Base Load Power Hub (BLPH)

INSTRUMENTS DATA SHEETS PSV (INCLUDING SIZING CALCULATION SHEETS)

Document Number: 1724000518-IN-DS-00004

Document Class: 2

Rev.	Date	Description	Prepared	Reviewed	Approved
05	18/09/2024	Accepted for construction (AFC)	Di Virgilio L.	Delponte P.L.	Bianchi R.
04	30/07/2024	Accepted for construction (AFC)	Di Virgilio L.	Delponte P.L.	Bianchi R.
03	19/06/2024	Issue for Review (IFR)	Di Virgilio L.	Delponte P.L.	Bianchi R.
02	29/05/2024	Issue for Review (IFR)	Di Virgilio L.	Delponte P.L.	Bianchi R.
01	11/04/2024	Issue for Review (IFR)	Di Virgilio L.	Delponte P.L.	Bianchi R.
00	22/03/2024	Issue for Review (IFR)	Di Virgilio L.	Delponte P.L.	Bianchi R.

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5	DATA SHEET 25-PSV-001A + 25-PSV-00X_S	X	X	X	X	X	X		
6	DATA SHEET 25-PSV-001B	X	X	X	X	X	X		
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13	CALCULATION SHEET 80-PSV-001 + 80-PSV-001_S	X	X	X	X	X	X		
14	CALCULATION SHEET 25-PSV-001A + 25-PSV-00X_S	X	X	X	X	X	X		
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19	CALCULATION SHEET 25-PSV-001F	X	X	X	X	X	X		
20	CALCULATION SHEET 64-PSV-001 + 64-PSV-001_S	X	X	X	X	X	X		
21	CALCULATION SHEET 50-PSV-011				X	X	X		

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Revision / Change Log

Rev.	Description
00	ISSUE FOR REVIEW (IFR)
01	ISSUE FOR REVIEW (IFR)
02	ISSUE FOR REVIEW (IFR)
03	ISSUE FOR REVIEW (IFR)
04	ACCEPTED FOR CONSTRUCTION (AFR)
05	ACCEPTED FOR CONSTRUCTION (AFR)

HOLDS LIST

No.	Description
1.	
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SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO							
1	TECHNICAL Ref. / Item	23-3962 / 10		4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA
2	Valve Code	320-K10-5L		5	Quantity	2	
3	Tag Number	**80-PSV-001 + 80-PSV-001_S**					
BASIS OF SELECTION							
6	Basis	Upstream fail open		10	Fire Case	No	
7	Sizing Code	API Std 520		11	Rupture Disc	No	
8	Valve Stamp	CE		12	Governing Case	Yes	
9	Other Approval	-		13	NACE Compliance	NONE	
DESIGN DATA							
14	Inlet	3" 150# RF		20	Outlet	4" 150# RF	
15	Valve Model	30000		21	Orifice Designation/Area	K - 12.94 cm²	
16	Valve Type	CONVENTIONAL		22	Lift Type / Value	FULL LIFT / 13 mm	
17	Seat Type	METAL-TO-METAL		23	Bonnet Type	CLOSED	
18	Overall Dimensions	Acc. to API 526		24	Body Type	CAST	
19	Seat Tightness Test Code	Acc. To API 527		25	Cap Type	SCREWED CAP	

SERVICE CONDITION									
26	Design Pressure	Pd	16.2	bar g	42	Design Temp.		100	°C
27	Operating Pressure	Pop	6.5	bar g	43	Operating Temp.		25	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.		-8.4/+25	°C
29	Set Pressure	Ps	10	bar g	45	Relieving Temperature		25	°C
30	CDTP		10	bar g	46	Phase / Medium	GAS / Hydrogen		
31	Overpressure	Overp	10	%	47	Required Flow Rate	W	2678	kg/h
32	Relieving Pressure	P0	12.01	bar a	48	Discharge Coefficient	KD	0.94	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT	2921.12	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M	2.02	kg/kmol
35	Variable	Pbcs	0	bar g	51	Compressibility Factor	Z	1.00	-
36	Total	Pbs	0	bar g	52	Ratio of Specific Heats	k	1.41	-
37	Built-up Backpressure	Pbb	0.17	bar g	53	Density	ρ	-	kg/m^3
38	Total BackPressure	Pb	0.17	bar g	54	Specific Gravity	G	-	-
39	Calculated Area	A	11.8631	cm²	55	Specific Volume	v	-	m^3/kg
40	Selected Area	As	12.94	cm²	56	Dynamic Viscosity	μ	0.01	cP
41	Area Gain	-	9.00	%	57	Blowdown		7-10%	

MATERIALS					
58	Body	A351 CF8M	65	Stem	SS 316L
59	Bonnet	A351 CF8M	66	Blowdown Ring	SS 316L
60	Cap	A351 CF3M	67	Disc-Holder	A747 CB7Cu-1
61	Nozzle	A351 CF3M / A479 316L	68	Spring	SS 316
62	Disc	A479 316L / A182 F316L	69	Spring Washer	STAINLESS STEEL
63	Seat	N/A	70	Gaskets	ARAMID FIBER / FKM
64	Guide	SS 316L	71	Bolting / Nut	A193 B8M / A194 8M
ACCESSORIES					
72	Bellows	N/A	78	Bug Screen	N/A
73	Balanced Piston	N/A	79	Weather Hood	N/A
74	Lifting Lever	N/A	80	Grease Injection	N/A
75	Test Gag	NO	81	Body Spacer	N/A
76	Jacket	N/A	82	Trevi Test (coupling)	N/A
77	Flushing Nozzle	N/A	83	Bearing	N/A
PAINTING / COATING					
84	Valve Painting	System A + RAL 9002	85		

REMARKS

Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

Valve opening time ≤ 100 msec

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO							
1	TECHNICAL Ref. / Item	23-3962 / 20	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	2		
3	Tag Number	**25-PSV-001A + 25-PSV-00X_S**					
BASIS OF SELECTION							
6	Basis	Fire case	10	Fire Case		Yes	
7	Sizing Code	API Std 520	11	Rupture Disc		No	
8	Valve Stamp	CE	12	Governing Case		Yes	
9	Other Approval	-	13	NACE Compliance		NONE	
DESIGN DATA							
14	Inlet	1" 300# RF	20	Outlet	2" 150# RF		
15	Valve Model	30000	21	Orifice Designation/Area		E - 1.389 cm²	
16	Valve Type	CONVENTIONAL	22	Lift Type / Value		FULL LIFT / 3.1 mm	
17	Seat Type	METAL-TO-METAL	23	Bonnet Type		CLOSED	
18	Overall Dimensions	Acc. to API 526	24	Body Type		CAST	
19	Seat Tightness Test Code	Acc. To API 527	25	Cap Type		SCREWED CAP	

SERVICE CONDITION									
26	Design Pressure	Pd	40	bar g	42	Design Temp.		80	°C
27	Operating Pressure	Pop	30	bar g	43	Operating Temp.		25	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.		-8.4/+25	°C
29	Set Pressure	Ps	40	bar g	45	Relieving Temperature		201.9	°C
30	CDTP		40	bar g	46	Phase / Medium	GAS / Hydrogen		
31	Overpressure	Overp	21	%	47	Required Flow Rate	W	736.4	kg/h
32	Relieving Pressure	P0	49.41	bar a	48	Discharge Coefficient	KD	0.94	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT	1016.22	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M	2.02	kg/kmol
35	Variable	Pbcs	0	bar g	51	Compressibility Factor	Z	1.02	-
36	Total	Pbs	0	bar g	52	Ratio of Specific Heats	k	1.41	-
37	Built-up Backpressure	Pbb	1	bar g	53	Density	ρ	-	kg/m^3
38	Total BackPressure	Pb	1	bar g	54	Specific Gravity	G	-	-
39	Calculated Area	A	1.0066	cm²	55	Specific Volume	v	-	m^3/kg
40	Selected Area	As	1.389	cm²	56	Dynamic Viscosity	μ	0.01	cP
41	Area Gain	-	38.00	%	57	Blowdown		7-10%	

