

Control System Specification



Compressor Type

RIKT 80-1+1+1+1

US STEEL
KOSICE SLOVAKIA
MAIN AIR COMPRESSOR UNIT

 AIR LIQUIDE TM				
N° D'AFFAIRE JOB NUMBER	FMT FMT	GROUPE GROUP	N° NBR	Rev Rev
KOSICE 50-3023-01	A4	611		

Rev.	Changed	Date	Checked	Date	Change No.	Change description
Rindlisbacher H		13.07.2005				
Issued	Date	Checked	Date	Released		Date
Type/Size: RIK80-4						Doc Type: SPE
Project No: N.7100175			Doc Title: Min. Requirements of Automatic Valves			
Project: Kosair 2004			Doc No: 837021172		Rev.:	Page 1 of 7

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Control System Specification



Contents

	<u>Sheet</u>	<u>REV</u>	<u>Date</u>	<u>Name</u>
Cover Page	1			
Contents	2			
Min. Requirements for Antisurge Valve	3			
General Notes for Antisurge Valve	4			
Valve Specification (for information only)	5			
Valve Sizing calculation (for information only)	6			
Valve Dim. Drawing (for information only)	7			

Reference Drawings

Compressor Plant P&ID	0-837 016 878
Performance Curves	4-837 016 381

Project No: N.7100175	Doc Title: Min. Requirements of Automatic Valves		
Project: Kosair 2004	Doc No: 837021172	Rev.:	Page 2 of 7

Control System Specification



Minimum Requirements for Antisurge Valve

Process Data for the Antisurge Valve Capacity Design

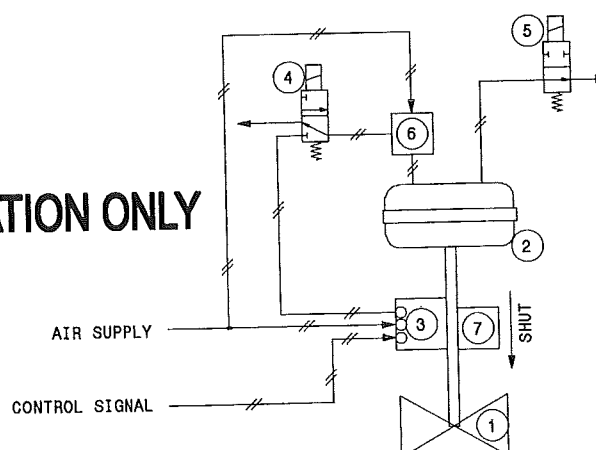
Compressor Section	:	RIK 80 1+1+1+1	
Fluid (gaseous)	:	Air	
Design Flow	:	115'000	Nm ³ /h
Design Upstream Pressure	:	4.90	bara
Design Downstream Pressure	:	0.99	bara
Design Upstream Temperature	:	58.2	°C
Molecular Weight	:	28.963	Kg/Kmol
Specific Heat Ratio K (Cp/Cv)	:	1.40	-
Compressibility Factor Z	:	1.00	-
Selected Valve Capacity	:	- 0 % / + 15 % of Design Flow	
Design Pressure / Temperature	:	10 barg. / -40°C; 180	°C

Standard Requirements of the Antisurge Valve (s)

Opening Time of the Valve :	Max. 3	sec.
Controlled Opening Time via Positioner :	Min. 33 %/sec. or Max. 0.03 sec./%	
Opening rate :	Max. 1	sec.
Opening via Solenoid Valve :	Open	
Fail Position :	Closes the Antisurge Valve	
Increasing Control Signal :	Linear	
Valve Characteristic :		

Tag-Number : FV 11074

FOR INFORMATION ONLY



- ① VALVE BODY
- ② ACTUATOR
- ③ POSITIONER
- ④ SOLENOID VALVE

- ⑤ SOLENOID VALVE
 - ⑥ BOOSTER
 - ⑦ LIMIT SWITCHES
- } IF REQUIRED

Project No: N.7100175	Doc Title: Min. Requirements of Automatic Valves		
Project: Kosair 2004	Doc No: 837021172	Rev.:	Page 3 of 7

