

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض خرید پکیج های کمپرسور گاز (رفت و برگشتی) بینک (قرارداد ۰۳-۰۰۰۸-GCS-HD-BK)																			
شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴	CALCULATION NOTE FOR PSV SIZING <table border="1"> <tr> <td>نسخه</td> <td>سریال</td> <td>نوع</td> <td>رشته</td> <td>تمهيلات</td> <td>صادر کننده</td> <td>بسته کاری</td> <td>پروژه</td> </tr> <tr> <td>V01</td> <td>0001</td> <td>CN</td> <td>PR</td> <td>120</td> <td>HY</td> <td>GCS</td> <td>BK</td> </tr> </table>		نسخه	سریال	نوع	رشته	تمهيلات	صادر کننده	بسته کاری	پروژه	V01	0001	CN	PR	120	HY	GCS	BK	شماره صفحه: ۱ از ۱۶	
نسخه	سریال	نوع	رشته	تمهيلات	صادر کننده	بسته کاری	پروژه													
V01	0001	CN	PR	120	HY	GCS	BK													
طرح نگهداشت و افزایش تولید ۲۷ مخزن																				
CALCULATION NOTE FOR PSV SIZING نگهداشت و افزایش تولید میدان نفتی بینک																				
V01	FEB.2025	AFC	Havayar CO	M.Fakharian	S.Faramarzpour															
V00	OCT.2024	IFR	Havayar CO	M.Fakharian	M.SADEGHIAN															
Rev.	Date	Purpose of Issue/Status	Prepared By	Checked By	Approved By	Client Approval														
status: CLIENT Doc. Number: IFA: Issued For Approval IFR: Issued For Review IFI: Issued For Information AFC: Approved For Construction																				



NISOC

شماره پیمان:

۰۵۳ - ۰۷۳ - ۹۱۸۴

نگهداشت و افزایش تولید میدان نفتی بینک
سطح الارض و ابنیه تحت الارض
خرید پکیج های کمپرسور گاز (رفت و برگشتی) بینک
(قرارداد ۰۳_۰۰۰۸-CO-GCS-BK-HD)



HAVAYAR
INDUSTRIAL GROUP

CALCULATION NOTE FOR PSV SIZING

نسخه	سریال	نوع	رشته	تسهیلات	صادر کننده	بسته کاری	پروژه
V01	0001	CN	PR	120	HY	GCS	BK

شماره صفحه: ۲ از ۱۶

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3	X	X			
4	X	X			
5	X	X			
6	X	X			
7	X	X			
8	X	X			
9	X	X			
10	X	X			
11	X	X			
12	X	X			
13	X	X			
14	X	X			
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				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2203A			12			
3	VALVE MODEL NO.	C1D22/1C21705			13			
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)#(Nm3/h)	3.75#3		18	AREA	REQUIRED (mm²)	1.33
9		RATED (kg/h)	220.58		19		SELECTED (mm²)	78.5
10	REACTION FORCE (N)		77.54		20	NOISE LEVEL (db) @ 30m		90.27
						NOISE LEVEL (db) @ 1m		120.27
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	28.01			
22		RATIO OF SPECIFIC HEATS		K	1.4			
23		COMPRESSIBILITY		Z	1			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		Wreq.	3.75			
25		SET PRESSURE (barg)		Pset	2.8			
26		OVER PRESSURE (barg)		Pover	0.28			
27		CONSTANT BACK PRESSURE (barg)			0			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	0			
31		RELIEVING TEMP. (°C)		T	60			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
34		BACK PRESSURE CORRECTION FACTOR		Kb	1			
35		OUTLET DIAMETER (mm)		D0	50.8			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P1=Pset +Pover +Patm (kPa)			P1		408		
37	P2=Pback +Patm (kPa)			P2		100		
38	PR=P2/P1			PR		0.25		
CALCULATION GAS CONSTANT								
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C		0.03		
CALCULATED RATED DISCHARGE CAPACITY								
40	$W_s = [A_s \times C \times K_d \times P_1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Ws (kg/h)		220.58		
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P_1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Areq. (mm²)		1.33		
NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db		90.27		
CALCULATION REACTION FORCE								
43	$A_0 = (\pi \times D_0^2) / 4$			Fr. (N)		77.54		
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

