JOKWANG I.L.I	Specification & Calculation Sheet	LG Chem Yeosu Complex

DOCUMENT NO.	180760-E2-P-054-2-S-0002
PROJECT NAME	Yeosu No. 2 Complex Project
ITEM NO.	Pressure Safety Valve
COMPANY NAME	LG Chem, Ltd.
SITE LOCATION	Yeosu, Korea
CONTRACTOR NAME	GS E&C
PROJECT NO.	180760
PURCHASE ORDER NO.	180760-E2-GS-PO-P-054-2
VENDOR NAME	Jokwang I.L.I

Action Code	Description
☐ 1	Approved without comment, Vendor to submit "FINAL"
☐ 2	Approved with comment, Vendor to amend and **submit "FOR FINAL"**
☐ 3	Vendor to amend and **re-submit** "**FOR APPROVAL"**
☐ 4	Not Reviewed/Considered unacceptable Quality, Vendor to **re- submit** "FOR APPROVAL"

2	24.MAR.21	FINAL	S.W.PARK	M.J.LEE	J.H.LEEM
1	27.JAN.21	FINAL	S.W.PARK	M.J.LEE	J.H.LEEM
0	30.JUL.20	FOR FINAL	S.W.PARK	J.G.YOON	J.H.LEEM
B	14.JUL.20	FOR APPROVAL	S.W.PARK	J.G.YOON	J.H.LEEM
A	20 APR. 20	FOR APPROVAL	S.W.PARK	J.G.YOON	S.C.KIM
REV.	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

GS E&C

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	1 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-201 2	
	Tag No.	2	E2-PSV-2104A/B	
	Service Line	3	E-21 0 (Dilution Steam Blowdown Cooler) SS	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	2	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 13160*W1*(√ZT/M)/(C*Kd*(P*1.21+101.325) *Kb*Kc)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	1"X2"	= 13160*526*(√1*455.5/18.02)/(348.47*0.831* (794*1.21+101.325)*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	= **113.159473** ㎟
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	Chrome Alloy(SWOSC-B)	W = A*C*Kd*(P*1.21+101.325)*Kb*Kc/(13160*√(ZT/M))
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	= 188.39*348.47*0.831*(794*1.21+101.325)*1*1/ (13160*√(1*455.5/18.02))
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520	= **876** kg/h
	Fire	26	Yes	
	Sizing Basis	27	External Fire	
	Rupture Disk	28	No	

SERVICE CONDITION	Fluid / State	29	Blowdown / GAS	
	Mol. Weight / Specific Gravity	30	18.02	
	Compressibility Factor	31	1	
	Ratio of Specific Heat	32	1.316	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	133.2 / 182.5 ℃	
	Design Min. / Design Max. Temp.	35	-18/150 ℃	
	Operating / Set Pressure	36	0.196 / 0.794 MPag	
	Design Pressure / C.D.T.P	37	0.794/FV / 0.80194 MPag	
	Back Pressure: Superimposed - Constant	38	- MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.014 MPag	
	Back Pressure: Total	41	0.014 MPag	
	Allowable Overpressure	42	21 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.73842 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	526 kg/h	
	Valve Actual Capacity	45	876 kg/h	
	Calculated Orifice Area	46	113.159473 ㎟	
	Selected Orifice Area	47	188.39 ㎟	
	Orifice Dia.(mm)	48	E1(15.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	876 kg/h
W1	Required Capacity	526 kg/h
P	Set Pressure	794 KPag
A1	Calculated Area	113.159473 ㎟
A	Selected Area	188.39 ㎟
Kd	Coefficient of Discharge	0.831
C	Coefficient base on Ratio of Specific Heat	348.47
T	Kelvin Temperature	455.5 K
M	Molecular Weight	18.02
Z	Compressibility Factor	1
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 2 kgf/㎠g
- Setting Pressure : 8.1 kgf/㎠g
- Design Pressure : 8.1 /FV kgf/㎠g
- Built-up Back Pressure : 0.14 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	2 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-2002A	
	Tag No.	2	E2-PSV-2120	
	Service Line	3	PT-201A (P-201 Steam Turbine)	
	Model No.	4	JSV-FF100	
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	
	Design Type	7	Conventional	
	Bonnet Type	8	Open	
	Lever Type	9	Plain Lever	
	Cap Type	10	Plain	
CONN.	Size. Inlet / Outlet	11	6"X8"	
	Inlet. Rating / Facing	12	ASME CL.300 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	
	Guide	18	316 SS	
	Gasket (Bonnet)	19	Graphite	
	Spring	20	316 SS	
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520	
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	MP Steam / STEAM	
	Mol. Weight / Specific Gravity	30	18.02	
	Compressibility Factor	31	0.971	
	Ratio of Specific Heat	32	1.290	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	304 / 344 ℃	
	Design Min. / Design Max. Temp.	35	350 ℃	
	Operating / Set Pressure	36	1.569 / 1.765 MPag	
	Design Pressure / C.D.T.P	37	1.765/F.V / 1.8356 MPag	
	Back Pressure: Superimposed - Constant	38	0 MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.15 MPag	
	Back Pressure: Total	41	0.15 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 1.64145 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	35753 kg/h	
	Valve Actual Capacity	45	55456 kg/h	
	Calculated Orifice Area	46	4598.654269 ㎟	
	Selected Orifice Area	47	7132.89 ㎟	
	Orifice Dia.(mm)	48	Q(95.3)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

Calculation

Calculation of Area

A1 = 190.4*W1/((P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh)

=190.4*35753/((1765*1.1+101.325)*0.831*1*1*1*0.872)

= **4598.654269** ㎟

Calculation of Capacity

W = A*(P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh/190.4

= 7132.89*(1765*1.1+101.325)
*0.831*1*1*1*0.872/190.4

= **55456** kg/h

W	Valve Capacity	55456 kg/h
W1	Required Capacity	35753 kg/h
P	Set Pressure	1765 KPag
A1	Calculated Area	4598.654269 ㎟
A	Selected Area	7132.89 ㎟
Kd	Coefficient of Discharge	0.831
Ksh	Steam Correction Factor	0.872
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kn	Correction Factor for Napier equation	1

