EMERSON.

EMERSON edgardovicente.chiari@emerson.com

Madrid, Spain

edgardovicente,chiari@emerson.com

+34 911 111 320

No Prpd. Chk. Appr. Date Revision

7-abr.-2022

7-mar.-2022

Pressure Relief Valve Sizing & Selection Report

New temperatures

New valve on scope.

Client: TECHNIP ENERGIES Location: CARTAGENA, SPAIN

Quote Number: 093-093

End-User Ref. No.: 201754C001

EVC

EVC

0

	Location. CARTAGENA, SPAIN End-Oser Ref. No.								End-Oser Rei. No					
	Project: C43 "New Bios 2G Hydrotreatment Unit"								Project Ref. No.: U-608 Hydrogen Unit					
1	Valve ID						41	SIZING DATA						
2		Tag No.	Tag No. 608-PSV-1140			42		Design Code	ASME VIII/XIII - U	// Sizing St	td. <i>API 520</i>			
3		Service	Nitrogen Compressor Suction			43		Sizing Basis	1	Valve Open				
4		PID No.	No. P-C43-A-110990 H36		44	F	luid State at Inlet		Gas / Vapor					
5	Line No. 4"SH-5707-D3-H Quant		Quantity	45	t			ressure Relief						
6		1		46	FI	uid Properties								
7				47	_	Fluid I	Name	Nitro	ogen					
8	,	Valve Type	Balanced Bell		rect Spring-	On	48	-			· · · · · · · · · · · · · · · · · · ·			
9		fety / Relief			Balanced		49	-	Molecular Weight, M Compressibility, Z			000		
10	Oal	Nozzle	-	i		Vented	50	-1	1 7			400		
11		NOZZIE	CONNEC	TIONS	Donnet	verneu	51	-	·	Ratio of Sp. Heats, k (Cp / Cv) Gas Constant, C		70.3		
12	Inlet	1"		300#	RF	Standard	52	-	Gas Coi	isiani, C	21	0.3		
_			J.			-	_	-	-					
13	Outlet	2"		150#	RF	ASME B16.5	53	-						
14			ERIALS OF C				54	-						
15		Body / Ba		-	CS SA216-W		55	-1						
16	E	Bonnet / Cyl	inder	0	CS SA216-W		56	_						
17		Nozzle			316 S	ST	57	-						
18		Disc			316 S	ST	58							
19		Seat			Meta	a <i>l</i>	59	Si	izing Coefficients		Unit			
20		Spindle	:		416 S	ST	60		Effective	Effective K, Gas		975		
21		Guide			SS A297	Gr. HE	61		Kb Kc		1	1		
22		Spring			Ctd. Alloy Steel		62							
23	Gaskets 316 SS		ST	63	1									
24	Bellows Inconel® 625			64	Re	equired Capacity		Unit						
25		Сар Тур	е		Bolted w/ T	est Rod	65	1	То	tal				
26	NACE MR0175/ISO 15156:2015 No				66	-								
27							-	+	ressures		Unit	kg/cm² g		
28	Accessories and a graph of the state of the						68	+	MAWP	Operating	15	6 6		
29	SS						69	-	Set	CDTP	13.6	13.600		
30	000			1			70	-	Over Pr		1.36	10%		
31	4	CIZI	NC / SELECTI	ION SU	MANADV		71	-	OverFi	Built-U		1.6		
	Value	Model No.	NG / SELECTI				72	-1		0.3				
32					JBS-E36M-	P	_	-	Back Pressure		Constant Superimposed Variable Superimposed			
33		Brand	.d 0.1 1		Crosby®	0.740	73	-	i iossuie	•	•	1.5		
34	Area	Calculate			4.07	0.710	74	-		Total		3.4		
35	(cm²)	Data Se			API	D	75		Inlet		0	0%		
36	<u></u>	Unit	Require		kg/hr	001000	76	_	Atmospheric	(Barometric)		kg/cm² a		
37	Flow		Maximu	m		884.335	77	_	emperatures		Unit	°C		
38				-			78	_		Normal System				
39		action Force, Open Discharge 80.3 N			79	-	Operating Relieving		35	35				
40	Noise Level (db), Open Discharge					80		Design Min	Design Max		80			
Tag Notes	 Standa Opening Blowd o 	rd C4M acc g Adjustmer	. ÌSÓ 12944 nt 5%	(%) U.Oʻ	is. (body a	na bonnet)				A 104.90 B 114.30 C 514.35 Weight 16.33	c	A		
										16.33				

Printed On: 6-jul.-2022

PRV2SIZE Software Version pr7_20220307.1

Page: 1



EMERSON

edgardovicente.chiari@emerson.com

Madrid, Spain +34 911 111 320

edgardovicente,chiari@emerson.com

EVC 7-abr.-2022 New temperatures 0 EVC 7-mar.-2022 New valve on scope.