MATERIALS					
58	Body	A351 CF8M	65	Stem	SS 316L
59	Bonnet	A351 CF8M	66	Blowdown Ring	SS 316L
60	Cap	A351 CF3M	67	Disc-Holder	A747 CB7Cu-1
61	Nozzle	A351 CF3M / A479 316L	68	Spring	SS 316
62	Disc	A479 316L / A182 F316L	69	Spring Washer	STAINLESS STEEL
63	Seat	N/A	70	Gaskets	ARAMID FIBER / FKM
64	Guide	SS 316L	71	Bolting / Nut	A193 B8M / A194 8M
ACCESSORIES					
72	Bellows	N/A	78	Bug Screen	N/A
73	Balanced Piston	N/A	79	Weather Hood	N/A
74	Lifting Lever	N/A	80	Grease Injection	N/A
75	Test Gag	NO	81	Body Spacer	N/A
76	Jacket	N/A	82	Trevi Test (coupling)	N/A
77	Flushing Nozzle	N/A	83	Bearing	N/A
PAINTING / COATING					
84	Valve Painting	System A + RAL 9002	85		

REMARKS

Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO									
1	TECHNICAL Ref. / Item		23-3962 / 30		4	Project	HOLLANDSE KUST NOORD WIND PARK		ROSETTI MARINO SPA
2	Valve Code		320-E20-5L		5	Quantity	1		
3	Tag Number	**25-PSV-001B**							
BASIS OF SELECTION									
6	Basis		Fire case		10	Fire Case			Yes
7	Sizing Code		API Std 520		11	Rupture Disc			No
8	Valve Stamp		CE		12	Governing Case			Yes
9	Other Approval		-		13	NACE Compliance			NONE
DESIGN DATA									
14	Inlet	1" 300# RF			20	Outlet	2" 150# RF		
15	Valve Model		30000		21	Orifice Designation/Area			E - 1.389 cm²
16	Valve Type		CONVENTIONAL		22	Lift Type / Value			FULL LIFT / 3.1 mm
17	Seat Type		METAL-TO-METAL		23	Bonnet Type			CLOSED
18	Overall Dimensions		Acc. to API 526		24	Body Type			CAST
19	Seat Tightness Test Code		Acc. To API 527		25	Cap Type			SCREWED CAP
SERVICE CONDITION									
26	Design Pressure	Pd	40	bar g	42	Design Temp.		80	°C
27	Operating Pressure	Pop	30	bar g	43	Operating Temp.		25	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.		-8.4/+25	°C
29	Set Pressure	Ps	40	bar g	45	Relieving Temperature		201.9	°C
30	CDTP		40	bar g	46	Phase / Medium	GAS / Hydrogen		
31	Overpressure	Overp	21	%	47	Required Flow Rate	W	736.4	kg/h
32	Relieving Pressure	P0	49.41	bar a	48	Discharge Coefficient	KD	0.94	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT	1016.22	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M	2.02	kg/kmol
35	Variable	Pbcs	0	bar g	51	Compressibility Factor	Z	1.02	-
36	Total	Pbs	0	bar g	52	Ratio of Specific Heats	k	1.41	-
37	Built-up Backpressure	Pbb	1	bar g	53	Density	ρ	-	kg/m^3
38	Total BackPressure	Pb	1	bar g	54	Specific Gravity	G	-	-
39	Calculated Area	A	1.0066	cm²	55	Specific Volume	v	-	m^3/kg
40	Selected Area	As	1.389	cm²	56	Dynamic Viscosity	μ	0.01	cP
41	Area Gain	-	38.00	%	57	Blowdown		7-10%	
MATERIALS									
58	Body		A351 CF8M		65	Stem		SS 316L	
59	Bonnet		A351 CF8M		66	Blowdown Ring		SS 316L	
60	Cap		A351 CF3M		67	Disc-Holder		A747 CB7Cu-1	
61	Nozzle		A351 CF3M / A479 316L		68	Spring		SS 316	
62	Disc		A479 316L / A182 F316L		69	Spring Washer		STAINLESS STEEL	
63	Seat		N/A		70	Gaskets		ARAMID FIBER / FKM	
64	Guide		SS 316L		71	Bolting / Nut		A193 B8M / A194 8M	
ACCESSORIES									
72	Bellows		N/A		78	Bug Screen		N/A	
73	Balanced Piston		N/A		79	Weather Hood		N/A	
74	Lifting Lever		N/A		80	Grease Injection		N/A	
75	Test Gag		NO		81	Body Spacer		N/A	
76	Jacket		N/A		82	Trevi Test (coupling)		N/A	
77	Flushing Nozzle		N/A		83	Bearing		N/A	
PAINTING / COATING									
84	Valve Painting		System A + RAL 9002		85				

REMARKS

Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO							
1	TECHNICAL Ref. / Item	23-3962 / 40	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	1		
3	Tag Number	**25-PSV-001C**					
BASIS OF SELECTION							
6	Basis	Fire case	10	Fire Case		Yes	
7	Sizing Code	API Std 520	11	Rupture Disc		No	
8	Valve Stamp	CE	12	Governing Case		Yes	
9	Other Approval	-	13	NACE Compliance		NONE	
DESIGN DATA							
14	Inlet	1" 300# RF	20	Outlet	2" 150# RF		
15	Valve Model	30000	21	Orifice Designation/Area		E - 1.389 cm²	
16	Valve Type	CONVENTIONAL	22	Lift Type / Value		FULL LIFT / 3.1 mm	
17	Seat Type	METAL-TO-METAL	23	Bonnet Type		CLOSED	
18	Overall Dimensions	Acc. to API 526	24	Body Type		CAST	
19	Seat Tightness Test Code	Acc. To API 527	25	Cap Type		SCREWED CAP	

SERVICE CONDITION									
26	Design Pressure	Pd	40	bar g	42	Design Temp.		80	°C
27	Operating Pressure	Pop	30	bar g	43	Operating Temp.		25	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.		-8.4/+25	°C
29	Set Pressure	Ps	40	bar g	45	Relieving Temperature		201.9	°C
30	CDTP		40	bar g	46	Phase / Medium	GAS / Hydrogen		
31	Overpressure	Overp	21	%	47	Required Flow Rate	W	736.4	kg/h
32	Relieving Pressure	P0	49.41	bar a	48	Discharge Coefficient	KD	0.94	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT	1016.22	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M	2.02	kg/kmol
35	Variable	Pbcs	0	bar g	51	Compressibility Factor	Z	1.02	-
36	Total	Pbs	0	bar g	52	Ratio of Specific Heats	k	1.41	-
37	Built-up Backpressure	Pbb	1	bar g	53	Density	ρ	-	kg/m^3
38	Total BackPressure	Pb	1	bar g	54	Specific Gravity	G	-	-
39	Calculated Area	A	1.0066	cm²	55	Specific Volume	v	-	m^3/kg
40	Selected Area	As	1.389	cm²	56	Dynamic Viscosity	μ	0.01	cP
41	Area Gain	-	38.00	%	57	Blowdown		7-10%	

MATERIALS					
58	Body	A351 CF8M	65	Stem	SS 316L
59	Bonnet	A351 CF8M	66	Blowdown Ring	SS 316L
60	Cap	A351 CF3M	67	Disc-Holder	A747 CB7Cu-1
61	Nozzle	A351 CF3M / A479 316L	68	Spring	SS 316
62	Disc	A479 316L / A182 F316L	69	Spring Washer	STAINLESS STEEL
63	Seat	N/A	70	Gaskets	ARAMID FIBER / FKM
64	Guide	SS 316L	71	Bolting / Nut	A193 B8M / A194 8M
ACCESSORIES					
72	Bellows	N/A	78	Bug Screen	N/A
73	Balanced Piston	N/A	79	Weather Hood	N/A
74	Lifting Lever	N/A	80	Grease Injection	N/A
75	Test Gag	NO	81	Body Spacer	N/A
76	Jacket	N/A	82	Trevi Test (coupling)	N/A
77	Flushing Nozzle	N/A	83	Bearing	N/A
PAINTING / COATING					
84	Valve Painting	System A + RAL 9002	85		