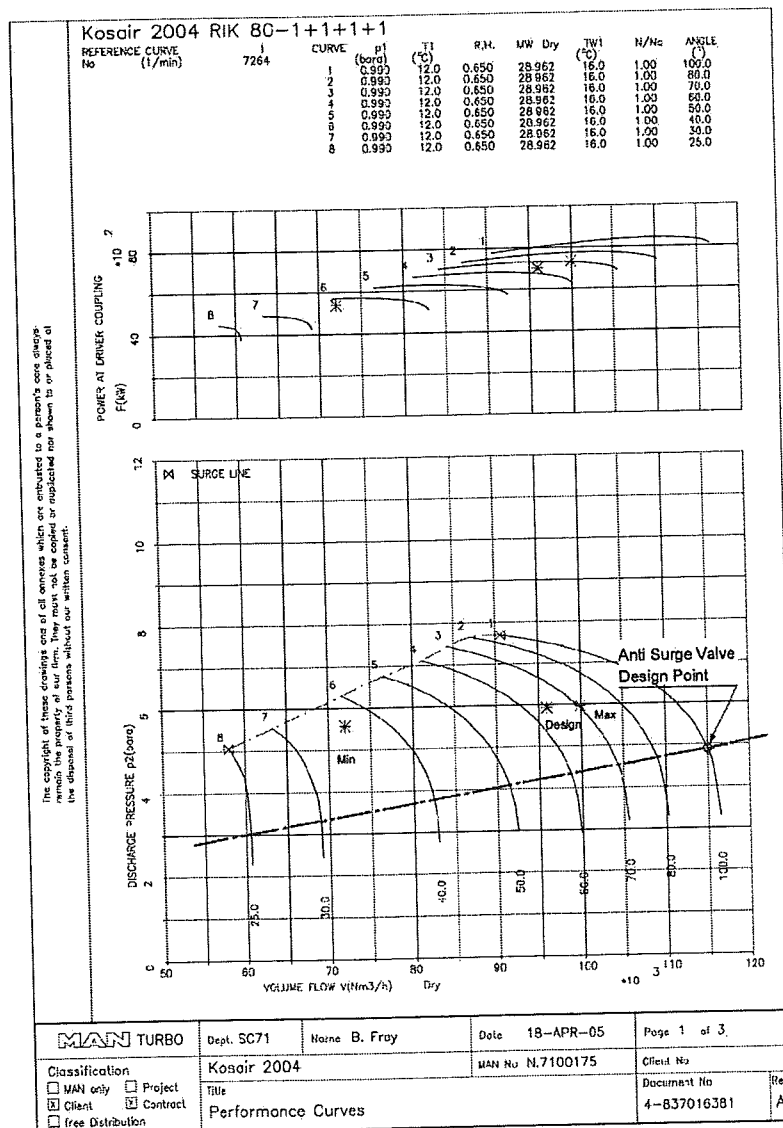
Control System Specification



General Notes for Antisurge Valves

Herein are MTZ recommendations and guidelines to design wisely the antisurge valve capacity :

- The antisurge valve body rating and actuator size to be defined for the maximal process conditions by Client. The solenoid valve(s) and booster to be defined by the Valve Manufacturer to meet the herein specified opening time.
- Position transmitter, limit (proximity) switches and other accessories to be defined by Client according his requirements.
- For an optimized and safe antisurge control, the Design Point of the valve may not correspond to the Design Point of the Compressor. All different process conditions are considered.
- Solenoid valves are energized in normal control mode.



Project No: N.7100175	Doc Title: Min. Requirements of Automatic Valves		
Project: Kosair 2004	Doc No: 837021172	Rev.:	Page 4 of 7