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 16 kgf/㎠g
- Setting Pressure : 18 kgf/㎠g
- Design Pressure : 18/F.V kgf/㎠g
- Built-up Back Pressure : 1.526 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	3 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-2008A	
	Tag No.	2	E2-PSV-2121	
	Service Line	3	PT-205A (P-205 Steam Turbine)	
	Model No.	4	JSV-FF100	
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	
	Design Type	7	Conventional	
	Bonnet Type	8	Open	
	Lever Type	9	Plain Lever	
	Cap Type	10	Plain	
CONN.	Size. Inlet / Outlet	11	6"X8"	
	Inlet. Rating / Facing	12	ASME CL.300 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	
	Guide	18	316 SS	
	Gasket (Bonnet)	19	Graphite	
	Spring	20	316 SS	
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520	
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	MP Steam / STEAM	
	Mol. Weight / Specific Gravity	30	18.02	
	Compressibility Factor	31	0.971	
	Ratio of Specific Heat	32	1.290	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	306 / 344 ℃	
	Design Min. / Design Max. Temp.	35	350 ℃	
	Operating / Set Pressure	36	1.569 / 1.765 MPag	
	Design Pressure / C.D.T.P	37	1.765/F.V / 1.8356 MPag	
	Back Pressure: Superimposed - Constant	38	0 MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.15 MPag	
	Back Pressure: Total	41	0.15 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 1.64145 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	34875 kg/h	
	Valve Actual Capacity	45	55456 kg/h	
	Calculated Orifice Area	46	4485.723369 ㎟	
	Selected Orifice Area	47	7132.89 ㎟	
	Orifice Dia.(mm)	48	Q(95.3)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

Calculation

Calculation of Area

A1 = 190.4*W1/((P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh)

=190.4*34875/((1765*1.1+101.325)*0.831*1*1*1*0.872)

= **4485.723369** ㎟

Calculation of Capacity

W = A*(P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh/190.4

= 7132.89*(1765*1.1+101.325)
*0.831*1*1*1*0.872/190.4

= **55456** kg/h

W	Valve Capacity	55456 kg/h
W1	Required Capacity	34875 kg/h
P	Set Pressure	1765 KPag
A1	Calculated Area	4485.723369 ㎟
A	Selected Area	7132.89 ㎟
Kd	Coefficient of Discharge	0.831
Ksh	Steam Correction Factor	0.872
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kn	Correction Factor for Napier equation	1

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 16 kgf/㎠g
- Setting Pressure : 18 kgf/㎠g
- Design Pressure : 18/F.V kgf/㎠g
- Built-up Back Pressure : 1.526 kgf/㎠g

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Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	4 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-3008	
	Tag No.	2	E2-PSV-3127A/B	
	Service Line	3	E-320A/B (Pyrolysis Gasoline Stripper Reboler) TS	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	2	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Bellows	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	1"X2"	= 11.78*165*√(0.6652/(463.1-41))/(0.615*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	= **125.464992** ㎟
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	Chrome Alloy(SWOSC-B)	W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))
	Bellows	21	316L SS	
BASIS	Approved by	22	KGS UV STAMP	= 132.9*0.615*1*1*1/(11.78*√(0.6652/(463.1-41)))
	Comply with NACE	23	No	
	EN 10204	24	No	= 174.80 ℓ/min
	Code	25	API RP 520-Certification	= **10.5** m3/h
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet (with heat input)	
	Rupture Disk	28	No	

SERVICE CONDITION	Fluid / State	29	Reboiler Liquid / LIQUID	
	Mol. Weight / Specific Gravity	30	0.6652	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	125 / 165 ℃	
	Design Min. / Design Max. Temp.	35	-18/165 ℃	
	Operating / Set Pressure	36	0.092 / 0.421 MPag	
	Design Pressure / C.D.T.P	37	0.421/HV / 0.42521 MPag	
	Back Pressure – Superimposed - Constant	38	0.03 MPag	
	Back Pressure – Superimposed - Variable	39	- MPag	
	Back Pressure – Built-up	40	0.011 MPag	
	Back Pressure – Total	41	0.041 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.3579 MPag / 14.9881%	
SIZING & SELECTION	Required Capacity	44	9.9 m3/h	
	Valve Actual Capacity	45	10.5 m3/h	
	Calculated Orifice Area	46	125.464992 ㎟	
	Selected Orifice Area	47	132.9 ㎟	
	Orifice Dia.(mm)	48	D1(13)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	Yes	

W	Valve Capacity	174.80 ℓ/min
W1	Required Capacity	165 ℓ/min
P	Set Pressure	421 KPag
A1	Calculated Area	125.464992 ㎟
A	Selected Area	132.9 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.6652
Pb	Back Pressure	41 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	463.1 KPag

Remarks

Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

Remark
- Operating Pressure : 0.94 kgf/㎠g
- Setting Pressure : 4.3 kgf/㎠g
- Design Pressure : 4.3/H.V kgf/㎠g
- Constant Back Pressure : 0.3 kgf/㎠g
- Built-up Back Pressure : 0.112 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	5 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9206	
	Tag No.	2	E2-PSV-9037A/B	
	Service Line	3	C-941 GTG FG Boosting Compressor 1 st stage discharge	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	2	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Bellows	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 13160*W1*(√ZT/M)/(C*Kd*(P*1.1+101.325)*Kb*Kc)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3"X4"	= 13160*7800*(√0.9913*392.6/16)/(345.08*0.831*
	Inlet. Rating / Facing	12	ASME CL.300 RF	(1401*1.1+101.325)*1*1)
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	= **1074.884601** ㎟
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	Chrome Alloy(SAE9254)	W = A*C*Kd*(P*1.1+101.325)*Kb*Kc/(13160*√(ZT/M))
	Bellows	21	316L SS	
BASIS	Approved by	22	KGS UV STAMP	= 1187.74*345.08*0.831*(1401*1.1+101.325)*1*1/
	Comply with NACE	23	No	(13160*√(0.9913*392.6/16))
	EN 10204	24	No	
	Code	25	API RP 520	= **8619** kg/h
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	Fuel Gas / GAS	
	Mol. Weight / Specific Gravity	30	16	
	Compressibility Factor	31	0.9913	
	Ratio of Specific Heat	32	1.28	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	119.6 / 119.6 ℃	
	Design Min. / Design Max. Temp.	35	-18/180 ℃	
	Operating / Set Pressure	36	1.184 / 1.401 MPag	
	Design Pressure / C.D.T.P	37	1.401 / 1.41501 MPag	
	Back Pressure: Superimposed - Constant	38	0.03 MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.14 MPag	
	Back Pressure: Total	41	0.17 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 1.30293 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	7800 kg/h	
	Valve Actual Capacity	45	8619 kg/h	
	Calculated Orifice Area	46	1074.884601 ㎟	
	Selected Orifice Area	47	1187.74 ㎟	
	Orifice Dia.(mm)	48	K(38.9)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	Yes	

