63
Stem Stress	lbf/in2	1,005.36	1,118.28	1049	1057
Stability	1/16 inch			0.02	0.02

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	30	39	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518035	30-PV-3036

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	38.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	14.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	37.50 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	14.00 inch / 40	Seat Lk @ 37.5 bar	2.69 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	PROCESS GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	14 x 14 x 14 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-5	No. of Stages	5
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	415	Trim Size Ref.	10
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	7 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	1.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	6345LA	Actuator Type	Double Acting Piston Type
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	4.00 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	5.00 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C		
A.8	Thrust (Max) Nm			
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.4.5.0.00.1-M5 R01
I.4	Air Set (Qty: 2)	KOSO R01	Air Set Model	FRS-M6 + PRS315-2-100 R01
I.5	Volume Booster (Qty: 2)	KOSO R01	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.
- Max. adjustable mechanical Limit Stopper to be provided at given design CV. (CV value shall be confirm by PIDECC).
- Volume Tank arrangement along with all necessary accessories to be provided, Volume tank size: 200 liter.
- Volume Tank MOC : CS, Volume tank Trip Valve: make - KOSO, Model No.: DCV02 QTY-1 Nos.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	30	39	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518035	30-PV-3036

Valve Design Details

Valve	Series 1200 Globe	Design CV	415
Valve Size (in x cm x out)	14 x 14 x 14 inch	Shut Off Pressure	37.50 bar
Body Rating	ANSI 300	Line Fluid	PROCESS GAS
Trim Design	HFL-5	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	14.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	14.00 inch / 40

Process Conditions

Description	UOM	Condition 1										
Gas Flow Rate	Nm ³ /hour	181700										
Inlet Pressure	bar	33.37										
Outlet Pressure	bar	3.4										
Pressure Drop	bar	30.3										
Inlet Temperature	°C	50										
Outlet Temperature	°C	50										
Molecular Weight		8.97										
Ratio Of Specific Heats		1.41										
Compressibility		1.01										

Calculated Values

Description	UOM	Condition 1										
Expansion Factor		1.5										
Inlet Spec Volume	m ³ /kg	0.0897										
Calculated CV	US Units	233.1										
Valve Opening	%	69.2										
Gas Recovery Factor		0.789										
Fluid State		Choked										
Predicted Noise Level	dBA	84.2										
Body Inlet Velocity	m/sec	20.4										
Body Outlet Velocity	m/sec	201.9										
Body Outlet Mach No.		0.2874										
Mach No. Condition		OK										
Sys. Outlet Velocity	m/sec	201.9										
Sys. Outlet Mach No.		0.3108										
Sys Mach No. Condition		OK										
Pipework Correction Factor		1										
Energy Conversion	MW	10.2237										
Velocity Head	bar	0.042										
Specific Volume In	m ³ /kg	0.0897										
Specific Volume Out	m ³ /kg	0.8893										
Min DP 100% Open		8.332										
Max Flow 100% Open		325096.7										

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area				Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
865.25 lbf	4,736.17 lbf	7 in	5.75 in	77.07 in ²	78.54 in ²	1.77 in ²						

Description	UOM	Closed	Cracked	Condition 1								
Inlet Pressure	bar	37.5	33.37									
Outlet Pressure	bar	1	3.4									
Unbalanced Force	lbf	183.1	960.89	863.5								
Min Air Required	lbf/in ²	10.27	7.68	32.01								
Min Spring Setting	lbf/in ²	19.28	6.09	5.76								
Stem Stress	lbf/in ²	593.24	1,033.38	978.3								
Stability	1/16 inch			0.83								
Mod. Stability	Ratio			1.78								

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	31	40	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518036	30-PV-3037

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	38.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	14.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	37.50 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	14.00 inch / 40	Seat Lk @ 37.5 bar	2.69 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	PROCESS GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	14 x 14 x 14 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-5	No. of Stages	5
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	415	Trim Size Ref.	10
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	7 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	1.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	6345LA	Actuator Type	Double Acting Piston Type
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	4.00 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	5.00 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C		
A.8	Thrust (Max) Nm			
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.4.5.0.00.1-M5 R01
I.4	Air Set (Qty: 2)	KOSO R01	Air Set Model	FRS-M6 + PRS315-2-100 R01
I.5	Volume Booster (Qty: 2)	KOSO R01	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.
- Max. adjustable mechanical Limit Stopper to be provided at given design CV. (CV value shall be confirm by PIDECC).
- Volume Tank arrangement along with all necessary accessories to be provided, Volume tank size: 200 liter.
- Volume Tank MOC : CS, Volume tank Trip Valve: make - KOSO, Model No.: DCV02 QTY-1 Nos.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	31	40	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518036	30-PV-3037

Valve Design Details

Valve	Series 1200 Globe	Design CV	415
Valve Size (in x cm x out)	14 x 14 x 14 inch	Shut Off Pressure	37.50 bar
Body Rating	ANSI 300	Line Fluid	PROCESS GAS
Trim Design	HFL-5	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	14.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	14.00 inch / 40

Process Conditions

Description	UOM	MAX
Gas Flow Rate	Nm ³ /hour	180000
Inlet Pressure	bar	31.97
Outlet Pressure	bar	3.44
Pressure Drop	bar	28.53
Inlet Temperature	°C	45
Outlet Temperature	°C	45
Molecular Weight		8.99
Ratio Of Specific Heats		1.41
Compressibility		1.01

Calculated Values

Description	UOM	MAX
Expansion Factor		1.5
Inlet Spec Volume	m ³ /kg	0.0929
Calculated CV	US Units	240.3
Valve Opening	%	53.3
Gas Recovery Factor		0.798
Fluid State		Choked
Predicted Noise Level	dBA	84
Body Inlet Velocity	m/sec	20.9
Body Outlet Velocity	m/sec	194.7
Body Outlet Mach No.		0.2795
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	194.7
Sys. Outlet Mach No.		0.3023
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	9.7725
Velocity Head	bar	0.038
Specific Volume In	m ³ /kg	0.0929
Specific Volume Out	m ³ /kg	0.8635
Min DP 100% Open		8.505
Max Flow 100% Open		312388.3

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
865.25 lbf	4,736.17 lbf	7 in	5.75 in	77.07 in ²	78.54 in ²	1.77 in ²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	37.5	37.5	31.97
Outlet Pressure	bar	1	1	3.44
Unbalanced Force	lbf	183.1	960.89	819.2
Min Air Required	lbf/in ²	10.27	7.68	32.15
Min Spring Setting	lbf/in ²	19.28	6.09	5.61
Stem Stress	lbf/in ²	593.24	1,033.38	953.2
Stability	1/16 inch			0.83
Mod. Stability	Ratio			1.87

TECHNICAL SPECIFICATIONS

					Customer	PIDEC					
					SO NO.	520000518					
					SERIAL NO.	SN520000518-037					
					Project	HENGAM FERTALIZER PROJECT					
GENERAL					SERVICE CONDITIONS					1	
TAG NO.	30-PCV-3574				FLUID STATE		Nitogen		G		2
PRODUCT SR.NO.	--				APPLICATION		DOWNSTREAM PRE CONTROL				3
SERVICE	TANK BLANKETING				FLOW -MIN/OP/MAX				550	NM ³ /Hr	4
MAKE	KOSO				INLET PR. -MIN/OP/MAX		8.9	8.9	9.0	Bara	5
MODEL NO.	D950				OUTLET PR. -MIN/OP/MAX			0.01		Barg	6
TYPE	GLOBE DIRECT ACTING				TEMP. MIN/ OP/MAX				40	°C	7
PRODUCT CODE	--				DP SIZING		7.89	7.89	7.99	Bar	8
INLET LINE OUTLET LINE		1½"		1½"	SP.GRAVITY MOL.WT.		0.967		28.00		9
P & ID NO.	--				VISCOSITY or Cp/Cv		--				10
QUANTITY	01 NO.				COMPRESSIBILITY FACTOR		--				11
											12
					SET PRESSURE		100		mmWcg		13
					SET PRESSURE RANGE		90 to 140		mmWcg		14
SIZING DATA					REGULATOR & ACTUATOR CONSTRUCTION					15	
REGULATION	DOWNSTREAM				BODY SIZE (mm)		25 mmNB - 1"				16
CALCULATED Cv	4.856	4.467	4.418		END CONNECTION		1" FLANGED RF SERR				17
SELECTED Cv OR FLOW	5.90				RATING		ANSI 150#				18
PREDICTED NOISE LEVEL dBA AT 1m	< 85 dBA				IMPULSE CONN.		EXTERNAL				19
VELOCITY IN/OUTLET	--	--		m/s	IMPULSE SIZE		½" SCREWED NPT F				20
DESIGN PRESSURE	AS PER ANSI 150#				PACKING OR SEAL		GLANDLESS CONSTRUCTION				21
DESIGN TEMPERATURE	AS PER ANSI 150#				LEAKAGE CLASS		CLASS IV				22
DP SHUT OFF		17		Bar							23
											24
											25
MATERIAL OF CONSTRUCTION					NOTES					26	
PART	ITEM	MOC			01 THE PRESSURE REGULATOR SHALL HAVE FACILITY TO CHANGE THE SET PRESSURE AT SITE. 02 TEST REQUIREMENTS a HYDRO TEST FOR VALVE BODY b SEAT LEAKAGE TEST c SET POINT VERIFICATION					27	
1	BODY	CS - A216 Gr WCB								28	
2	BOTTOM	CS- A105								29	
3	SOFT SEAT	VITON								30	
4	METALLIC SEAT	AISI 316								31	
5	STEM	AISI 316								32	
6	DIAPHRAGM	Reinforced VITON								33	
7	DIAPHRAGM CASING	CS - CRC/ HRC SHEET								34	
8	BOTTOM SPRING	AISI 302								35	
9	FASTENERS	A193 B7 / A194 2H								36	
10	PILOT BODY	CS - A105								37	
11	PILOT SEAT	AISI 316								38	
12	PILOT STEM	AISI 316								39	
13	PILOT DIAPHRAGM	Reinforced FKM								40	
14	SET SCREW	AISI 304								41	
15	TUBING AND RAD	AISI 304								42	
					43						
					44						
					P.O. NUMBER	1208-00-IN-POR-605					
					P.O. DATE	--					
					QUOTATION NO.	QNE002377					
					QUOTATION DATE	12-04-2017					
03	12-Apr	SAC	PMJ	PMJ	ENQUIRY NO.	1208-00-IN-RFQ-605					
REV	DATE	PRPD	CHKD	APRD	REMARK	ENQUIRY DATE	12-04-2017				
DOWNSTREAM PRESSURE REGULATING VALVE - BLANKETING PRV					PROJECT NO.	--					
					DOC NO.	4339/01					

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	32	42	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518038	40-PV-4011

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	48.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	14.00 inch / 80	Hydro Test Pressure	2250 psig
Shut Off Pressure	48.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	14.00 inch / 80	Seat Lk @60psi	7989 cc/min
Max/Min Temp	447.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		7.99 ltr/min
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A217 WC6	Body Overlay	NONE
V.3	Body Size (in/cm/out)	18 x 18 x 18 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A217 WC6	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B16
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	1.1/4Cr.1/2Mo	Guide Finish/Overlay	Gas Nitrided
T.3	Plug Material	1.1/4Cr.1/2Mo	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	1.1/4Cr.1/2Mo	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	431 ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	2780	Trim Size Ref.	18
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	9 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	1.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	C300R-70ZSCK4-B	Actuator Type	Piston Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	4.10 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	6.90 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.2-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.6	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000
I.7	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.
- Max. adjustable mechanical Limit Stopper to be provided at given design CV. (CV value shall be confirm by PIDEC).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	32	42	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518038	40-PV-4011

Valve Design Details

Valve	Series 1200 Globe	Design CV	2780
Valve Size (in x cm x out)	18 x 18 x 18 inch	Shut Off Pressure	48.00 bar
Body Rating	ANSI 600	Line Fluid	STEAM
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	14.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	14.00 inch / 80

Process Conditions

Description	UOM	MAX
Steam Flow Rate	kg/hour	100000
Inlet Pressure	bar	42.8
Outlet Pressure	bar	42.6
Pressure Drop	bar	0.2
Inlet Temperature	°C	419

Calculated Values

Description	UOM	MAX
Expansion Factor		1
Inlet Spec Volume	m³/kg	0.0724
Calculated CV	US Units	2324
Valve Opening	%	78.2
Gas Recovery Factor		0.747
Fluid State		Normal
Predicted Noise Level	dBA	72.2
Body Inlet Velocity	m/sec	14.6
Body Outlet Velocity	m/sec	14.6
Body Outlet Mach No.		0.0197
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	14.6
Sys. Outlet Mach No.		0.0227
Sys Mach No. Condition		OK
Pipework Correction Factor		1.1
Energy Conversion	MW	0.0403
Velocity Head	bar	0.119
Specific Volume In	m³/kg	0.0724
Specific Volume Out	m³/kg	0.0727
Min DP 100% Open		0.1276
Max Flow 100% Open		119622.8
Outlet Temperature		418.86
Inlet Saturated Temp		254.6
Outlet Saturated Temp		254.3
Dryness Fraction		1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
1,260.96 lbf	2,807.80 lbf	9 in	5.75 in	250.95 in²	254.47 in²	2.41 in²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	48	48	42.8
Outlet Pressure	bar	1	1	42.6
Unbalanced Force	lbf	-726.18	1,674.08	1493
Min Air Required	lbf/in2	23.62	15.62	39.23
Min Spring Setting	lbf/in2	11.14	9.78	9.18
Stem Stress	lbf/in2	826.16	1,220.24	1145
Stability	1/16 inch			1.51
Mod. Stability	Ratio			2.57

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	33	43	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518039	40-PV-4012A

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	10.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	10.00 inch / 80	Seat Lk @60psi	1868 cc/min
Max/Min Temp	425.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		1.87 ltr/min
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	8 x 8 x 8 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	420 ST.ST.	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 St.St.	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 ST.ST.	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	650	Trim Size Ref.	8
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	4 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-H00SCE3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <14 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	33	43	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518039	40-PV-4012A

Valve Design Details

Valve	Series 1200 Globe	Design CV	650
Valve Size (in x cm x out)	8 x 8 x 8 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	STEAM
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	10.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	10.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM
Steam Flow Rate	kg/hour	55000	5100
Inlet Pressure	bar	43	43
Outlet Pressure	bar	41.6	40.2
Pressure Drop	bar	1.4	2.8
Inlet Temperature	°C	385	385

Calculated Values

Description	UOM	MAX	NORM
Expansion Factor		1	1
Inlet Spec Volume	m³/kg	0.0676	0.0676
Calculated CV	US Units	454.8	30.04
Valve Opening	%	85	16.6
Gas Recovery Factor		0.742	0.773
Fluid State		Normal	Normal
Predicted Noise Level	dBA	75.4	70
Body Inlet Velocity	m/sec	32.9	3.1
Body Outlet Velocity	m/sec	34	3.3
Body Outlet Mach No.		0.0541	0.0052
Mach No. Condition		OK	OK
Sys. Outlet Velocity	m/sec	34	3.3
Sys. Outlet Mach No.		0.0542	0.0052
Sys Mach No. Condition		OK	OK
Pipework Correction Factor		1	1
Energy Conversion	MW	0.1465	0.0275
Velocity Head	bar	0.909	1.855
Specific Volume In	m³/kg	0.0676	0.0676
Specific Volume Out	m³/kg	0.0699	0.0724
Min DP 100% Open		0.6767	0.006
Max Flow 100% Open		78602	110350.2
Outlet Temperature		383.87	382.77
Inlet Saturated Temp		254.9	254.9
Outlet Saturated Temp		252.8	250.7
Dryness Fraction		1	1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
663.96 lbf	1,241.87 lbf	4 in	3.56 in	49.09 in²	50.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	52	52	43	43
Outlet Pressure	bar	1	1	41.6	40.2
Unbalanced Force	lbf	-276.2	592.19	489.7	489.7
Min Air Required	lbf/in2	23.13	20.24	40.58	40.58
Min Spring Setting	lbf/in2	5.43	4.19	3.85	3.85
Stem Stress	lbf/in2	1,197.05	1,599.38	1469	1469
Stability	1/16 inch			0.25	0.25
Mod. Stability	Ratio			10.9	10.9

KOSO	PROJECT	HENGAM FERTILIZER PROJ.	UNIT	DATASHEET	OF	
	CUSTOMER	PIDEC		SO No.	5200000518	
	P.O.	1208-00-IN-POR-605		TAG #	40-PV-4012B	
	INQ / REV	Email	DATE	20-Jul-18	ITEM #	43
	PROP / REV	QNE002377 Rev 4	DATE	20-Jul-18	QTY	1
	SERVICE	MP Steam to Silencer			DRAWING	

OPTION DESCRIPTION	OPTIONS
Application	Other
Type of Gas	Water/Steam
Flow Rate Type	Mass Flow Rate

Valve Type 530D/540D, Custom Vector

Body Type	Globe
Flow Direction	Flow to Open (UTP)
Flow Distributor Design	1 Stage
Pipe Correction Factor Option	Calculate Correction

PIPE SIZE, SCHD & DIMS	UNITS	INLET	OUTLET
Method of Specifying Pipe		OD & t	OD & t

Pipe Outside Diameters	mm	500	750
Pipe Wall Thicknesses	mm	26.19	36.48

Nominal Valve Sizes	14in (350mm)	14in (350mm)
Valve ASME Pressure Rating	600	600

VALVE SIZING TERMS	UNITS	SUG'D	ACTUAL
Relative Capacity	Kv/mm2	0.0107	0.0107
Terminal Press Drop Ratio		1	1
Liq Press Recovery Factor		1	1
Number of Flow Passages		Calc'd	Calc'd
Over Capacity Margin	OCM		0%

OPERATING CONDITIONS	UNITS	CONDITION VALUES
Condition Set		
Condition Label		
Gas Mass Flow Rate	kg/h	MAX. FLOW 200000
Inlet Pressure	barA	45
Outlet Pressure	barA	2
Inlet Temperature	deg C	385

Req'd Valve Flow Coefficient Cv 435.70

VALVE TRIM	UNITS	CONDITION VALUES
Number of Stages, Suggested		8
Number of Stages, Used		12
Fluid Kinetic Energy Exiting Stack	bar	3.35
Trim Sound Pressure Level, (Bare Pipe)	dBa	76.6

To meet KE, not noise

PLUG SIZE	UNITS	SUG'D	ACTUAL
Minimum Plug Size, Energy	mm	134.2	
Minimum Plug Size, Cv	mm	155.2	
Actual Plug Size	mm		254

Assumes BF = 21

DIAMETER INTO OUTLET PIPE	UNITS	SUG'D	ACTUAL
Minimum Valve Outlet Run ID	mm	326.9	326.9

VALVE OUTLET/FLOW DISTRIB. DETAILS	UNITS	SUG'D	ACTUAL
Flow Distributor Outlet Hole Size	mm	6.35	6.35
No. of Holes in FD Outlet		3975	3975
FD Outlet to Inlet Area Ratio			1.50
Flow Distrib. Flow Coefficient	Cv		6054.0

Just Upstream of Final Piping

Default outlet hole area is 1.5 times the valve run area

125885.139
360013.2933
0.349668031

VALVE OUTLET TO OUTLET PIPE DETAILS	UNITS	CONDITION VALUES
Press. Between Valve and FD	barA	3.67
Gas Velocity, Valve Outlet	m/s	515.33
Mach Number, Valve Outlet		0.85
Gas Kinetic Energy, Valve Outlet	bar	1.71
Gas Velocity, Flow Distributor Outlet	m/s	607.85
Mach Number, Flow Distributor Outlet		1.00
Gas Kinetic Energy, Flow Distrib. Outlet	bar	1.34
Gas Velocity, Outlet Pipe	m/s	220.3
Mach Number, Outlet Pipe		0.36
Gas Kinetic Energy, Outlet Pipe	bar	0.17

ADDITIONAL NOISE ASSUMPTIONS	UNITS	SUG'D	ACTUAL
Lagging Credit	dBa	5	10
Credit for Spraywater Injection	dBa	0	0

NOISE RESULTS	UNITS	CONDITION VALUES
Overall System Noise	dBa	75.0

+0/-5 dBA

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	34	45	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518041	40-PV-4024

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	7.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	18.00 inch / 10	Hydro Test Pressure	450 psig
Shut Off Pressure	7.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	24.00 inch / 20 R01	Seat Lk @ 7 bar	0.5 cc/min
Max/Min Temp	300.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	12 x 12 x 12 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Pilot Balanced	Plug Seal	Alloy 25
T.7	Design CV	600	Trim Size Ref.	10
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	6 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-HS0SCG3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Stay Put (Tend to Close)	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000
I.6	Air Lock (Qty: 1)	KOSO	Air Lock Model	PA121211

Additional Instrumentation Features:

Technical Comments

- Stroking time shall be <16 Sec.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	34	45	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518041	40-PV-4024

Valve Design Details

Valve	Series 1200 Globe	Design CV	600
Valve Size (in x cm x out)	12 x 12 x 12 inch	Shut Off Pressure	7.00 bar
Body Rating	ANSI 150	Line Fluid	STEAM
Trim Design	HFL-2	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	18.00 inch / 10
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	24.00 inch / 20

Process Conditions

Description	UOM	MAX
Steam Flow Rate	kg/hour	20000
Inlet Pressure	bar	4.5
Outlet Pressure	bar	1.6
Pressure Drop	bar	2.9
Inlet Temperature	°C	191

Calculated Values

Description	UOM	MAX
Expansion Factor		1.4
Inlet Spec Volume	m³/kg	0.4723
Calculated CV	US Units	417.5
Valve Opening	%	63.0
Gas Recovery Factor		0.79
Fluid State		Normal
Predicted Noise Level	dBA	79.8
Body Inlet Velocity	m/sec	36
Body Outlet Velocity	m/sec	101.2
Body Outlet Mach No.		0.1995
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	101.2
Sys. Outlet Mach No.		0.1933
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	1.0861
Velocity Head	bar	0.144
Specific Volume In	m³/kg	0.4723
Specific Volume Out	m³/kg	1.3295
Min DP 100% Open		0.7593
Max Flow 100% Open		38968
Outlet Temperature		183.84
Inlet Saturated Temp		148.2
Outlet Saturated Temp		112.6
Dryness Fraction		1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
628.13 lbf	5,020.53 lbf	6 in	3.56 in	77.07 in²	78.54 in²	1.23 in²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	7	7	4.5
Outlet Pressure	bar	1	1	1.6
Unbalanced Force	lbf	-3.3	124.56	80.07
Min Air Required	lbf/in2	14.1	13.68	30.83
Min Spring Setting	lbf/in2	18.82	2.51	2.36
Stem Stress	lbf/in2	514.53	613.34	577.1
Stability	1/16 inch			0.05
Mod. Stability	Ratio			37.11

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	35	46	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518042	40-PV-4027

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	19.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 40	Hydro Test Pressure	450 psig
Shut Off Pressure	19.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	4.00 inch / 40	Seat Lk @ 19 bar	0.15 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	I		
Line Fluid	INSTRUMENT AIR			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	2 x 2 x 2 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	Gr.6 Stellite	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	21	Trim Size Ref.	1.25
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075D-IS0SCA1-B R01	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Opens	Actuator Action	Direct
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.00 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-1.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	35	46	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518042	40-PV-4027