REMARKS

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Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO							
1	TECHNICAL Ref. / Item	23-3962 / 50	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	1		
3	Tag Number	**25-PSV-001D**					
BASIS OF SELECTION							
6	Basis	Fire case	10	Fire Case		Yes	
7	Sizing Code	API Std 520	11	Rupture Disc		No	
8	Valve Stamp	CE	12	Governing Case		Yes	
9	Other Approval	-	13	NACE Compliance		NONE	
DESIGN DATA							
14	Inlet	1" 300# RF	20	Outlet	2" 150# RF		
15	Valve Model	30000	21	Orifice Designation/Area		E - 1.389 cm²	
16	Valve Type	CONVENTIONAL	22	Lift Type / Value		FULL LIFT / 3.1 mm	
17	Seat Type	METAL-TO-METAL	23	Bonnet Type		CLOSED	
18	Overall Dimensions	Acc. to API 526	24	Body Type		CAST	
19	Seat Tightness Test Code	Acc. To API 527	25	Cap Type		SCREWED CAP	

SERVICE CONDITION									
26	Design Pressure	Pd	40	bar g	42	Design Temp.		80	°C
27	Operating Pressure	Pop	30	bar g	43	Operating Temp.		25	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.		-8.4/+25	°C
29	Set Pressure	Ps	40	bar g	45	Relieving Temperature		201.9	°C
30	CDTP		40	bar g	46	Phase / Medium	GAS / Hydrogen		
31	Overpressure	Overp	21	%	47	Required Flow Rate	W	736.4	kg/h
32	Relieving Pressure	P0	49.41	bar a	48	Discharge Coefficient	KD	0.94	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT	1016.22	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M	2.02	kg/kmol
35	Variable	Pbcs	0	bar g	51	Compressibility Factor	Z	1.02	-
36	Total	Pbs	0	bar g	52	Ratio of Specific Heats	k	1.41	-
37	Built-up Backpressure	Pbb	1	bar g	53	Density	ρ	-	kg/m^3
38	Total BackPressure	Pb	1	bar g	54	Specific Gravity	G	-	-
39	Calculated Area	A	1.0066	cm²	55	Specific Volume	v	-	m^3/kg
40	Selected Area	As	1.389	cm²	56	Dynamic Viscosity	μ	0.01	cP
41	Area Gain	-	38.00	%	57	Blowdown		7-10%	

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73	Balanced Piston	N/A	79	Weather Hood	N/A
74	Lifting Lever	N/A	80	Grease Injection	N/A
75	Test Gag	NO	81	Body Spacer	N/A
76	Jacket	N/A	82	Trevi Test (coupling)	N/A
77	Flushing Nozzle	N/A	83	Bearing	N/A
PAINTING / COATING					
84	Valve Painting	System A + RAL 9002	85		

REMARKS

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REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO							
1	TECHNICAL Ref. / Item	23-3962 / 60	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	1		
3	Tag Number	**25-PSV-001E**					
BASIS OF SELECTION							
6	Basis	Fire case	10	Fire Case		Yes	
7	Sizing Code	API Std 520	11	Rupture Disc		No	
8	Valve Stamp	CE	12	Governing Case		Yes	
9	Other Approval	-	13	NACE Compliance		NONE	
DESIGN DATA							
14	Inlet	1" 300# RF	20	Outlet	2" 150# RF		
15	Valve Model	30000	21	Orifice Designation/Area		E - 1.389 cm²	
16	Valve Type	CONVENTIONAL	22	Lift Type / Value		FULL LIFT / 3.1 mm	
17	Seat Type	METAL-TO-METAL	23	Bonnet Type		CLOSED	
18	Overall Dimensions	Acc. to API 526	24	Body Type		CAST	
19	Seat Tightness Test Code	Acc. To API 527	25	Cap Type		SCREWED CAP	

SERVICE CONDITION									
26	Design Pressure	Pd	40	bar g	42	Design Temp.		80	°C
27	Operating Pressure	Pop	30	bar g	43	Operating Temp.		25	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.		-8.4/+25	°C
29	Set Pressure	Ps	40	bar g	45	Relieving Temperature		201.9	°C
30	CDTP		40	bar g	46	Phase / Medium	GAS / Hydrogen		
31	Overpressure	Overp	21	%	47	Required Flow Rate	W	736.4	kg/h
32	Relieving Pressure	P0	49.41	bar a	48	Discharge Coefficient	KD	0.94	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT	1016.22	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M	2.02	kg/kmol
35	Variable	Pbcs	0	bar g	51	Compressibility Factor	Z	1.02	-
36	Total	Pbs	0	bar g	52	Ratio of Specific Heats	k	1.41	-
37	Built-up Backpressure	Pbb	1	bar g	53	Density	ρ	-	kg/m^3
38	Total BackPressure	Pb	1	bar g	54	Specific Gravity	G	-	-
39	Calculated Area	A	1.0066	cm²	55	Specific Volume	v	-	m^3/kg
40	Selected Area	As	1.389	cm²	56	Dynamic Viscosity	μ	0.01	cP
41	Area Gain	-	38.00	%	57	Blowdown		7-10%	

MATERIALS					
58	Body	A351 CF8M	65	Stem	SS 316L
59	Bonnet	A351 CF8M	66	Blowdown Ring	SS 316L
60	Cap	A351 CF3M	67	Disc-Holder	A747 CB7Cu-1
61	Nozzle	A351 CF3M / A479 316L	68	Spring	SS 316
62	Disc	A479 316L / A182 F316L	69	Spring Washer	STAINLESS STEEL
63	Seat	N/A	70	Gaskets	ARAMID FIBER / FKM
64	Guide	SS 316L	71	Bolting / Nut	A193 B8M / A194 8M
ACCESSORIES					
72	Bellows	N/A	78	Bug Screen	N/A
73	Balanced Piston	N/A	79	Weather Hood	N/A
74	Lifting Lever	N/A	80	Grease Injection	N/A
75	Test Gag	NO	81	Body Spacer	N/A
76	Jacket	N/A	82	Trevi Test (coupling)	N/A
77	Flushing Nozzle	N/A	83	Bearing	N/A
PAINTING / COATING					
84	Valve Painting	System A + RAL 9002	85		