W	Valve Capacity	8619 kg/h
W1	Required Capacity	7800 kg/h
P	Set Pressure	1401 KPag
A1	Calculated Area	1074.884601 ㎟
A	Selected Area	1187.74 ㎟
Kd	Coefficient of Discharge	0.831
C	Coefficient base on Ratio of Specific Heat	345.08
T	Kelvin Temperature	392.6 K
M	Molecular Weight	16
Z	Compressibility Factor	0.9913
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 12.07 kgf/㎠g
- Setting Pressure : 14.3 kgf/㎠g
- Design Pressure : 14.3 kgf/㎠g
- Constant Back Pressure : 0.3 kgf/㎠g
- Built-up Back Pressure : 1.43 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	6 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9206	
	Tag No.	2	E2-PSV-9038A/B	
	Service Line	3	C-941 GTG FG Boosting Compressor 2nd stage discharge	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	2	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 13160*W1*(√ZT/M)/(C*Kd*(P*1.1+101.325)*Kb*Kc)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	2"X3"	= 13160*7800*(√0.9864*395.2/16)/(345.08*0.831*
	Inlet. Rating / Facing	12	ASME CL.300 RF	(3746*1.1+101.325)*1*1)
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	= **418.498758** ㎟
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	Chrome Alloy(SWOSC-B)	W = A*C*Kd*(P*1.1+101.325)*Kb*Kc/(13160*√(ZT/M))
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	= 506.45*345.08*0.831*(3746*1.1+101.325)*1*1/
	Comply with NACE	23	No	(13160*√(0.9864*395.2/16))
	EN 10204	24	No	
	Code	25	API RP 520	= **9439** kg/h
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	Fuel Gas / GAS	
	Mol. Weight / Specific Gravity	30	16	
	Compressibility Factor	31	0.9864	
	Ratio of Specific Heat	32	1.28	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	122.2 / 122.2 ℃	
	Design Min. / Design Max. Temp.	35	-18/180 ℃	
	Operating / Set Pressure	36	3.118 / 3.746 MPag	
	Design Pressure / C.D.T.P	37	3.746 / 3.753766 MPag	
	Back Pressure: Superimposed - Constant	38	0.0294 MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.3452 MPag	
	Back Pressure: Total	41	0.3746 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 3.48378 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	7800 kg/h	
	Valve Actual Capacity	45	9439 kg/h	
	Calculated Orifice Area	46	418.498758 ㎟	
	Selected Orifice Area	47	506.45 ㎟	
	Orifice Dia.(mm)	48	H(25.4)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	9439 kg/h
W1	Required Capacity	7800 kg/h
P	Set Pressure	3746 KPag
A1	Calculated Area	418.498758 ㎟
A	Selected Area	506.45 ㎟
Kd	Coefficient of Discharge	0.831
C	Coefficient base on Ratio of Specific Heat	345.08
T	Kelvin Temperature	395.2 K
M	Molecular Weight	16
Z	Compressibility Factor	0.9864
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1

Remarks

Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

Remark
- Operating Pressure : 31.8 kgf/㎠g
- Setting Pressure : 38.2 kgf/㎠g
- Design Pressure : 38.2 kgf/㎠g
- Constant Back Pressure : 0.3 kgf/㎠g
- Built-up Back Pressure : 3.5 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	7 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9001A	
	Tag No.	2	E2-PSV-9003	
	Service Line	3	PT-901A (SHP BFW PUMP P-901A Turbine)	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Open	
	Lever Type	9	Plain Lever	A1 = 190.4*W1/((P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh)
	Cap Type	10	Plain	
CONN.	Size. Inlet / Outlet	11	6"X8"	=190.4*57600/((1765*1.1+101.325)*0.831*1*1*1*0.943)
	Inlet. Rating / Facing	12	ASME CL.300 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	= **6850.867165** ㎟
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	Graphite	
	Spring	20	316 SS	W = A*(P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh/190.4
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	= 7132.89*(1765*1.1+101.325) *0.831*1*1*1*0.943/190.4
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520	= **59971** kg/h
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	

SERVICE CONDITION	Fluid / State	29	MP Steam / STEAM	
	Mol. Weight / Specific Gravity	30	18.02	
	Compressibility Factor	31	0.951	
	Ratio of Specific Heat	32	1.36	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	270 / 270 ℃	
	Design Min. / Design Max. Temp.	35	350 ℃	
	Operating / Set Pressure	36	1.47 / 1.765 MPag	
	Design Pressure / C.D.T.P	37	1.765/F.V / 1.81795 MPag	
	Back Pressure – Superimposed - Constant	38	0 MPag	
	Back Pressure – Superimposed - Variable	39	- MPag	
	Back Pressure – Built-up	40	0.09 MPag	
	Back Pressure – Total	41	0.09 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 1.64145 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	57600 kg/h	
	Valve Actual Capacity	45	59971 kg/h	
	Calculated Orifice Area	46	6850.867165 ㎟	
	Selected Orifice Area	47	7132.89 ㎟	
	Orifice Dia.(mm)	48	Q(95.3)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	59971 kg/h
W1	Required Capacity	57600 kg/h
P	Set Pressure	1765 KPag
A1	Calculated Area	6850.867165 ㎟
A	Selected Area	7132.89 ㎟
Kd	Coefficient of Discharge	0.831
Ksh	Steam Correction Factor	0.943
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kn	Correction Factor for Napier equation	1