Valve Design Details

Valve	Series 10 Globe	Design CV	21
Valve Size (in x cm x out)	2 x 2 x 2 inch	Shut Off Pressure	19.00 bar
Body Rating	ANSI 150	Line Fluid	INSTRUMENT AIR
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	4.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	4.00 inch / 40

Process Conditions

Description	UOM	Max	Condition 2	Condition 3
Gas Flow Rate	Nm³/hour	2500	2250	1125
Inlet Pressure	bar	15.3	15.4	15.5
Outlet Pressure	bar	9.7	9.7	9.7
Pressure Drop	bar	5.6	5.7	5.8
Inlet Temperature	°C	48	48	48
Outlet Temperature	°C	48	48	48
Molecular Weight		28.9	28.9	28.9
Ratio Of Specific Heats		1.4	1.4	1.4
Compressibility		1	1	1

Calculated Values

Description	UOM	Max	Condition 2	Condition 3
Expansion Factor		1.2	1.2	1.2
Inlet Spec Volume	m³/kg	0.0604	0.06	0.0596
Calculated CV	US Units	15.03	13.34	6.517
Valve Opening	%	64.6	58.1	31.7
Gas Recovery Factor		0.676	0.684	0.714
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70.8	70	70
Body Inlet Velocity	m/sec	26.7	23.8	11.8
Body Outlet Velocity	m/sec	42.1	37.9	18.9
Body Outlet Mach No.		0.1207	0.1087	0.0543
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	42.1	37.9	18.9
Sys. Outlet Mach No.		0.117	0.1053	0.0526
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0353	0.0322	0.0163
Velocity Head	bar	5.848	6.009	6.296
Specific Volume In	m³/kg	0.0604	0.06	0.0596
Specific Volume Out	m³/kg	0.0952	0.0952	0.0952
Min DP 100% Open		2.827	2.275	0.5571
Max Flow 100% Open		3493.8	3541.6	3625.1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	379.95 lbf	1.125 in	2.12 in	0.89 in²	0.00 in²	0.20 in²			

Description	UOM	Closed	Cracked	Max	Condition 2	Condition 3
Inlet Pressure	bar	19	19	15.3	15.4	15.5
Outlet Pressure	bar	1	1	9.7	9.7	9.7
Unbalanced Force	lbf	234.48	234.48	99.68	101	102.3
Min Air Required	lbf/in2	7.52	7.52	33.44	33.42	33.41
Min Spring Setting	lbf/in2	11.64	6.22	4.29	4.31	4.33
Stem Stress	lbf/in2	2,216.14	2,216.14	1530	1536	1543
Stability	1/16 inch			0.05	0.05	0.05
Mod. Stability	Ratio			3.6	3.56	3.51

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	36	47	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518043	50-FV-5011A

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	216.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 160	Hydro Test Pressure	5575 psig
Shut Off Pressure	216.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	4.00 inch / 160	Seat Lk @60psi	57 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.06 ltr/min
Line Fluid	SYNTHESIS GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	2 x 2 x 2 inch	Body Rating	ANSI 1500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finish	H - CLA 63 u in
V.6	Inlet Rating	ANSI 1500	Outlet Rating	ANSI 1500
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	20	Trim Size Ref.	2
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.5 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-X0ASCB1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.3 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <20 SEC.
- SIL1 CERTIFICATE TO BE PRPVIDED FOR BODY AS WELL AS ELECTRONICS PARTS.
- Max. adjustable mechanical Limit Stopper to be provided at given design CV. (CV value shall be confirm by PIDECC).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	36	47	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518043	50-FV-5011A

Valve Design Details

Valve	Series 1200 Globe	Design CV	20
Valve Size (in x cm x out)	2 x 2 x 2 inch	Shut Off Pressure	216.00 bar
Body Rating	ANSI 1500	Line Fluid	SYNTHESIS GAS
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	4.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	4.00 inch / 160

Process Conditions

Description	UOM	MAX	NORM
Gas Flow Rate	Nm ³ /hour	31840	24449
Inlet Pressure	bar	184.34	184.36
Outlet Pressure	bar	124.06	123.88
Pressure Drop	bar	60.28	60.48
Inlet Temperature	°C	0	0
Outlet Temperature	°C	0	0
Molecular Weight		10.41	10.41
Ratio Of Specific Heats		1.38	1.38
Compressibility		1.08	1.08

Calculated Values

Description	UOM	MAX	NORM
Expansion Factor		1.2	1.2
Inlet Spec Volume	m ³ /kg	0.0128	0.0128
Calculated CV	US Units	9.253	7.081
Valve Opening	%	68.6	59.4
Gas Recovery Factor		0.749	0.753
Fluid State		Normal	Normal
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	29.6	22.7
Body Outlet Velocity	m/sec	44	33.8
Body Outlet Mach No.		0.0724	0.0557
Mach No. Condition		OK	OK
Sys. Outlet Velocity	m/sec	44	33.8
Sys. Outlet Mach No.		0.0802	0.0617
Sys Mach No. Condition		OK	OK
Pipework Correction Factor		1	1
Energy Conversion	MW	0.3629	0.2797
Velocity Head	bar	43.146	43.501
Specific Volume In	m ³ /kg	0.0128	0.0128
Specific Volume Out	m ³ /kg	0.019	0.019
Min DP 100% Open		12.83	7.558
Max Flow 100% Open		68820.3	69052.2

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
413.43 lbf	299.39 lbf	1.5 in	2.12 in	2.85 in ²	3.14 in ²	0.20 in ²			


Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	216	216	184.3	184.4
Outlet Pressure	bar	1	1	124.1	123.9
Unbalanced Force	lbf	-284.03	614.97	524.8	524.9
Min Air Required	lbf/in ²	19.98	13.56	32.2	32.2
Min Spring Setting	lbf/in ²	3.06	7.35	6.7	6.7
Stem Stress	lbf/in ²	3,552.10	5,237.56	4778	4779
Stability	1/16 inch			0.05	0.05
Mod. Stability	Ratio			3.21	3.21

CONTROL VALVE DATA SHEET



PROJECT	HENGAM FERTILIZER PROJECT		DATA SHEET	1	OF	1
CUSTOMER	PIDEC		SO No.	5200000518		
P.O.	1208-00-IN-POR-605		TAG #	50-FV-5011B		
INQUIRY	Email	REV	DATE	19-Jun-18	ITEM #	47
PROPOSAL	QNE002377	REV	DATE	20-Jul-18	QTY	1
SERVICE	Ammonia Vent to vent Drum		Sl. No.	SN520000518044		

1	SERVICE CONDITIONS	Fluid	Gas -Synthesis Gas		Crit Press, Pc	barA	Crit Temp, Tc	deg C		
2			Units	Max Flow						
3		Gas Volume Flow Rate	Nm3/h	31840						
4		Inlet Pressure	barA	184.34						
5		Outlet Pressure	barA	1.57						
6		Inlet Temperature	deg C	0						
7		Molecular Weight		10.41						
8		Ratio of Specific Heat		1.38						
9		Compressibility Factor		1.08						
10		Flow Coefficient	Cv	6.84						
11		Travel	%	68						
12		Predicted SPL	dBA	78.2						
		Number of Stages Needed		28						
13	LINE		INLET	OUTLET						
14		Pipe Size / Sch	in. 4 / Sch 160	6 / Sch 160						
15		Pipe Material	TBA	TBA						
16	Pipe Line Insulation	N/A								
17	VALVE BODY / BONNET	Valve Size	in. 4	4						
18		Design Press	barA 216	216						
19		Min/Max Design T	deg C -29 / 85	-29 / 85						
20		Rating(s)	ASME 1500	1500						
21		Connections	RTJ Flange	RTJ Flange						
22		End Extension	N/A	4"X6"						
23		End Material	N/A	A216-WCB						
24		Body Type	Globe							
25		Mfr & Model	KOSO	& 530D						
26		Body/Bnt Mat'l	A216-WCB	/ A216-WCB						
27	Flow Direction	Flow to Open (FTO)								
28	Type of Bonnet	Bolted-Standard								
29	Lube & Iso Valve	No	Lube No							
30	Pkg Type / Mat'l	Standard	/ Teflon							
31	VALVE TRIM	Type	VECTOR Multi-Path, Multi-Stage							
32		Number of Pressure Reducing Stages	28							
33		Nominal Size / Travel	in. 1.5	/ 90mm						
34		Characteristic	Linear							
35		Balanced/Unbalanced	Balanced							
36		Rated Cv	10 FL	1 XT	1					
37		Spindle	316SS,Stellited							
38		Seat Material	316SS,Stellited							
39		Cage / Stack / Guide Mat'l	316SS,							
40										
41	SPECIAL ACCESSORIES	Elect. Cert.	IP-65							
42		Position Feedback	Yes Built-In Positioner							
43		I-P Transducer	Yes Built-In Positioner							
44		Solenoid Valve(s)	N/A							
45		KOSO Standard Painting is applicable.				Rev	Date	Description	Orig	App
46		KOSO Standard ITP is applicable.				0	15-May-18	Released		<i>sebanja</i>
47		316SS Tubing & Fittings-Swagelok, Tubing standard -Imperial,Tubing size 1/2" NPT.				1	22-May-18	Line 36 updated, 39 deleted		<i>sebanja</i>
48		1 Qty Volume Booster - KKI Series 1000, 1/4" AI MOC				2	22-Jun-18	Line 72 updated		<i>sebanja</i>
49		Commissioning Spares - 1set of Complete Trim softgoods kit per Valve is included & 2 year spares as per Project's Attachment-04				3	29-Jun-18	Line 62, 66 updated		<i>sebanja</i>
50		SIL 1 Certification is applicable				4	20-Jul-18	No change		<i>sebanja</i>
50A	Mechanical adjustable Limit stopper to be provided at given Design Cv (Cv value shall be confirm by PIDECE) as informed by Mostafa									
50B	RT is applicable									
51	ACTUATOR	Type	Pneumatic Diaphragm- Reverse Acting							
52		Mfr & Model	KOSO	& G300						
53		Size	G300	Effective area	193000 mm2					
54		Fail Pos / Pwr	Closed	Springs	(1.40 to 2.75barG)					
55		Supply Type	Pneumatic							
56		Customer Supply Max / Min	barG 8.7	/ 4.7						
57		Actuator Orientation	Vertical Up							
58		Handwheel Type	N/A							
59		Shut-Off Pressure	bar 216							
60		Input Signal	Foundation Fieldbus							
61	POSITIONER	Type	Electro-Pneumatic							
62		Mfr & Model	ABB	& V18347.10.4.1.1.5.0.00.1-M5				R01		
63		Increasing Signal	To Open the Valve							
64		Gauges	Yes	Bypass	No					
65		Cam Characteristics	N/A							
66		Aluminium Enclosure,Exia, Elect conn. M20x1.5mm						R01		
67	SWITCHES	N/A								
68										
69										
70										
71	AIRSET	Mfr & Model	KOSO	& PRS 815-4-60						
72		Set Pressure	barG 3.4							
73		Filter	Yes	Gauges	Yes					
74	TESTS	Aluminium MOC, Manual Drain,1/2" NPT								
75		Hydro Press.	barG	As per ASME Standard						
76		Seat Leakage	ANSI/FCI Class V							
77		Open Time(s)	<20 sec modulating							
78		Close Time(s)	<20 sec modulating							
79										
80										
81										

	PROJECT	HENGAM FERTILIZER PROJ.	UNIT	DATASHEET	OF	
	CUSTOMER	PIDEC		SO No.	5200000518	
	P.O.	1208-00-IN-POR-605		TAG #	50-FV-5011B	
	INQ / REV	Email	DATE	20-Jul-18	ITEM #	47
	PROP / REV	QNE002377 Rev 4	DATE	20-Jul-18	QTY	1
	SERVICE	Ammonia Vent to Vent Drum		DRAWING		

OPTION DESCRIPTION	OPTIONS
Application	Other
Type of Gas	Custom Gas
Flow Rate Type	Volume Flow Rate
Method of Specifying Density	Calculate from MW
Compressibility Option	Direct Input
Valve Type	530D/540D, Custom Vector

Body Type	Globe
Flow Direction	Flow to Open (UTP)
Flow Distributor Design	None
Pipe Correction Factor Option	Calculate Correction

PIPE SIZE, SCHD & DIMS	UNITS	INLET	OUTLET
Method of Specifying Pipe		NPS & Schd	NPS & Schd
Nominal Pipe Sizes		4in (100mm)	6in (150mm)
Pipe Schedules		160	160

Nominal Valve Sizes		4in (100mm)	4in (100mm)
Valve ASME Pressure Rating		1500	1500

VALVE SIZING TERMS	UNITS	SUG'D	ACTUAL
Relative Capacity	Cd	Kv/mm2	0.0107
Terminal Press Drop Ratio	Xt		1
Liq Press Recovery Factor	FL		1
Number of Flow Passages	Np	Calc'd	Calc'd
Over Capacity Margin	OCM		0%

OPERATING CONDITIONS	UNITS	CONDITION VALUES
Condition Set		
Condition Label		MAX. FLOW
Gas Volume Flow Rate	Nm3/h	31840
Inlet Pressure	barA	184.34
Outlet Pressure	barA	1.57
Inlet Temperature	deg C	0
Molecular Weight		10.41
Compressibility Factor		1.08
Ratio of Specific Heats		1.38
Req'd Valve Flow Coefficient	Cv	6.84

VALVE TRIM	UNITS	CONDITION VALUES
Number of Stages, Suggested		28
Number of Stages, Used		28
Fluid Kinetic Energy Exiting Stack	bar	4.49
Trim Sound Pressure Level, (Bare Pipe)	dBa	78.2

To meet KE, not noise

PLUG SIZE	UNITS	SUG'D	ACTUAL
Minimum Plug Size, Energy	in.	1.0	
Minimum Plug Size, Cv	in.	0.8	
Actual Plug Size	in.		1.5

Assumes BF = 21

DIAMETER INTO OUTLET PIPE	UNITS	SUG'D	ACTUAL
Minimum Valve Outlet Run ID	in.	3.618	3.618

VALVE OUTLET/FLOW DISTRIB. DETAILS	UNITS	SUG'D	ACTUAL
Entrance Dia to Outlet Pipe	in.	3.618	3.62
No. of Holes in FD Outlet		1	1

Just Upstream of Final Piping

VALVE OUTLET TO OUTLET PIPE DETAILS	UNITS	CONDITION VALUES
Gas Velocity, Valve Outlet	m/s	570.22
Mach Number, Valve Outlet		1.00
Gas Kinetic Energy, Valve Outlet	bar	1.77

Gas Velocity, Outlet Pipe	m/s	450.5
Mach Number, Outlet Pipe		0.79
Gas Kinetic Energy, Outlet Pipe	bar	0.68

ADDITIONAL NOISE ASSUMPTIONS	UNITS	SUG'D	ACTUAL
Lagging Credit	dBa	0	0
Credit for Spraywater Injection	dBa	0	0

NOISE RESULTS	UNITS	CONDITION VALUES
Overall System Noise	dBa	78.2

+0/-5 dBA

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	37	49	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518045	50-FV-5012

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1100 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @60psi	216 cc/min
Max/Min Temp	85.0°C / -33.0°C	Industrial Specification	Standard	PED Category	II		0.22 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Normalising R01
V.8	Bonnet Lubrication	None	Packing Material	Supagraf R01
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	75	Trim Size Ref.	3
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <8 SEC.
- Vapour pressure must be less than inlet pressure, hence we have assumed accordingly. However please confirm correct value.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	37	49	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518045	50-FV-5012

Valve Design Details

Valve	Series 1200 Globe	Design CV	75
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	13389	11157	5579
Gas Flow Rate	kg/hour	135	113	56
Inlet Pressure	bar	3.49	3.53	3.6
Outlet Pressure	bar	1.65	1.64	1.63
Pressure Drop	bar	1.84	1.89	1.97
Inlet Temperature	°C	-4	-4	-4
Outlet Temperature	°C	-4	-4	-4
Specific Gravity		0.644	0.644	0.644
Vapour Pressure	bar	3.3	3.3	3.3
Critical Pressure		221	221	221
Molecular Weight		13.05	13.05	13.05
Ratio Of Specific Heats		1.35	1.35	1.35
Compressibility		0.98	0.98	0.98

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	45.52	37.09	17.83
Valve Opening	%	79.2	71.2	47.2
Pressure Recovery Factor		0.946	0.949	0.955
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70	70	70
Liquid Phase Vel (Inlet)	m/sec	2.9	2.4	1.2
Liquid Phase Vel (Outlet)	m/sec	3.9	3.3	1.6
Gas Phase Vel (Inlet)	m/sec	5.9	4.9	2.4
Gas Phase Vel (Outlet)	m/sec	10.7	9	4.5
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0077	0.0065	0.0033

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
314.33 lbf	456.47 lbf	2.25 in	2.81 in	6.63 in ²	7.07 in ²	0.31 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	3.49	3.53	3.6
Outlet Pressure	bar	1	1	1.65	1.64	1.63
Unbalanced Force	lbf	162.51	4.45	7.34	7.3	7.25
Min Air Required	lbf/in ²	10.17	12.43	36.39	36.39	36.39
Min Spring Setting	lbf/in ²	13.33	4.55	4.6	4.59	4.59
Stem Stress	lbf/in ²	1,554.26	1,039.06	1048	1048	1048
Stability	1/16 inch			0.01	0.01	0.01
Mod. Stability	Ratio			33.47	33.67	33.88

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	38	50	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518046	50-FV-5031

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	3.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	3.00 inch / 40	Seat Lk @60psi	144 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.14 ltr/min
Line Fluid	AMMONIA GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	50	Trim Size Ref.	3
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 ,R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <8 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	38	50	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518046	50-FV-5031

Valve Design Details

Valve	Series 1200 Globe	Design CV	50
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA GAS
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	3.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	3.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	Nm³/hour	1927	3854	4625
Inlet Pressure	bar	19.5	19.52	19.54
Outlet Pressure	bar	18.28	18.25	18.23
Pressure Drop	bar	1.22	1.27	1.31
Inlet Temperature	°C	46	46	46
Outlet Temperature	°C	46	46	46
Molecular Weight		17	17	17
Ratio Of Specific Heats		1.15	1.15	1.15
Compressibility		0.85	0.85	0.85

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1	1	1
Inlet Spec Volume	m³/kg	0.068	0.0679	0.0679
Calculated CV	US Units	13.12	25.76	30.47
Valve Opening	%	50.2	72.9	79.3
Gas Recovery Factor		0.757	0.747	0.744
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	6.1	12.1	14.5
Body Outlet Velocity	m/sec	6.5	12.9	15.5
Body Outlet Mach No.		0.0138	0.0277	0.0333
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	6.5	12.9	15.5
Sys. Outlet Mach No.		0.0152	0.0305	0.0367
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0035	0.0072	0.0089
Velocity Head	bar	0.801	0.832	0.857
Specific Volume In	m³/kg	0.068	0.0679	0.0679
Specific Volume Out	m³/kg	0.0725	0.0727	0.0727
Min DP 100% Open		0.084	0.3367	0.4855
Max Flow 100% Open		7343.6	7479.3	7588.6

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
314.33 lbf	456.47 lbf	2.25 in	2.81 in	6.63 in²	7.07 in²	0.31 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	19.5	19.52	19.54
Outlet Pressure	bar	1	1	18.28	18.25	18.23
Unbalanced Force	lbf	-42.4	115.66	86.75	86.84	86.92
Min Air Required	lbf/in2	13.1	10.84	35.25	35.25	35.25
Min Spring Setting	lbf/in2	10.41	6.14	5.73	5.73	5.73
Stem Stress	lbf/in2	1,162.76	1,401.56	1307	1308	1308
Stability	1/16 inch			0.06	0.06	0.06
Mod. Stability	Ratio			2.83	2.83	2.83

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	39	51	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518047	50-FV-5042

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	31.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	31.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40	Seat Lk @60psi	9.2 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.01 ltr/min
Line Fluid	AMMONIA WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	Gr.6 Stellite	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	3.2	Trim Size Ref.	3/8
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B0ASCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.
- Max. adjustable mechanical Limit Stopper to be provided at given design CV. (CV value shall be confirm by PIDECE).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	39	51	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518047	50-FV-5042

Valve Design Details

Valve	Series 10 Globe	Design CV	3.2
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	31.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA WATER
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	3000	2273
Inlet Pressure	bar	25.05	25.05
Outlet Pressure	bar	18.1	18.1
Pressure Drop	bar	6.95	6.95
Inlet Temperature	°C	49	49
Specific Gravity		0.99	0.99
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.6	0.6

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	1.328	1.006
Valve Opening	%	64.6	55.4
Pressure Recovery Factor		0.904	0.908
Cavitation Index		-8.34	-8.48
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	1.7	1.3
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.0006	0.0004
Trim Exit Velocity	m/sec	34.716	34.73
Min DP 100% Open		1.195	0.686
Max Flow 100% Open		7229.6	7232.3

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	6.95	6.95
Cavitation Index	1	-8.34	-8.48

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	46.89 lbf	1.125 in	2.12 in	0.28 in ²	0.00 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	31	31	25.05	25.05
Outlet Pressure	bar	1	1	18.1	18.1
Unbalanced Force	lbf	123.37	123.37	57.2	57.2
Min Air Required	lbf/in ²	5.52	5.52	30.47	30.47
Min Spring Setting	lbf/in ²	3.72	3.05	2.1	2.1
Stem Stress	lbf/in ²	1,931.87	1,931.87	1333	1333
Stability	1/16 inch			0.05	0.05
Mod. Stability	Ratio			5.77	5.77

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	40	52	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518048	50-FV-5053

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	3.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	3.00 inch / 80	Seat Lk @60psi	244 cc/min
Max/Min Temp	425.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.24 ltr/min
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	440C ST.ST.	Guide Finish/Overlay	None
T.3	Plug Material	420 St.St.	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 ST.ST.	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	85	Trim Size Ref.	2.5
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.5 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-H0ASCB2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <8 SEC.
- Max. adjustable mechanical Limit stopper to be provided at given design CV. (CV value shall be confirm by PIDECE).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	40	52	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518048	50-FV-5053

Valve Design Details

Valve	Series 10 Globe	Design CV	85
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	STEAM
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	3.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	3.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM
Steam Flow Rate	kg/hour	4500	3428
Inlet Pressure	bar	44.55	44.64
Outlet Pressure	bar	44.06	44.04
Pressure Drop	bar	0.49	0.6
Inlet Temperature	°C	270	270