REMARKS

Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO									
1	TECHNICAL Ref. / Item		23-3962 / 70		4	Project	HOLLANDSE KUST NOORD WIND PARK		ROSETTI MARINO SPA
2	Valve Code		320-E20-5L		5	Quantity	1		
3	Tag Number	**25-PSV-001F**							
BASIS OF SELECTION									
6	Basis		Fire case		10	Fire Case			Yes
7	Sizing Code		API Std 520		11	Rupture Disc			No
8	Valve Stamp		CE		12	Governing Case			Yes
9	Other Approval		-		13	NACE Compliance			NONE
DESIGN DATA									
14	Inlet	1" 300# RF			20	Outlet	2" 150# RF		
15	Valve Model		30000		21	Orifice Designation/Area			E - 1.389 cm²
16	Valve Type		CONVENTIONAL		22	Lift Type / Value			FULL LIFT / 3.1 mm
17	Seat Type		METAL-TO-METAL		23	Bonnet Type			CLOSED
18	Overall Dimensions		Acc. to API 526		24	Body Type			CAST
19	Seat Tightness Test Code		Acc. To API 527		25	Cap Type			SCREWED CAP
SERVICE CONDITION									
26	Design Pressure	Pd	40	bar g	42	Design Temp.		80	°C
27	Operating Pressure	Pop	30	bar g	43	Operating Temp.		25	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.		-8.4/+25	°C
29	Set Pressure	Ps	40	bar g	45	Relieving Temperature		201.9	°C
30	CDTP		40	bar g	46	Phase / Medium	GAS / Hydrogen		
31	Overpressure	Overp	21	%	47	Required Flow Rate	W	736.4	kg/h
32	Relieving Pressure	P0	49.41	bar a	48	Discharge Coefficient	KD	0.94	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT	1016.22	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M	2.02	kg/kmol
35	Variable	Pbcs	0	bar g	51	Compressibility Factor	Z	1.02	-
36	Total	Pbs	0	bar g	52	Ratio of Specific Heats	k	1.41	-
37	Built-up Backpressure	Pbb	1	bar g	53	Density	ρ	-	kg/m^3
38	Total BackPressure	Pb	1	bar g	54	Specific Gravity	G	-	-
39	Calculated Area	A	1.0066	cm²	55	Specific Volume	v	-	m^3/kg
40	Selected Area	As	1.389	cm²	56	Dynamic Viscosity	μ	0.01	cP
41	Area Gain	-	38.00	%	57	Blowdown		7-10%	
MATERIALS									
58	Body		A351 CF8M		65	Stem		SS 316L	
59	Bonnet		A351 CF8M		66	Blowdown Ring		SS 316L	
60	Cap		A351 CF3M		67	Disc-Holder		A747 CB7Cu-1	
61	Nozzle		A351 CF3M / A479 316L		68	Spring		SS 316	
62	Disc		A479 316L / A182 F316L		69	Spring Washer		STAINLESS STEEL	
63	Seat		N/A		70	Gaskets		ARAMID FIBER / FKM	
64	Guide		SS 316L		71	Bolting / Nut		A193 B8M / A194 8M	
ACCESSORIES									
72	Bellows		N/A		78	Bug Screen		N/A	
73	Balanced Piston		N/A		79	Weather Hood		N/A	
74	Lifting Lever		N/A		80	Grease Injection		N/A	
75	Test Gag		NO		81	Body Spacer		N/A	
76	Jacket		N/A		82	Trevi Test (coupling)		N/A	
77	Flushing Nozzle		N/A		83	Bearing		N/A	
PAINTING / COATING									
84	Valve Painting		System A + RAL 9002		85				

REMARKS

Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 80		4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA
2	Valve Code	320-D10-L2		5	Quantity	2	
3	Tag Number	**64-PSV-001 + 64-PSV-001_S**					

BASIS OF SELECTION

6	Basis	Upstream fail open	10	Fire Case	No
7	Sizing Code	API Std 520	11	Rupture Disc	No
8	Valve Stamp	CE	12	Governing Case	Yes
9	Other Approval	-	13	NACE Compliance	NONE

DESIGN DATA

14	Inlet	1" 150# RF	20	Outlet	2" 150# RF
15	Valve Model	30000	21	Orifice Designation/Area	D - 0.785 cm²
16	Valve Type	CONVENTIONAL	22	Lift Type / Value	FULL LIFT / 2.5 mm
17	Seat Type	METAL-TO-METAL	23	Bonnet Type	CLOSED
18	Overall Dimensions	Acc. to API 526	24	Body Type	CAST
19	Seat Tightness Test Code	Acc. To API 527	25	Cap Type	SCREWED CAP

SERVICE CONDITION

26	Design Pressure	Pd	17.7	bar g	42	Design Temp.			100	°C
27	Operating Pressure	Pop	7	bar g	43	Operating Temp.			25	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.			-8.4/+25	°C
29	Set Pressure	Ps	10	bar g	45	Relieving Temperature			25	°C
30	CDTP		10	bar g	46	Phase / Medium	GAS / Nitrogen			
31	Overpressure	Overp	10	%	47	Required Flow Rate	W		61.34	kg/h
32	Relieving Pressure	P0	12.01	bar a	48	Discharge Coefficient	KD		0.94	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT		662.42	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M		28.00	kg/kmol
35	Variable	Pbcs	0	bar g	51	Compressibility Factor	Z		1.00	-
36	Total	Pbs	0	bar g	52	Ratio of Specific Heats	k		1.40	-
37	Built-up Backpressure	Pbb	0.1	bar g	53	Density	ρ		-	kg/m^3
38	Total BackPressure	Pb	0.1	bar g	54	Specific Gravity	G		-	-
39	Calculated Area	A	0.0727	cm²	55	Specific Volume	v		-	m^3/kg
40	Selected Area	As	0.785	cm²	56	Dynamic Viscosity	μ		0.02	cP
41	Area Gain	-	980.00	%	57	Blowdown			7-10%	

MATERIALS

58	Body	A352 LCB	65	Stem	SS 316L
59	Bonnet	A352 LCB	66	Blowdown Ring	SS 316L
60	Cap	A352 LCB	67	Disc-Holder	A747 CB7Cu-1
61	Nozzle	A351 CF3M / A479 316L	68	Spring	SS 316
62	Disc	A479 316L / A182 F316L	69	Spring Washer	STAINLESS STEEL
63	Seat	N/A	70	Gaskets	ARMED GRAPHITE
64	Guide	SS 316L	71	Bolting / Nut	A193 B8M / A194 8M

ACCESSORIES

72	Bellows	N/A	78	Bug Screen	N/A
73	Balanced Piston	N/A	79	Weather Hood	N/A
74	Lifting Lever	N/A	80	Grease Injection	N/A
75	Test Gag	NO	81	Body Spacer	N/A
76	Jacket	N/A	82	Trevi Test (coupling)	N/A
77	Flushing Nozzle	N/A	83	Bearing	N/A

PAINTING / COATING

84	Valve Painting	System B + RAL 9002	85	

REMARKS

Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
DATASHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 90		4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA
2	Valve Code	320-D10-F1		5	Quantity	1	
3	Tag Number	**50-PSV-011**					

BASIS OF SELECTION

6	Basis	blocked outlet	10	Fire Case	No
7	Sizing Code	API Std 520	11	Rupture Disc	No
8	Valve Stamp	CE	12	Governing Case	Yes
9	Other Approval	-	13	NACE Compliance	NONE

DESIGN DATA

14	Inlet	1" 150# RF	20	Outlet	2" 150# RF
15	Valve Model	30000	21	Orifice Designation/Area	D - 0.785 cm²
16	Valve Type	CONVENTIONAL	22	Lift Type / Value	FULL LIFT / 2.5 mm
17	Seat Type	METAL-TO-METAL	23	Bonnet Type	CLOSED
18	Overall Dimensions	Acc. to API 526	24	Body Type	CAST
19	Seat Tightness Test Code	Acc. To API 527	25	Cap Type	SCREWED CAP

SERVICE CONDITION

26	Design Pressure	Pd	17.7	bar g	42	Design Temp.		100	°C
27	Operating Pressure	Pop	5	bar g	43	Operating Temp.		1.3/ 20.2	°C
28	Ambient Pressure	Patm	1.013	bar a	44	Ambient Temp.		-8.4/+25	°C
29	Set Pressure	Ps	6	bar g	45	Relieving Temperature		20	°C
30	CDTP		6	bar g	46	Phase / Medium	LIQUID / Sea water		
31	Overpressure	Overp	10	%	47	Required Flow Rate	W	2500	kg/h
32	Relieving Pressure	P0	7.61	bar a	48	Discharge Coefficient	KD	0.8	-
33	Superimposed Bkp				49	Maximum Flow Rate	WT	7407.00	kg/h
34	Constant	Pbvs	0	bar g	50	Molecular Weight	M	-	kg/kmol
35	Variable	Pbcs	0.1	bar g	51	Compressibility Factor	Z	-	-
36	Total	Pbs	0.1	bar g	52	Ratio of Specific Heats	k	-	-
37	Built-up Backpressure	Pbb	0	bar g	53	Density	ρ	1025.00	kg/m³
38	Total BackPressure	Pb	0.1	bar g	54	Specific Gravity	G	1.03	-
39	Calculated Area	A	0.265	cm²	55	Specific Volume	v	0.001	m³/kg
40	Selected Area	As	0.785	cm²	56	Dynamic Viscosity	μ	1.00	cP
41	Area Gain	-	196.00	%	57	Blowdown		7-10%	