Remarks

Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

Remark
- Operating Pressure : 15 kgf/㎠g
- Setting Pressure : 18 kgf/㎠g
- Design Pressure : 18/F.V kgf/㎠g
- Built-up Back Pressure : 0.92kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	8 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9001A	
	Tag No.	2	E2-PSV-9009	
	Service Line	3	P-901A-E3 (SHP BFW PUMP P-901A Turbine Gland Condenser) TS	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Open	
	Lever Type	9	Plain Lever	A1 = 190.4*W1/((P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh)
	Cap Type	10	Plain	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	=190.4*65.5/((1358*1.1+101.325)*0.831*1*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	= **9.408329** ㎟
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	Graphite	
	Spring	20	Chrome Alloy(SWOSC-B)	W = A*(P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh/190.4
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	= 132.9*(1358*1.1+101.325)*0.831*1*1*1*1/190.4
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520	= **925** kg/h
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	

SERVICE CONDITION	Fluid / State	29	Cooling Water / STEAM	
	Mol. Weight / Specific Gravity	30	18.02	
	Compressibility Factor	31	0.904	
	Ratio of Specific Heat	32	1.313	
	Viscosity	33	0.016 cP	
	Operating / Relieving Temp.	34	41.06 / 201.2 ℃	
	Design Min. / Design Max. Temp.	35	65 ℃	
	Operating / Set Pressure	36	0.49 / 1.358 MPag	
	Design Pressure / C.D.T.P	37	1.358 / 1.358 MPag	
	Back Pressure — Superimposed - Constant	38	0 MPag	
	Back Pressure — Superimposed - Variable	39	- MPag	
	Back Pressure — Built-up	40	0.086 MPag	
	Back Pressure — Total	41	0.086 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 1.26294 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	65.5 kg/h	
	Valve Actual Capacity	45	925 kg/h	
	Calculated Orifice Area	46	9.408329 ㎟	
	Selected Orifice Area	47	132.9 ㎟	
	Orifice Dia.(mm)	48	D1(13)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	925 kg/h
W1	Required Capacity	65.5 kg/h
P	Set Pressure	1358 KPag
A1	Calculated Area	9.408329 ㎟
A	Selected Area	132.9 ㎟
Kd	Coefficient of Discharge	0.831
Ksh	Steam Correction Factor	1
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kn	Correction Factor for Napier equation	1

Remarks

Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

Remark
- Operating Pressure : 5 kgf/㎠g
- Setting Pressure : 13.85 kgf/㎠g
- Design Pressure : 13.85 kgf/㎠g
- Built-up Back Pressure : 0.88 kgf/㎠g

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Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	9 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-91 57	
	Tag No.	2	E2-PSV-3750B	
	Service Line	3	CT-301 ERC Turbine Sealing Steam	
	Model No.	4	JSV-FF100	
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	
	Design Type	7	Conventional	
	Bonnet Type	8	Open	
	Lever Type	9	Plain Lever	
	Cap Type	10	Plain	
CONN.	Size. Inlet / Outlet	11	3"X4"	
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA217 WC6	
	Bonnet	15	SA217 WC6	
	Seat	16	AS(2.25Cr)-st.	
	Disc	17	Inconel 625	
	Guide	18	316 SS	
	Gasket (Bonnet)	19	Graphite	
	Spring	20	316 SS	
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520	
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	LP Steam / STEAM	
	Mol. Weight / Specific Gravity	30	18.02	
	Compressibility Factor	31	0.997	
	Ratio of Specific Heat	32	1.281	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	415 / 433.5 ℃	
	Design Min. / Design Max. Temp.	35	434 ℃	
	Operating / Set Pressure	36	0.019 / 0.127 MPag	
	Design Pressure / C.D.T.P	37	0.127/FV / 1.358 MPag	
	Back Pressure: Superimposed - Constant	38	0 MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.013 MPag	
	Back Pressure: Total	41	0.013 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.11811 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	1147 kg/h	
	Valve Actual Capacity	45	1575 kg/h	
	Calculated Orifice Area	46	1344.455377 ㎟	
	Selected Orifice Area	47	1846.45 ㎟	
	Orifice Dia.(mm)	48	L(48.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

Calculation

Calculation of Area

A1 = 190.4*W1/((P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh)

=190.4*1147/((127*1.1+101.325)*0.831*1*1*1*0.811)

= **1344.455377** ㎟

Calculation of Capacity

W = A*(P*1.1+101.325)*Kd*Kb*Kc*Kn*Ksh/190.4

= 1846.45*(127*1.1+101.325)
*0.831*1*1*1*0.811/190.4

= **1575** kg/h

W	Valve Capacity	1575 kg/h
W1	Required Capacity	1147 kg/h
P	Set Pressure	127 KPag
A1	Calculated Area	1344.455377 ㎟
A	Selected Area	1846.45 ㎟
Kd	Coefficient of Discharge	0.831
Ksh	Steam Correction Factor	0.811
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kn	Correction Factor for Napier equation	1

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 0.2 kgf/㎠g
- Setting Pressure : 1.3 kgf/㎠g
- Design Pressure : 1.3/F.V kgf/㎠g
- Built-up Back Pressure : 0.13 kgf/㎠g

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Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	10 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9161	
	Tag No.	2	E2-PSV-5850B	
	Service Line	3	CT-501 ERC Turbine Sealing Steam	
	Model No.	4	JSV-FF100	
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	
	Design Type	7	Conventional	
	Bonnet Type	8	Open	
	Lever Type	9	Plain Lever	
	Cap Type	10	Plain	
CONN.	Size. Inlet / Outlet	11	1-1/2"X2"	
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	
	Guide	18	316 SS	
	Gasket (Bonnet)	19	Graphite	
	Spring	20	316 SS	
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520	
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	LP Steam / STEAM	
	Mol. Weight / Specific Gravity	30	18.02	
	Compressibility Factor	31	0.996	
	Ratio of Specific Heat	32	1.290	
	Viscosity	33	-	
	Operating / Relieving Temp.	34	299 / 347.2 ℃	
	Design Min. / Design Max. Temp.	35	347 ℃	
	Operating / Set Pressure	36	0.019 / 0.127 MPag	
	Design Pressure / C.D.T.P	37	0.127/FV / 0.13081 MPag	
	Back Pressure: Superimposed - Constant	38	0 MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.013 MPag	
	Back Pressure: Total	41	0.013 MPag	
	Allowable Overpressure	42	3 psi	
	Closing Pressure / Blowdown(%)	43	Min. 0.11811 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	228 kg/h	
	Valve Actual Capacity	45	248 kg/h	
	Calculated Orifice Area	46	239.221815 ㎟	
	Selected Orifice Area	47	260 ㎟	
	Orifice Dia.(mm)	48	F1(18.2)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

