

		<b>Specification</b> Flow Element				TAG - No.: <b>FE20003</b>  Project-No.: K70101  Page:                      of:					
		Air Liquide AGS GmbH				Project: <b>ASU No. 9 KOSICE</b>  Designation: <b>HP-GAN TO CUSTOMER</b>				Combination with Tag-No.:	

  

Rev.	Line - No.	100 N-20008-AA40C1	Rev.	Line - No.	Calculation data
1	Location	Equipment-No.	55	55	Isentrop. exponent    κ    -    1,4334
2	Location	DN    100    PN    40    Material    St37	56	56	Real gas factor i. n.    Zn    -
3		Flanges    DIN EN 1092-1    Gasket    Form B1	57	57	Real gas factor    Z <sub>1</sub> -
4		Taps	58	58	Pipe roughness    k    mm    0,03
5			59	59	
6	Service conditions	Medium    GAN	60	60	Calculation at 2/3 * flow:
7		State <input type="checkbox"/> liquid <input checked="" type="checkbox"/> gaseous <input type="checkbox"/> vaporous	61	61	Flow coefficient    α    -
8		Operation case    case 1    case 2    case 3    2    62	62	62	Discharge coefficient    C    -    0,6058
9		Flow    Nm³/h    3500	63	63	Expansibility factor    ε    -    0,99914
10		P <sub>1</sub> (abs.)    bar    21	64	64	Reynold factor    ReD    -    728940
11		Temperature t <sub>1</sub> °C    20	65	65	
12		Operat. density    kg/m³    24,24	66	66	Type of operating pressure probe
13		Normal density    kg/m³    1,2504	67	67	Pressure loss    dw    mbar    max. 100 / norm. 61
14		Ambient temp.    °C    -25...+35	68	68	Edge radius    rk    mm    0,02
15		Dynamic viscosity    mPa s    0,0179	69	69	Inside pipe diameter    D    mm    101,7
16	Design point	P <sub>1</sub> (abs.)    bar    21	70	70	Throat diameter    d    mm    60,47
17		T <sub>1</sub> °C    20	71	71	Diameter ratio    β    -    0,59459
18		Flow	72	72	Required inlet section    mm    1100
19		at 100% flow-rate    Nm³/h    4500	73	73	Required outlet section    mm    650
20		Differential pressure	74	74	Vent/-drain drill <input type="checkbox"/> yes <input checked="" type="checkbox"/> no
21		at 100% flow-rate    mbar    145,97	75	75	Intake edge stellite <input type="checkbox"/> yes <input checked="" type="checkbox"/> no
22	Order data	Manufacturer	76	76	Compensating pots <input type="checkbox"/> yes <input checked="" type="checkbox"/> no
23		Kind of flow device    corner orifice	77	77	Mounting position <input checked="" type="checkbox"/> horizontal <input type="checkbox"/> vert.
24		Order-No.	78	78	<input type="checkbox"/> Calibrating capable
25		Order addition	79	79	<input type="checkbox"/> Calibration certificate
26		with measuring line <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	80	80	
27		Process connection:	81	81	Documentation <input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> French
28		<input checked="" type="checkbox"/> Sandwich	82	82	Quantity per type    4-fold
29		<input type="checkbox"/> Flange	83	83	
30		<input type="checkbox"/> Welding ends for pipe:	84	84	<input checked="" type="checkbox"/> Material certificate EN 10204 3.1.B
31		DN    100    PN    40    Inst. length    mm    65	85	85	<input checked="" type="checkbox"/> Cleaned, oil and grease free acc. cert. 06401
32		Difference pressure connections: *)	86	86	<input checked="" type="checkbox"/> Packed acc. cert. 06271
33			87	87	<input type="checkbox"/> AD 2000-leaflet W10, low temperature design
34	Element    Material    316 SS    Taps    Material    316 SS	88	88	<input checked="" type="checkbox"/> Marking with TAG-number	
35	Pipe    Material       Frames    Material    316 SS	89	89	<input type="checkbox"/> ANSI B31.3	
36		90	90	<input checked="" type="checkbox"/> UVV-Gase	
37	max. allow. press.    30 bar (g)	91	91	<input checked="" type="checkbox"/> UVV-Sauerstoff	
38		92	92	<input type="checkbox"/>	
39		93	93		
40		94	94		
41					
42					
43	Remarks	<b>*) Difference pressure connections:</b> Shut-off valves, inlet G1/2", outlet SWAGELOK fittings for tube D = 6mm, material 316 SS			
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2	19.08.2005	Eichler	Ri				
1	11.11.2004	Möller	Eichler	Order Spec.			
0	20.10.2004	Möller	Eichler	Initial Version			
Rev.	Date	Name	Checked	Change	Rev.	Date	Change