Calculated Values

Description	UOM	MAX	NORM
Expansion Factor		1	1
Inlet Spec Volume	m³/kg	0.0483	0.0482
Calculated CV	US Units	52.49	36.07
Valve Opening	%	79.8	65.4
Gas Recovery Factor		0.673	0.678
Fluid State		Normal	Normal
Predicted Noise Level	dBa	70	70
Body Inlet Velocity	m/sec	13.2	10.1
Body Outlet Velocity	m/sec	13.4	10.2
Body Outlet Mach No.		0.0213	0.0162
Mach No. Condition		OK	OK
Sys. Outlet Velocity	m/sec	13.4	10.2
Sys. Outlet Mach No.		0.0234	0.0179
Sys Mach No. Condition		OK	OK
Pipework Correction Factor		1	1
Energy Conversion	MW	0.003	0.0028
Velocity Head	bar	0.478	0.588
Specific Volume In	m³/kg	0.0483	0.0482
Specific Volume Out	m³/kg	0.0488	0.0488
Min DP 100% Open		0.1856	0.1077
Max Flow 100% Open		7286.7	8078.1
Outlet Temperature		269.2	269.02
Inlet Saturated Temp		257.1	257.2
Outlet Saturated Temp		256.4	256.4
Dryness Fraction		1	1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
250.82 lbf	343.69 lbf	1.5 in	2.81 in	3.76 in²	0.00 in²	0.31 in²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	52	52	44.55	44.64
Outlet Pressure	bar	1	1	44.06	44.04
Unbalanced Force	lbf	2,784.95	2,784.95	222.7	228.6
Min Air Required	lbf/in2	11.55	11.55	40.09	40.07
Min Spring Setting	lbf/in2	11.26	10.12	1.58	1.6
Stem Stress	lbf/in2	9,895.08	9,895.08	1544	1563
Stability	1/16 inch			0.41	0.41
Mod. Stability	Ratio			25.81	25.15

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	41	53	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518049	50-FV-5054

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	71.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	1.00 inch / 160	Hydro Test Pressure	2225 psig
Shut Off Pressure	71.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	1.00 inch / 160	Seat Lk @60psi	0.57 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Microspline	No. of Stages	1
T.2	Guide Bush Material	None	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	0.2	Trim Size Ref.	No 4
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN R01	Solenoid Valve Model	YX13AA1H1BS R01

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	41	53	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518049	50-FV-5054

Valve Design Details

Valve	Series 10 Globe	Design CV	0.2
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	71.00 bar
Body Rating	ANSI 600	Line Fluid	PROCESS CONDENSATE
Trim Design	Microspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	1.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	1.00 inch / 160

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	221	184	92
Inlet Pressure	bar	32.41	32.42	32.43
Outlet Pressure	bar	25.83	25.83	25.83
Pressure Drop	bar	6.58	6.59	6.6
Inlet Temperature	°C	49	49	49
Specific Gravity		0.99	0.99	0.99
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.55	0.55	0.55

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	0.1004	0.0836	0.0417
Valve Opening	%	65.2	58.4	38.6
Pressure Recovery Factor		0.951	0.954	0.961
Cavitation Index		-21.18	-21.35	-21.76
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	0.1	0.1	0.1
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0	0	0
Trim Exit Velocity	m/sec	30.429	30.452	30.475
Min DP 100% Open		1.66	1.15	0.288
Max Flow 100% Open		440.1	440.4	440.7

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	6.58	6.59	6.6
Cavitation Index	1	-21.2	-21.4	-21.8

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	29.45 lbf	1.125 in	2.12 in	0.11 in ²	0.00 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	71	71	32.41	32.42	32.43
Outlet Pressure	bar	1	1	25.83	25.83	25.83
Unbalanced Force	lbf	1.6	1.6	41.37	41.37	41.37
Min Air Required	lbf/in ²	7.26	7.26	30.69	30.69	30.69
Min Spring Setting	lbf/in ²	1.73	1.31	1.88	1.88	1.88
Stem Stress	lbf/in ²	829.37	829.37	1189	1189	1189
Stability	1/16 inch			0	0	0
Mod. Stability	Ratio			7.98	7.98	7.98

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	42	54 / 55	0	2	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518050-051	50-LV-5012A / 50-LV-5012B

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	216.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 160	Hydro Test Pressure	5625 psig
Shut Off Pressure	216.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 160	Seat Lk @60psi	69 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.07 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A217 WC6	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 1500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finish	H - CLA 63 u in
V.6	Inlet Rating	ANSI 1500	Outlet Rating	ANSI 1500
V.7	Bonnet Material	ASTM A217 WC6	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevron
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B16
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-4	No. of Stages	4
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	24	Trim Size Ref.	1.5
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-V00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS
I.7	Limit Switch (Qty: 2)	P&F (Rotex Enclosure)	Limit Switch Model	DXLW3A2-3M

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <8 SEC.
- SIL1 CERTIFICATE TO BE PROVIDED FOR BODY AS WELL AS ELECTRONICS PARTS.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	42	54 / 55	0	2	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518050-051	50-LV-5012A / 50-LV-5012B

Valve Design Details

Valve	Series 1200 Globe	Design CV	24
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	216.00 bar
Body Rating	ANSI 1500	Line Fluid	AMMONIA LIQUID
Trim Design	HFL-4	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 160

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	109983	91652	45826
Inlet Pressure	bar	184.42	184.44	183.5
Outlet Pressure	bar	81.4	81.33	35
Pressure Drop	bar	103.02	103.11	148.5
Inlet Temperature	°C	0	0	0
Specific Gravity		0.629	0.629	0.629
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.2	0.2	0.2

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	15.87	13.21	5.501
Valve Opening	%	77.2	68.6	24.9
Pressure Recovery Factor		0.973	0.974	0.99
Cavitation Index		-72.81	-72.9	-32.19
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	6.7	5.9	4
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.5022	0.4187	0.3013
Trim Exit Velocity	m/sec	24.816	24.836	29.824
Min DP 100% Open		44.93	31.2	7.799
Max Flow 100% Open		166362	166491.7	199932.5

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	44.3	44.3	63.9
Cavitation Index	1	-121.5	-121.8	-106.9
Pressure Drop	2	44.3	44.3	63.9
Cavitation Index	2	-81.6	-81.8	-47.5
Pressure Drop	3	11.3	11.3	16.3
Cavitation Index	3	-74.8	-74.9	-35.5
Pressure Drop	4	3.09	3.09	4.46
Cavitation Index	4	-72.8	-72.9	-32.2

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
460.56 lbf	220.85 lbf	2.25 in	2.81 in	1.55 in²	1.77 in²	0.44 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	216	216	184.4	184.4	183.5
Outlet Pressure	bar	1	1	81.4	81.33	35
Unbalanced Force	lbf	714.84	1,383.68	1181	1182	1175
Min Air Required	lbf/in2	13.18	8.41	25.85	25.85	25.89
Min Spring Setting	lbf/in2	9.97	13.17	11.73	11.73	11.69
Stem Stress	lbf/in2	2,660.57	4,174.51	3717	3717	3703
Stability	1/16 inch			0.2	0.2	0.2
Mod. Stability	Ratio			1.39	1.39	1.39

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	43	56	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518052	50-LV-5013

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 40	Hydro Test Pressure	1100 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @60psi	302 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		0.3 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	105	Trim Size Ref.	4
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-J00SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <20 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	43	56	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518052	50-LV-5013

Valve Design Details

Valve	Series 1200 Globe	Design CV	105
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	108870	90725	45363
Inlet Pressure	bar	19.37	19.43	19.52
Outlet Pressure	bar	6.7	6.7	6.7
Pressure Drop	bar	12.67	12.73	12.82
Inlet Temperature	°C	27	27	27
Specific Gravity		0.623	0.623	0.623
Vapour Pressure	bar	10.7	10.7	10.7
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.1	0.1	0.1

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	52.47	43.42	21.57
Valve Opening	%	65	58.1	38.2
Pressure Recovery Factor		0.976	0.98	0.982
Cavitation Index		N/A	N/A	N/A
Fluid State		FLASHING	FLASHING	FLASHING
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.7	2.3	1.1
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.072	0.06	0.0301
Trim Exit Velocity	m/sec	20.728	20.871	21.005
Min DP 100% Open		2.322	1.613	0.403
Max Flow 100% Open		217871.8	219379.2	220788

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	10.1	10.2	10.3
Cavitation Index	1	N/A	N/A	N/A
Pressure Drop	2	2.53	2.55	2.56
Cavitation Index	2	N/A	N/A	N/A

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
486.00 lbf	613.55 lbf	3.5 in	3.56 in	11.98 in²	12.57 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	19.37	19.43	19.52
Outlet Pressure	bar	1	1	6.7	6.7	6.7
Unbalanced Force	lbf	84.51	296.1	220.6	221.3	222.3
Min Air Required	lbf/in2	10.87	9.36	33.9	33.89	33.88
Min Spring Setting	lbf/in2	8.46	5.59	5.05	5.05	5.06
Stem Stress	lbf/in2	726.39	995.79	899.7	900.5	901.8
Stability	1/16 inch			0.11	0.11	0.12
Mod. Stability	Ratio			2.87	2.87	2.85

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	44	57	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518053	50-LV-5014

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 40	Hydro Test Pressure	1100 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	8.00 inch / 30	Seat Lk @60psi	445 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.44 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	4 x 4 x 4 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	155	Trim Size Ref.	4
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <10 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	44	57	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518053	50-LV-5014

Valve Design Details

Valve	Series 1200 Globe	Design CV	155
Valve Size (in x cm x out)	4 x 4 x 4 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	4.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	8.00 inch / 30

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	48487	40406	20203
Inlet Pressure	bar	6.53	6.54	6.56
Outlet Pressure	bar	3.91	3.91	3.91
Pressure Drop	bar	2.62	2.63	2.65
Inlet Temperature	°C	12	12	12
Specific Gravity		0.624	0.624	0.624
Vapour Pressure	bar	6.5	6.5	6.5
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.2	0.2	0.2

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	96.33	79.45	38.83
Valve Opening	%	57	48	26.7
Pressure Recovery Factor		0.953	0.955	0.961
Cavitation Index		N/A	N/A	N/A
Fluid State		FLASHING	FLASHING	FLASHING
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.7	2.3	1.1
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0124	0.0103	0.0051
Trim Exit Velocity	m/sec	11.044	11.159	11.416
Min DP 100% Open		0.211	0.147	0.037
Max Flow 100% Open		78021.9	78831.8	80646.5

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	2.62	2.63	2.65
Cavitation Index	1	N/A	N/A	N/A

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
385.67 lbf	613.55 lbf	2.25 in	2.81 in	11.98 in ²	12.57 in ²	0.44 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Stability	1/16 inch			0.01	0.01	0.01
Mod. Stability	Ratio			29.32	29.32	29.32
Inlet Pressure	bar	26	26	6.53	6.54	6.56
Outlet Pressure	bar	1	1	3.91	3.91	3.91
Unbalanced Force	lbf	217.99	6.41	25.05	25.05	25.05
Min Air Required	lbf/in2	9.2	10.71	34.58	34.58	34.58
Min Spring Setting	lbf/in2	8.69	2.8	2.93	2.93	2.93
Stem Stress	lbf/in2	1,366.40	887.47	929.7	929.7	929.7

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	45	58	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518054	50-LV-5015

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1100 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40	Seat Lk @60psi	14 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.01 ltr/min
Line Fluid				ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	GR.6 STELLITE	Guide Finish/Overlay	None
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	5	Trim Size Ref.	1/2
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.
- VAPOR PRESSURE MUST BE LESS THAN THE INLET PRESSURE HENCE WE HAVE ASSUMED ACCORDINGLY.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	45	58	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518054	50-LV-5015

Valve Design Details

Valve	Series 10 Globe	Design CV	5
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	1155.42	962.36	481.18
Gas Flow Rate	kg/hour	23.58	19.64	9.82
Inlet Pressure	bar	5.84	5.83	5.83
Outlet Pressure	bar	3.68	3.68	3.68
Pressure Drop	bar	2.16	2.15	2.15
Inlet Temperature	°C	12	12	12
Outlet Temperature	°C	12	12	12
Specific Gravity		0.624	0.624	0.624
Vapour Pressure	bar	5	5	5
Critical Pressure		221	221	221
Molecular Weight		13.05	13.05	13.05
Ratio Of Specific Heats		1.35	1.35	1.35
Compressibility		0.98	0.98	0.98

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	3.362	2.803	1.397
Valve Opening	%	61	51.9	29.1
Pressure Recovery Factor		0.907	0.909	0.932
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dba	70	70	70
Liquid Phase Vel (Inlet)	m/sec	2.9	2.4	1.2
Liquid Phase Vel (Outlet)	m/sec	3.5	2.9	1.5
Gas Phase Vel (Inlet)	m/sec	6.4	5.3	2.7
Gas Phase Vel (Outlet)	m/sec	9.2	7.7	3.8
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0008	0.0007	0.0003

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	46.89 lbf	1.125 in	2.12 in	0.28 in ²	0.00 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	5.84	5.83	5.83
Outlet Pressure	bar	1	1	3.68	3.68	3.68
Unbalanced Force	lbf	103.07	103.07	14.66	14.62	14.62
Min Air Required	lbf/in ²	5.81	5.81	31.08	31.08	31.08
Min Spring Setting	lbf/in ²	3.43	2.76	1.5	1.49	1.49
Stem Stress	lbf/in ²	1,748.12	1,748.12	947.6	947.3	947.3
Stability	1/16 inch			0	0	0
Mod. Stability	Ratio			22.51	22.57	22.57

CONTROL VALVE TECHNICAL SPECIFICATION



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KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	46	59	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518055	50-LV-5017

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	216.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 160	Hydro Test Pressure	5575 psig
Shut Off Pressure	216.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 160	Seat Lk @60psi	2.16 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 1500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finish	H - CLA 63 u in
V.6	Inlet Rating	ANSI 1500	Outlet Rating	ANSI 1500
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	3S Mspline	No. of Stages	3
T.2	Guide Bush Material	None	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Fully Stelited
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Fully Stelited
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	0.75	Trim Size Ref.	No 1
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.93 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS
I.7	Limit Switch (Qty: 2)	P&F (Rotex Enclosure)	Limit Switch Model	DXLW3A2-3M

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	46	59	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518055	50-LV-5017

Valve Design Details

Valve	Series 10 Globe	Design CV	0.75
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	216.00 bar
Body Rating	ANSI 1500	Line Fluid	PROCESS CONDENSATE
Trim Design	3S Mspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	2.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 160

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	4000	288
Inlet Pressure	bar	185.45	185.45
Outlet Pressure	bar	32.26	32.18
Pressure Drop	bar	153.19	153.27
Inlet Temperature	°C	16	16
Specific Gravity		1.002	1.002
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	1.1	1.1

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	0.3745	0.027
Valve Opening	%	71.6	13.8
Pressure Recovery Factor		0.95	0.986
Cavitation Index		-24.3	-27.87
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	2.3	0.2
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.017	0.0012
Trim Exit Velocity	m/sec	56.344	56.362
Min DP 100% Open		38.2	0.198
Max Flow 100% Open		8009.8	8012.5

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	84.3	84.3
Cavitation Index	1	-74.7	-86.9
Pressure Drop	2	46	46
Cavitation Index	2	-40.7	-47.3
Pressure Drop	3	23	23
Cavitation Index	3	-24.3	-27.9

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	78.54 lbf	1.125 in	2.12 in	0.79 in²	0.00 in²	0.11 in²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	216	216	185.4	185.4
Outlet Pressure	bar	1	1	32.26	32.18
Unbalanced Force	lbf	-2,102.56	-2,102.56	-1448	-1448
Min Air Required	lbf/in2	37.32	37.32	51.97	51.98
Min Spring Setting	lbf/in2	-27.63	-28.75	-19.39	-19.41
Stem Stress	lbf/in2	19,851.76	19,851.76	13920	13930
Stability	1/16 inch			-0.2	-0.2
Mod. Stability	Ratio			-2.43	-2.42

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
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 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	47	60	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518056	50-LV-5018

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	3.00 inch / 40	Hydro Test Pressure	1100 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @60psi	34 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.03 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1.5 x 1.5 x 1.5 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	12	Trim Size Ref.	1
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-J00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <10 SEC.

DESIGN CALCULATIONS



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 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	47	60	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518056	50-LV-5018

Valve Design Details

Valve	Series 1200 Globe	Design CV	12
Valve Size (in x cm x out)	1.5 x 1.5 x 1.5 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	3.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	12928	10773	5386
Inlet Pressure	bar	19.43	19.47	19.53
Outlet Pressure	bar	6.6	6.5	6.6
Pressure Drop	bar	12.83	12.97	12.93
Inlet Temperature	°C	27	27	27
Specific Gravity		0.6	0.6	0.6
Vapour Pressure	bar	10.7	10.7	10.7
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.1	0.1	0.1

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	6.364	5.257	2.615
Valve Opening	%	67.2	59.9	39.7
Pressure Recovery Factor		0.975	0.98	0.98
Cavitation Index		N/A	N/A	N/A
Fluid State		FLASHING	FLASHING	FLASHING
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	4.8	4	2
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0091	0.0076	0.0038
Trim Exit Velocity	m/sec	21.071	21.254	21.367
Min DP 100% Open		2.603	1.807	0.452
Max Flow 100% Open		24378.2	24590	24720.6

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	10.3	10.4	10.3
Cavitation Index	1	N/A	N/A	N/A
Pressure Drop	2	2.57	2.59	2.59
Cavitation Index	2	N/A	N/A	N/A

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
221.83 lbf	147.26 lbf	1.125 in	2.12 in	0.69 in ²	0.79 in ²	0.20 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	19.43	19.47	19.53
Outlet Pressure	bar	1	1	6.6	6.5	6.6
Unbalanced Force	lbf	39.55	74.02	55.32	55.43	55.6
Min Air Required	lbf/in ²	10.6	10.11	34.38	34.38	34.37
Min Spring Setting	lbf/in ²	5.84	4.23	3.96	3.96	3.96
Stem Stress	lbf/in ²	1,331.18	1,506.77	1412	1412	1413
Stability	1/16 inch			0.02	0.02	0.02
Mod. Stability	Ratio			6.11	6.1	6.08

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
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 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	48	61	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518057	50-LV-5022A

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	31.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	31.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @60psi	1221 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		1.22 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	425	Trim Size Ref.	6
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-J00SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <12 SEC.

DESIGN CALCULATIONS



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KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	48	61	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518057	50-LV-5022A

Valve Design Details

Valve	Series 1200 Globe	Design CV	425
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	31.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	110244	91870	45935
Inlet Pressure	bar	25.75	25.78	25.84
Outlet Pressure	bar	25.37	25.26	24.84
Pressure Drop	bar	0.38	0.52	1
Inlet Temperature	°C	1	1	1
Specific Gravity		0.627	0.627	0.627
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.2	0.2	0.2

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	262	186.6	67.29
Valve Opening	%	56.7	42.4	19
Pressure Recovery Factor		0.953	0.956	0.963
Cavitation Index		-21.75	-21.78	-21.68
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.8	2.3	1.2
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0019	0.0021	0.002
Trim Exit Velocity	m/sec	9.188	10.748	14.906
Min DP 100% Open		0.144	0.1	0.025
Max Flow 100% Open		178828.4	209197.4	290110.5

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.38	0.52	1
Cavitation Index	1	-21.8	-21.8	-21.7

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
541.79 lbf	927.71 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	31	31	25.75	25.78	25.84
Outlet Pressure	bar	1	1	25.37	25.26	24.84
Unbalanced Force	lbf	393.75	11.39	288.9	287.7	282.9
Min Air Required	lbf/in2	9.06	11.79	33.81	33.82	33.85
Min Spring Setting	lbf/in2	13.31	3.95	5.93	5.92	5.89
Stem Stress	lbf/in2	1,191.16	704.33	1058	1056	1050
Stability	1/16 inch			0.37	0.37	0.37
Mod. Stability	Ratio			2	2.01	2.04

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	49	62	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518058	50-LV-5022B

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	31.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 40	Hydro Test Pressure	1100 psig
Shut Off Pressure	31.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	18.00 inch / XS	Seat Lk @ 31 bar	0.88 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-3	No. of Stages	3
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	50	Trim Size Ref.	4
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-H00SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <20 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	49	62	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518058	50-LV-5022B

Valve Design Details

Valve	Series 1200 Globe	Design CV	50
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	31.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HFL-3	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	18.00 inch / XS

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	110328	91940	45970
Inlet Pressure	bar	25.81	25.82	25.84
Outlet Pressure	bar	1.61	1.61	1.61
Pressure Drop	bar	24.2	24.21	24.23
Inlet Temperature	°C	1	1	1
Specific Gravity		0.627	0.627	0.627
Vapour Pressure	bar	3.9	3.9	3.9
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.2	0.2	0.2

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	35.27	29.38	14.57
Valve Opening	%	80.3	71.5	47.6
Pressure Recovery Factor		0.972	0.973	0.98
Cavitation Index		N/A	N/A	N/A
Fluid State		FLASHING	FLASHING	FLASHING
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.8	2.3	1.2
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.1273	0.1061	0.0527
Trim Exit Velocity	m/sec	14.851	14.855	14.976
Min DP 100% Open		10.45	7.256	1.814
Max Flow 100% Open		156425.7	156465.2	157742.8

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	18.4	18.4	18.4
Cavitation Index	1	N/A	N/A	N/A
Pressure Drop	2	4.6	4.6	4.6
Cavitation Index	2	N/A	N/A	N/A
Pressure Drop	3	1.21	1.21	1.21
Cavitation Index	3	N/A	N/A	N/A

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
494.97 lbf	1,502.90 lbf	3.5 in	3.56 in	11.98 in²	12.57 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	31	31	25.81	25.82	25.84
Outlet Pressure	bar	1	1	1.61	1.61	1.61
Unbalanced Force	lbf	99.14	353.04	293.9	294.1	294.3
Min Air Required	lbf/in2	10.83	9.01	33.44	33.44	33.43
Min Spring Setting	lbf/in2	14.98	6.06	5.63	5.64	5.64
Stem Stress	lbf/in2	756.43	1,079.71	1004	1005	1005
Stability	1/16 inch			0.37	0.37	0.37
Mod. Stability	Ratio			2.13	2.13	2.12

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	50	63	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518059	50-LV-5023

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 40	Hydro Test Pressure	1050 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @ 26 bar	1.11 cc/min
Max/Min Temp	85.0°C / -33.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A352 LCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A352 LCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A320 L7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	425	Trim Size Ref.	6
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-H00SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.29 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <12 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	50	63	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518059	50-LV-5023

Valve Design Details

Valve	Series 1200 Globe	Design CV	425
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	110040	91700	45850
Inlet Pressure	bar	6.77	6.78	6.79
Outlet Pressure	bar	6.44	6.3	6.06
Pressure Drop	bar	0.33	0.48	0.73
Inlet Temperature	°C	-33	-33	-33
Specific Gravity		0.681	0.681	0.681
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.3	0.3	0.3

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	269.3	186.1	75.43
Valve Opening	%	58	42.3	20.6
Pressure Recovery Factor		0.952	0.956	0.963
Cavitation Index		-5.41	-5.32	-5.16
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.5	2.1	1.1
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0015	0.0018	0.0014
Trim Exit Velocity	m/sec	8.216	9.909	12.22
Min DP 100% Open		0.132	0.092	0.023
Max Flow 100% Open		173676.2	209466.7	258323.7

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.33	0.48	0.73
Cavitation Index	1	-5.41	-5.32	-5.16