Calculation

Calculation of Area

A1 = 190.4*W1/((P*1.1628+101.325)*Kd*Kb*Kc*Kn*Ksh)

=190.4*228/((127*1.1628+101.325)*0.831*1*1*1*0.877)

= **239.221815** ㎟

Calculation of Capacity

W = A*(P*1.1628+101.325)*Kd*Kb*Kc*Kn*Ksh/190.4

= 260*(127*1.1628+101.325)
*0.831*1*1*1*0.877/190.4

= **248** kg/h

W	Valve Capacity	248 kg/h
W1	Required Capacity	228 kg/h
P	Set Pressure	127 KPag
A1	Calculated Area	239.221815 ㎟
A	Selected Area	260 ㎟
Kd	Coefficient of Discharge	0.831
Ksh	Steam Correction Factor	0.877
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kn	Correction Factor for Napier equation	1

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 0.2 kgf/㎠g
- Setting Pressure : 1.3 kgf/㎠g
- Design Pressure : 1.3/F.V kgf/㎠g
- Built-up Back Pressure : 0.13 kgf/㎠g

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Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	11 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-91 64	
	Tag No.	2	E2-PSV-6850B	
	Service Line	3	CT-601 ERC Turbine Sealing Steam	
	Model No.	4	JSV-FF100	
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	
	Design Type	7	Conventional	
	Bonnet Type	8	Open	
	Lever Type	9	Plain Lever	
	Cap Type	10	Plain	
CONN.	Size. Inlet / Outlet	11	2"X3"	
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	
	Guide	18	316 SS	
	Gasket (Bonnet)	19	Graphite	
	Spring	20	316 SS	
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520	
	Fire	26	No	
	Sizing Basis	27	Blocked Outlet	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	LP Steam / STEAM	
	Mol. Weight / Specific Gravity	30	18.02	
	Compressibility Factor	31	0.997	
	Ratio of Specific Heat	32	1.282	
	Viscosity	33	m	
	Operating / Relieving Temp.	34	419 / 424.4 ℃	
	Design Min. / Design Max. Temp.	35	424 ℃	
	Operating / Set Pressure	36	0.019 / 0.127 MPag	
	Design Pressure / C.D.T.P	37	0.127/FV / 0.13081 MPag	
	Back Pressure: Superimposed - Constant	38	0 MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.013 MPag	
	Back Pressure: Total	41	0.013 MPag	
	Allowable Overpressure	42	3 psi	
	Closing Pressure / Blowdown(%)	43	Min. 0.11811 MPag / 7%	
SIZING & SELECTION	Required Capacity	44	578 kg/h	
	Valve Actual Capacity	45	741 kg/h	
	Calculated Orifice Area	46	650.98549 ㎟	
	Selected Orifice Area	47	834.19 ㎟	
	Orifice Dia.(mm)	48	J(32.6)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

Calculation

Calculation of Area

A1 = 190.4*W1/((P*1.1628+101.325)*Kd*Kb*Kc*Kn*Ksh)

=190.4*578/((127*1.1628+101.325)*0.831*1*1*1*0.817)

= **650.98549** ㎟

Calculation of Capacity

W = A*(P*1.1628+101.325)*Kd*Kb*Kc*Kn*Ksh/190.4

= 834.19*(127*1.1628+101.325)
*0.831*1*1*1*0.817/190.4

= **741** kg/h

W	Valve Capacity	741 kg/h
W1	Required Capacity	578 kg/h
P	Set Pressure	127 KPag
A1	Calculated Area	650.98549 ㎟
A	Selected Area	834.19 ㎟
Kd	Coefficient of Discharge	0.831
Ksh	Steam Correction Factor	0.817
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kn	Correction Factor for Napier equation	1

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 0.2 kgf/㎠g
- Setting Pressure : 1.3 kgf/㎠g
- Design Pressure : 1.3/F.V kgf/㎠g
- Built-up Back Pressure : 0.13 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	12 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9207	
	Tag No.	2	E2-PSV-9039	
	Service Line	3	C-941 GTG FG Boosting Compressor Lube Oil Cooler 2	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	= 11.78*0*√(0.986/(1133-103))/(0.615*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	= **0** ㎟
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))
	Bellows	21	None	
BASIS	Approved by	22	UV STAMP	= 70.97*0.615*1*1*1/(11.78*√(0.986/(1133-103)))
	Comply with NACE	23	No	
	EN 10204	24	No	= 119.80 ℓ/min
	Code	25	API RP 520-Certification	= **7.2** m3/h
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	Cooling Water / LIQUID	
	Mol. Weight / Specific Gravity	30	0.986	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.5 cP	
	Operating / Relieving Temp.	34	43 / 55 ℃	
	Design Min. / Design Max. Temp.	35	-18/65 ℃	
	Operating / Set Pressure	36	0.539 / 1.03 MPag	
	Design Pressure / C.D.T.P	37	1.03 / 1.03 MPag	
	Back Pressure: Superimposed - Constant	38	- MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.103 MPag	
	Back Pressure: Total	41	0.103 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.78 MPag / 24.2718%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	7.2 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	119.80 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1030 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.986
Pb	Back Pressure	103 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1133 KPag