MATERIALS

58	Body	A995 5A	65	Stem	SS 316L
59	Bonnet	A995 5A	66	Blowdown Ring	SS 316L
60	Cap	A995 5A	67	Disc-Holder	A995 5A / SAF 2507
61	Nozzle	A995 5A / A182 F53 / A479 S32750	68	Spring	SS 316
62	Disc	A182 F53 / A479 S32750	69	Spring Washer	STAINLESS STEEL
63	Seat	N/A	70	Gaskets	ARMED GRAPHITE
64	Guide	A995 5A / SAF 2507	71	Bolting / Nut	A193 B8M / A194 8M

ACCESSORIES

72	Bellows	N/A	78	Bug Screen	N/A
73	Balanced Piston	N/A	79	Weather Hood	N/A
74	Lifting Lever	N/A	80	Grease Injection	N/A
75	Test Gag	N/A	81	Body Spacer	N/A
76	Jacket	N/A	82	Trevi Test (coupling)	N/A
77	Flushing Nozzle	N/A	83	Bearing	N/A

PAINTING / COATING

84	Valve Painting	not painted	85	

REMARKS

Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 10	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-K10-5L	5	Quantity	2		
3	Tag Number	**80-PSV-001 + 80-PSV-001_S**					

DESIGN DATA

6	Operating Pressure	6.5	bar g	10	Operating Temperature	25	°C
7	Ambient Pressure	1.013	bar a	11	Sizing Code	API Std 520	
8	Basis	Upstream fail open		12	Fire Case	No	
9	Governing Case	Yes		13	Rupture Disc	No	

INSTALLATION DATA

14	Inlet	3" 150# RF		22	Outlet	4" 150# RF		
15	**Valve Model**	**30000**		23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp			24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0 bar g	25	Set Pressure	Ps	10.000	bar g
18	Variable	Pbvs	0 bar g	26	CDTP		10.000	bar g
19	Total	Pbs	0 bar g	27	Overpressure	Overp	10	%
20	Built-up Backpressure	Pbb	0.17 bar g	28	Relieving Temperature	T_0	25.0	°C
21	Total BackPressure	Pb	0.17 bar g	29	Required Flow Rate	W	2678.00	kg/h

FLUID PROPERTIES

30	Phase	GAS		35	Density	ρ	-	kg/m^3
31	Medium	Hydrogen		36	Specific Volume	v	-	m^3/kg
32	Ratio of Specific Heats	k	1.405 -	37	Specific Gravity	G	-	-
33	Molecular Weight	M	2.02 kg/kmol	38	Dynamic Viscosity	μ	0.008754	cP
34	Compressibility Factor	Z	1.004 -	39	Dryness Steam Factor	x0	-	-

SIZING — CRITICAL FLOW - GAS&VAPOURS - API 520

40	Critical / Subcritical Flow		CRITICAL	
41	Relieving Pressure	P_0	12.013	bar a
42	C Factor	C	2.7066	-
43	Discharge Coefficient	K_D	**0.940**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	Kb	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	-	-
52	Reynolds Number	Re	-	-
53	Calculated Area	A	11.8631	cm^2
54	Orifice Designation	-	**K**	-
55	Selected Area	A_S	**12.940**	cm^2
56	Area Gain	-	9	%
57	Maximum Flow Rate	W_T	2921.12	kg/h
58				

$$A = \frac{W}{0{,}9\ C\ P_0\ K_D K_{BP} K_C}\sqrt{\frac{Z T_0}{M}}$$

$$C = 3{,}948\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{(k+1)}{(k-1)}}}$$

$$W_T = \frac{W\ \ As}{A}$$

Units of measure
A [mm^2]; W [kg/h]; P [kPa]; T [K]; M [kg/kg mole]

REACTION FORCE — API 520 PART II — OPEN DISCHARGE TO ATMOSPHERE

59	Reaction force (Flow)	FF	1081	N
60	Reaction force (Static Bkp)	FB	133	N
61	Total Reaction Force	FT	1215	N

$$F_F = \frac{129 W_{MAX}}{0{,}9 * 3600}\sqrt{\frac{k\ T_0}{(k+1)M}}\ ;\ F_B = \frac{A_2 P_b}{10}\ ;\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	L30	116.6	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.1	m
65	Noise Level @ distance d	Ld	146.2	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

REMARKS: Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

Valve opening time ≤ 100 msec

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

ITALIAN VALVES MANUFACTURER SINCE 1973

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 20	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	2		
3	Tag Number	**25-PSV-001A + 25-PSV-00X_S**					

DESIGN DATA

6	Operating Pressure	30	bar g	10	Operating Temperature	25	°C
7	Ambient Pressure	1.013	bar a	11	Sizing Code	API Std 520	
8	Basis	Fire case		12	Fire Case	Yes	
9	Governing Case	Yes		13	Rupture Disc	No	

INSTALLATION DATA

14	Inlet	1" 300# RF		22	Outlet	2" 150# RF		
15	**Valve Model**	**30000**		23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp			24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0 bar g	25	Set Pressure	Ps	40.000	bar g
18	Variable	Pbvs	0 bar g	26	CDTP		40.000	bar g
19	Total	Pbs	0 bar g	27	Overpressure	Overp	21	%
20	Built-up Backpressure	Pbb	1 bar g	28	Relieving Temperature	T_0	201.9	°C
21	Total BackPressure	Pb	1 bar g	29	Required Flow Rate	W	736.40	kg/h

FLUID PROPERTIES

30	Phase	GAS		35	Density	ρ	-	kg/m^3
31	Medium	Hydrogen		36	Specific Volume	v	-	m^3/kg
32	Ratio of Specific Heats	k	1.405 -	37	Specific Gravity	G	-	-
33	Molecular Weight	M	2.02 kg/kmol	38	Dynamic Viscosity	μ	0.01272	cP
34	Compressibility Factor	Z	1.015 -	39	Dryness Steam Factor	x0	-	-

SIZING — CRITICAL FLOW - GAS&VAPOURS - API 520

40	Critical / Subcritical Flow		CRITICAL	
41	Relieving Pressure	P_0	49.413	bar a
42	C Factor	C	2.7066	-
43	Discharge Coefficient	K_D	**0.940**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	Kb	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	-	-
52	Reynolds Number	Re	-	-
53	Calculated Area	A	1.0066	cm^2
54	Orifice Designation	-	**E**	-
55	Selected Area	A_S	**1.389**	cm^2
56	Area Gain	-	38	%
57	Maximum Flow Rate	W_T	1016.22	kg/h
58				

$$A = \frac{W}{0{,}9\ C\ P_0\ K_D K_{BP} K_C}\sqrt{\frac{Z T_0}{M}}$$

$$C = 3{,}948\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{(k+1)}{(k-1)}}}$$

$$W_T = \frac{W\ \ As}{A}$$

Units of measure
A [mm^2]; W [kg/h]; P [kPa]; T [K]; M [kg/kg mole]

REACTION FORCE — API 520 PART II — OPEN DISCHARGE TO ATMOSPHERE

59	Reaction force (Flow)	FF	475	N
60	Reaction force (Static Bkp)	FB	196	N
61	Total Reaction Force	FT	671	N

$$F_F = \frac{129 W_{MAX}}{0{,}9 * 3600}\sqrt{\frac{k\ T_0}{(k+1)M}}\ ;\ F_B = \frac{A_2 P_b}{10}\ ;\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	L30	114.7	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.05	m
65	Noise Level @ distance d	Ld	143.7	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

REMARKS: Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 30	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	1		
3	Tag Number	**25-PSV-001B**					