Revision

Pressure Relief Valve Calculation Report

Quote Number: 093-093 Client: TECHNIP ENERGIES Location: CARTAGENA, SPAIN

End-User Ref. No.: 201754C001

Prpd. Chk. Appr.

Date

1	Project: C43 "New Bios 2G Hydrotreatment Unit"							Project Ref. No.: U-608 Hydrogen Unit						
2	VALVE ID					12	1 Maximu	CALCULATION NOTES 1. Maximum Content P(%) 0.020 - S(%) 0.015. (body and bonnet)						
-	Tag No. 608-PSV-1140				L. 4	┿		. Standard C4M acc. ISO 12944						
3	Valve Model No. 1D2JBS-E36M-P			Q	ty. 1	13	3. Opening	, Adi	justment 5%					
4	SIZING DATA				l . -	14	4. Blowd o	4. Blowd own: 11.8%						
\vdash	5 Design Code ASME VIII/XIII - UV Sizing Std. API 520 15 5. ASME "UV" Stamp required.													
6	·						16		_					
7														
8	Flow		Required				18	- Δrea ·						
9			Maximum		.335 kg	ı/hr	19	9 Selected 0.710 cm						
10			pen Discharge		80.3 N		20			I (db), Open Discharge		126.4 at 1.0000 m		
Vari	able Type	e Va	riable Name			Symbol		In	put '	Value	Equatio	n Value		
Flui	d Properti	es Mo	lecular Weight			M		28	3.0		28.0			
		Ra	tio of Specific Heat	S		k		1.4	00		1.400			
		Со	mpressibility			Z		1.0	00		1.000			
Pro	cess Con	d. Re	quired Mass Flow		•	Wreq								
		Se	Set Pressure			Pset		13		kg/cm² g	13.337	barg		
		Over Pressure			Pover Ploss Pback					kg/cm² g kg/cm² g kg/cm² g	1.334	barg		
		Inle	Inlet Line Loss Back Pressure								0	barg		
		Ва									3.334	barg		
	Atmospheric Pressure Relieving Temperature Distance from Valve (noise) Rupture Disc CCF Valve Data Discharge Coefficient (API)		•		Patm T			1.033 35		kg/cm² a	1.013	bara		
										°C	308.150	°K		
			Distance from Valve (noise)			r		1.000		m	1.0000	m		
				Kc				1		1				
Valv			Discharge Coefficient (API)			K,API		0.975			0.975			
			Orifice Area			Α		0.710 cm ²		cm ²	0.710	cm ²		
			Back Press. Correction Factor		Kb				1		1			
		Ou	utlet Diameter		Do			52.5		mm	5.25	cm		
Cal	culate Inl	et Relievin	g Pressure, Outlet	Pressure	Absolu	ute Pr essu	ıre F	Ratio						
ł			Ploss + Patm			P1					15.684	bara		
1	P2 = Pbac				P2						4.348			
ł	PR = P2 /					PR					0.277			
Ì														
Cal	culate Ga	s Constant	t			С					270.3			
ł			: :+ 1)]^[(k + 1) / (k -	1)] }^0.5							3.0			
`	200	(·· [= / (iv	. /1 [//, ///	/1 / 0.0										
Cal	culate Ma	ass Critical	Flow			W	-	884 3	35	kg/hr	884.335	kg/hr		
ł	Calculate Mass Critical Flow W = A * C * K.API * P1 * Kb * Kc * [M / (T * Z)]^0.5						550		Ng/III 004.3		Ng/III			
'	0		[1117 (1	_/, 0.0										
Cal	culate Re	quired Orif	fice Area			Areq	-							
ł		Wreq / W			·	·								
		1' ''												