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
889.01 lbf	2,205.17 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	6.77	6.78	6.79
Outlet Pressure	bar	1	1	6.44	6.3	6.06
Unbalanced Force	lbf	330.02	11.39	73.34	71.75	69.01
Min Air Required	lbf/in2	21.86	22.93	42.72	42.72	42.73
Min Spring Setting	lbf/in2	11.41	3	3.21	3.2	3.19
Stem Stress	lbf/in2	1,552.12	1,146.43	1225	1223	1220
Stability	1/16 inch			0.02	0.02	0.02
Mod. Stability	Ratio			69.69	71.24	74.06

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	51	64	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518060	50-LV-5032

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1100 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	3.00 inch / 40	Seat Lk @60psi	14 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.01 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	5	Trim Size Ref.	3/4
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	51	64	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518060	50-LV-5032

Valve Design Details

Valve	Series 1200 Globe	Design CV	5
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	3.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	3507	2922	1461
Inlet Pressure	bar	19.51	19.51	19.52
Outlet Pressure	bar	4	4	4
Pressure Drop	bar	15.51	15.51	15.52
Inlet Temperature	°C	46	46	46
Specific Gravity		0.568	0.568	0.568
Vapour Pressure	bar	19	19	19
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.1	0.1	0.1

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	3.396	2.817	1.391
Valve Opening	%	61.6	52.1	29
Pressure Recovery Factor		0.952	0.954	0.96
Cavitation Index		N/A	N/A	N/A
Fluid State		FLASHING	FLASHING	FLASHING
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	3.5	2.9	1.5
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0066	0.0055	0.0027
Trim Exit Velocity	m/sec	21.896	22.002	22.314
Min DP 100% Open		1.165	0.809	0.202
Max Flow 100% Open		5164.1	5186.1	5250.8

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	15.5	15.5	15.5
Cavitation Index	1	N/A	N/A	N/A

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
105.88 lbf	54.00 lbf	1.125 in	2.12 in	0.37 in ²	0.44 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	19.51	19.51	19.52
Outlet Pressure	bar	1	1	4	4	4
Unbalanced Force	lbf	27.18	1.6	6.41	6.41	6.41
Min Air Required	lbf/in ²	7.12	7.49	31.42	31.42	31.42
Min Spring Setting	lbf/in ²	2.67	1.54	1.6	1.6	1.6
Stem Stress	lbf/in ²	1,204.72	973.12	1017	1017	1017
Stability	1/16 inch			0.01	0.01	0.01
Mod. Stability	Ratio			49.04	49.04	49.04

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	52	65	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518061	50-LV-5033

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1050 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40	Seat Lk @60psi	8.62 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.01 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A352 LCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A352 LCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A320 L7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Microspline	No. of Stages	1
T.2	Guide Bush Material	NONE	Guide Finish/Overlay	None
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	3	Trim Size Ref.	No 00
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	52	65	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518061	50-LV-5033

Valve Design Details

Valve	Series 10 Globe	Design CV	3
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	Microspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	3217	2681	1340
Inlet Pressure	bar	18.21	18.22	18.22
Outlet Pressure	bar	6.61	6.6	6.59
Pressure Drop	bar	11.6	11.62	11.63
Inlet Temperature	°C	1	1	1
Specific Gravity		0.639	0.639	0.639
Vapour Pressure	bar	4.5	4.5	4.5
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.2	0.2	0.2

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	1.372	1.142	0.5703
Valve Opening	%	61.4	55.8	36.3
Pressure Recovery Factor		0.953	0.955	0.963
Cavitation Index		-0.23	-0.27	-0.46
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	2.8	2.4	1.2
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0016	0.0014	0.0007
Trim Exit Velocity	m/sec	50.241	50.299	50.346
Min DP 100% Open		2.421	1.682	0.42
Max Flow 100% Open		7034.4	7042.5	7049.1

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	11.6	11.6	11.6
Cavitation Index	1	-0.23	-0.27	-0.46

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	58.90 lbf	1.125 in	2.12 in	0.44 in ²	0.00 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	18.21	18.22	18.22
Outlet Pressure	bar	1	1	6.61	6.6	6.59
Unbalanced Force	lbf	-118.51	-118.51	-45.15	-45.26	-45.32
Min Air Required	lbf/in ²	8.98	8.98	31.93	31.93	31.93
Min Spring Setting	lbf/in ²	0.43	-0.41	0.64	0.64	0.64
Stem Stress	lbf/in ²	1,887.87	1,887.87	1224	1225	1225
Stability	1/16 inch			-0.03	-0.03	-0.03
Mod. Stability	Ratio			-7.31	-7.29	-7.28

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	53	66	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518062	50-LV-5041

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	137.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 160	Hydro Test Pressure	3350 psig
Shut Off Pressure	137.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 160	Seat Lk @60psi	4.31 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0 ltr/min
Line Fluid	AMMONIA WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 900
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finish	H - CLA 63 u in
V.6	Inlet Rating	ANSI 900	Outlet Rating	ANSI 900
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Microspline	No. of Stages	1
T.2	Guide Bush Material	None	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	1.5	Trim Size Ref.	No 0
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B0ASCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.
- Max. adjustable mechanical Limit stopper to be provided at given design CV. (CV value shall be confirm by PIDECE).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	53	66	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518062	50-LV-5041

Valve Design Details

Valve	Series 10 Globe	Design CV	1.5
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	137.00 bar
Body Rating	ANSI 900	Line Fluid	AMMONIA WATER
Trim Design	Microspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	2.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 160

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	5800	4406
Inlet Pressure	bar	123.83	123.86
Outlet Pressure	bar	27.44	27.37
Pressure Drop	bar	96.39	96.49
Inlet Temperature	°C	35	35
Specific Gravity		0.888	0.888
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.5	0.5

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	0.7274	0.5522
Valve Opening	%	70.4	60.7
Pressure Recovery Factor		0.95	0.953
Cavitation Index		-9.69	-10.29
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	3.7	2.8
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.0175	0.0133
Trim Exit Velocity	m/sec	122.939	123.017
Min DP 100% Open		22.66	13.07
Max Flow 100% Open		11960.2	11967.8

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	96.4	96.5
Cavitation Index	1	-9.69	-10.3

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	49.09 lbf	1.125 in	2.12 in	0.31 in ²	0.00 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	137	137	123.8	123.9
Outlet Pressure	bar	1	1	27.44	27.37
Unbalanced Force	lbf	-385.6	-385.6	-230.5	-230.9
Min Air Required	lbf/in ²	12.79	12.79	34.58	34.58
Min Spring Setting	lbf/in ²	-3.52	-4.22	-2.01	-2.01
Stem Stress	lbf/in ²	4,306.15	4,306.15	2902	2905
Stability	1/16 inch			-0.06	-0.06
Mod. Stability	Ratio			-15.24	-15.21

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	54	67	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518063	50-LV-5044

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	41.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	41.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40	Seat Lk @60psi	37 cc/min
Max/Min Temp	120.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.04 ltr/min
Line Fluid	AMMONIA WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	13	Trim Size Ref.	1
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B0ASCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.
- Max. adjustable mechanical Limit Stopper to be provided at given design CV. (CV value shall be confirm by PIDECE).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	54	67	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518063	50-LV-5044

Valve Design Details

Valve	Series 1200 Globe	Design CV	13
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	41.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA WATER
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	3400	2551
Inlet Pressure	bar	27.81	27.82
Outlet Pressure	bar	27.43	27.36
Pressure Drop	bar	0.38	0.46
Inlet Temperature	°C	86	86
Specific Gravity		0.874	0.874
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.3	0.3

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	7.013	4.72
Valve Opening	%	50	36.1
Pressure Recovery Factor		0.954	0.958
Cavitation Index		-23.58	-23.71
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	2.2	1.7
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0	0
Trim Exit Velocity	m/sec	7.594	8.467
Min DP 100% Open		0.105	0.059
Max Flow 100% Open		6302.5	7026.6

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	0.38	0.46
Cavitation Index	1	-23.6	-23.7

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
117.90 lbf	73.63 lbf	1.125 in	2.12 in	0.69 in ²	0.79 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	41	41	27.81	27.82
Outlet Pressure	bar	1	1	27.43	27.36
Unbalanced Force	lbf	56.76	1.6	43.93	43.82
Min Air Required	lbf/in ²	6.87	7.66	31.06	31.06
Min Spring Setting	lbf/in ²	3.55	1.71	2.31	2.31
Stem Stress	lbf/in ²	1,581.40	1,081.95	1465	1464
Stability	1/16 inch			0.03	0.03
Mod. Stability	Ratio			6.88	6.89

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	55	68	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518064	50-LV-5050

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	49.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 80	Hydro Test Pressure	2250 psig
Shut Off Pressure	49.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	4.00 inch / 80	Seat Lk @60psi	17 cc/min
Max/Min Temp	265.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.02 ltr/min
Line Fluid	STEAM CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A217 WC9	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1.5 x 1.5 x 1.5 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A217 WC9	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B16
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	6	Trim Size Ref.	1
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-N00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.75-1.5 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	55	68	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518064	50-LV-5050

Valve Design Details

Valve	Series 1200 Globe	Design CV	6
Valve Size (in x cm x out)	1.5 x 1.5 x 1.5 inch	Shut Off Pressure	49.00 bar
Body Rating	ANSI 600	Line Fluid	STEAM CONDENSATE
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	4.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	4450	3395
Inlet Pressure	bar	44.26	44.27
Outlet Pressure	bar	4.07	4
Pressure Drop	bar	40.19	40.27
Inlet Temperature	°C	256	256
Specific Gravity		0.923	0.923
Vapour Pressure	bar	44	44
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.1	0.1

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	2	1.525
Valve Opening	%	51.3	44.3
Pressure Recovery Factor		0.98	0.98
Cavitation Index		N/A	N/A
Fluid State		FLASHING	FLASHING
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	1.1	0.8
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.0127	0.0097
Trim Exit Velocity	m/sec	15.002	15.013
Min DP 100% Open		0.802	0.467
Max Flow 100% Open		13350	13359.7

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	32.2	32.2
Cavitation Index	1	N/A	N/A
Pressure Drop	2	8.04	8.05
Cavitation Index	2	N/A	N/A

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	147.26 lbf	1.125 in	2.12 in	0.69 in ²	0.79 in ²	0.20 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	49	49	44.26	44.27
Outlet Pressure	bar	1	1	4.07	4
Unbalanced Force	lbf	497.61	549.48	469.3	470
Min Air Required	lbf/in ²	6.76	6.02	18.16	18.15
Min Spring Setting	lbf/in ²	12.08	10.72	9.57	9.58
Stem Stress	lbf/in ²	3,556.28	3,820.45	3412	3416
Stability	1/16 inch			0.51	0.51
Mod. Stability	Ratio			1.21	1.21

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	56	69	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518065	50-LV-5053

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	36.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	36.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40	Seat Lk @60psi	5.75 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.01 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	316L St.St.	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	2	Trim Size Ref.	1/4
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	56	69	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518065	50-LV-5053

Valve Design Details

Valve	Series 10 Globe	Design CV	2
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	36.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	1350	1005
Inlet Pressure	bar	28.16	28.16
Outlet Pressure	bar	25.83	25.82
Pressure Drop	bar	2.33	2.34
Inlet Temperature	°C	49	49
Specific Gravity		0.562	0.562
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.1	0.1

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	1.37	1.017
Valve Opening	%	62.1	47.8
Pressure Recovery Factor		0.906	0.912
Cavitation Index		-14.94	-15.16
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	1.4	1
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.0002	0.0001
Trim Exit Velocity	m/sec	26.677	26.746
Min DP 100% Open		1.091	0.605
Max Flow 100% Open		1971.1	1976.1

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	2.33	2.34
Cavitation Index	1	-14.9	-15.2

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	26.62 lbf	1.125 in	2.12 in	0.09 in ²	0.00 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	36	36	28.16	28.16
Outlet Pressure	bar	1	1	25.83	25.82
Unbalanced Force	lbf	47.41	47.41	44.42	44.41
Min Air Required	lbf/in ²	6.61	6.61	30.65	30.65
Min Spring Setting	lbf/in ²	2.34	1.96	1.92	1.92
Stem Stress	lbf/in ²	1,244.11	1,244.11	1217	1217
Stability	1/16 inch			-0.01	-0.01
Mod. Stability	Ratio			7.43	7.43

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	57	70	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518066	50-PV-5012

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	216.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 160	Hydro Test Pressure	5575 psig
Shut Off Pressure	216.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 160	Seat Lk @60psi	4.31 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0 ltr/min
Line Fluid	SYNTHESIS GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	2 x 2 x 2 inch	Body Rating	ANSI 1500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finish	H - CLA 63 u in
V.6	Inlet Rating	ANSI 1500	Outlet Rating	ANSI 1500
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	5S Mspline	No. of Stages	5
T.2	Guide Bush Material	None	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	1.5	Trim Size Ref.	No 0
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	0.5 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-XS0SCP1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	57	70	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518066	50-PV-5012

Valve Design Details

Valve	Series 10 Globe	Design CV	1.5
Valve Size (in x cm x out)	2 x 2 x 2 inch	Shut Off Pressure	216.00 bar
Body Rating	ANSI 1500	Line Fluid	SYNTHESIS GAS
Trim Design	5S Mspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	2.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 160

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	Nm³/hour	3606	3005	1502
Inlet Pressure	bar	183.83	183.88	183.97
Outlet Pressure	bar	53.3	53	52.5
Pressure Drop	bar	130.53	130.88	131.47
Inlet Temperature	°C	39	39	39
Outlet Temperature	°C	39	39	39
Molecular Weight		10.08	10.08	10.08
Ratio Of Specific Heats		1.4	1.4	1.4
Compressibility		1.09	1.09	1.09

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.5	1.5	1.5
Inlet Spec Volume	m³/kg	0.0153	0.0153	0.0152
Calculated CV	US Units	0.9469	0.7889	0.3899
Valve Opening	%	80.7	73.8	50
Gas Recovery Factor		0.75	0.75	0.766
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	3.9	3.2	1.6
Body Outlet Velocity	m/sec	13.4	11.2	5.7
Body Outlet Mach No.		0.0201	0.0169	0.0085
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	13.4	11.2	5.7
Sys. Outlet Mach No.		0.0223	0.0187	0.0094
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.1318	0.1102	0.0555
Velocity Head	bar	4.384	4.411	4.554
Specific Volume In	m³/kg	0.0153	0.0153	0.0152
Specific Volume Out	m³/kg	0.0526	0.0529	0.0534
Min DP 100% Open		52.01	36.2	8.884
Max Flow 100% Open		5712.5	5713.7	5778.2

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
200.66 lbf	157.08 lbf	1.125 in	2.12 in	0.79 in²	0.00 in²	0.20 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	216	216	183.8	183.9	184
Outlet Pressure	bar	1	1	53.3	53	52.5
Unbalanced Force	lbf	-1,833.51	-1,833.51	-963.1	-967	-973.4
Min Air Required	lbf/in2	20.53	20.53	38.31	38.34	38.39
Min Spring Setting	lbf/in2	-10.54	-11.66	-5.45	-5.47	-5.52
Stem Stress	lbf/in2	10,359.95	10,359.95	5927	5947	5980
Stability	1/16 inch			-0.09	-0.09	-0.09
Mod. Stability	Ratio			-7.27	-7.24	-7.19

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	58	71	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518067	50-PV-5021

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	31.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	31.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40	Seat Lk @60psi	23 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.02 ltr/min
Line Fluid	AMMONIA GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	Gr.6 Stellite	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	8	Trim Size Ref.	3/4
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B0ASCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.
- Max. adjustable mechanical Limit stopper to be provided at given design CV. (CV value shall be confirm by PIDECE).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	58	71	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518067	50-PV-5021

Valve Design Details

Valve	Series 10 Globe	Design CV	8
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	31.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA GAS
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM
Gas Flow Rate	Nm³/hour	2500	1231
Inlet Pressure	bar	25.9	25.98
Outlet Pressure	bar	18.1	18.3
Pressure Drop	bar	7.8	7.68
Inlet Temperature	°C	0	0
Outlet Temperature	°C	0	0
Molecular Weight		13.05	13.05
Ratio Of Specific Heats		1.35	1.35
Compressibility		0.98	0.98

Calculated Values

Description	UOM	MAX	NORM
Expansion Factor		1.2	1.2
Inlet Spec Volume	m³/kg	0.0658	0.0656
Calculated CV	US Units	5.871	2.838
Valve Opening	%	66.4	35.4
Gas Recovery Factor		0.676	0.71
Fluid State		Normal	Normal
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	52.5	25.8
Body Outlet Velocity	m/sec	75.1	36.6
Body Outlet Mach No.		0.1601	0.078
Mach No. Condition		OK	OK
Sys. Outlet Velocity	m/sec	75.1	36.6
Sys. Outlet Mach No.		0.1551	0.0755
Sys Mach No. Condition		OK	OK
Pipework Correction Factor		1	1
Energy Conversion	MW	0.0236	0.0114
Velocity Head	bar	7.728	7.93
Specific Volume In	m³/kg	0.0658	0.0656
Specific Volume Out	m³/kg	0.0942	0.0931
Min DP 100% Open		4.058	0.9587
Max Flow 100% Open		3406.8	3470

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	63.93 lbf	1.125 in	2.12 in	0.52 in²	0.00 in²	0.11 in²			

Description	UOM	Closed	Cracked	MAX	NORM
Stability	1/16 inch			0.12	0.12
Mod. Stability	Ratio			3.76	3.78
Inlet Pressure	bar	31	31	25.9	25.98
Outlet Pressure	bar	1	1	18.1	18.3
Unbalanced Force	lbf	227.98	227.98	87.84	87.26
Min Air Required	lbf/in2	4.03	4.03	30.03	30.04
Min Spring Setting	lbf/in2	5.46	4.54	2.54	2.53
Stem Stress	lbf/in2	2,879.00	2,879.00	1610	1605

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	59	72	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518068	50-PV-5023

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 40	Hydro Test Pressure	1050 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @ 26 bar	1.11 cc/min
Max/Min Temp	85.0°C / -33.0°C	Industrial Specification	Standard	PED Category	III		
Line Fluid	AMMONIA GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A352 LCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A352 LCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A320 L7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	155	Trim Size Ref.	6
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-HS0SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <12 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	59	72	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518068	50-PV-5023

Valve Design Details

Valve	Series 1200 Globe	Design CV	155
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA GAS
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	MAX
Gas Flow Rate	Nm³/hour	2500
Inlet Pressure	bar	1.5
Outlet Pressure	bar	1
Pressure Drop	bar	0.5
Inlet Temperature	°C	-33
Outlet Temperature	°C	-33
Molecular Weight		17.02
Ratio Of Specific Heats		1.29
Compressibility		0.975

Calculated Values

Description	UOM	MAX
Expansion Factor		1.2
Inlet Spec Volume	m³/kg	0.762
Calculated CV	US Units	101.8
Valve Opening	%	59.7
Gas Recovery Factor		0.753
Fluid State		Normal
Predicted Noise Level	dBA	70
Body Inlet Velocity	m/sec	22
Body Outlet Velocity	m/sec	33
Body Outlet Mach No.		0.0877
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	33
Sys. Outlet Mach No.		0.085
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	0.0234
Velocity Head	bar	0.353
Specific Volume In	m³/kg	0.762
Specific Volume Out	m³/kg	1.1431
Min DP 100% Open		0.2156
Max Flow 100% Open		3807.5

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
889.01 lbf	2,205.17 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	26	26	1.5
Outlet Pressure	bar	1	1	1
Unbalanced Force	lbf	-22.54	296.1	17.08
Min Air Required	lbf/in2	18.51	16.24	34.23
Min Spring Setting	lbf/in2	21.94	8.47	6.47
Stem Stress	lbf/in2	1,160.62	1,508.93	1154
Stability	1/16 inch			0.01
Mod. Stability	Ratio			46.3

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	60	73	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518069	50-PV-5032

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40	Seat Lk @60psi	37 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.04 ltr/min
Line Fluid	AMMONIA GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	13	Trim Size Ref.	1
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-J00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	60	73	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518069	50-PV-5032

Valve Design Details

Valve	Series 1200 Globe	Design CV	13
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA GAS
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	Nm³/hour	390	325	271
Inlet Pressure	bar	18.7	18.7	18.7
Outlet Pressure	bar	18.4	18.4	18.4
Pressure Drop	bar	0.3	0.3	0.3
Inlet Temperature	°C	1	1	1
Outlet Temperature	°C	1	1	1
Molecular Weight		16.58	16.58	16.58
Ratio Of Specific Heats		1.31	1.31	1.31
Compressibility		0.96	0.96	0.96

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1	1	1
Inlet Spec Volume	m³/kg	0.0705	0.0705	0.0705
Calculated CV	US Units	5.262	4.366	3.63
Valve Opening	%	63.7	57.6	51.9
Gas Recovery Factor		0.752	0.755	0.757
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	11.2	9.3	7.8
Body Outlet Velocity	m/sec	11.3	9.4	7.9
Body Outlet Mach No.		0.0276	0.023	0.0192
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	11.3	9.4	7.9
Sys. Outlet Mach No.		0.0267	0.0223	0.0186
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0002	0.0001	0.0001
Velocity Head	bar	0.191	0.193	0.194
Specific Volume In	m³/kg	0.0705	0.0705	0.0705
Specific Volume Out	m³/kg	0.0717	0.0717	0.0717
Min DP 100% Open		0.0478	0.0332	0.0231
Max Flow 100% Open		963.4	967.6	970.5

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
111.17 lbf	73.63 lbf	1.125 in	2.12 in	0.69 in²	0.79 in²	0.11 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	26	26	18.7	18.7	18.7
Outlet Pressure	bar	1	1	18.4	18.4	18.4
Unbalanced Force	lbf	7.16	41.64	29.95	29.95	29.95
Min Air Required	lbf/in2	7.49	6.99	31.16	31.16	31.16
Min Spring Setting	lbf/in2	2.74	2.18	2.02	2.02	2.02
Stem Stress	lbf/in2	1,071.39	1,383.54	1278	1278	1278
Stability	1/16 inch			0.01	0.01	0.01
Mod. Stability	Ratio			10.31	10.31	10.31

CONTROL VALVE DATA SHEET



PROJECT	HENGAM FERTILIZER PROJECT		DATA SHEET	1	OF	1
CUSTOMER	PIDEC		SO No.	5200000518		
P.O.	1208-00-IN-POR-605		TAG #	50-PV-5042		
INQUIRY	Email	REV	DATE	19-Jun-18	ITEM #	73
PROPOSAL	QNE002377	REV	DATE	20-Jul-18	QTY	1
SERVICE	SG FROM 50-T-551		Sl. No.	SN520000518070		