Control System Specification



ROTARY CONTROL VALVE SPECIFICATION

FISHER

Item: 002		Rev:	Qty: 1	Project: KOSAIR.01	Rev: 00	09 NOV 04																						
Service: Tag: FV 11074 ASV DESIGN Size and Type: 14 Inch 8510 E-Disc				Positioner Type: None Input Signal: Access: Gauges: None Action: Certification:																								
Body Style: Butterfly Design Temp: Design Press: End Connect: In: Out: Material: Flow Directn:				Controller Type: None Action: Measure Element: Range: Output: Mounting: Airset: Mounting:																								
Trim Number: Retainer Matl: Bushing/ Bearing Material: Seal/ Liner Matl: Disk/ Ball Matl: Shutoff Class: Port Size: Characteristic: Shaft Matl: Shaft Size:				Transducer: None Input Signal: Output Signal: Action: Mounting: Airset: Certifications:																								
Bonnet Packing: PackFlg/Bltg: Bonnet Style:				Line In: 42.000 in, STD Line Out: 42.000 in, STD Insulation: Service Cond: Process Fluid: Air																								
Actuator: None Type/Size: Travel: Bench Set: Push Down To: Supply: To Actuator: Fails Valve: Mounting: Handwheel: None				<table border="1"> <thead> <tr> <th></th> <th>ASV Design</th> </tr> </thead> <tbody> <tr> <td>M</td> <td>28.963</td> </tr> <tr> <td>T</td> <td>58.200</td> </tr> <tr> <td>P1</td> <td>4.900</td> </tr> <tr> <td>dP</td> <td>3.910</td> </tr> <tr> <td>Q</td> <td>115000.000</td> </tr> <tr> <td>Vlv Lpa</td> <td>101.901</td> </tr> <tr> <td>Cg</td> <td>99818.444</td> </tr> <tr> <td>C1</td> <td>23.455</td> </tr> <tr> <td>Degree Open</td> <td>74</td> </tr> <tr> <td>Maximum Rated Flow Coefficient:</td> <td>113000 Cg</td> </tr> </tbody> </table>				ASV Design	M	28.963	T	58.200	P1	4.900	dP	3.910	Q	115000.000	Vlv Lpa	101.901	Cg	99818.444	C1	23.455	Degree Open	74	Maximum Rated Flow Coefficient:	113000 Cg
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Project No: N.7100175	Doc Title: Min. Requirements of Automatic Valves		
Project: Kosair 2004	Doc No: 837021172	Rev.:	Page 5 of 7

Control System Specification



SIZING CALCULATION

FISHER

Contact: H. Rindlisbacher
Customer: MAN Turbo / Switzerland
Loc: Zürich

Project: KOSAIR.01

Rev: 00

Date: 09 NOV 04

Item: 002 - VALVE/REGULATOR SIZING CALCULATION: Fisher Ideal Gas
Item Desc: 8510 E-Disc, 14 Inch
Tags: FV 11074 ASV DESIGN

SERVICE & SIZING

ASV Design

Gas Name	Air
Inlet Pressure (bar(a))	4.900
System Pressure Drop (bar)	3.910
dP/P1 Ratio	0.797
Atm. Pressure (bar(a))	1.013
Molecular Weight (M)	28.963
Specific Heat Ratio, k	1.395
Temperature (deg C)	58.200
Gas Flow Rate (Nm3/h)	115000.000

VALVE NOISE CALCULATION

E-DISC

Fisher Valve/Reg Trim Type	0.376
Pressure Drop (bar)	0.077
Valve dP/P1 Ratio	23.455
Recovery Factor, C1	99818.444
Valve Cg	42.000
Downstream Pipe Size (in)	STD
Downstream Pipe Schedule	93.1
Valve/Reg LpA (SPL) (dB(A))	

VELOCITY

Upstream Area (in2)	233.700
Downstream Area (in2)	1336.000
Sonic Velocity (m/s)	364.378
Inlet Mach	0.146
Inlet Velocity (m/s)	53.199
Outlet Mach	0.126
Outlet Velocity (m/s)	45.912

DIFFUSER NOISE CALCULATION

INLINE

Type	4.524
Inlet Pressure (bar(a))	3.534
Pressure Drop (bar)	0.781
dP/P1 Ratio	70000.000
Diffuser Cg	48.000
Outlet Pipe Size (in)	STD
Outlet Pipe Schedule	101.9
Diffuser LpA (SPL) (dB(A))	77.778
Minimum Tube Area (in2)	332.511
Minimum Annular Area (in2)	1717.953
Minimum Outlet Area (in2)	

DIFFUSER INCREASED VELOCITY NOISE

Recommended Outlet Area (in2)	1717.953
Actual Outlet Area (in2)	1753.500
Actual Outlet Velocity (Mach)	0.453
LpA (SPL) Correction (dB(A))	0.001
Adjusted LpA (SPL) (dB(A))	101.901