SPEZ23EN.XLS 08.12.1998

				Specification Flow Element				TAG - No.: <b>FE63033</b>			
				Project: ASU No. 9 KOSICE				Project-No.: K70101			
Air Liquide AGS GmbH								Designation: LOX-LGCC FLOW			
								Combination with Tag-No.:			

  

Rev.								Rev.								
		Location	Line - No.	50 OL-63003-ZB10C1C							Calculation data	Isentrop. exponent	κ	-		
			Equipment-No.									Real gas factor i. n.	Zn	-		
			DN	50	PN	10	Material	VA				Real gas factor	Z <sub>1</sub>	-		
			Flanges	DIN EN 1092-1		Gasket	Form B1					Pipe roughness	k	mm		
			Taps			Material										
		Service conditions	Medium	LOX							Office	Calculation at 2/3 * flow:				
			State	<input checked="" type="checkbox"/> liquid <input type="checkbox"/> gaseous <input type="checkbox"/> vaporous								Flow coefficient	α	-		
			Operation case	case 1	case 2	case 3							Discharge coefficient	C	-	
			Flow	Nm³/h	5000								Expansibility factor	ε	-	
			P <sub>1</sub> (abs.)	bar	4,5								Reynold factor	ReD	-	
			Temperature t <sub>1</sub>	°C	-181,8											
			Operat. density	kg/m³	1137											
			Normal density	kg/m³	1,429								Type of operating pressure probe			
			Ambient temp.	°C	-25...+35								Pressure loss	dw	mbar	max. 150
			Dynamic viscosity	mPa s	0,1813								Edge radius	rk	mm	
		Design point	P <sub>1</sub> (abs.)	bar	4,5							Inside pipe diameter	D	mm		
			T <sub>1</sub>	°C	-181,8							Throat diameter	d	mm		
			Flow									Diameter ratio	β	-		
			at 100% flow-rate	Nm³/h	6000 (8574 kg/h)							Required inlet section	mm			
			Differential pressure									Required outlet section	mm			
			at 100% flow-rate	mbar	383							Vent-/drain drill	<input type="checkbox"/> yes	<input type="checkbox"/> no		
			Manufacturer	FLOW Instruments								Intake edge stellite	<input type="checkbox"/> yes	<input type="checkbox"/> no		
			Kind of flow device	SWM flow element								Compensating pots	<input type="checkbox"/> yes	<input type="checkbox"/> no		
			Order-No.									Mounting position	<input type="checkbox"/> horizontal	<input type="checkbox"/> vert.		
			Order addition									<input type="checkbox"/> Calibrating capable				
		Order data	with measuring line	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no								<input type="checkbox"/> Calibration certificate				
			Process connection:									Documentation	<input type="checkbox"/> German	<input checked="" type="checkbox"/> English	<input type="checkbox"/> French	
			<input type="checkbox"/> Sandwich									Quantity per type	4-fold			
			<input checked="" type="checkbox"/> Flange DN50/PN10/16 DIN EN 1092-1 Form B1													
			<input type="checkbox"/> Welding ends for pipe:													
			DN	50	PN	10	Inst. length	mm				<input checked="" type="checkbox"/> Material certificate EN 10204 3.1.B				
			Difference pressure connections:									<input checked="" type="checkbox"/> Cleaned, oil and grease free acc. cert. 06401				
			*)									<input checked="" type="checkbox"/> Packed acc. cert. 06271				
			Element	Material	316 SS	Taps	Material	316 SS				<input checked="" type="checkbox"/> AD 2000-leaflet W10, low temperature design				
			Pipe	Material		Frames	Material					<input checked="" type="checkbox"/> Marking with TAG-number				
		Certificates									<input type="checkbox"/> ANSI B31.3					
											<input checked="" type="checkbox"/> UVV-Gase					
											<input checked="" type="checkbox"/> UVV-Sauerstoff					
											<input type="checkbox"/>					
		Remarks	*) Difference pressure connections: <b>shut-off valves with tube fittings 6 mm Swagelok,</b> <b>mounted on SST support, spacing to pipe section 150 mm</b>													
2	14.06.2005	Möller	Eichler	diff. press.												
1	08.11.2004	Möller	Eichler	Order Spec.												
0	20.10.2004	Möller	Eichler	Initial Version												
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change							