1	SERVICE CONDITIONS	Fluid	Gas - Synthesis Gas		Crit Press, Pc	barA	Crit Temp, Tc	deg C
			Units	Max Flow	Normal flow			
		Gas Volume Flow Rate	Nm3/h	30558	23506			
		Inlet Pressure	barA	123.2	123.4			
		Outlet Pressure	barA	1.4	1.3			
		Inlet Temperature	deg C	40	40			
		Molecular Weight		10.27	10.27			
		Ratio of Specific Heat		1.4	1.4			
		Compressibility Factor		1.07	1.07			
		Flow Coefficient	Cv	10.28	7.9			
		Travel	%	80	63			
		Predicted SPL	dBA	75	75			
Number of Stages Needed		22	22					
13	LINE		INLET	OUTLET				
		Pipe Size / Sch	in. 3 / Sch 80	16 / Sch 120				
		Pipe Material	API 5L GR.B SMLS	API 5L GR.B SMLS				
		Pipe Line Insulation	N/A					
		Valve Size	in. 3	3				
		Design Press	barA 137	137				
		Max Design T	deg C 85	85				
		Rating(s)	ASME 900	900				
		Connections	RTJ Flange	RTJ Flange				
		End Extension	N/A	3"x16"				
		End Material	N/A	A105				
		Body Type	Globe					
Mfr & Model	KOSO	& 530D						
Body/Bnt Mat'l	A216-WCB	/ A216-WCB						
Flow Direction	Flow to Open (FTO)							
Type of Bonnet	Bolted-Standard							
Lube & Iso Valve	No	Lube No						
Pkg Type / Mat'l	Standard	/ Teflon						
Type	VECTOR Multi-Path, Multi-Stage							
Number of Pressure Reducing Stages	22							
Nominal Size / Travel	in. 1.5	/ 90mm						
Characteristic	Linear							
Balanced/Unbalanced	Balanced							
Rated Cv	13.1	FL 1 XT 1						
Plug / Ball /Disk Mat'l	316SS,Stellited							
Seat Material	316SS,Stellited							
Cage / Stack / Guide Mat'l	316SS							
Stem Material	17-4PH							
Elect. Cert.	IP-65							
Position Feedback	Yes Built-In Positioner							
I-P Transducer	Yes Built-In Positioner							
Solenoid Valve(s)	N/A							
KOSO Standard Painting is applicable.			Rev	Date	Description	Orig	App	
KOSO Standard ITP is applicable.			0	15-May-18	Released			
316SS Tubing & Fittings-Swagelok, Tubing standard -Imperial,Tubing size 1/2" NPT.			1	22-May-18	Line 10,32,35 updated			
1 Qty Volume Booster - KKI Series 1000, 1/4" AI MOC			2	22-Jun-18	Line 72 updated			
Commissioning Spares - 1set of Complete Trim softgoods kit per Valve is included & 2 year spares as per Project's Attachment-04			3	29-Jun-18	Line 62, 66 updated			
Flow distributor is included			4	20-Jul-18	Line 14 updated			
Mechanical adjustable Limit stopper to be provided at given Design Cv (Cv value shall be confirm by PIDEDEC)								
RT is applicable								
51	ACTUATOR	Type	Pneumatic Diaphragm- Reverse Acting					
		Mfr & Model	KOSO	& G300				
		Size	G300	Effective area	193000 mm2			
		Fail Pos / Pwr	Closed	Springs	(1.40 to 2.75barG)			
		Supply Type	Pneumatic					
		Customer Supply Max / Min	barG 8.7	/ 4.7				
		Actuator Orientation	Vertical Up					
		Handwheel Type	Side mounted-Side access					
		Shut-Off Pressure	bar 137					
		Input Signal	Foundation Fieldbus					
		Type	Electro-Pneumatic					
		Mfr & Model	ABB	& V18347.10.4.1.1.5.0.00.1-M5				
Increasing Signal	To Open the Valve							
Gauges	Yes	Bypass No						
Cam Characteristics	N/A							
Aluminium Enclosure,Exia, Elect conn. M20x1.5mm								
52	POSITIONER		N/A					
		Mfr & Model	KOSO	& PRS 815-4-60				
		Set Pressure	barG 3.4					
		Filter	Yes	Gauges Yes				
		Aluminium MOC, Manual Drain,1/2" NPT						
		Hydro Press.	barG	As per ASME Standard				
		Seat Leakage	ANSI/FCI Class IV					
		Open Time(s)	<20 sec modulating					
		Close Time(s)	<20 sec modulating					
53	SWITCHES		N/A					
		Mfr & Model	KOSO	& PRS 815-4-60				
		Set Pressure	barG 3.4					
		Filter	Yes	Gauges Yes				
		Aluminium MOC, Manual Drain,1/2" NPT						
		Hydro Press.	barG	As per ASME Standard				
		Seat Leakage	ANSI/FCI Class IV					
		Open Time(s)	<20 sec modulating					
		Close Time(s)	<20 sec modulating					
54	AIRSET		N/A					
		Mfr & Model	KOSO	& PRS 815-4-60				
		Set Pressure	barG 3.4					
		Filter	Yes	Gauges Yes				
		Aluminium MOC, Manual Drain,1/2" NPT						
		Hydro Press.	barG	As per ASME Standard				
		Seat Leakage	ANSI/FCI Class IV					
		Open Time(s)	<20 sec modulating					
		Close Time(s)	<20 sec modulating					
55	TESTS		N/A					
		Mfr & Model	KOSO	& PRS 815-4-60				
		Set Pressure	barG 3.4					
		Filter	Yes	Gauges Yes				
		Aluminium MOC, Manual Drain,1/2" NPT						
		Hydro Press.	barG	As per ASME Standard				
		Seat Leakage	ANSI/FCI Class IV					
		Open Time(s)	<20 sec modulating					
		Close Time(s)	<20 sec modulating					
56	SPECIAL/ACCESSORIES	Elect. Cert.	IP-65					
		Position Feedback	Yes Built-In Positioner					
		I-P Transducer	Yes Built-In Positioner					
		Solenoid Valve(s)	N/A					
		KOSO Standard Painting is applicable.						
		KOSO Standard ITP is applicable.						
		316SS Tubing & Fittings-Swagelok, Tubing standard -Imperial,Tubing size 1/2" NPT.						
		1 Qty Volume Booster - KKI Series 1000, 1/4" AI MOC						
		Commissioning Spares - 1set of Complete Trim softgoods kit per Valve is included & 2 year spares as per Project's Attachment-04						
		Flow distributor is included						
		Mechanical adjustable Limit stopper to be provided at given Design Cv (Cv value shall be confirm by PIDEDEC)						
		RT is applicable						

R01

R01

R01

KOSO	PROJECT	HENGAM FERTILIZER PROJ.	UNIT	DATASHEET	OF	
	CUSTOMER	PIDEC		SO no.	5200000518	
	P.O.	1208-00-IN-POR-605		TAG #	50-PV-5042	
	INQ / REV	Email	DATE	20-Jul-18	ITEM #	73
	PROP / REV	QNE002377 Rev 4	DATE	20-Jul-18	QTY	1
	SERVICE	SG from 50-T-551			DRAWING	

OPTION DESCRIPTION	OPTIONS
Application	Other
Type of Gas	Custom Gas
Flow Rate Type	Volume Flow Rate
Method of Specifying Density	Calculate from MW
Compressibility Option	Direct Input
Valve Type	530D/540D, Custom Vector

Body Type	Globe		
Flow Direction	Flow to Open (UTP)		
Flow Distributor Design	1 Stage		
Pipe Correction Factor Option	Calculate Correction		
PIPE SIZE, SCHD & DIMS	UNITS	INLET	OUTLET
Method of Specifying Pipe		NPS & Schd	NPS & Schd
Nominal Pipe Sizes		3in (80mm)	16in (400mm)
Pipe Schedules		80	120

Nominal Valve Sizes		3in (80mm)	3in (80mm)
Valve ASME Pressure Rating		900	900
VALVE SIZING TERMS	UNITS	SUG'D	ACTUAL
Relative Capacity	Cd	Kv/mm2	0.0107
Terminal Press Drop Ratio	Xt		1
Liq Press Recovery Factor	FL		1
Number of Flow Passages	Np	Calc'd	Calc'd
Over Capacity Margin	OCM		0%

OPERATING CONDITIONS	UNITS	CONDITION VALUES	
Condition Set			
Condition Label		Max Flow	Normal Flow
Gas Volume Flow Rate	Nm3/h	30558	23506
Inlet Pressure	barA	123.2	123.4
Outlet Pressure	barA	1.4	1.3
Inlet Temperature	deg C	40	40
Molecular Weight		10.27	10.27
Compressibility Factor		1.07	1.07
Ratio of Specific Heats		1.4	1.4
Req'd Valve Flow Coefficient	Cv	10.28	7.9

VALVE TRIM	UNITS	CONDITION VALUES	
Number of Stages, Suggested		22	22
Number of Stages, Used		22	22
Fluid Kinetic Energy Exiting Stack	bar	4.67	4.67
Trim Sound Pressure Level, (Bare Pipe)	dBa	75.0	75.0

To meet KE, not noise

PLUG SIZE	UNITS	SUG'D	ACTUAL
Minimum Plug Size, Energy	in.	1.1	
Minimum Plug Size, Cv	in.	0.9	
Actual Plug Size	in.		1.5

Assumes BF = 21

DIAMETER INTO OUTLET PIPE	UNITS	SUG'D	ACTUAL
Minimum Valve Outlet Run ID	in.	2.87	2.87

VALVE OUTLET/FLOW DISTRIB. DETAILS	UNITS	SUG'D	ACTUAL
Flow Distributor Outlet Hole Size	in.	0.25	0.25
No. of Holes in FD Outlet		197	197
FD Outlet to Inlet Area Ratio			1.49
Flow Distrib. Flow Coefficient	Cv		300.0

Just Upstream of Final Piping

Default outlet hole area is 1.5 times the valve run area

9.67021489
93211.25038
0.000103745

VALVE OUTLET TO OUTLET PIPE DETAILS	UNITS	CONDITION VALUES	
Press. Between Valve and FD	barA	4.47	3.50
Gas Velocity, Valve Outlet	m/s	565.47	555.53
Mach Number, Valve Outlet		0.92	0.90
Gas Kinetic Energy, Valve Outlet	bar	2.63	1.99
Gas Velocity, Flow Distributor Outlet	m/s	616.25	616.25
Mach Number, Flow Distributor Outlet		1.00	1.00
Gas Kinetic Energy, Flow Distrib. Outlet	bar	1.92	1.48
Gas Velocity, Outlet Pipe	m/s	80.8	67.0
Mach Number, Outlet Pipe		0.13	0.11
Gas Kinetic Energy, Outlet Pipe	bar	0.02	0.01

ADDITIONAL NOISE ASSUMPTIONS	UNITS	SUG'D	ACTUAL
Lagging Credit	dBa	0	0
Credit for Spraywater Injection	dBa	0	0

NOISE RESULTS	UNITS	CONDITION VALUES	
Overall System Noise	dBa	75.0	75.0

+0/-5 dBA

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	61	75	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518071	50-PV-5043

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	26.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	26.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	4.00 inch / 40	R01 Seat Lk @ 26 bar	0.55 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		
Line Fluid	FUEL GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	4 x 4 x 4 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-3	No. of Stages	3
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	65	Trim Size Ref.	3
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-VSASCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	Maximum	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Baffles

Plate Number	Baffle ID	Pipe Size	CV	Type
1	MB1	100	200	Valve Outlet Baffle

Technical Comments

- STROKING TIME <10 SEC.
- WE RECOMMEND ONE 4" BAFFLE AT THE VALVE OUTLET TO CONTROL THE NOISE WITHIN ACCEPTABLE LIMIT.
- Max. adjustable mechanical Limit Stopper to be provided at given design CV. (CV value shall be confirm by PIDECC).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	61	75	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518071	50-PV-5043

Valve Design Details

Valve	Series 1200 Globe	Design CV	65
Valve Size (in x cm x out)	4 x 4 x 4 inch	Shut Off Pressure	26.00 bar
Body Rating	ANSI 300	Line Fluid	FUEL GAS
Trim Design	HFL-3	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	4.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	4.00 inch / 40

Process Conditions

Description	UOM	MAX
Gas Flow Rate	Nm³/hour	14056
Inlet Pressure	bar	17.8
Outlet Pressure	bar	1.75
Pressure Drop	bar	16.05
Inlet Temperature	°C	47
Outlet Temperature	°C	47
Molecular Weight		19.37
Ratio Of Specific Heats		1.39
Compressibility		1

Calculated Values

Description	UOM	MAX
Expansion Factor		1.4
Inlet Spec Volume	m³/kg	0.0772
Calculated CV	US Units	50.21
Valve Opening	%	83.6
Gas Recovery Factor		0.785
Fluid State		Normal
Predicted Noise Level	dBA	77.9
Body Inlet Velocity	m/sec	32.1
Body Outlet Velocity	m/sec	105.5
Body Outlet Mach No.		0.2494
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	105.5
Sys. Outlet Mach No.		0.2416
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	0.4688
Velocity Head	bar	0.165
Specific Volume In	m³/kg	0.0772
Specific Volume Out	m³/kg	0.2536
Min DP 100% Open		7.402
Max Flow 100% Open		18195.3

Silencer Calculated Values

Description	UOM	MAX
Baffle Plate Number	1	0
Baffle CV	200	0
Baffle Pipe Size	100	0
Baffle Inlet Pressure	bar	5.416
Baffle Pressure Ratio		3.095
Outlet Spec Volume	m³/kg	0.785
Outlet Velocity	m/sec	320.5
Mach Number		0.73
Baffle Noise	dBA	77.5
Est System Noise	dBA	0
Limiting CV		290.1
Back Pressure	bar	5.416

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
364.50 lbf	1,085.04 lbf	2.25 in	2.81 in	6.63 in²	7.07 in²	0.44 in²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	26	26	17.8
Outlet Pressure	bar	1	1	1.75
Unbalanced Force	lbf	8.49	166.55	114
Min Air Required	lbf/in2	10.54	9.41	33.79

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	62	76	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518072	50-TV-5066

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	31.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	31.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	4.00 inch / 40	Seat Lk @60psi	517 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.52 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	4 x 4 x 4 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	180	Trim Size Ref.	4
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075D-JS0SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Opens	Actuator Action	Direct
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Closes Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <10 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	62	76	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518072	50-TV-5066

Valve Design Details

Valve	Series 1200 Globe	Design CV	180
Valve Size (in x cm x out)	4 x 4 x 4 inch	Shut Off Pressure	31.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	4.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	4.00 inch / 40

Process Conditions

Description	UOM	MAX
Liquid Flow Rate	kg/hour	44500
Inlet Pressure	bar	25.37
Outlet Pressure	bar	24.9
Pressure Drop	bar	0.47
Inlet Temperature	°C	0
Specific Gravity		0.627
Vapour Pressure	bar	3.9
Critical Pressure	bar	221
Viscosity	Centi-Poise	0.168

Calculated Values

Description	UOM	MAX
Calculated CV	US Units	95.09
Valve Opening	%	74
Pressure Recovery Factor		0.948
Cavitation Index		-17.86
Fluid State		NORMAL
Predicted Noise Level	dBA	70
Body Inlet Velocity	m/sec	2.5
Pipework Correction Factor		1
Viscosity Correction Factor		1
Energy Conversion	MW	0.0009
Trim Exit Velocity	m/sec	10.218
Min DP 100% Open		0.131
Max Flow 100% Open		84233.3

Pressure Drop and Cavitation

Description	Stage	MAX
Pressure Drop	1	0.47
Cavitation Index	1	-17.9

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
394.64 lbf	613.55 lbf	2.25 in	2.81 in	11.98 in ²	12.57 in ²	0.44 in ²			

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	31	31	25.37
Outlet Pressure	bar	1	1	24.9
Unbalanced Force	lbf	260.31	6.41	159.5
Min Air Required	lbf/in ²	41.36	41.36	39.92
Min Spring Setting	lbf/in ²	1.92	5.55	3.36
Stem Stress	lbf/in ²	1,482.49	907.77	1254
Stability	1/16 inch			0.26
Mod. Stability	Ratio			1.04

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	63	77	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518073	50-TV-5088

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	31.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	1125 psig
Shut Off Pressure	31.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 40	Seat Lk @60psi	37 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.04 ltr/min
Line Fluid	AMMONIA LIQUID			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	13	Trim Size Ref.	1
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	63	77	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518073	50-TV-5088

Valve Design Details

Valve	Series 1200 Globe	Design CV	13
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	31.00 bar
Body Rating	ANSI 300	Line Fluid	AMMONIA LIQUID
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	3400	2589
Inlet Pressure	bar	27.58	27.59
Outlet Pressure	bar	25.85	25.84
Pressure Drop	bar	1.73	1.75
Inlet Temperature	°C	49	49
Specific Gravity		0.562	0.562
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.1	0.1

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	4.033	3.043
Valve Opening	%	55	46.8
Pressure Recovery Factor		0.953	0.955
Cavitation Index		-21.98	-22.07
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	3.4	2.6
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.0003	0.0002
Trim Exit Velocity	m/sec	20.539	20.73
Min DP 100% Open		0.164	0.095
Max Flow 100% Open		10959.9	11062

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	1.73	1.75
Cavitation Index	1	-22	-22.1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
113.41 lbf	73.63 lbf	1.125 in	2.12 in	0.69 in ²	0.79 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	31	31	27.58	27.59
Outlet Pressure	bar	1	1	25.85	25.84
Unbalanced Force	lbf	42.97	1.6	41.4	41.38
Min Air Required	lbf/in ²	7.01	7.6	31.03	31.03
Min Spring Setting	lbf/in ²	3.29	1.64	2.21	2.21
Stem Stress	lbf/in ²	1,415.93	1,041.34	1402	1402
Stability	1/16 inch			0.03	0.03
Mod. Stability	Ratio			7.41	7.41

CONTROL VALVE DATA SHEET



PROJECT	HENGAM FERTILIZER PROJECT		DATA SHEET	1	OF	1	
CUSTOMER	PIDEC		SO No.	5200000518			
P.O.	1208-00-IN-POR-605		TAG #	50-HV-5013			
INQUIRY	Email	REV	DATE	19-Jun-18	ITEM #	77	
PROPOSAL	QNE002377	REV	4	DATE	20-Jul-18	QTY	1
SERVICE	Syn Gas to Flare		Sl. No.	SN520000518074			

SERVICE CONDITIONS	Fluid	Gas - Synthesis Gas		Crit Press, Pc	barA	Crit Temp, Tc	deg C
		Units	Max Flow				
	Gas Volume Flow Rate	Nm3/h	119300				
	Inlet Pressure	barA	183				
	Outlet Pressure	barA	1.7				
	Inlet Temperature	deg C	39				
	Molecular Weight		10.08				
	Ratio of Specific Heat		1.4				
	Compressibility Factor		1.09				
	Flow Coefficient	Cv	26.96				
	Travel	%	69				
	Predicted SPL	dBA	80.5				
Number of Stages Needed		28					
LINE		INLET	OUTLET				
	Pipe Size / Sch	in.	8 / Sch 140	12 / Sch 160			
	Pipe Material		ASTM A106 GR.B SMLS	ASTM A106 GR.B SMLS			
	Pipe Line Insulation		N/A				
	Valve Size	in.	8	8			
	Design Press	barA	216	216			
	Max Design T	deg C	85	85			
	Rating(s)	ASME	1500	1500			
	Connections		RTJ Flange	RTJ Flange			
	End Extension		8"x12"				
VALVE BODY / BONNET	End Material		A216-WCB				
	Body Type		Globe				
	Mfr & Model		KOSO	&	530D		
	Body/Bnt Mat'l		A216-WCB	/	A216-WCB		
	Flow Direction		Flow to Open (FTO)				
	Type of Bonnet		Bolted-Standard				
	Lube & Iso Valve	No	Lube	No			
	Pkg Type / Mat'l		Standard	/	Teflon		
	Type		VECTOR Multi-Path, Multi-Stage				
	Number of Pressure Reducing Stages		28				
VALVE TRIM	Nominal Size / Travel	in.	4	/	150mm		
	Characteristic		Linear				
	Balanced/Unbalanced		Balanced				
	Rated Cv	38	FL	1	XT	1	
	Plug / Ball / Disk Mat'l		316SS,Stellited				
	Seat Material		316SS,Stellited				
	Cage / Stack / Guide Mat'l		316SS				
	Stem Material		17-4PH				
	Elect. Cert.		IP-65				
	Position Feedback		Yes Built-In Positioner				
SPECIAL/ACCESSORIES	I-P Transducer		Yes Built-In Positioner				
	Solenoid Valve(s)		N/A				
	KOSO Standard Painting is applicable.						
	KOSO Standard ITP is applicable.						
	316SS Tubing & Fittings-Swagelok, Tubing standard -Imperial,Tubing size 1/2" NPT.						
	2 Qty Volume Boosters - KKI Series 1000, 1/4" AI MOC						
	Snap Acting Relay-KOSO DCV-01, 1/4" AI MOC						
	Check Valve-KOSO Standard 1/2", AI MOC						
	30L Volume Tank in Carbon Steel & sized for 2 full strokes						
	Commissioning Spares - 1set of Complete Trim softgoods kit per Valve is included & 2 year spares as per Project's Attachment-04						
Flow distributor is included							
Mechanical adjustable Limit stopper to be provided at given Design Cv (Cv value shall be confirm by PIDEc)							
RT is applicable							
ACTUATOR	Type	Pneumatic Double-Acting Piston					
	Mfr & Model	KOSO	&	6345LA			
	Size	43.5 cm	Eff Area	1490 cm2			
	Fail Pos / Pwr	Closed	/	Air Tank (ASME)			
	Supply Type	Pneumatic					
	Customer Supply Max / Min	barG	8.7	/	4.7		
	Actuator Orientation	Vertical Up					
	Handwheel Type	Top mounted-Side access					
	Shut-Off Pressure	bar	216				
	Input Signal	Foundation Fieldbus					
POSITIONER	Type	Electro-Pneumatic					
	Mfr & Model	ABB	&	V18347.10.4.1.4.5.0.00.1-M5			
	Increasing Signal	To Open the Valve					
	Gauges	Yes	Bypass	No			
	Cam Characteristics	N/A					
SWITCHES	Aluminium Enclosure,Exia, Elect conn.	M20x1.5mm					
	N/A						
	Mfr & Model	KOSO	&	PRS 815-4-100			
	Set Pressure	barG	6				
	Filter	Yes	Gauges	Yes			
AIRSET	Aluminium MOC, Manual Drain,1/2" NPT						
	Hydro Press.	barG	As per ASME Standard				
	Seat Leakage	ANSI/FCI Class V					
	Open Time(s)	<20 sec modulating					
	Close Time(s)	<20 sec modulating					
TESTS							
Rev	Date	Description		Orig	App		
0	15-May-18	Released					
1	22-May-18	Line 11 updated					
2		Line 11, 13, 72 updated					
3	29-Jun-18	Line 62, 66 updated					
4	20-Jul-18	Line 14,17 updated					

R01

R01

R01

R01

KOSO	PROJECT	HENGAM FERTILIZER PROJ.	UNIT	DATASHEET	OF	
	CUSTOMER	PIDEC		SPEC		
	P.O.	1208-00-IN-POR-605		TAG #	50-HV-5013	
	INQ / REV	Email	DATE	20-Jul-18	ITEM #	77
	PROP / REV	QNE002377 Rev 4	DATE	20-Jul-18	QTY	1
	SERVICE	Syn. Gas to Flare			DRAWING	

OPTION DESCRIPTION	OPTIONS
Application	Other
Type of Gas	Custom Gas
Flow Rate Type	Volume Flow Rate
Method of Specifying Density	Calculate from MW
Compressibility Option	Direct Input
Valve Type	530D/540D, Custom Vector

Body Type	Globe
Flow Direction	Flow to Open (UTP)
Flow Distributor Design	1 Stage
Pipe Correction Factor Option	Calculate Correction