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 5.5 kgf/㎠g
- Setting Pressure : 1 0.5 kgf/㎠g
- Design Pressure : 1 0.5 kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 1 .05 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	13 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9207	
	Tag No.	2	E2-PSV-9040	
	Service Line	3	C-941 GTG FG Boosting Compressor Rod Packing 1	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	= 11.78*0*√(0.94/(1133-103))/(0.615*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	= **0** ㎟
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))
	Bellows	21	None	
BASIS	Approved by	22	UV STAMP	= 70.97*0.615*1*1*1/(11.78*√(0.94/(1133-103)))
	Comply with NACE	23	No	
	EN 10204	24	No	= 122.60 ℓ/min
	Code	25	API RP 520-Certification	= **7.4** m3/h
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	Cooling Water / LIQUID	
	Mol. Weight / Specific Gravity	30	0.94	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.22 cP	
	Operating / Relieving Temp.	34	43 / 122.2 ℃	
	Design Min. / Design Max. Temp.	35	-18/65 ℃	
	Operating / Set Pressure	36	0.539 / 1.03 MPag	
	Design Pressure / C.D.T.P	37	1.03 / 1.03 MPag	
	Back Pressure: Superimposed - Constant	38	- MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.103 MPag	
	Back Pressure: Total	41	0.103 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.78 MPag / 24.2718%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	7.4 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	122.60 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1030 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.94
Pb	Back Pressure	103 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1133 KPag

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 5.5 kgf/㎠g
- Setting Pressure : 10.5 kgf/㎠g
- Design Pressure : 10.5 kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 10.7 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	14 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9207	
	Tag No.	2	E2-PSV-9041	
	Service Line	3	C-941 GTG FG Boosting Compressor Rod Packing 2	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	= 11.78*0*√(0.94/(1133-103))/(0.615*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	= **0** ㎟
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))
	Bellows	21	None	
BASIS	Approved by	22	UV STAMP	= 70.97*0.615*1*1*1/(11.78*√(0.94/(1133-103)))
	Comply with NACE	23	No	
	EN 10204	24	No	= 122.60 ℓ/min
	Code	25	API RP 520-Certification	= **7.4** m3/h
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	Cooling Water / LIQUID	
	Mol. Weight / Specific Gravity	30	0.94	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.22 cP	
	Operating / Relieving Temp.	34	43 / 122.2 ℃	
	Design Min. / Design Max. Temp.	35	-18/65 ℃	
	Operating / Set Pressure	36	0.539 / 1.03 MPag	
	Design Pressure / C.D.T.P	37	1.03 / 1.03 MPag	
	Back Pressure: Superimposed - Constant	38	- MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.103 MPag	
	Back Pressure: Total	41	0.103 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.78 MPag / 24.2718%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	7.4 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	122.60 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1030 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.94
Pb	Back Pressure	103 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1133 KPag

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 5.5 kgf/㎠g
- Setting Pressure : 10.5 kgf/㎠g
- Design Pressure : 10.5 kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 1.05 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	15 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9207	
	Tag No.	2	E2-PSV-9042	
	Service Line	3	C-941 GTG FG Boosting Compressor Rod Packing 3	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	= 11.78*0*√(0.94/(1133-103))/(0.615*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	= **0** ㎟
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))
	Bellows	21	None	
BASIS	Approved by	22	UV STAMP	= 70.97*0.615*1*1*1/(11.78*√(0.94/(1133-103)))
	Comply with NACE	23	No	
	EN 10204	24	No	= 122.60 ℓ/min
	Code	25	API RP 520-Certification	= **7.4** m3/h
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	

SERVICE CONDITION	Fluid / State	29	Cooling Water / LIQUID	
	Mol. Weight / Specific Gravity	30	0.94	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.22 cP	
	Operating / Relieving Temp.	34	43 / 122.2 ℃	
	Design Min. / Design Max. Temp.	35	-18/65 ℃	
	Operating / Set Pressure	36	0.539 / 1.03 MPag	
	Design Pressure / C.D.T.P	37	1.03 / 1.03 MPag	
	Back Pressure – Superimposed - Constant	38	- MPag	
	Back Pressure – Superimposed - Variable	39	- MPag	
	Back Pressure – Built-up	40	0.103 MPag	
	Back Pressure – Total	41	0.103 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.78 MPag / 24.2718%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	7.4 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	122.60 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1030 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.94
Pb	Back Pressure	103 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1133 KPag

Remarks

Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

Remark
- Operating Pressure : 5.5 kgf/㎠g
- Setting Pressure : 10.5 kgf/㎠g
- Design Pressure : 10.5 kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 1.05 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	16 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-3047	
	Tag No.	2	E2-PSV-3128A/B	
	Service Line	3	F-305 (Guard Dryer Filter)	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	2	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 13160*W1*(√ZT/M)/(C*Kd*(P*1.1+101.325)*Kb*Kc)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	1"X2"	= 13160*3793*(√0.610*461/27.10)/(339.24*0.831*
	Inlet. Rating / Facing	12	ASME CL.300 RF	(4511*1.1+101.325)*1*1)
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	= **112.64632** ㎟
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	W = A*C*Kd*(P*1.1+101.325)*Kb*Kc/(13160*√(ZT/M))
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	= 126.45*339.24*0.831*(4511*1.1+101.325)*1*1/
	Comply with NACE	23	No	(13160*√(0.610*461/27.10))
	EN 10204	24	No	
	Code	25	API RP 520	= **4258** kg/h
	Fire	26	No	
	Sizing Basis	27	External Fire	
	Rupture Disk	28	No	

W	Valve Capacity	4258 kg/h
W1	Required Capacity	3793 kg/h
P	Set Pressure	4511 KPag
A1	Calculated Area	112.64632 ㎟
A	Selected Area	126.45 ㎟
Kd	Coefficient of Discharge	0.831
C	Coefficient base on Ratio of Specific Heat	339.24
T	Kelvin Temperature	461 K
M	Molecular Weight	27.10
Z	Compressibility Factor	0.610
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1