DESIGN DATA

6	Operating Pressure	30	bar g	10	Operating Temperature	25	°C
7	Ambient Pressure	1.013	bar a	11	Sizing Code	API Std 520	
8	Basis	Fire case		12	Fire Case	Yes	
9	Governing Case	Yes		13	Rupture Disc	No	

INSTALLATION DATA

14	Inlet	1" 300# RF			22	Outlet	2" 150# RF		
15	**Valve Model**	**30000**			23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp				24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0	bar g	25	Set Pressure	Ps	40.000	bar g
18	Variable	Pbvs	0	bar g	26	CDTP		40.000	bar g
19	Total	Pbs	0	bar g	27	Overpressure	Overp	21	%
20	Built-up Backpressure	Pbb	1	bar g	28	Relieving Temperature	T_0	201.9	°C
21	Total BackPressure	Pb	1	bar g	29	Required Flow Rate	W	736.40	kg/h

FLUID PROPERTIES

30	Phase	GAS			35	Density	ρ	-	kg/m^3
31	Medium	Hydrogen			36	Specific Volume	v	-	m^3/kg
32	Ratio of Specific Heats	k	1.405	-	37	Specific Gravity	G	-	-
33	Molecular Weight	M	2.02	kg/kmol	38	Dynamic Viscosity	μ	0.01272	cP
34	Compressibility Factor	Z	1.015	-	39	Dryness Steam Factor	x0	-	-

SIZING — CRITICAL FLOW - GAS&VAPOURS - API 520

40	Critical / Subcritical Flow		CRITICAL	
41	Relieving Pressure	P_0	49.413	bar a
42	C Factor	C	2.7066	-
43	Discharge Coefficient	K_D	**0.940**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	Kb	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	-	-
52	Reynolds Number	Re	-	-
53	Calculated Area	A	1.0066	cm^2
54	Orifice Designation	-	**E**	-
55	Selected Area	A_S	**1.389**	cm^2
56	Area Gain	-	38	%
57	Maximum Flow Rate	W_T	1016.22	kg/h
58				

$$A = \frac{W}{0{,}9\ C\ P_0\ K_D K_{BP} K_C}\sqrt{\frac{Z T_0}{M}}$$

$$C = 3{,}948\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{(k+1)}{(k-1)}}}$$

$$W_T = \frac{W\ \ As}{A}$$

Units of measure
A [mm^2]; W [kg/h]; P [kPa]; T [K]; M [kg/kg mole]

REACTION FORCE — API 520 PART II — OPEN DISCHARGE TO ATMOSPHERE

59	Reaction force (Flow)	FF	475	N
60	Reaction force (Static Bkp)	FB	196	N
61	Total Reaction Force	FT	671	N

$$F_F = \frac{129 W_{MAX}}{0{,}9 * 3600}\sqrt{\frac{k\ T_0}{(k+1)M}}\ ;\ F_B = \frac{A_2 P_b}{10}\ ;\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	L30	114.7	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.05	m
65	Noise Level @ distance d	Ld	143.7	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

REMARKS: Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 40	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA
2	Valve Code	320-E20-5L	5	Quantity	1	
3	Tag Number	**25-PSV-001C**				

DESIGN DATA

6	Operating Pressure	30	bar g	10	Operating Temperature	25	°C
7	Ambient Pressure	1.013	bar a	11	Sizing Code	API Std 520	
8	Basis	Fire case		12	Fire Case	Yes	
9	Governing Case	Yes		13	Rupture Disc	No	

INSTALLATION DATA

14	Inlet	1" 300# RF		22	Outlet	2" 150# RF		
15	**Valve Model**	**30000**		23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp			24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0 bar g	25	Set Pressure	Ps	40.000	bar g
18	Variable	Pbvs	0 bar g	26	CDTP		40.000	bar g
19	Total	Pbs	0 bar g	27	Overpressure	Overp	21	%
20	Built-up Backpressure	Pbb	1 bar g	28	Relieving Temperature	T_0	201.9	°C
21	Total BackPressure	Pb	1 bar g	29	Required Flow Rate	W	736.40	kg/h

FLUID PROPERTIES

30	Phase	GAS		35	Density	ρ	-	kg/m^3
31	Medium	Hydrogen		36	Specific Volume	v	-	m^3/kg
32	Ratio of Specific Heats	k	1.405 -	37	Specific Gravity	G	-	-
33	Molecular Weight	M	2.02 kg/kmol	38	Dynamic Viscosity	μ	0.01272	cP
34	Compressibility Factor	Z	1.015 -	39	Dryness Steam Factor	x0	-	-

SIZING — CRITICAL FLOW - GAS&VAPOURS - API 520

40	Critical / Subcritical Flow		CRITICAL	
41	Relieving Pressure	P_0	49.413	bar a
42	C Factor	C	2.7066	-
43	Discharge Coefficient	K_D	**0.940**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	Kb	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	-	-
52	Reynolds Number	Re	-	-
53	Calculated Area	A	1.0066	cm^2
54	Orifice Designation	-	**E**	-
55	Selected Area	A_S	**1.389**	cm^2
56	Area Gain	-	38	%
57	Maximum Flow Rate	W_T	1016.22	kg/h
58				

$$A = \frac{W}{0{,}9\ C\ P_0\ K_D K_{BP} K_C}\sqrt{\frac{Z T_0}{M}}$$

$$C = 3{,}948\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{(k+1)}{(k-1)}}}$$

$$W_T = \frac{W\ \ As}{A}$$

Units of measure
A [mm^2]; W [kg/h]; P [kPa]; T [K]; M [kg/kg mole]

REACTION FORCE — API 520 PART II — OPEN DISCHARGE TO ATMOSPHERE

59	Reaction force (Flow)	FF	475	N
60	Reaction force (Static Bkp)	FB	196	N
61	Total Reaction Force	FT	671	N

$$F_F = \frac{129 W_{MAX}}{0{,}9 * 3600}\sqrt{\frac{k\ T_0}{(k+1)M}}\ ;\ F_B = \frac{A_2 P_b}{10}\ ;\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	L30	114.7	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.05	m
65	Noise Level @ distance d	Ld	143.7	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

REMARKS: Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 50	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	1		
3	Tag Number	**25-PSV-001D**					

DESIGN DATA

6	Operating Pressure	30		bar g	10	Operating Temperature		25	°C
7	Ambient Pressure	1.013		bar a	11	Sizing Code		API Std 520	
8	Basis	Fire case			12	Fire Case		Yes	
9	Governing Case	Yes			13	Rupture Disc		No	

INSTALLATION DATA

14	Inlet	1" 300# RF			22	Outlet	2" 150# RF		
15	**Valve Model**	**30000**			23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp				24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0	bar g	25	Set Pressure	Ps	40.000	bar g
18	Variable	Pbvs	0	bar g	26	CDTP		40.000	bar g
19	Total	Pbs	0	bar g	27	Overpressure	Overp	21	%
20	Built-up Backpressure	Pbb	1	bar g	28	Relieving Temperature	T_0	201.9	°C
21	Total BackPressure	Pb	1	bar g	29	Required Flow Rate	W	736.40	kg/h

FLUID PROPERTIES

30	Phase	GAS			35	Density	ρ	-	kg/m^3
31	Medium	Hydrogen			36	Specific Volume	v	-	m^3/kg
32	Ratio of Specific Heats	k	1.405	-	37	Specific Gravity	G	-	-
33	Molecular Weight	M	2.02	kg/kmol	38	Dynamic Viscosity	μ	0.01272	cP
34	Compressibility Factor	Z	1.015	-	39	Dryness Steam Factor	x0	-	-