PIPE SIZE, SCHD & DIMS	UNITS	INLET	OUTLET
Method of Specifying Pipe		NPS & Schd	NPS & Schd
Nominal Pipe Sizes		8in (200mm)	12in (300mm)
Pipe Schedules		140	160

Nominal Valve Sizes		8in (200mm)	8in (200mm)
Valve ASME Pressure Rating		1500	1500
VALVE SIZING TERMS	UNITS	SUG'D	ACTUAL
Relative Capacity	Cd	Kv/mm2	0.0107
Terminal Press Drop Ratio	Xt		1
Liq Press Recovery Factor	FL		1
Number of Flow Passages	Np	Calc'd	Calc'd
Over Capacity Margin	OCM		0%

OPERATING CONDITIONS	UNITS	CONDITION VALUES	
Condition Set			
Condition Label		MAX. FLOW	
Gas Volume Flow Rate	Nm3/h	119300	
Inlet Pressure	barA	183	
Outlet Pressure	barA	1.7	
Inlet Temperature	deg C	39	
Molecular Weight		10.08	
Compressibility Factor		1.09	
Ratio of Specific Heats		1.4	
Req'd Valve Flow Coefficient	Cv	26.96	

INLET PIPE DETAILS	UNITS	CONDITION VALUES	
Fluid Velocity in Inlet Pipe	m/s	9.185	
Fluid Kinetic Energy in Inlet Pipe	bar	0.028	

VALVE TRIM	UNITS	CONDITION VALUES	
Number of Stages, Suggested		28	
Number of Stages, Used		28	
Fluid Velocity Exiting Stack	m/s	627	
Fluid Kinetic Energy Exiting Stack	bar	4.52	
Trim Sound Pressure Level, (Bare Pipe)	dBA	75.0	

To meet KE, not noise

PLUG SIZE	UNITS	SUG'D	ACTUAL
Minimum Plug Size, Energy	in.	1.9	
Minimum Plug Size, Cv	in.	1.5	
Actual Plug Size	in.		4

Assumes BF = 21

PLUG VELOCITY/ENERGY	UNITS	CONDITION VALUES	
Gas Velocity at Plug	m/s	28.19	
Gas Kinetic Energy at Plug	bar	0.26	

DIAMETER INTO OUTLET PIPE	UNITS	SUG'D	ACTUAL
Minimum Valve Outlet Run ID	in.	7	7

VALVE OUTLET/FLOW DISTRIB. DETAILS	UNITS	SUG'D	ACTUAL
Flow Distributor Outlet Hole Size	in.	0.25	0.25
No. of Holes in FD Outlet		1176	800
FD Outlet to Inlet Area Ratio			1.02
Flow Distrib. Flow Coefficient	Cv		1218.4

Just Upstream of Final Piping 39.26990817

VALVE OUTLET TO OUTLET PIPE DETAILS	UNITS	CONDITION VALUES	
Press. Between Valve and FD	barA	4.39	
Gas Velocity, Valve Outlet	m/s	383.57	
Mach Number, Valve Outlet		0.61	
Gas Kinetic Energy, Valve Outlet	bar	1.15	
Gas Velocity, Flow Distributor Outlet	m/s	626.82	
Mach Number, Flow Distributor Outlet		1.00	
Gas Kinetic Energy, Flow Distrib. Outlet	bar	1.84	
Gas Velocity, Outlet Pipe	m/s	474.3	
Mach Number, Outlet Pipe		0.76	
Gas Kinetic Energy, Outlet Pipe	bar	0.68	

ADDITIONAL NOISE ASSUMPTIONS	UNITS	SUG'D	ACTUAL
Lagging Credit	dBA	0	0
Credit for Spraywater Injection	dBA	0	0

NOISE RESULTS	UNITS	CONDITION VALUES	
Overall System Noise	dBA	80.5	

+0/-5 dBA

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	64	80	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518075	50-HV-5502

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	216.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 160	Hydro Test Pressure	5575 psig
Shut Off Pressure	216.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	4.00 inch / 160	Seat Lk @60psi	52 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.05 ltr/min
Line Fluid	SYNTHESIS GAS			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	2 x 2 x 2 inch	Body Rating	ANSI 1500
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finsh	H - CLA 63 u in
V.6	Inlet Rating	ANSI 1500	Outlet Rating	ANSI 1500
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	18	Trim Size Ref.	1.5
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	1.5 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Manual

A.1	Model Number	MO-OBAHS	Actuator Type	Gear Operator
A.2	Handwheel Type	Side Mounted Handwheel	Limit Stop	None
A.3	Material	Standard	Paint	System C

Additional Actuator Features:

Technical Comments

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	64	80	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518075	50-HV-5502

Valve Design Details

Valve	Series 1200 Globe	Design CV	18
Valve Size (in x cm x out)	2 x 2 x 2 inch	Shut Off Pressure	216.00 bar
Body Rating	ANSI 1500	Line Fluid	SYNTHESIS GAS
Trim Design	HFL-2	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	4.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	4.00 inch / 160

Process Conditions

Description	UOM	MAX
Gas Flow Rate	Nm ³ /hour	31840
Inlet Pressure	bar	184
Outlet Pressure	bar	124
Pressure Drop	bar	60
Inlet Temperature	°C	0
Outlet Temperature	°C	0
Molecular Weight		10.41
Ratio Of Specific Heats		1.08
Compressibility		1.08

Calculated Values

Description	UOM	MAX
Expansion Factor		1.2
Inlet Spec Volume	m ³ /kg	0.0128
Calculated CV	US Units	9.573
Valve Opening	%	67.3
Gas Recovery Factor		0.789
Fluid State		Normal
Predicted Noise Level	dBA	70
Body Inlet Velocity	m/sec	29.7
Body Outlet Velocity	m/sec	44
Body Outlet Mach No.		0.0819
Mach No. Condition		OK
Sys. Outlet Velocity	m/sec	44
Sys. Outlet Mach No.		0.0907
Sys Mach No. Condition		OK
Pipework Correction Factor		1
Energy Conversion	MW	0.3762
Velocity Head	bar	2.16
Specific Volume In	m ³ /kg	0.0128
Specific Volume Out	m ³ /kg	0.019
Min DP 100% Open		16.87
Max Flow 100% Open		59867.9

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
360.23 lbf	220.85 lbf	1.5 in	2.12 in	1.55 in ²	1.77 in ²	0.20 in ²		1,031.92	1,252.77

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	216	216	184
Outlet Pressure	bar	1	1	124
Unbalanced Force	lbf	671.68	2.85	353
Stem Stress	lbf/in ²	5,255.52	1,849.16	3633

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	65	81	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518076	50-HV-5503

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	136.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 160	Hydro Test Pressure	3350 psig
Shut Off Pressure	137.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	2.00 inch / 160	Seat Lk @60psi	4.31 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0 ltr/min
Line Fluid	AMMONIA WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 900
V.4	Inlet End Connection	RTJ Groove-H	Outlet End Connection	RTJ Groove-H
V.5	Inlet Connection Finish	H - CLA 63 u in	Outlet Connection Finsh	H - CLA 63 u in
V.6	Inlet Rating	ANSI 900	Outlet Rating	ANSI 900
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	3S Mspline	No. of Stages	3
T.2	Guide Bush Material	316L ST.ST.	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	1.5	Trim Size Ref.	No 0
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Manual

A.1	Model Number	MO-OAHS	Actuator Type	Gear Operator
A.2	Handwheel Type	Side Mounted Handwheel	Limit Stop	None
A.3	Material	Standard	Paint	System C

Additional Actuator Features:

Technical Comments

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	65	81	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518076	50-HV-5503

Valve Design Details

Valve	Series 10 Globe	Design CV	1.5
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	137.00 bar
Body Rating	ANSI 900	Line Fluid	AMMONIA WATER
Trim Design	3S Mspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	2.00 inch / 160
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	2.00 inch / 160

Process Conditions

Description	UOM	MAX
Liquid Flow Rate	kg/hour	5800
Inlet Pressure	bar	123.83
Outlet Pressure	bar	27.44
Pressure Drop	bar	96.39
Inlet Temperature	°C	35
Specific Gravity		0.888
Vapour Pressure	bar	0.1
Critical Pressure	bar	221
Viscosity	Centi-Poise	0.5

Calculated Values

Description	UOM	MAX
Calculated CV	US Units	0.7274
Valve Opening	%	63.7
Pressure Recovery Factor		0.956
Cavitation Index		-21.83
Fluid State		NORMAL
Predicted Noise Level	dBA	70
Body Inlet Velocity	m/sec	3.7
Pipework Correction Factor		1
Viscosity Correction Factor		1
Energy Conversion	MW	0.0175
Trim Exit Velocity	m/sec	47.467
Min DP 100% Open		22.66
Max Flow 100% Open		11960.2

Pressure Drop and Cavitation

Description	Stage	MAX
Pressure Drop	1	53
Cavitation Index	1	-54.4
Pressure Drop	2	28.9
Cavitation Index	2	-32.5
Pressure Drop	3	14.5
Cavitation Index	3	-21.8

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	78.54 lbf	1.125 in	2.12 in	0.79 in²	0.00 in²	0.11 in²		1,419.40	168.54

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	137	137	123.8
Outlet Pressure	bar	1	1	27.44
Unbalanced Force	lbf	-1,329.40	-1,329.40	-899.4
Stem Stress	lbf/in2	12,851.48	12,851.48	8958

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	66	82	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518077	70-FV-7010

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	8.00 inch / 80	Hydro Test Pressure	2225 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	8.00 inch / 80	Seat Lk @60psi	1868 cc/min
Max/Min Temp	425.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		1.87 ltr/min
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	8 x 8 x 8 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	420 ST.ST.	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 St.St.	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 ST.ST.	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	650	Trim Size Ref.	8
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	4 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-HS0SCE3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS815-4 -100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <14 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	66	82	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518077	70-FV-7010

Valve Design Details

Valve	Series 1200 Globe	Design CV	650
Valve Size (in x cm x out)	8 x 8 x 8 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	STEAM
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	8.00 inch / 80
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	8.00 inch / 80

Process Conditions

Description	UOM	MAX	NORM	MIN
Steam Flow Rate	kg/hour	32095	26746	13373
Inlet Pressure	bar	44.7	44.7	44.7
Outlet Pressure	bar	44.1	44	44
Pressure Drop	bar	0.6	0.7	0.7
Inlet Temperature	°C	385	385	385

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1	1	1
Inlet Spec Volume	m³/kg	0.0649	0.0649	0.0649
Calculated CV	US Units	391.2	302.1	151
Valve Opening	%	78.9	68.7	46.5
Gas Recovery Factor		0.744	0.749	0.758
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	18.4	15.4	7.7
Body Outlet Velocity	m/sec	18.7	15.6	7.8
Body Outlet Mach No.		0.0297	0.0248	0.0124
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	18.7	15.6	7.8
Sys. Outlet Mach No.		0.0297	0.0248	0.0124
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0349	0.034	0.017
Velocity Head	bar	0.394	0.459	0.46
Specific Volume In	m³/kg	0.0649	0.0649	0.0649
Specific Volume Out	m³/kg	0.0658	0.0659	0.0659
Min DP 100% Open		0.2173	0.1512	0.0378
Max Flow 100% Open		53328.6	57547.3	57553.1
Outlet Temperature		384.52	384.44	384.44
Inlet Saturated Temp		257.3	257.3	257.3
Outlet Saturated Temp		256.4	256.3	256.3
Dryness Fraction		1	1	1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
663.96 lbf	1,241.87 lbf	4 in	3.56 in	49.09 in²	50.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Min Air Required	lbf/in2	23.13	20.24	40.52	40.52	40.52
Min Spring Setting	lbf/in2	5.43	4.19	3.91	3.91	3.91
Stem Stress	lbf/in2	1,197.05	1,599.38	1494	1494	1494
Stability	1/16 inch			0.25	0.25	0.25
Mod. Stability	Ratio			10.48	10.48	10.48
Inlet Pressure	bar	52	52	44.7	44.7	44.7
Outlet Pressure	bar	1	1	44.1	44	44
Unbalanced Force	lbf	-276.2	592.19	509.1	509.1	509.1

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	67	83	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518078	70-FV-7025

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	11.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	10.00 inch / 10S	Hydro Test Pressure	425 psig
Shut Off Pressure	11.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	10.00 inch / 10S	Seat Lk @60psi	2931 cc/min
Max/Min Temp	140.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		2.93 ltr/min
Line Fluid	DEMNERLIZED WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	None
V.3	Body Size (in/cm/out)	10 x 10 x 10 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	1020	Trim Size Ref.	10
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-J00SCF3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Stay Put (Tend to Close)	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000
I.6	Air Lock (Qty: 1)	KOSO	Air Lock Model	PA121211

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	67	83	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518078	70-FV-7025

Valve Design Details

Valve	Series 1200 Globe	Design CV	1020
Valve Size (in x cm x out)	10 x 10 x 10 inch	Shut Off Pressure	11.00 bar
Body Rating	ANSI 150	Line Fluid	DEMNERLIZED WATER
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	10.00 inch / 10S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	10.00 inch / 10S

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	521610	434675	156183
Inlet Pressure	bar	5	5	5
Outlet Pressure	bar	4.17	4.15	4.11
Pressure Drop	bar	0.83	0.85	0.89
Inlet Temperature	°C	111	111	111
Specific Gravity		0.95	0.95	0.95
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.3	0.3	0.3

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	681.4	561.1	197
Valve Opening	%	83	75.6	41.6
Pressure Recovery Factor		0.945	0.947	0.957
Cavitation Index		-3.33	-3.32	-3.37
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	3.1	2.6	0.9
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0127	0.0108	0.0041
Trim Exit Velocity	m/sec	11.032	11.164	11.424
Min DP 100% Open		0.37	0.257	0.033
Max Flow 100% Open		780774.4	790135.5	808532.6

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	0.83	0.85	0.89
Cavitation Index	1	-3.33	-3.32	-3.37

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
646.07 lbf	1,556.03 lbf	5 in	3.56 in	77.07 in ²	78.54 in ²	1.23 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	11	11	5	5	5
Outlet Pressure	bar	1	1	4.17	4.15	4.11
Unbalanced Force	lbf	230.89	17.79	74.2	73.85	73.13
Min Air Required	lbf/in ²	9.38	10.09	33.91	33.91	33.91
Min Spring Setting	lbf/in ²	8.11	2.21	2.4	2.4	2.4
Stem Stress	lbf/in ²	714.61	540.96	586.9	586.6	586.1
Stability	1/16 inch			0.03	0.03	0.03
Mod. Stability	Ratio			23.64	23.75	23.98

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	68	84	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518079	70-HV-7011A

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 80S	Hydro Test Pressure	2175 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 80S	Seat Lk @60psi	575 cc/min
Max/Min Temp	120.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.57 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8M	Body Overlay	NONE
V.3	Body Size (in/cm/out)	4 x 4 x 4 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8M	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	200	Trim Size Ref.	4
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <10 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	68	84	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518079	70-HV-7011A

Valve Design Details

Valve	Series 1200 Globe	Design CV	200
Valve Size (in x cm x out)	4 x 4 x 4 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	PROCESS CONDENSATE
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 80S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 80S

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	91786	76564
Inlet Pressure	bar	46	46
Outlet Pressure	bar	45.5	45.5
Pressure Drop	bar	0.5	0.5
Inlet Temperature	°C	75	75
Specific Gravity		0.976	0.976
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.4	0.4

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	156.6	129.5
Valve Opening	%	71.6	59
Pressure Recovery Factor		0.949	0.952
Cavitation Index		-38.77	-39.02
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	3.3	2.8
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.0013	0.0011
Trim Exit Velocity	m/sec	8.224	8.293
Min DP 100% Open		0.29	0.202
Max Flow 100% Open		117255.6	118234.2

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	0.5	0.5
Cavitation Index	1	-38.8	-39

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
432.31 lbf	613.55 lbf	2.25 in	2.81 in	11.98 in ²	12.57 in ²	0.44 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	52	52	46	46
Outlet Pressure	bar	1	1	45.5	45.5
Unbalanced Force	lbf	438.04	6.41	291.5	291.5
Min Air Required	lbf/in ²	7.96	11.04	33.01	33.01
Min Spring Setting	lbf/in ²	10.6	3.13	5.17	5.17
Stem Stress	lbf/in ²	1,970.06	993.05	1638	1638
Stability	1/16 inch			0.13	0.13
Mod. Stability	Ratio			2.36	2.36

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	69	85	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518080	70-HV-7011B

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 80S	Hydro Test Pressure	2175 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 80S	R01 Seat Lk @60psi	86 cc/min
Max/Min Temp	120.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.09 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8M	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8M	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	30	Trim Size Ref.	2
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075D-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Opens	Actuator Action	Direct
A.3	Manual Override	None	Min. Operating Pressure	4.00 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Closes Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <8 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	69	85	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518080	70-HV-7011B

Valve Design Details

Valve	Series 1200 Globe	Design CV	30
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	PROCESS CONDENSATE
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 80S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 40S

Process Conditions

Description	UOM	MAX	NORM
Liquid Flow Rate	kg/hour	91786	76564
Inlet Pressure	bar	46	46
Outlet Pressure	bar	5.1	5
Pressure Drop	bar	40.9	41
Inlet Temperature	°C	75	75
Specific Gravity		0.976	0.976
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	221	221
Viscosity	Centi-Poise	0.4	0.4

Calculated Values

Description	UOM	MAX	NORM
Calculated CV	US Units	16.87	14.05
Valve Opening	%	69.5	62.4
Pressure Recovery Factor		0.973	0.978
Cavitation Index		-3.67	-3.7
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	5.2	4.3
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.1072	0.0896
Trim Exit Velocity	m/sec	34.686	34.742
Min DP 100% Open		12.91	8.98
Max Flow 100% Open		163192.9	163455.5

Pressure Drop and Cavitation

Description	Stage	MAX	NORM
Pressure Drop	1	32.7	32.8
Cavitation Index	1	-8.56	-8.91
Pressure Drop	2	8.18	8.2
Cavitation Index	2	-3.67	-3.7

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
316.48 lbf	299.39 lbf	2.25 in	2.81 in	2.85 in ²	3.14 in ²	0.31 in ²			

Description	UOM	Closed	Cracked	MAX	NORM
Inlet Pressure	bar	52	52	46	46
Outlet Pressure	bar	1	1	5.1	5
Unbalanced Force	lbf	18.07	231.32	204.6	204.6
Min Air Required	lbf/in ²	36.78	36.78	39.44	39.44
Min Spring Setting	lbf/in ²	4.26	1.22	1.6	1.6
Stem Stress	lbf/in ²	1,090.49	1,785.58	1699	1699
Stability	1/16 inch			0.18	0.18
Mod. Stability	Ratio			1.19	1.19

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	70	86	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518081	70-LV-7012

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 80S	Hydro Test Pressure	2175 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 80S	Seat Lk @60psi	86 cc/min
Max/Min Temp	130.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.09 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8M	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8M	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	30	Trim Size Ref.	2
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN	Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <10 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	70	86	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518081	70-LV-7012

Valve Design Details

Valve	Series 1200 Globe	Design CV	30
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	PROCESS CONDENSATE
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 80S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 80S

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	88978	74148	37074
Inlet Pressure	bar	43	43	43
Outlet Pressure	bar	6.31	6.31	6.29
Pressure Drop	bar	36.69	36.69	36.71
Inlet Temperature	°C	97	97	97
Specific Gravity		0.96	0.96	0.96
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.4	0.4	0.4

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	17.41	14.51	7.246
Valve Opening	%	70.9	63.6	42.7
Pressure Recovery Factor		0.973	0.977	0.98
Cavitation Index		-4.85	-4.95	-5
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	5.1	4.3	2.1
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0948	0.079	0.0395
Trim Exit Velocity	m/sec	33.123	33.136	33.168
Min DP 100% Open		12.33	8.563	2.141
Max Flow 100% Open		153281	153344.1	153493.4

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	29.4	29.4	29.4
Cavitation Index	1	-9.23	-9.55	-9.77
Pressure Drop	2	7.34	7.34	7.34
Cavitation Index	2	-4.85	-4.95	-5

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
316.48 lbf	299.39 lbf	2.25 in	2.81 in	2.85 in ²	3.14 in ²	0.31 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	52	52	43	43	43
Outlet Pressure	bar	1	1	6.31	6.31	6.29
Unbalanced Force	lbf	18.07	231.32	191.3	191.3	191.3
Min Air Required	lbf/in2	12.26	9.22	33.79	33.79	33.79
Min Spring Setting	lbf/in2	9.06	7.83	7.25	7.25	7.25
Stem Stress	lbf/in2	1,090.49	1,785.58	1655	1655	1655
Stability	1/16 inch			0.18	0.18	0.18
Mod. Stability	Ratio			1.27	1.27	1.27

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	71	87	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518082	70-LV-7020

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	7.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	2.00 inch / 40	Hydro Test Pressure	450 psig
Shut Off Pressure	7.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	3.00 inch / 40	Seat Lk @60psi	26 cc/min
Max/Min Temp	165.0°C / 0.0°C	Industrial Specification	Standard	PED Category	SEP		0.03 ltr/min
Line Fluid	BOILER BLOW DOWN			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A217 WC9	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A217 WC9	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B16
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	9	Trim Size Ref.	1
T.8	Flow Direction	Flow Over	Flow Characteristic	Linear
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-B00SCA1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.4-2.0 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	71	87	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518082	70-LV-7020

Valve Design Details

Valve	Series 1200 Globe	Design CV	9
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	7.00 bar
Body Rating	ANSI 150	Line Fluid	BOILER BLOW DOWN
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	2.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	3.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	5500	2707	1354
Inlet Pressure	bar	5.1	5.1	5.1
Outlet Pressure	bar	1.28	1.27	1.27
Pressure Drop	bar	3.82	3.83	3.83
Inlet Temperature	°C	151	151	151
Specific Gravity		0.915	0.915	0.915
Vapour Pressure	bar	3.88	3.88	3.88
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.2	0.2	0.2

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	5.798	2.789	1.384
Valve Opening	%	58.8	31.7	18.7
Pressure Recovery Factor		0.952	0.96	0.963
Cavitation Index		N/A	N/A	N/A
Fluid State		FLASHING	FLASHING	FLASHING
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	3.4	1.7	0.8
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0011	0.0005	0.0003
Trim Exit Velocity	m/sec	14.195	14.524	14.634
Min DP 100% Open		0.549	0.133	0.033
Max Flow 100% Open		8538.1	8735.7	8802.3

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	3.82	3.83	3.83
Cavitation Index	1	N/A	N/A	N/A

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
102.65 lbf	73.63 lbf	1.125 in	2.12 in	0.69 in ²	0.79 in ²	0.11 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	7	7	5.1	5.1	5.1
Outlet Pressure	bar	1	1	1.28	1.27	1.27
Unbalanced Force	lbf	9.88	1.6	2.05	2.03	2.03
Min Air Required	lbf/in ²	7.33	7.44	31.44	31.44	31.44
Min Spring Setting	lbf/in ²	2.66	1.49	1.5	1.5	1.5
Stem Stress	lbf/in ²	1,018.80	943.89	948	947.8	947.8
Stability	1/16 inch			0	0	0
Mod. Stability	Ratio			154.8	156	156