SERVICE CONDITION	Fluid / State		29	Reactor Effluent / GAS
	Mol. Weight / Specific Gravity		30	27.10
	Compressibility Factor		31	0.610
	Ratio of Specific Heat		32	1.22
	Viscosity		33	0.01 cP
	Operating / Relieving Temp.		34	40 / 188 ℃
	Design Min. / Design Max. Temp.		35	-18/149 ℃
	Operating / Set Pressure		36	3.677 / 4.511 MPag
	Design Pressure / C.D.T.P		37	4.511 / 4.481 MPag
	Back Pressure	Superimposed - Constant	38	0.03 MPag
		Superimposed - Variable	39	- MPag
		Built-up	40	0.114 MPag
		Total	41	0.144 MPag
	Allowable Overpressure		42	10 %
	Closing Pressure / Blowdown(%)		43	Min. 4.19523 MPag / 7%
SIZING & SELECTION	Required Capacity		44	3793 kg/h
	Valve Actual Capacity		45	4258 kg/h
	Calculated Orifice Area		46	112.64632 ㎟
	Selected Orifice Area		47	126.45 ㎟
	Orifice Dia.(mm)		48	E(12.7)
				-
				-
ETC	Paint System & Color		49	See Remark
	Test Gag		50	Yes
	Bug screen		51	No

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	17 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9201	
	Tag No.	2	E2-PSV-9044	
	Service Line	3	W-931 No.1 Gas Turbine Generator Package	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	= 11.78*0*√(0.941/(1133-103))/(0.615*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	= **0** ㎟
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))
	Bellows	21	None	
BASIS	Approved by	22	UV STAMP	= 70.97*0.615*1*1*1/(11.78*√(0.941/(1133-103)))
	Comply with NACE	23	No	
	EN 10204	24	No	= 122.60 ℓ/min
	Code	25	API RP 520-Certification	= **7.4** m3/h
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	Cooling Water / LIQUID	
	Mol. Weight / Specific Gravity	30	0.941	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.22 cP	
	Operating / Relieving Temp.	34	43 / 123 ℃	
	Design Min. / Design Max. Temp.	35	-18/65 ℃	
	Operating / Set Pressure	36	0.539 / 1.03 MPag	
	Design Pressure / C.D.T.P	37	1.03 / 1.03 MPag	
	Back Pressure: Superimposed - Constant	38	- MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.103 MPag	
	Back Pressure: Total	41	0.103 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.78 MPag / 24.2718%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	7.4 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	122.60 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1030 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.941
Pb	Back Pressure	103 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1133 KPag

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 5.5 kgf/㎠g
- Setting Pressure : 10.5 kgf/㎠g
- Design Pressure : 10.5 kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 1.05 kgf/㎠g

JOKWANG I.L.I

Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	18 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9202	
	Tag No.	2	E2-PSV-9045	
	Service Line	3	W-941 No.2 Gas Turbine Generator Package	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	= 11.78*0*√(0.941/(1133-103))/(0.615*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	= **0** ㎟
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))
	Bellows	21	None	
BASIS	Approved by	22	UV STAMP	= 70.97*0.615*1*1*1/(11.78*√(0.941/(1133-103)))
	Comply with NACE	23	No	
	EN 10204	24	No	= 122.60 ℓ/min
	Code	25	API RP 520-Certification	= **7.4** m3/h
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	

W	Valve Capacity	122.60 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1030 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.941
Pb	Back Pressure	103 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1133 KPag

SERVICE CONDITION	Fluid / State	29	Cooling Water / LIQUID	
	Mol. Weight / Specific Gravity	30	0.941	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.22 cP	
	Operating / Relieving Temp.	34	43 / 123 ℃	
	Design Min. / Design Max. Temp.	35	-18/65 ℃	
	Operating / Set Pressure	36	0.539 / 1.03 MPag	
	Design Pressure / C.D.T.P	37	1.03 / 1.03 MPag	
	Back Pressure: Superimposed - Constant	38	- MPag	
	Back Pressure: Superimposed - Variable	39	- MPag	
	Back Pressure: Built-up	40	0.103 MPag	
	Back Pressure: Total	41	0.103 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.78 MPag / 24.2718%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	7.4 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

Remarks

Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

Remark
- Operating Pressure : 5.5 kgf/㎠g
- Setting Pressure : 10.5 kgf/㎠g
- Design Pressure : 10.5 kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 1.05 kgf/㎠g

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Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	19 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9201	
	Tag No.	2	E2-PSV-9046	
	Service Line	3	W-931 Lube Oil Cooler Cold	
	Model No.	4	JSV-FF100	
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	
	Bellows	21	None	
BASIS	Approved by	22	UV STAMP	
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520-Certification	
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	Cooling Water / LIQUID	
	Mol. Weight / Specific Gravity	30	0.972	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.35 cP	
	Operating / Relieving Temp.	34	43 / 80 ℃	
	Design Min. / Design Max. Temp.	35	-18/65 ℃	
	Operating / Set Pressure	36	0.539 / 1.03 MPag	
	Design Pressure / C.D.T.P	37	1.03 / 1.03 MPag	
	Back Pressure — Superimposed - Constant	38	- MPag	
	Back Pressure — Superimposed - Variable	39	- MPag	
	Back Pressure — Built-up	40	0.103 MPag	
	Back Pressure — Total	41	0.103 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.78 MPag / 24.2718%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	7.2 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

Calculation

Calculation of Area

A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)

= 11.78*0*√(0.972/(1133-103))/(0.615*1*1*1)

= **0** ㎟

Calculation of Capacity

W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))

= 70.97*0.615*1*1*1/(11.78*√(0.972/(1133-103)))

= 120.60 ℓ/min
= **7.2** m3/h

W	Valve Capacity	120.60 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1030 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.972
Pb	Back Pressure	103 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1133 KPag

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 5.5 kgf/㎠g
- Setting Pressure : 10.5 kgf/㎠g
- Design Pressure : 10.5 kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 1.05 kgf/㎠g