<b>AIR LIQUIDE</b> <small>TM</small>				<b>Specification</b>				TAG - No.: <b>FE70041</b>			
				Flow Element				Project-No.: K70101			
Air Liquide AGS GmbH				Project: <b>ASU No. 9 KOSICE</b>				Page:                      of:			
				Designation: <b>MP-GAN TO CUSTOMER</b>				Combination with Tag-No.:			

  

Rev.							Rev.						
	1	Location	Line - No.		350 N-75005-AA25C1				55	Calculation data			
	2		Equipment-No.						56				
	3		DN	350	PN	25	Material	St37					57
	4		Flanges		DIN EN 1092-1		Gasket	Form B1					58
	5		Taps				Material						59
	6	Service conditions	Medium		GAN				60	Orifice			
	7		State		<input type="checkbox"/> liquid <input checked="" type="checkbox"/> gaseous <input type="checkbox"/> vaporous				61				
	8		Operation case		case 1	case 2	case 3		62				
	9		Flow	Nm³/h	16000	20000	29500		63				
	10		P <sub>1</sub> (abs.)	bar	7	7	7,3		64				
	11		Temperature t <sub>1</sub>	°C	15	15	26		65				
	12		Operat. density	kg/m³	8,202	8,202	8,234		66				
	13		Normal density	kg/m³	1,2504			1	67				
	14		Ambient temp.	°C	-25...+35				68				
	15		Dynamic viscosity	mPa s	0,018				69				
	16	Design point	P <sub>1</sub> (abs.)		bar		7,3	1	70	Certificates			
	17		T <sub>1</sub>		°C		26	1	71				
	18		Flow					1	72				
	19		at 100% flow-rate		Nm³/h		35000		73				
	20		Differential pressure						74				
	21	at 100% flow-rate		mbar		150		75	Documentation				
	22	Manufacturer						76					
	23	Kind of flow device		corner orifice				77					
	24	Order-No.						78					
	25	Order addition						79					
	26	with measuring line		<input type="checkbox"/> yes <input checked="" type="checkbox"/> no				80					
	27	Process connection:						81					
	28	<input checked="" type="checkbox"/> Sandwich						82					
	29	<input type="checkbox"/> Flange						83					
	30	<input type="checkbox"/> Welding ends for pipe:						84					
	31	DN	350	PN	25	Inst. length	mm	65		85			
	32	Difference pressure connections: *)							86	Remarks			
	33								87				
	34	Element	Material	316 SS	Taps	Material	316 SS		88				
	35	Pipe	Material		Frames	Material	316 SS		89				
	36								90				
	37	max. allow. press.		25 bar (g)					91				
	38								92				
	39								93				
	40								94				
	41								95				
	42								96				
	43	<p><b>*) Difference pressure connections:</b></p> <p>Shut-off valves, inlet G1/2", outlet SWAGELOK fittings for tube D = 6mm, material 316 SS</p>											
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1	11.11.2004	Möller	Eichler	Order Spec.				
0	20.10.2004	Möller	Eichler	Initial Version				
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked
								Change