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	72	88	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518083	70-PV-7025

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	7.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	14.00 inch / 10	Hydro Test Pressure	450 psig
Shut Off Pressure	7.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	16.00 inch / 10	Seat Lk @60psi	2586 cc/min
Max/Min Temp	300.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		2.59 ltr/min
Line Fluid	STEAM			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	10 x 10 x 10 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	420 ST.ST.	Guide Finish/Overlay	Hardened
T.3	Plug Material	420 St.St.	Plug Finish/Overlay	Hardened
T.4	Seat Material	420 ST.ST.	Seat Finish/Overlay	Hardened
T.5	Stem Material	431 ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Alloy 25
T.7	Design CV	900	Trim Size Ref.	10
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-H00SCF3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.23 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.4-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	72	88	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518083	70-PV-7025

Valve Design Details

Valve	Series 1200 Globe	Design CV	900
Valve Size (in x cm x out)	10 x 10 x 10 inch	Shut Off Pressure	7.00 bar
Body Rating	ANSI 150	Line Fluid	STEAM
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	14.00 inch / 10
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	16.00 inch / 10

Process Conditions

Description	UOM	MAX	NORM	MIN
Steam Flow Rate	kg/hour	25900	11720	5860
Inlet Pressure	bar	4.38	4.39	4.39
Outlet Pressure	bar	3.04	3.03	3.03
Pressure Drop	bar	1.34	1.36	1.36
Inlet Temperature	°C	159	159	159

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.2	1.2	1.2
Inlet Spec Volume	m³/kg	0.4479	0.4469	0.4469
Calculated CV	US Units	646.5	287.5	143.3
Valve Opening	%	64.9	32.5	19.1
Gas Recovery Factor		0.752	0.765	0.771
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	79.6	73	70
Body Inlet Velocity	m/sec	63.6	28.7	14.4
Body Outlet Velocity	m/sec	91.4	41.5	20.7
Body Outlet Mach No.		0.1864	0.0846	0.0423
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	91.4	41.5	20.7
Sys. Outlet Mach No.		0.1805	0.082	0.041
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.4943	0.2269	0.1135
Velocity Head	bar	0.919	0.954	0.96
Specific Volume In	m³/kg	0.4479	0.4469	0.4469
Specific Volume Out	m³/kg	0.6435	0.6456	0.6456
Min DP 100% Open		0.6777	0.1382	0.0345
Max Flow 100% Open		36054	36686.3	36792
Outlet Temperature		153.62	153.54	153.54
Inlet Saturated Temp		147.2	147.3	147.3
Outlet Saturated Temp		134.6	134.5	134.5
Dryness Fraction		1	1	1

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
628.13 lbf	1,556.03 lbf	5 in	3.56 in	77.07 in²	78.54 in²	1.23 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	7	7	4.38	4.39	4.39
Outlet Pressure	bar	1	1	3.04	3.03	3.03
Unbalanced Force	lbf	-3.3	124.56	77.94	78.12	78.12
Min Air Required	lbf/in2	22.1	21.68	41.83	41.83	41.83
Min Spring Setting	lbf/in2	7.27	2.51	2.35	2.35	2.35
Stem Stress	lbf/in2	514.53	613.34	575.4	575.5	575.5
Stability	1/16 inch			0.03	0.03	0.03
Mod. Stability	Ratio			68.92	68.77	68.77

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	73	89	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518084	70-HV-7501

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	52.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 80S	Hydro Test Pressure	2175 psig
Shut Off Pressure	52.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 80S	Seat Lk @60psi	60 cc/min
Max/Min Temp	130.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.06 ltr/min
Line Fluid	PROCESS CONDENSATE			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8M	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 600
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 600	Outlet Rating	ANSI 600
V.7	Bonnet Material	ASTM A351 CF8M	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HFL-2	No. of Stages	2
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	21	Trim Size Ref.	2
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Manual

A.1	Model Number	MO-OCBHS	Actuator Type	Gear Operator
A.2	Handwheel Type	Side Mounted Handwheel	Limit Stop	None
A.3	Material	Standard	Paint	System C

Additional Actuator Features:

Technical Comments

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	73	89	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518084	70-HV-7501

Valve Design Details

Valve	Series 1200 Globe	Design CV	21
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	52.00 bar
Body Rating	ANSI 600	Line Fluid	PROCESS CONDENSATE
Trim Design	HFL-2	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	6.00 inch / 80S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 80S

Process Conditions

Description	UOM	MAX
Liquid Flow Rate	kg/hour	74148
Inlet Pressure	bar	43
Outlet Pressure	bar	6.31
Pressure Drop	bar	36.69
Inlet Temperature	°C	97
Specific Gravity		0.96
Vapour Pressure	bar	0.1
Critical Pressure	bar	221
Viscosity	Centi-Poise	0.4

Calculated Values

Description	UOM	MAX
Calculated CV	US Units	14.51
Valve Opening	%	79.3
Pressure Recovery Factor		0.973
Cavitation Index		-4.85
Fluid State		NORMAL
Predicted Noise Level	dBA	70
Body Inlet Velocity	m/sec	4.3
Pipework Correction Factor		1
Viscosity Correction Factor		1
Energy Conversion	MW	0.079
Trim Exit Velocity	m/sec	33.136
Min DP 100% Open		17.48
Max Flow 100% Open		107340.9

Pressure Drop and Cavitation

Description	Stage	MAX
Pressure Drop	1	29.4
Cavitation Index	1	-9.23
Pressure Drop	2	7.34
Cavitation Index	2	-4.85

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
316.48 lbf	299.39 lbf	2.25 in	2.81 in	2.85 in ²	3.14 in ²	0.31 in ²		547.81	847.2

Description	UOM	Closed	Cracked	MAX
Inlet Pressure	bar	52	52	43
Outlet Pressure	bar	1	1	6.31
Unbalanced Force	lbf	18.07	231.32	191.3
Stem Stress	lbf/in ²	1,090.49	1,785.58	1655

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	74	90	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518085	85-PV-8501

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	32.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 40	Hydro Test Pressure	1050 psig
Shut Off Pressure	32.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	4.00 inch / 40	Seat Lk @60psi	144 cc/min
Max/Min Temp	85.0°C / -40.0°C	Industrial Specification	Standard	PED Category	II		0.14 ltr/min
Line Fluid	AMMUNIA			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A352 LCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A352 LCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A320 L7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	50	Trim Size Ref.	3
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <20 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	74	90	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518085	85-PV-8501

Valve Design Details

Valve	Series 1200 Globe	Design CV	50
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	32.00 bar
Body Rating	ANSI 300	Line Fluid	AMMUNIA
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	4.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	4.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	50000	40000	20000
Inlet Pressure	bar	24.14	24.19	24.32
Outlet Pressure	bar	11.71	11.5	11.41
Pressure Drop	bar	12.43	12.69	12.91
Inlet Temperature	°C	20	20	20
Specific Gravity		0.61	0.61	0.61
Vapour Pressure	bar	8.741	8.741	8.741
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.132	0.132	0.132

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	21.07	16.68	8.268
Valve Opening	%	65.1	57.4	37.6
Pressure Recovery Factor		0.95	0.953	0.958
Cavitation Index		-0.77	-0.64	-0.67
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	4.5	3.6	1.8
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0284	0.0232	0.0118
Trim Exit Velocity	m/sec	53.251	53.816	54.295
Min DP 100% Open		2.206	1.412	0.353
Max Flow 100% Open		118625.2	119883.7	120949.4

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	12.4	12.7	12.9
Cavitation Index	1	-0.77	-0.64	-0.67

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
547.83 lbf	456.47 lbf	2.25 in	2.81 in	6.63 in ²	7.07 in ²	0.31 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	32	32	24.14	24.19	24.32
Stability	1/16 inch			0.09	0.09	0.09
Mod. Stability	Ratio			10.98	11.18	11.27
Outlet Pressure	bar	1	1	11.71	11.5	11.41
Unbalanced Force	lbf	200.44	4.45	52.09	51.16	50.76
Min Air Required	lbf/in2	10.48	11.88	35.54	35.55	35.55
Min Spring Setting	lbf/in2	8.61	3.94	4.29	4.28	4.28
Stem Stress	lbf/in2	2,438.99	1,800.15	1955	1952	1951

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	75	91	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518086	85-PV-8502

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	32.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 40	Hydro Test Pressure	1050 psig
Shut Off Pressure	32.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	4.00 inch / 40	Seat Lk @60psi	57 cc/min
Max/Min Temp	86.0°C / -40.0°C	Industrial Specification	Standard	PED Category	II		0.06 ltr/min
Line Fluid	AMMUNIA			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A352 LCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	2 x 2 x 2 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A352 LCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A320 L7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	20	Trim Size Ref.	2
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.5 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.5 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-J00SCB1-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <4 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	75	91	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518086	85-PV-8502

Valve Design Details

Valve	Series 1200 Globe	Design CV	20
Valve Size (in x cm x out)	2 x 2 x 2 inch	Shut Off Pressure	32.00 bar
Body Rating	ANSI 300	Line Fluid	AMMUNIA
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	4.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	4.00 inch / 40

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	kg/hour	606	484	303
Inlet Pressure	bar	9.41	9.42	9.42
Outlet Pressure	bar	1.07	1.06	1.037
Pressure Drop	bar	8.34	8.36	8.383
Inlet Temperature	°C	23	23	23
Outlet Temperature	°C	23	23	23
Molecular Weight		17.03	17.03	17.03
Ratio Of Specific Heats		1.4	1.4	1.4
Compressibility		1	1	1

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1.5	1.5	1.5
Inlet Spec Volume	m³/kg	0.1536	0.1534	0.1534
Calculated CV	US Units	4.927	3.92	2.442
Valve Opening	%	48.3	42	30.4
Gas Recovery Factor		0.757	0.76	0.766
Fluid State		Choked	Choked	Choked
Predicted Noise Level	dBA	76.2	75	74.4
Body Inlet Velocity	m/sec	12.8	10.2	6.4
Body Outlet Velocity	m/sec	112.2	90.4	57.9
Body Outlet Mach No.		0.2574	0.2075	0.1328
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	112.2	90.4	57.9
Sys. Outlet Mach No.		0.2494	0.201	0.1287
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.0394	0.0316	0.0199
Velocity Head	bar	3.69	3.704	3.722
Specific Volume In	m³/kg	0.1536	0.1534	0.1534
Specific Volume Out	m³/kg	1.3505	1.3633	1.3935
Min DP 100% Open		0.4305	0.2743	0.1075
Max Flow 100% Open		2460.1	2469.4	2481.5

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
428.72 lbf	299.39 lbf	1.5 in	2.12 in	2.85 in²	3.14 in²	0.20 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	32	32	9.41	9.42	9.42
Outlet Pressure	bar	1	1	1.07	1.06	1.04
Unbalanced Force	lbf	-38.52	91.11	26.79	26.82	26.82
Min Air Required	lbf/in2	14.67	12.82	37.74	37.74	37.74
Min Spring Setting	lbf/in2	9.85	7.43	6.51	6.51	6.51
Stem Stress	lbf/in2	2,379.61	2,647.45	2320	2320	2320
Stability	1/16 inch			0.01	0.01	0.01
Mod. Stability	Ratio			4.9	4.89	4.89

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	76	92	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518087	85-PV-8503

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	15.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 40	Hydro Test Pressure	400 psig
Shut Off Pressure	15.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @ 15 bar	0.24 cc/min
Max/Min Temp	85.0°C / -40.0°C	Industrial Specification	Standard	PED Category	II		
Line Fluid	MDEA SOLUTION			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A352 LCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A352 LCB	Bonnet Form	Normalising
V.8	Bonnet Lubrication	None	Packing Material	Supagraf R01
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A320 L7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr7
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	GR.6 STELLITE	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	85	Trim Size Ref.	2.5
T.8	Flow Direction	Flow Under	Flow Characteristic	Linear
T.9	Valve Travel	1.5 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-XS0SCB2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.3 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <10 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	76	92	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518087	85-PV-8503

Valve Design Details

Valve	Series 10 Globe	Design CV	85
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	15.00 bar
Body Rating	ANSI 150	Line Fluid	MDEA SOLUTION
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Linear	Inlet Pipe Size/Schedule	4.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	Condition 1	Condition 2	Condition 3
Liquid Flow Rate	kg/hour	38500	35000	10000
Inlet Pressure	bar	4.3	4.3	5.7
Outlet Pressure	bar	3	3	3
Pressure Drop	bar	1.3	1.3	1.3
Inlet Temperature	°C	-27.3	-27.3	-27.3
Specific Gravity		0.68	0.68	0.68
Vapour Pressure	bar	1.3	1.3	1.3
Critical Pressure	bar	100	100	100
Viscosity	Centi-Poise	0.25	0.25	0.25

Calculated Values

Description	UOM	Condition 1	Condition 2	Condition 3
Calculated CV	US Units	47.68	43.31	12.34
Valve Opening	%	51.9	47.8	17.9
Pressure Recovery Factor		0.909	0.912	0.95
Cavitation Index		-0.56	-0.57	-0.73
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	3.1	2.8	0.8
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0021	0.0019	0.0005
Trim Exit Velocity	m/sec	18.066	18.078	18.128
Min DP 100% Open		0.406	0.336	0.027
Max Flow 100% Open		68641.3	68685.4	68877.8

Pressure Drop and Cavitation

Description	Stage	Condition 1	Condition 2	Condition 3
Pressure Drop	1	1.3	1.3	1.3
Cavitation Index	1	-0.56	-0.57	-0.73

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
254.00 lbf	762.13 lbf	1.5 in	2.81 in	3.76 in ²	0.00 in ²	0.31 in ²			

Description	UOM	Closed	Cracked	Condition 1	Condition 2	Condition 3
Inlet Pressure	bar	15	15	4.3	4.3	4.3
Outlet Pressure	bar	1	1	3	3	3
Unbalanced Force	lbf	767.72	767.72	84.22	84.22	84.22
Min Air Required	lbf/in ²	4.33	4.33	33.21	33.21	33.21
Min Spring Setting	lbf/in ²	12.74	7.3	2.42	2.42	2.42
Stem Stress	lbf/in ²	3,330.30	3,330.30	1102	1102	1102
Stability	1/16 inch			0.05	0.05	0.05
Mod. Stability	Ratio			10.28	10.28	10.28

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	77	93	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518088	85-TV-8506

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	6.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	12.00 inch / 20	Hydro Test Pressure	400 psig
Shut Off Pressure	6.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	12.00 inch / 20	Seat Lk @60psi	4195 cc/min
Max/Min Temp	185.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		4.2 ltr/min
Line Fluid				ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200		Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	R01	Body Overlay	None
V.3	Body Size (in/cm/out)	12 x 12 x 12 inch		Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A		Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in		Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150		Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A216 WCB	R01	Bonnet Form	Standard
V.8	Bonnet Lubrication	None		Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE		Body Stud Material	A320 GrL7
V.10	Valve Paint Spec.	System A		Body Nut Material	A194 Gr7
V.11				Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF		No. of Stages	1
T.2	Guide Material	316L ST.ST.		Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.		Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.		Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.		Stem Finish/Overlay	None
T.6	Plug Type	Balanced		Plug Seal	Carb/PTFE U Seal
T.7	Design CV	1460		Trim Size Ref.	12
T.8	Flow Direction	Flow Under		Flow Characteristic	Eq%
T.9	Valve Travel	6 inch		Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None		Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-HSASCG3-B	R01	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes		Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel		Min. Operating Pressure	3.23 barG
A.4	Limit Stop	Maximum	R01	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard		Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron			
A.7	Paint	System C		Actuator Area	300 in²
A.8	Thrust (Max) Nm			Spring Setting	1.4-2.8 bar
A.9	Description				

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.		Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)		Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB	R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5
I.4	Air Set (Qty: 1)	KOSO		Air Set Model	FRS-M6
I.5	Volume Booster (Qty: 1)	KOSO		Volume Booster Model	VB3000
I.6	Solenoid Valve (Qty: 1)	IMI NORGREN		Solenoid Valve Model	YX13AA1H1BS

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	77	93	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518088	85-TV-8506

Valve Design Details

Valve	Series 1200 Globe	Design CV	1460
Valve Size (in x cm x out)	12 x 12 x 12 inch	Shut Off Pressure	6.00 bar
Body Rating	ANSI 150	Line Fluid	
Trim Design	HF	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	12.00 inch / 20
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	12.00 inch / 20

Process Conditions

Description	UOM	MAX	NORM	MIN
Gas Flow Rate	kg/hour	12859	11690	2000
Inlet Pressure	bar	4.48	4.49	4.5
Outlet Pressure	bar	4.39	4.38	4.35
Pressure Drop	bar	0.09	0.11	0.15
Inlet Temperature	°C	147	147	147
Outlet Temperature	°C	147	147	147
Molecular Weight		18	18	18
Ratio Of Specific Heats		1.4	1.4	1.4
Compressibility		1	1	1

Calculated Values

Description	UOM	MAX	NORM	MIN
Expansion Factor		1	1	1
Inlet Spec Volume	m³/kg	0.433	0.4321	0.4311
Calculated CV	US Units	1047.9	862.2	126.6
Valve Opening	%	85.9	78.2	25.8
Gas Recovery Factor		0.741	0.746	0.768
Fluid State		Normal	Normal	Normal
Predicted Noise Level	dBA	73.7	71.9	70
Body Inlet Velocity	m/sec	21.2	19.2	3.3
Body Outlet Velocity	m/sec	21.6	19.7	3.4
Body Outlet Mach No.		0.0428	0.039	0.0067
Mach No. Condition		OK	OK	OK
Sys. Outlet Velocity	m/sec	21.6	19.7	3.4
Sys. Outlet Mach No.		0.0415	0.0378	0.0065
Sys Mach No. Condition		OK	OK	OK
Pipework Correction Factor		1	1	1
Energy Conversion	MW	0.014	0.0156	0.0036
Velocity Head	bar	0.059	0.072	0.099
Specific Volume In	m³/kg	0.433	0.4321	0.4311
Specific Volume Out	m³/kg	0.4419	0.4429	0.446
Min DP 100% Open		0.0464	0.0384	0.0011
Max Flow 100% Open		17916.8	19794.9	23066

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
648.04 lbf	1,865.32 lbf	6 in	3.56 in	110.75 in²	113.10 in²	1.23 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	6	6	4.48	4.49	4.5
Outlet Pressure	bar	1	1	4.39	4.38	4.35
Unbalanced Force	lbf	-63.17	106.77	79.72	79.9	80.07
Min Air Required	lbf/in2	22.37	21.8	41.89	41.89	41.89
Min Spring Setting	lbf/in2	8.17	2.52	2.43	2.43	2.43
Stem Stress	lbf/in2	579.54	615.07	593	593.2	593.3
Stability	1/16 inch			0.04	0.04	0.04
Mod. Stability	Ratio			67.14	66.99	66.84

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	78	94	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518089	90-LV-9004

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	12.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 10S	Hydro Test Pressure	425 psig
Shut Off Pressure	12.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 10S	Seat Lk @60psi	216 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.22 ltr/min
Line Fluid	DEMINERALIZED WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L St.St.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	75	Trim Size Ref.	3
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	2.25 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G075R-J00SCC2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	75 in ²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <8 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	78	94	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518089	90-LV-9004

Valve Design Details

Valve	Series 1200 Globe	Design CV	75
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	12.00 bar
Body Rating	ANSI 150	Line Fluid	DEMINERALIZED WATER
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	6.00 inch / 10S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 10S

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	79000	63556	25000
Inlet Pressure	bar	8.71	8.72	8.75
Outlet Pressure	bar	2.99	2.98	2.95
Pressure Drop	bar	5.72	5.74	5.8
Inlet Temperature	°C	48	48	48
Specific Gravity		0.988	0.988	0.988
Vapour Pressure	bar	0.132	0.132	0.132
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.54	0.54	0.54

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	38.81	31.09	12.12
Valve Opening	%	73.1	64.5	36.9
Pressure Recovery Factor		0.948	0.951	0.958
Cavitation Index		-1.6	-1.64	-1.71
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	4.4	3.6	1.4
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0128	0.0103	0.0041
Trim Exit Velocity	m/sec	28.211	28.328	28.579
Min DP 100% Open		1.511	0.978	0.151
Max Flow 100% Open		152684.1	153313.6	154672.3

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	5.72	5.74	5.8
Cavitation Index	1	-1.6	-1.64	-1.71

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
295.50 lbf	456.47 lbf	2.25 in	2.81 in	6.63 in ²	7.07 in ²	0.31 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	12	12	8.71	8.72	8.75
Outlet Pressure	bar	1	1	2.99	2.98	2.95
Unbalanced Force	lbf	73.99	4.45	13.3	13.26	13.12
Min Air Required	lbf/in ²	11.16	12.16	36.03	36.03	36.03
Min Spring Setting	lbf/in ²	11.8	4.28	4.41	4.41	4.41
Stem Stress	lbf/in ²	1,204.35	977.66	1007	1006	1006
Stability	1/16 inch			0.03	0.03	0.03
Mod. Stability	Ratio			19.89	19.95	20.16

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Monday 30 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	79	95	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518090	95-FV-9502

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	9.50 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	6.00 inch / 40	Hydro Test Pressure	450 psig
Shut Off Pressure	9.50 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	6.00 inch / 40	Seat Lk @60psi	776 cc/min
Max/Min Temp	85.0°C / 0.0°C	Industrial Specification	Standard	PED Category	II		0.78 ltr/min
Line Fluid	WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	None
V.3	Body Size (in/cm/out)	6 x 6 x 6 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	270	Trim Size Ref.	6
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	3.5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-J00SCD3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.05 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18345.10.2.7.1.5.0.00.1 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS-315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- Stroking time shall be <16 Sec.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Monday 30 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	79	95	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518090	95-FV-9502

Valve Design Details

Valve	Series 1200 Globe	Design CV	270
Valve Size (in x cm x out)	6 x 6 x 6 inch	Shut Off Pressure	9.50 bar
Body Rating	ANSI 150	Line Fluid	WATER
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	6.00 inch / 40
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	6.00 inch / 40

Process Conditions

Description	UOM	Condition 1	Condition 2	Condition 3
Liquid Flow Rate	kg/hour	103147	85956	42987
Inlet Pressure	bar	7.6	7.6	7.6
Outlet Pressure	bar	5.9	5.8	5.7
Pressure Drop	bar	1.7	1.8	1.9
Inlet Temperature	°C	49	49	49
Specific Gravity		0.988	0.988	0.988
Vapour Pressure	bar	0.11	0.11	0.11
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.55	0.55	0.55

Calculated Values

Description	UOM	Condition 1	Condition 2	Condition 3
Calculated CV	US Units	92.32	74.77	36.39
Valve Opening	%	58.2	51.7	32.5
Pressure Recovery Factor		0.952	0.954	0.959
Cavitation Index		-4.75	-4.68	-4.64
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	70	70	70
Body Inlet Velocity	m/sec	1.6	1.4	0.7
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.0049	0.0044	0.0023
Trim Exit Velocity	m/sec	15.482	15.931	16.368
Min DP 100% Open		0.199	0.138	0.035
Max Flow 100% Open		301652	310398	318904.5