SIZING — CRITICAL FLOW - GAS&VAPOURS - API 520

40	Critical / Subcritical Flow		CRITICAL	
41	Relieving Pressure	P_0	49.413	bar a
42	C Factor	C	2.7066	-
43	Discharge Coefficient	K_D	**0.940**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	Kb	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	-	-
52	Reynolds Number	Re	-	-
53	Calculated Area	A	1.0066	cm^2
54	Orifice Designation	-	**E**	-
55	Selected Area	A_S	**1.389**	cm^2
56	Area Gain	-	38	%
57	Maximum Flow Rate	W_T	1016.22	kg/h
58				

$$A = \frac{W}{0{,}9\ C\ P_0\ K_D K_{BP} K_C}\sqrt{\frac{Z T_0}{M}}$$

$$C = 3{,}948\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{(k+1)}{(k-1)}}}$$

$$W_T = \frac{W\ \ As}{A}$$

Units of measure
A [mm^2]; W [kg/h]; P [kPa]; T [K]; M [kg/kg mole]

REACTION FORCE — API 520 PART II — OPEN DISCHARGE TO ATMOSPHERE

59	Reaction force (Flow)	FF	475	N
60	Reaction force (Static Bkp)	FB	196	N
61	Total Reaction Force	FT	671	N

$$F_F = \frac{129 W_{MAX}}{0{,}9 * 3600}\sqrt{\frac{k\ T_0}{(k+1)M}}\ ;\ F_B = \frac{A_2 P_b}{10}\ ;\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	L30	114.7	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.05	m
65	Noise Level @ distance d	Ld	143.7	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

REMARKS: Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 60	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	1		
3	Tag Number	**25-PSV-001E**					

DESIGN DATA

6	Operating Pressure	30		bar g	10	Operating Temperature		25	°C
7	Ambient Pressure	1.013		bar a	11	Sizing Code		API Std 520	
8	Basis	Fire case			12	Fire Case		Yes	
9	Governing Case	Yes			13	Rupture Disc		No	

INSTALLATION DATA

14	Inlet	1" 300# RF			22	Outlet	2" 150# RF		
15	**Valve Model**	**30000**			23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp				24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0	bar g	25	Set Pressure	Ps	40.000	bar g
18	Variable	Pbvs	0	bar g	26	CDTP		40.000	bar g
19	Total	Pbs	0	bar g	27	Overpressure	Overp	21	%
20	Built-up Backpressure	Pbb	1	bar g	28	Relieving Temperature	T_0	201.9	°C
21	Total BackPressure	Pb	1	bar g	29	Required Flow Rate	W	736.40	kg/h

FLUID PROPERTIES

30	Phase	GAS			35	Density	ρ	-	kg/m^3
31	Medium	Hydrogen			36	Specific Volume	v	-	m^3/kg
32	Ratio of Specific Heats	k	1.405	-	37	Specific Gravity	G	-	-
33	Molecular Weight	M	2.02	kg/kmol	38	Dynamic Viscosity	μ	0.01272	cP
34	Compressibility Factor	Z	1.015	-	39	Dryness Steam Factor	x0	-	-

SIZING — CRITICAL FLOW - GAS&VAPOURS - API 520

40	Critical / Subcritical Flow		CRITICAL	
41	Relieving Pressure	P_0	49.413	bar a
42	C Factor	C	2.7066	-
43	Discharge Coefficient	K_D	**0.940**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	Kb	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	-	-
52	Reynolds Number	Re	-	-
53	Calculated Area	A	1.0066	cm^2
54	Orifice Designation	-	**E**	-
55	Selected Area	A_S	**1.389**	cm^2
56	Area Gain	-	38	%
57	Maximum Flow Rate	W_T	1016.22	kg/h
58				

$$A = \frac{W}{0{,}9\ C\ P_0\ K_D K_{BP} K_C}\sqrt{\frac{Z T_0}{M}}$$

$$C = 3{,}948\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{(k+1)}{(k-1)}}}$$

$$W_T = \frac{W\ \ As}{A}$$

Units of measure
A [mm^2]; W [kg/h]; P [kPa]; T [K]; M [kg/kg mole]

REACTION FORCE — API 520 PART II — OPEN DISCHARGE TO ATMOSPHERE

59	Reaction force (Flow)	FF	475	N
60	Reaction force (Static Bkp)	FB	196	N
61	Total Reaction Force	FT	671	N

$$F_F = \frac{129 W_{MAX}}{0{,}9 * 3600}\sqrt{\frac{k\ T_0}{(k+1)M}}\ ;\ F_B = \frac{A_2 P_b}{10}\ ;\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	L30	114.7	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.05	m
65	Noise Level @ distance d	Ld	143.7	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

REMARKS: Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 70	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-E20-5L	5	Quantity	1		
3	Tag Number	**25-PSV-001F**					

DESIGN DATA

6	Operating Pressure	30	bar g	10	Operating Temperature	25	°C	
7	Ambient Pressure	1.013	bar a	11	Sizing Code	API Std 520		
8	Basis	Fire case		12	Fire Case	Yes		
9	Governing Case	Yes		13	Rupture Disc	No		

INSTALLATION DATA

14	Inlet	1" 300# RF		22	Outlet	2" 150# RF		
15	**Valve Model**	**30000**		23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp			24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0 bar g	25	Set Pressure	Ps	40.000	bar g
18	Variable	Pbvs	0 bar g	26	CDTP		40.000	bar g
19	Total	Pbs	0 bar g	27	Overpressure	Overp	21	%
20	Built-up Backpressure	Pbb	1 bar g	28	Relieving Temperature	T_0	201.9	°C
21	Total BackPressure	Pb	1 bar g	29	Required Flow Rate	W	736.40	kg/h

FLUID PROPERTIES

30	Phase	GAS		35	Density	ρ	-	kg/m^3
31	Medium	Hydrogen		36	Specific Volume	v	-	m^3/kg
32	Ratio of Specific Heats	k	1.405 -	37	Specific Gravity	G	-	-
33	Molecular Weight	M	2.02 kg/kmol	38	Dynamic Viscosity	μ	0.01272	cP
34	Compressibility Factor	Z	1.015 -	39	Dryness Steam Factor	x0	-	-

SIZING — CRITICAL FLOW - GAS&VAPOURS - API 520

40	Critical / Subcritical Flow		CRITICAL	
41	Relieving Pressure	P_0	49.413	bar a
42	C Factor	C	2.7066	-
43	Discharge Coefficient	K_D	**0.940**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	Kb	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	-	-
52	Reynolds Number	Re	-	-
53	Calculated Area	A	1.0066	cm^2
54	Orifice Designation	-	**E**	-
55	Selected Area	A_S	**1.389**	cm^2
56	Area Gain	-	38	%
57	Maximum Flow Rate	W_T	1016.22	kg/h
58				

$$A = \frac{W}{0{,}9\ C\ P_0\ K_D K_{BP} K_C}\sqrt{\frac{Z T_0}{M}}$$

$$C = 3{,}948\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{(k+1)}{(k-1)}}}$$

$$W_T = \frac{W\ \ As}{A}$$

Units of measure
A [mm^2]; W [kg/h]; P [kPa]; T [K]; M [kg/kg mole]

REACTION FORCE — API 520 PART II — OPEN DISCHARGE TO ATMOSPHERE

59	Reaction force (Flow)	FF	475	N
60	Reaction force (Static Bkp)	FB	196	N
61	Total Reaction Force	FT	671	N

$$F_F = \frac{129 W_{MAX}}{0{,}9 * 3600}\sqrt{\frac{k\ T_0}{(k+1)M}}\ ;\ F_B = \frac{A_2 P_b}{10}\ ;\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	L30	114.7	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.05	m
65	Noise Level @ distance d	Ld	143.7	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

REMARKS: Process data are under customer responsibility.