Printed On: 6-iul2022	PRV ² SIZE Software Version pr7 20220307.1	Page : 2	

EMERSON Pressure Relief Valve Calculation Report EVC edgardovicente.chiari@emerson.com 7-abr.-2022 New temperatures 0 **EVC** 7-mar.-2022 New valve on scope. Madrid, Spain EMERSON. +34 911 111 320 edgardovicente,chiari@emerson.com Quote Number: 093-093 No Prpd. Chk. Appr. **Date** Revision Client: TECHNIP ENERGIES Location: CARTAGENA, SPAIN End-User Ref. No.: 201754C001 Project Ref. No.: U-608 Hydrogen Unit Project: C43 "New Bios 2G Hydrotreatment Unit" 1 **VALVE ID** 11 **CALCULATION NOTES** 1. Maximum Content P(%) 0.020 - S(%) 0.015. (body and bonnet) 2 12 Tag No. 608-PSV-1140 2 . Standard C4M acc. ISO 12944 3 1D2JBS-E36M-P Qty. 1 13 Valve Model No. 3. Opening Adjustment 5% 4 **SIZING DATA** 4. Blowd own: 11.8% API 520 5. ASME "UV" Stamp required. 5 15 Design Code ASME VIII/XIII - UV Sizing Std. 6 Fluid State at Inlet Gas / Vapor 16 **CALCULATION SUMMARY** 7 8 18 Required Required Flow Area 9 19 Maximum 884.335 kg/hr Selected 0.710 cm² 10 20 126.4 at 1.0000 m Reaction Force, Open Discharge 80.3 N Noise Level (db), Open Discharge Calculate Noise Level at 100-ft (30-m) L100 96.9 db L100 = [6.5 * log(1/PR) + 51.28] + [10 * log(1.1552 * W * k * T/M)]

80.3 N

Lp

126.4

80.3 N

db

Calculate Noise Level at Distance, r

Calculate Reaction Force for Open Discharge

Fr = (A * C * K,API * P1 * Kc / 27.907) * {k / [(k + 1) * Z]}^0.5

Lp = L100 - 20 * log(r / 30)



EMERSON edgardovicente.chiari@emerson.com

Madrid, Spain +34 911 111 320

edgardovicente,chiari@emerson.com

Pressure Relief Valve Dimensional Drawing											
1	EVC			7-abr2022	New temperatures						
0	EVC			7-mar2022	New valve on scope.						
No	Prpd.	Chk.	Appr.	Date	Revision						

Client: TECHNIP ENERGIES Location: CARTAGENA, SPAIN

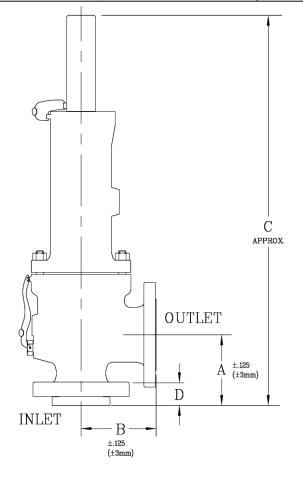
Project: C43 "New Bios 2G Hydrotreatment Unit"

Quote Number: 093-093

End-User Ref. No.: 201754C001

Project Ref. No.: U-608 Hydrogen Unit

					, , - j						
1		7	SELECTION SUMMARY								
2	Tag No. 608-PSV-1140			8	Valve Model No. 1D2JBS-E36M-P			P			
3	Service	ce Nitrogen Compressor Suction			Е	Brand Crosby®					
4	PID No.	PID No. P-C43-A-110990 H36					CONN	IECTIONS			
5	Line No.	4"SH-5707-D3-H	Quantity	11	Inlet	1"	Flngd.	300#	RF	Standard	
6			1	12	Outlet	2"	Flngd.	150#	RF	ASME B16.5	



Wt.=	36 lb	=	16 33 ka

- 1. Maximum Content P(%) 0.020 S(%) 0.015. (body and bonnet)
- 2 . Standard C4M acc. ISO 12944
- 3. Opening Adjustment 5%
- 4. Blowd own: 11.8%
 5. ASME "UV" Stamp required.

Dimension Notes

- · Accessories not shown.
- · Actual valve may vary from. image.

Printed On: 6-jul.-2022

PRV2SIZE Software Version pr7_20220307.1

Page: 4