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Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	20 of 20	Rev . No	1
Project Name	Yeosu No.2 Complex Project(E2) 2nd PO		
Project No.			
Date	2021-01-27	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-9202	
	Tag No.	2	E2-PSV-9047	
	Service Line	3	W-941 Lube Oil Cooler Cold	
	Model No.	4	JSV-FF100	
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	316 SS	
	Bellows	21	None	
BASIS	Approved by	22	UV STAMP	
	Comply with NACE	23	No	
	EN 10204	24	No	
	Code	25	API RP 520-Certification	
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	
SERVICE CONDITION	Fluid / State	29	Cooling Water / LIQUID	
	Mol. Weight / Specific Gravity	30	0.972	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.35 cP	
	Operating / Relieving Temp.	34	43 / 80 ℃	
	Design Min. / Design Max. Temp.	35	-18/65 ℃	
	Operating / Set Pressure	36	0.539 / 1.03 MPag	
	Design Pressure / C.D.T.P	37	1.03 / 1.03 MPag	
	Back Pressure – Superimposed - Constant	38	- MPag	
	Back Pressure – Superimposed - Variable	39	- MPag	
	Back Pressure – Built-up	40	0.103 MPag	
	Back Pressure – Total	41	0.103 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 0.78 MPag / 24.2718%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	7.2 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

Calculation

Calculation of Area

A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)

= 11.78*0*√(0.972/(1133-103))/(0.615*1*1*1)

= **0** ㎟

Calculation of Capacity

W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))

= 70.97*0.615*1*1*1/(11.78*√(0.972/(1133-103)))

= 120.60 ℓ/min
= **7.2** m3/h

W	Valve Capacity	120.60 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1030 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.972
Pb	Back Pressure	103 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1133 KPag

Remarks

*Paint Color(*)
Painting : P-5 (RAL 9006 Silver)

*Remark
- Operating Pressure : 5.5 kgf/㎠g
- Setting Pressure : 10.5 kgf/㎠g
- Design Pressure : 10.5 kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 1.05 kgf/㎠g

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Pressure Safety & Relief Valve Specification and Calculation Sheet

Sheet No.	1 of 1	Rev . No	1
Project Name	Yeosu No.2 Complex Project (긴급분)		
Project No.			
Date	2021-03-24	By	S.W.PARK
Checked	S.C.KIM	Approved	S.C.KIM

GENERAL	P&ID No.	1	H465-E2-PID-2013	
	Tag No.	2	E2-PSV-2122	
	Service Line	3	E-211 (Process Condensate Stripper Reboiler) SS	
	Model No.	4	JSV-FF100	**Calculation**
	Quantity	5	1	
TYPE	Nozzle Type	6	Full Nozzle	Calculation of Area
	Design Type	7	Conventional	
	Bonnet Type	8	Close	
	Lever Type	9	None	A1 = 11.78*W1*(√G/(P1-Pb))/(Kd*Kb*Kc*Kv)
	Cap Type	10	Screwed	
CONN.	Size. Inlet / Outlet	11	3/4"X1"	= 11.78*0*√(0.894/(1455.3-25))/(0.615*1*1*1)
	Inlet. Rating / Facing	12	ASME CL.150 RF	
	Outlet. Rating / Facing	13	ASME CL.150 RF	= **0** ㎟
MATERIALS	Body (Base)	14	SA216 WCB	
	Bonnet	15	SA216 WCB	
	Seat	16	316 SS-st.	
	Disc	17	316 SS-st.	Calculation of Capacity
	Guide	18	316 SS	
	Gasket (Bonnet)	19	PTFE	
	Spring	20	Chrome Alloy(SWOSC-B)	W = A*Kd*Kb*Kc*Kv/(11.78*√(G/(P1-Pb)))
	Bellows	21	None	
BASIS	Approved by	22	KGS UV STAMP	= 70.97*0.615*1*1*1/(11.78*√(0.894/(1455.3-25)))
	Comply with NACE	23	/	
	EN 10204	24	No	= 148.20 ℓ/min
	Code	25	API RP 520-Certification	= **8.9** m3/h
	Fire	26	No	
	Sizing Basis	27	Thermal Expansion	
	Rupture Disk	28	No	

SERVICE CONDITION	Fluid / State	29	Process Condensate / LIQUID	
	Mol. Weight / Specific Gravity	30	0.894	
	Compressibility Factor	31	-	
	Ratio of Specific Heat	32	-	
	Viscosity	33	0.155 cP	
	Operating / Relieving Temp.	34	117.1 / 173.4 ℃	
	Design Min. / Design Max. Temp.	35	-18/195 ℃	
	Operating / Set Pressure	36	0.072 / 1.323 MPag	
	Design Pressure / C.D.T.P	37	1.323/FV / 1.33623 MPag	
	Back Pressure – Superimposed - Constant	38	- MPag	
	Back Pressure – Superimposed - Variable	39	- MPag	
	Back Pressure – Built-up	40	0.025 MPag	
	Back Pressure – Total	41	0.025 MPag	
	Allowable Overpressure	42	10 %	
	Closing Pressure / Blowdown(%)	43	Min. 1.12455 MPag / 15%	
SIZING & SELECTION	Required Capacity	44	0 m3/h	
	Valve Actual Capacity	45	8.9 m3/h	
	Calculated Orifice Area	46	0 ㎟	
	Selected Orifice Area	47	70.97 ㎟	
	Orifice Dia.(mm)	48	D(9.5)	
			-	
			-	
ETC	Paint System & Color	49	See Remark	
	Test Gag	50	Yes	
	Bug screen	51	No	

W	Valve Capacity	148.20 ℓ/min
W1	Required Capacity	0 ℓ/min
P	Set Pressure	1323 KPag
A1	Calculated Area	0 ㎟
A	Selected Area	70.97 ㎟
Kd	Coefficient of Discharge	0.615
G	Specific Gravity	0.894
Pb	Back Pressure	25 KPag
Kb	Correction Factor Due to Back Pressure	1
Kc	Correction Factor for a rupture disk	1
Kv	Correction Factor due to Viscosity	1
P1	Set Pressure plus Overpressure	1455.3 KPag

Remarks

*Paint Color(*)
P-5

*Remark
- Operating Pressure : 0.74 kgf/㎠g
- Setting Pressure : 13.5 kgf/㎠g
- Design Pressure : 13.5/FV kgf/㎠g
- Constant Back Pressure : 0 kgf/㎠g
- Built-up Back Pressure : 0.251 kgf/㎠g

Ref. No : SLO211311-10-696971 JOKWANG I.L.I CO.,LTD. No.TTIPCF500-2