Testing according to Doc. 1724000518-QC-ITP-00002

REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 80	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA	
2	Valve Code	320-D10-L2	5	Quantity	2		
3	Tag Number	**64-PSV-001 + 64-PSV-001_S**					

DESIGN DATA

6	Operating Pressure	7	bar g	10	Operating Temperature	25	°C
7	Ambient Pressure	1.013	bar a	11	Sizing Code	API Std 520	
8	Basis	Upstream fail open		12	Fire Case	No	
9	Governing Case	Yes		13	Rupture Disc	No	

INSTALLATION DATA

14	Inlet	1" 150# RF			22	Outlet	2" 150# RF		
15	**Valve Model**	**30000**			23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp				24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0	bar g	25	Set Pressure	Ps	10.000	bar g
18	Variable	Pbvs	0	bar g	26	CDTP		10.000	bar g
19	Total	Pbs	0	bar g	27	Overpressure	Overp	10	%
20	Built-up Backpressure	Pbb	0.1	bar g	28	Relieving Temperature	T_0	25.0	°C
21	Total BackPressure	Pb	0.1	bar g	29	Required Flow Rate	W	61.34	kg/h

FLUID PROPERTIES

30	Phase	GAS			35	Density	ρ	-	kg/m^3
31	Medium	Nitrogen			36	Specific Volume	v	-	m^3/kg
32	Ratio of Specific Heats	k	1.399	-	37	Specific Gravity	G	-	-
33	Molecular Weight	M	28.00	kg/kmol	38	Dynamic Viscosity	μ	0.01851	cP
34	Compressibility Factor	Z	0.995	-	39	Dryness Steam Factor	x0	-	-

SIZING — CRITICAL FLOW - GAS&VAPOURS - API 520

40	Critical / Subcritical Flow		CRITICAL	
41	Relieving Pressure	P_0	12.013	bar a
42	C Factor	C	2.7027	-
43	Discharge Coefficient	K_D	**0.940**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	Kb	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	-	-
52	Reynolds Number	Re	-	-
53	Calculated Area	A	0.0727	cm^2
54	Orifice Designation	-	**D**	-
55	Selected Area	A_S	**0.785**	cm^2
56	Area Gain	-	980	%
57	Maximum Flow Rate	W_T	662.42	kg/h
58				

$$A = \frac{W}{0{,}9\ C\ P_0\ K_D K_{BP} K_C}\sqrt{\frac{Z T_0}{M}}$$

$$C = 3{,}948\sqrt{k\left(\frac{2}{k+1}\right)^{\frac{(k+1)}{(k-1)}}}$$

$$W_T = \frac{W\ \ As}{A}$$

Units of measure
A [mm^2]; W [kg/h]; P [kPa]; T [K]; M [kg/kg mole]

REACTION FORCE — API 520 PART II — OPEN DISCHARGE TO ATMOSPHERE

59	Reaction force (Flow)	FF	66	N
60	Reaction force (Static Bkp)	FB	20	N
61	Total Reaction Force	FT	85	N

$$F_F = \frac{129 W_{MAX}}{0{,}9 * 3600}\sqrt{\frac{k\ T_0}{(k+1)M}}\ ;\ F_B = \frac{A_2 P_b}{10}\ ;\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	L30	90.5	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.05	m
65	Noise Level @ distance d	Ld	128.0	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

REMARKS: Process data are under customer responsibility.

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REV	DATE	DESCRIPTION	PREP.	CHECK.	APPROV.
5	18/09/2024	MODIFIED ACCORDING TO CUSTOMER COMMENTS	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
4	29/07/2024	MODIFIED GASKET MAT ON POS 1 TO 7	R. BIANCHI	P.L.DELPONTE	R. BIANCHI
3	20/06/2024	ADD. VALVE	TCH	L. DI VIRGILIO	P.L.DELPONTE

SAFETY VALVE
SIZING SHEET

GENERAL INFO

1	TECHNICAL Ref. / Item	23-3962 / 90	4	Project	HOLLANDSE KUST NOORD WIND PARK	ROSETTI MARINO SPA
2	Valve Code	320-D10-F1	5	Quantity	1	
3	Tag Number	**50-PSV-011**				

DESIGN DATA

6	Operating Pressure	5	bar g	10	Operating Temperature	1.3/ 20.2	°C
7	Ambient Pressure	1.013	bar a	11	Sizing Code	API Std 520	
8	Basis	blocked outlet		12	Fire Case	No	
9	Governing Case	Yes		13	Rupture Disc	No	

INSTALLATION DATA

14	Inlet	1" 150# RF		22	Outlet	2" 150# RF		
15	**Valve Model**	**30000**		23	Valve Type	CONVENTIONAL		
16	Superimposed Bkp			24	Seat Type	METAL-TO-METAL		
17	Constant	Pbcs	0 bar g	25	Set Pressure	Ps	6.000	bar g
18	Variable	Pbvs	0.1 bar g	26	CDTP		6.000	bar g
19	Total	Pbs	0.1 bar g	27	Overpressure	Overp	10	%
20	Built-up Backpressure	Pbb	0 bar g	28	Relieving Temperature	T_0	20.0	°C
21	Total BackPressure	Pb	0.1 bar g	29	Required Flow Rate	W	2500.00	kg/h

FLUID PROPERTIES

30	Phase	LIQUID		35	Density	ρ	1025	kg/m^3
31	Medium	Sea water		36	Specific Volume	v	0.001	m^3/kg
32	Ratio of Specific Heats	k	- -	37	Specific Gravity	G	1.025	-
33	Molecular Weight	M	- kg/kmol	38	Dynamic Viscosity	μ	1	cP
34	Compressibility Factor	Z	- -	39	Dryness Steam Factor	x0	-	-

SIZING — LIQUID FLOW - API 520

40	Critical / Subcritical Flow		-	
41	Relieving Pressure	P_0	7.613	bar a
42	C Factor	C	-	-
43	Discharge Coefficient	K_D	**0.800**	-
44	Backpressure Corr. Factor	K_{BP}	1	-
45	Subcritical Corr. Factor	F2	-	-
46	Rupture Disk Corr. Factor	K_C	1	-
47	Steam Correction Factor EN	ks	-	-
48	Superheat Corr. Factor	ksh	-	-
49	Supercritical Corr. Factor	ksc	-	-
50	Napier Factor	kn	-	-
51	Viscosity Corr. Factor	K_V	0.997	-
52	Reynolds Number	Re	88412	-
53	Calculated Area	A	0.2650	cm²
54	Orifice Designation	-	**D**	-
55	Selected Area	A_S	**0.785**	cm²
56	Area Gain	-	196	%
57	Maximum Flow Rate	W_T	7407.00	kg/h
58				

$$A = \frac{11{,}78\ W}{0{,}9\ K_D\ K_C\ K_B\ K_V}\sqrt{\frac{G}{P_0 - P_B}}$$

$$Re = \frac{18{,}8\ G\ W}{\mu\sqrt{A}}$$

$$K_V = \left(0{,}9935 + \frac{2{,}878}{Re^{0{,}5}} + \frac{342{,}75}{Re^{1{,}5}}\right)^{-1}$$

$$W_T = \frac{W\ A_S}{A}$$

Units of measure
A [mm^2]; W [L/min]; P [kPag]

REACTION FORCE — API 520 PART II — CLOSED DISCHARGE SYSTEM

59	Reaction force (Flow)	FF	0	N
60	Reaction force (Static Bkp)	FB	20	N
61	Total Reaction Force	FT	20	N

$$F_F = \frac{(W_{MAX})^2}{0{,}81 * 12{,}96 \rho A_2};\ F_B = \frac{A_2 P_b}{10};\ F_T = F_F + F_B$$

NOISE EVALUATION — API 521 — Not Applicable for Liquid

62	Noise Level @ 30m	-	-	dB
63	Distance d	d	1	m
64	Outlet Tube Diameter	da	0.05	m
65	Noise Level @ distance d	-	-	dB

$$L_{30} = L + 10 log_{10}\left(\frac{W_{M-MAX}\ c^2}{3600 * 0{,}9 * 2}\right);\ c = 91{,}2\left(\frac{k\ T_0}{M}\right)^{0{,}5}$$

$$L_p = L_{30} - 20 log_{10}\left(\frac{d}{30}\right)$$

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