Notes: SZNG: Anti Surge Valve Design

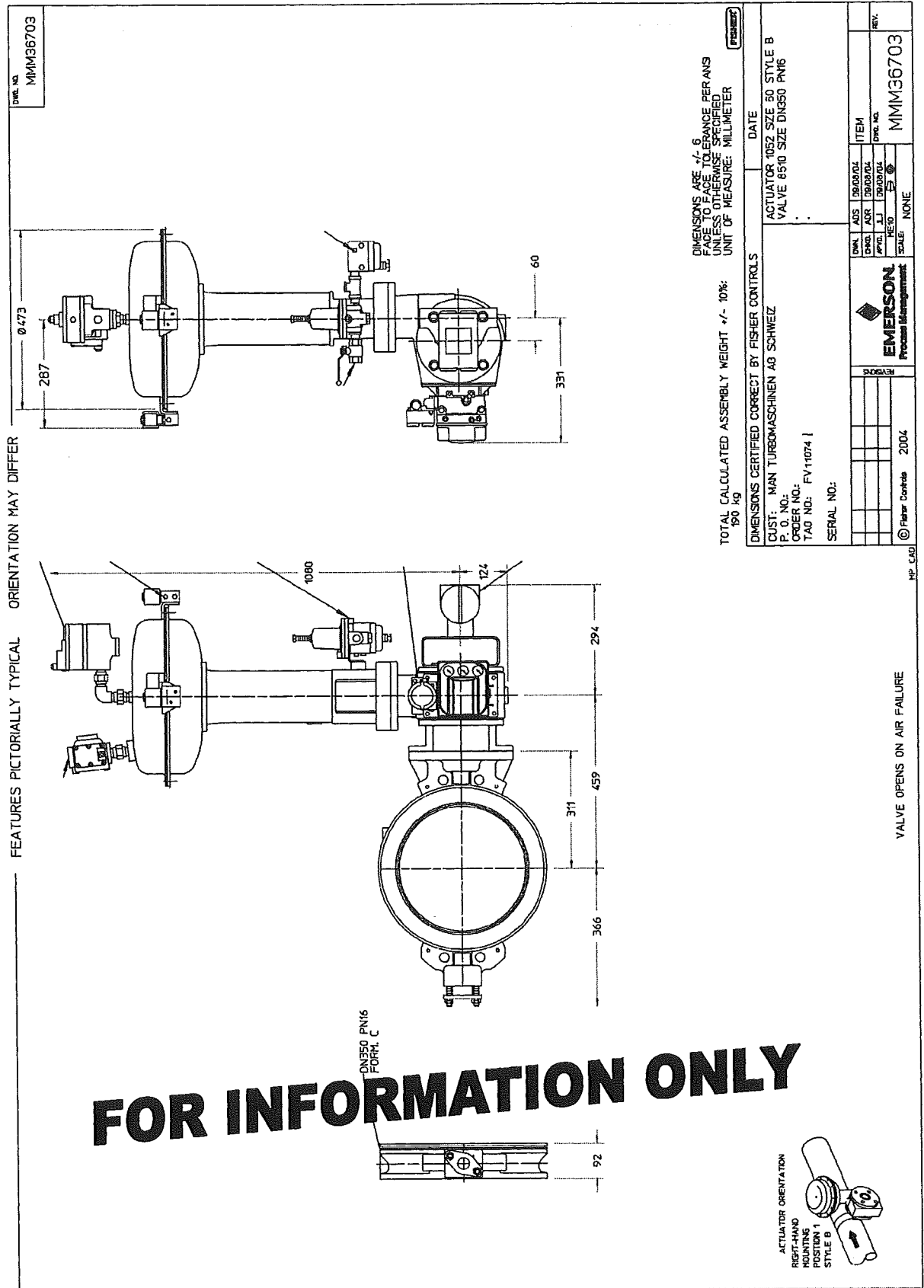
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Project No: N.7100175	Doc Title: Min. Requirements of Automatic Valves		
Project: Kosair 2004	Doc No: 837021172	Rev.:	Page 6 of 7

Control System Specification



Project No: N.7100175	Doc Title: Min. Requirements of Automatic Valves		
Project: Kosair 2004	Doc No: 837021172	Rev.:	Page 7 of 7