Pressure Drop and Cavitation

Description	Stage	Condition 1	Condition 2	Condition 3
Pressure Drop	1	1.7	1.8	1.9
Cavitation Index	1	-4.75	-4.68	-4.64

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
483.93 lbf	927.71 lbf	3.5 in	3.56 in	27.40 in²	28.27 in²	0.79 in²			

Description	UOM	Closed	Cracked	Condition 1	Condition 2	Condition 3
Inlet Pressure	bar	9.5	9.5	7.6	7.6	7.6
Outlet Pressure	bar	1	1	5.9	5.8	5.7
Unbalanced Force	lbf	119.72	11.39	67.19	66.05	64.91
Min Air Required	lbf/in2	10.6	11.38	34.98	34.98	34.99
Min Spring Setting	lbf/in2	10.94	3.54	3.94	3.93	3.92
Stem Stress	lbf/in2	768.6	630.66	701.7	700.3	698.8
Stability	1/16 inch			0.04	0.04	0.04
Mod. Stability	Ratio			9.47	9.63	9.8

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	80	96	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518091	95-FV-9503

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	8.50 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	24.00 inch / 20	Hydro Test Pressure	450 psig
Shut Off Pressure	8.50 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	24.00 inch / 20	Seat Lk @60psi	9138 cc/min
Max/Min Temp	50.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		9.14 ltr/min
Line Fluid	WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	18 x 18 x 18 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	3180	Trim Size Ref.	18
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	9 inch	Bonnet Mounting Dia.	5.75 inch
T.10	Stem Protection	None	Stem Diameter	1.75 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	C300R-700SCK4-B	Actuator Type	Piston Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	4.10 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	6.90 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	1.2-2.8 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 3/4" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.6	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- Stroking time shall be <16 sec.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	80	96	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518091	95-FV-9503

Valve Design Details

Valve	Series 1200 Globe	Design CV	3180
Valve Size (in x cm x out)	18 x 18 x 18 inch	Shut Off Pressure	8.50 bar
Body Rating	ANSI 150	Line Fluid	WATER
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	24.00 inch / 20
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	24.00 inch / 20

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	2399882	1992902	996451
Inlet Pressure	bar	6.1	6.2	6.5
Outlet Pressure	bar	4.2	3.8	3.1
Pressure Drop	bar	1.9	2.4	3.4
Inlet Temperature	°C	39	39	39
Specific Gravity		0.993	0.993	0.993
Vapour Pressure	bar	0.07	0.07	0.07
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.66	0.66	0.66

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	2041.5	1503.4	629.5
Valve Opening	%	81.4	69.4	42.2
Pressure Recovery Factor		0.946	0.949	0.956
Cavitation Index		-3.23	-2.84	-2.18
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	74.4	72.8	70
Body Inlet Velocity	m/sec	4.2	3.5	1.8
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.1288	0.1351	0.0951
Trim Exit Velocity	m/sec	16.208	18.277	21.825
Min DP 100% Open		0.772	0.536	0.133
Max Flow 100% Open		3738302.3	4215269.8	5033639.3

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	1.9	2.4	3.4
Cavitation Index	1	-3.23	-2.84	-2.18

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
942.08 lbf	2,807.80 lbf	9 in	5.75 in	250.95 in ²	254.47 in ²	2.41 in ²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	8.5	8.5	6.1	6.2	6.5
Outlet Pressure	bar	1	1	4.2	3.8	3.1
Unbalanced Force	lbf	417.9	34.88	146.5	132.5	108.1
Min Air Required	lbf/in ²	18.75	20.02	42.65	42.7	42.78
Min Spring Setting	lbf/in ²	13.89	3.26	3.63	3.58	3.5
Stem Stress	lbf/in ²	565.41	406.17	452.6	446.8	436.6
Stability	1/16 inch			0.15	0.15	0.16
Mod. Stability	Ratio			28.39	31.37	38.46

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	81	97	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTALIZER PROJECT		SN520000518092	95-LV-9501

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	14.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	14.00 inch / 10	Hydro Test Pressure	450 psig
Shut Off Pressure	14.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	14.00 inch / 10	Seat Lk @60psi	2328 cc/min
Max/Min Temp	50.0°C / 0.0°C	Industrial Specification	Standard	PED Category	III		2.33 ltr/min
Line Fluid	WATER			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	1200	Guiding	Cage Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	10 x 10 x 10 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	HF	No. of Stages	1
T.2	Guide Material	316L ST.ST.	Guide Finish/Overlay	Hard Chrome
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Balanced	Plug Seal	Carb/PTFE U Seal
T.7	Design CV	810	Trim Size Ref.	10
T.8	Flow Direction	Flow Over	Flow Characteristic	Eq%
T.9	Valve Travel	5 inch	Bonnet Mounting Dia.	3.56 inch
T.10	Stem Protection	None	Stem Diameter	1.25 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G300R-J00SCF3-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	None	Min. Operating Pressure	3.20 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	3.40 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	300 in²
A.8	Thrust (Max) Nm		Spring Setting	0.55-2.2 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" (Signal) & 1/2" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	FRS-M6
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB3000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <16 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	81	97	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518092	95-LV-9501

Valve Design Details

Valve	Series 1200 Globe	Design CV	810
Valve Size (in x cm x out)	10 x 10 x 10 inch	Shut Off Pressure	14.00 bar
Body Rating	ANSI 150	Line Fluid	WATER
Trim Design	HF	Flow Direction	Flow Over
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	14.00 inch / 10
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	14.00 inch / 10

Process Conditions

Description	UOM	MAX	NORM	MIN
Liquid Flow Rate	kg/hour	1007588	839657	419828
Inlet Pressure	bar	8.7	8.9	9
Outlet Pressure	bar	2.6	2.5	2.4
Pressure Drop	bar	6.1	6.4	6.6
Inlet Temperature	°C	45	45	45
Specific Gravity		0.99	0.99	0.99
Vapour Pressure	bar	0.1	0.1	0.1
Critical Pressure	bar	221	221	221
Viscosity	Centi-Poise	0.6	0.6	0.6

Calculated Values

Description	UOM	MAX	NORM	MIN
Calculated CV	US Units	478.1	388.3	190.7
Valve Opening	%	78.1	69.9	46.9
Pressure Recovery Factor		0.947	0.949	0.955
Cavitation Index		-1.23	-1.13	-1.11
Fluid State		NORMAL	NORMAL	NORMAL
Predicted Noise Level	dBA	78.9	77.2	70.5
Body Inlet Velocity	m/sec	5.8	4.8	2.4
Pipework Correction Factor		1	1	1
Viscosity Correction Factor		1	1	1
Energy Conversion	MW	0.1738	0.1504	0.078
Trim Exit Velocity	m/sec	29.147	29.909	30.45
Min DP 100% Open		2.103	1.437	0.365
Max Flow 100% Open		1707135	1751770.4	1783439.8

Pressure Drop and Cavitation

Description	Stage	MAX	NORM	MIN
Pressure Drop	1	6.1	6.4	6.6
Cavitation Index	1	-1.23	-1.13	-1.11

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
659.52 lbf	1,556.03 lbf	5 in	3.56 in	77.07 in²	78.54 in²	1.23 in²			

Description	UOM	Closed	Cracked	MAX	NORM	MIN
Inlet Pressure	bar	14	14	8.7	8.9	9
Outlet Pressure	bar	1	1	2.6	2.5	2.4
Unbalanced Force	lbf	294.82	17.79	46.26	44.49	42.71
Min Air Required	lbf/in2	9.22	10.14	34.04	34.05	34.06
Min Spring Setting	lbf/in2	8.37	2.26	2.35	2.35	2.34
Stem Stress	lbf/in2	777.66	551.93	575.1	573.7	572.2
Stability	1/16 inch			0.06	0.06	0.06
Mod. Stability	Ratio			37.62	39.12	40.75

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	82	98	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518093	02-PV-0209

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	15.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	4.00 inch / 40	Hydro Test Pressure	450 psig
Shut Off Pressure	15.00 bar	Leakage Class	ANSI Class V	Outlet Pipe Size/Sched.	4.00 inch / 40	Seat Lk @ 15 bar	0.24 cc/min
Max/Min Temp	85.0°C / 10.0°C	Industrial Specification	Standard	PED Category	II		
Line Fluid	AIR			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A216 WCB	Body Overlay	NONE
V.3	Body Size (in/cm/out)	3 x 3 x 3 inch	Body Rating	ANSI 150
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finish	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 150	Outlet Rating	ANSI 150
V.7	Bonnet Material	ASTM A216 WCB	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B7
V.10	Valve Paint Spec.	System A	Body Nut Material	A194 Gr2H
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Contoured	No. of Stages	1
T.2	Guide Bush Material	Gr.6 Stellite	Guide Finish/Overlay	None
T.3	Plug Material	316L ST.ST.	Plug Finish/Overlay	Gr.6 Stellite Face
T.4	Seat Material	316L ST.ST.	Seat Finish/Overlay	Gr.6 Stellite Face
T.5	Stem Material	316L ST.ST.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	85	Trim Size Ref.	2.5
T.8	Flow Direction	Flow Under	Flow Characteristic	Eq%
T.9	Valve Travel	1.5 inch	Bonnet Mounting Dia.	2.81 inch
T.10	Stem Protection	None	Stem Diameter	0.625 inch

Additional Trim Features:

Actuator - Pneumatic

A.1	Model Number	G150R-XS0SCB2-B	Actuator Type	Diaphragm Spring Return
A.2	Fail Mode Plug Type	Valve Closes	Actuator Action	Reverse
A.3	Manual Override	Side Mounted Handwheel	Min. Operating Pressure	3.80 barG
A.4	Limit Stop	None	Inc. Actuator Pressure	Opens Valve
A.5	Material	Standard	Max. Operating Pressure	4.10 barG
A.6	Yoke/Distance Piece Mat	SG Iron		
A.7	Paint	System C	Actuator Area	150 in ²
A.8	Thrust (Max) Nm		Spring Setting	1.0-2.3 bar
A.9	Description			

Additional Actuator Features:

Instrumentation

I.1	Instrument Piping	3/8" St.St.	Pneumatic Connection	NPT
I.2	Instrument Fittings	St.St. (Swagelok)	Electrical Connections	M20 x 1.5 mm
I.3	Positioner (Qty: 1)	ABB R01	Positioner Model	V18347.10.4.1.1.5.0.00.1-M5 R01
I.4	Air Set (Qty: 1)	KOSO	Air Set Model	PRS315-2-100
I.5	Volume Booster (Qty: 1)	KOSO	Volume Booster Model	VB1000

Additional Instrumentation Features:

Technical Comments

- STROKING TIME <10 SEC.

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	82	98	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518093	02-PV-0209

Valve Design Details

Valve	Series 10 Globe	Design CV	85
Valve Size (in x cm x out)	3 x 3 x 3 inch	Shut Off Pressure	15.00 bar
Body Rating	ANSI 150	Line Fluid	AIR
Trim Design	Contoured	Flow Direction	Flow Under
Flow Characteristic	Eq%	Inlet Pipe Size/Schedule	4.00 inch / 40
Leakage Class	ANSI Class V	Outlet Pipe Size/Schedule	4.00 inch / 40

Process Conditions

Description	UOM	Condition 1	Condition 2
Gas Flow Rate	Nm³/hour	1800	830
Inlet Pressure	bar	9.3	9.3
Outlet Pressure	bar	9	9
Pressure Drop	bar	0.3	0.3
Inlet Temperature	°C	49	49
Outlet Temperature	°C	49	49
Molecular Weight		28.95	28.95
Ratio Of Specific Heats		1.4	1.4
Compressibility		1	1

Calculated Values

Description	UOM	Condition 1	Condition 2
Expansion Factor		1	1
Inlet Spec Volume	m³/kg	0.0994	0.0994
Calculated CV	US Units	50.2	23.08
Valve Opening	%	78.2	51.2
Gas Recovery Factor		0.673	0.688
Fluid State		Normal	Normal
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	14.1	6.5
Body Outlet Velocity	m/sec	14.6	6.7
Body Outlet Mach No.		0.0367	0.0169
Mach No. Condition		OK	OK
Sys. Outlet Velocity	m/sec	14.6	6.7
Sys. Outlet Mach No.		0.0404	0.0186
Sys Mach No. Condition		OK	OK
Pipework Correction Factor		1	1
Energy Conversion	MW	0.0019	0.0009
Velocity Head	bar	0.294	0.295
Specific Volume In	m³/kg	0.0994	0.0994
Specific Volume Out	m³/kg	0.1027	0.1027
Min DP 100% Open		0.104	0.0221
Max Flow 100% Open		3047.8	3056.2

Actuator Calculated Values

Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area	Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
250.82 lbf	762.13 lbf	1.5 in	2.81 in	3.76 in²	0.00 in²	0.31 in²			

Description	UOM	Closed	Cracked	Condition 1	Condition 2
Inlet Pressure	bar	15	15	9.3	9.3
Outlet Pressure	bar	1	1	9	9
Unbalanced Force	lbf	767.72	767.72	56.39	56.39
Min Air Required	lbf/in2	4.31	4.31	33.39	33.39
Min Spring Setting	lbf/in2	12.72	7.28	2.19	2.19
Stem Stress	lbf/in2	3,319.95	3,319.95	1001	1001
Stability	1/16 inch			0.1	0.1
Mod. Stability	Ratio			15.41	15.41

CONTROL VALVE TECHNICAL SPECIFICATION



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	83	29	0	1	520000518		03

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
HENGAM FERTILIZER PROJECT		SN520000518094	30-HV-3027

Design Conditions		Valve Requirements		Pipe Interface/Legislation		Test Pressures	
Design Pressure	41.00 bar	Valve Design	Globe	Inlet Pipe Size/Sched.	1.00 inch / 40S	Hydro Test Pressure	1100 psig
Shut Off Pressure	41.00 bar	Leakage Class	ANSI Class IV	Outlet Pipe Size/Sched.	1.00 inch / 40S	Seat Lk @60psi	8.62 cc/min
Max/Min Temp	85.0°C / 10.0°C	Industrial Specification	Standard	PED Category	SEP		0.01 ltr/min
Line Fluid	MDEA SOLUTION			ATEX Group 2	Zone 1 = Cat 2		
Valve Application	Standard	Noise Limit	85.00 dBA	Export License Req'd?	N/A		

Valve and Bonnet Specification

V.1	Valve Series	10	Guiding	Top Guided
V.2	Body Material	ASTM A351 CF8	Body Overlay	NONE
V.3	Body Size (in/cm/out)	1 x 1 x 1 inch	Body Rating	ANSI 300
V.4	Inlet End Connection	Flanged R/F-A	Outlet End Connection	Flanged R/F-A
V.5	Inlet Connection Finish	A - CLA 125/250 u in	Outlet Connection Finsh	A - CLA 125/250 u in
V.6	Inlet Rating	ANSI 300	Outlet Rating	ANSI 300
V.7	Bonnet Material	ASTM A351 CF8	Bonnet Form	Standard
V.8	Bonnet Lubrication	None	Packing Material	TEF/Chevrons
V.9	Body/Bonnet Seal	316 L ST.ST. / GRAPHITE	Body Stud Material	A193 B8M CLASS 2
V.10	Valve Paint Spec.	None	Body Nut Material	A194 Gr8M
V.11			Stud/Nut Treatment	None

Additional Valve Features:

Trim Specification

T.1	Trim Design	Microspline	No. of Stages	1
T.2	Guide Bush Material	None	Guide Finish/Overlay	None
T.3	Plug Material	316L St.St.	Plug Finish/Overlay	Gr.6 Fully Stellite
T.4	Seat Material	316L St.St.	Seat Finish/Overlay	Gr.6 Fully Stellite
T.5	Stem Material	316L St.St.	Stem Finish/Overlay	None
T.6	Plug Type	Solid	Plug Seal	NONE (Solid)
T.7	Design CV	3	Trim Size Ref.	No 00
T.8	Flow Direction	Flow Over	Flow Characteristic	Mod Eq%
T.9	Valve Travel	1.125 inch	Bonnet Mounting Dia.	2.12 inch
T.10	Stem Protection	None	Stem Diameter	0.375 inch

Additional Trim Features:

Actuator - Manual

A.1	Model Number	MO-OAHS	Actuator Type	Gear Operator
A.2	Handwheel Type	Side Mounted Handwheel	Limit Stop	Maximum
A.3	Material	Standard	Paint	System C

Additional Actuator Features:

Technical Comments

- Max. adjustable mechanical Limit stopper to be provided at given design CV. (CV value shall be confirm by PIDECC).

DESIGN CALCULATIONS



Approver
 Approved Date
 Printed Date Friday 27 April 2018

KIPL Sizing References					Order		
Quote No.	Item No.	Cust. Item	Rev	Qty	Order No.	Order Item	Rev
QNE002377	83	29	0	1	520000518		

Customer	Customer Reference	Sales Engineer
PIDEC	1208-00-IN-POR-605	Shatrughn Gupta

Project	Quality	Serial Number	Tag Number
		SN520000518094	30-HV-3027

Valve Design Details			
Valve	Series 10 Globe	Design CV	3
Valve Size (in x cm x out)	1 x 1 x 1 inch	Shut Off Pressure	41.00 bar
Body Rating	ANSI 300	Line Fluid	MDEA SOLUTION
Trim Design	Microspline	Flow Direction	Flow Over
Flow Characteristic	Mod Eq%	Inlet Pipe Size/Schedule	1.00 inch / 40S
Leakage Class	ANSI Class IV	Outlet Pipe Size/Schedule	1.00 inch / 40S

Process Conditions			
Description	UOM	Condition 1	Condition 2
Liquid Flow Rate	kg/hour	6000	5454
Inlet Pressure	bar	35.5	35.5
Outlet Pressure	bar	6.5	6.5
Pressure Drop	bar	29	29
Inlet Temperature	°C	50	50
Specific Gravity		1.022	1.022
Vapour Pressure	bar	0.1	0.1
Critical Pressure	bar	100	100
Viscosity	Centi-Poise	2.4	2.4

Calculated Values			
Description	UOM	Condition 1	Condition 2
Calculated CV	US Units	1.278	1.162
Valve Opening	%	59	56.2
Pressure Recovery Factor		0.953	0.955
Cavitation Index		-1.54	-1.67
Fluid State		NORMAL	NORMAL
Predicted Noise Level	dBA	70	70
Body Inlet Velocity	m/sec	3.3	3
Pipework Correction Factor		1	1
Viscosity Correction Factor		1	1
Energy Conversion	MW	0.0047	0.0043
Trim Exit Velocity	m/sec	62.874	62.874
Min DP 100% Open		5.267	4.352
Max Flow 100% Open		14079.5	14079.5

Pressure Drop and Cavitation			
Description	Stage	Condition 1	Condition 2
Pressure Drop	1	29	29
Cavitation Index	1	-1.54	-1.67

Actuator Calculated Values											
Frictional Force	Seat Load	Travel	Yoke Mounting	Seat Area	Cage Area	Stem Area			Unbalanced Area	Max. Modulating Thrust	Max. Seating Thrust
90.00 lbf	58.90 lbf	1.125 in	2.12 in	0.44 in ²	0.00 in ²	0.11 in ²				280.58	148.9

Description	UOM	Closed	Cracked	Condition 1	Condition 2
Inlet Pressure	bar	41	41	35.5	35.5
Outlet Pressure	bar	1	1	6.5	6.5
Unbalanced Force	lbf	-190.58	-190.58	-128.9	-128.9
Stem Stress	lbf/in ²	2,540.37	2,540.37	1982	1982



Customer	PIDEC
SO NO.	SO520000518
SERIAL NO.	SN520000518095
Project	HENGAM FERTALIZER PROJECT

GENERAL				SERVICE CONDITIONS				1
TAG NO.	00-PCV-0020			FLUID STATE	POTABLE WATER		L	2
PRODUCT SR.NO.	--			APPLICATION	DOWNSTREAM PRE CONTROL			3
SERVICE	PRESURE REDUCING			FLOW -MIN/OP/MAX	10.0	25.0	m ³ /hr	4
MAKE	KOSO			INLET PR. -MIN/OP/MAX	8.7		Kg/cm ² g	5
MODEL NO.	D200			OUTLET PR. -MIN/OP/MAX	6.0		Kg/cm ² g	6
TYPE	GLOBE PILOT OPERATED			TEMP. MIN/ OP/MAX	40	TO 45	°C	7
PRODUCT CODE	-			DP SIZING	2.70		Kg/cm ² g	8
INLET LINE OUTLET LINE	3"		3"	SP.GRAVITY MOL.WT.			0.989	9
P & ID NO.	-			VISCOSITY or Cp/Cv	--			10
QUANTITY	01 NO.			COMPRESSIBILITY FACTOR	--			11
								12
				SET PRESSURE	6.0		Kg/cm ² g	13
				SET PRESSURE RANGE	5.5 TO 6.5		Kg/cm ² g	14

SIZING DATA				REGULATOR & ACTUATOR CONSTRUCTION				15
REGULATION	DOWNSTREAM			BODY SIZE (mm)	50 mmNB - 2"			16
CALCULATED Cv	18.085	7.234		END CONNECTION	2" FLANGED RF SERR			17
SELECTED Cv OR FLOW	7.6			RATING	ANSI 150#			18
PREDICTED NOISE LEVEL dBA	< 85 dBA			IMPULSE CONN.	EXTERNALS			19
VELOCITY IN/OUTLET	--	--	m/s	IMPULSE SIZE	½" NPT F			20
DESIGN PRESSURE	AS PER ANSI 150#			PACKING OR SEAL	GLANDLESS CONSTRUCTION			21
DESIGN TEMPERATURE	AS PER ANSI 150#			LEAKAGE CLASS	CLASS VI			22
DP SHUT OFF	10.0		Kg/cm ²					23
								24
								25

MATERIAL OF CONSTRUCTION				NOTES				26
PART	ITEM	MOC		1.Valve shall be added in order once receipt of amended PO. 2.Delivery shall be applicable after receipt of amended PO.				
1	BODY	AISI316 - A351 Gr CF8M						27
2	BOTTOM	AISI 316						28
3	SOFT SEAT	EPDM						29
4	METALLIC SEAT	AISI 316						30
5	STEM	AISI 316						31
6	DIAPHRAGM	Reinforced EPDM						32
7	DIAPHRAGM CASING	AISI 316						33
8	BOTTOM SPRING	AISI 304						34
9	FASTENERS	AISI 316						35
10	PILOT BODY	AISI 316						36
11	PILOT SEAT	AISI 316 + EPDM						37
12	PILOT STEM	AISI 316						38
13	PILOT DIAPHRAGM	Reinforced EPDM						39
14	SET SCREW	AISI 304						40
15	TUBING AND RAD	AISI 304						41
				42				
				43				
				44				

					P.O. NUMBER	1208-00-IN-POR-605
					P.O. DATE	-
					QUOTATION NO.	QNE002377
					QUOTATION DATE	20-07-2018
0	24/jul	SAC	PMJ	PMJ	ENQUIRY NO.	00-PCV-0020
REV	DATE	PRPD	CHKD	APRD	REMARK	ENQUIRY DATE
						19-07-2018

DOWNSTREAM PRESSURE REGULATING VALVE - DIRECT ACTING				PROJECT NO	--
				DOC NO.	5639/01