								
				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID			11	CALCULATION NOTES			
2	TAG No.	PSV-2204A		12				
3	VALVE MODEL NO.	C1D22/1C21705		13				
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520				15
6	FLUID STATE	GAS		16				
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)#(Nm3/h)	3.75#3	18	AREA	REQUIRED (mm²)	1.33	
9		RATED (kg/h)	220.58	19		SELECTED (mm²)	78.5	
10	REACTION FORCE (N)		77.54	20	NOISE LEVEL (db) @ 30m		90.27	
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VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	28.01			
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23		COMPRESSIBILITY		Z	1			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		W _{req.}	3.75			
25		SET PRESSURE (barg)		P _{set}	2.8			
26		OVER PRESSURE (barg)		P _{over}	0.28			
27		CONSTANT BACK PRESSURE (barg)			0			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		P _{back}	0			
31		RELIEVING TEMP. (°C)		T	60			
32		RUPTURE DISC COEFFICIENT		K _c	1			
33		DISCHARGE COEFFICIENT		K _d	0.88			
34		BACK PRESSURE CORRECTION FACTOR		K _b	1			
35		OUTLET DIAMETER (mm)		D ₀	50.8			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P ₁ =P _{set} +P _{over} +P _{atm} (kPa)			P ₁		408		
37	P ₂ =P _{back} +P _{atm} (kPa)			P ₂		100		
38	PR=P ₂ /P ₁			PR		0.25		
CALCULATION GAS CONSTANT								
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C		0.03		
CALCULATED RATED DISCHARGE CAPACITY								
40	$W_s = [A_s \times C \times K_d \times P_1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			W _s (kg/h)		220.58		
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P_1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			A _{req.} (mm²)		1.33		
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43	A ₀ = (π × D ₀ ²)/4			F _r . (N)		77.54		
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				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2203B			12			
3	VALVE MODEL NO.	C1D22/1C21705			13			
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
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21	FLUID DATA	MOLECULAR WEIGHT		M	28.01			
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25		SET PRESSURE (barg)		Pset	2.8			
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27		CONSTANT BACK PRESSURE (barg)			0			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	0			
31		RELIEVING TEMP. (°C)		T	60			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
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CALCULATION REACTION FORCE								
43	$A_0 = (\pi \times D_0^2) / 4$			Fr. (N)		77.54		
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

								
				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2204B			12			
3	VALVE MODEL NO.	C1D22/1C21705			13			
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)#(Nm3/h)	3.75#3		18	AREA	REQUIRED (mm²)	1.33
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23		COMPRESSIBILITY		Z	1			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		W _{req.}	3.75			
25		SET PRESSURE (barg)		P _{set}	2.8			
26		OVER PRESSURE (barg)		P _{over}	0.28			
27		CONSTANT BACK PRESSURE (barg)			0			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		P _{back}	0			
31		RELIEVING TEMP. (°C)		T	60			
32		RUPTURE DISC COEFFICIENT		K _c	1			
33		DISCHARGE COEFFICIENT		K _d	0.88			
34		BACK PRESSURE CORRECTION FACTOR		K _b	1			
35		OUTLET DIAMETER (mm)		D ₀	50.8			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P ₁ =P _{set} +P _{over} +P _{atm} (kPa)			P ₁		408		
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40	$W_s = [A_s \times C \times K_d \times P_1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			W _s (kg/h)		220.58		
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P_1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			A _{req.} (mm²)		1.33		
NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db		90.27		
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43	A ₀ = (π × D ₀ ²)/4			F _r . (N)		77.54		
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

								
				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2203C			12			
3	VALVE MODEL NO.	C1D22/1C21705			13			
4	SIZING DATA				14			
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
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VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	28.01			
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23		COMPRESSIBILITY		Z	1			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		Wreq.	3.75			
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26		OVER PRESSURE (barg)		Pover	0.28			
27		CONSTANT BACK PRESSURE (barg)			0			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	0			
31		RELIEVING TEMP. (°C)		T	60			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
34		BACK PRESSURE CORRECTION FACTOR		Kb	1			
35		OUTLET DIAMETER (mm)		D0	50.8			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P1=Pset +Pover +Patm (kPa)			P1		408		
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40	$W_s = [A_s \times C \times K_d \times P_1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Ws (kg/h)		220.58		
CALCULATION REQUIRED ORIFICE AREA								
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NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db		90.27		
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1	VALVE ID				11	CALCULATION NOTES	
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						120.27	
VARIABLE TYPE		VARIABLE NAME		SYMBOLE	INPUT VALUE	EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	28.01		
22		RATIO OF SPECIFIC HEATS		K	1.4		
23		COMPRESSIBILITY		Z	1		
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CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE							
36	P1=Pset +Pover +Patm (kPa)			P1		408	
37	P2=Pback +Patm (kPa)			P2		100	
38	PR=P2/P1			PR		0.25	
CALCULATION GAS CONSTANT							
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C		0.03	
CALCULATED RATED DISCHARGE CAPACITY							
40	$W_S = [A_S \times C \times K_d \times P1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			W _S (kg/h)		220.58	
CALCULATION REQUIRED ORIFICE AREA							
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			A _{req.} (mm²)		1.33	
NOISE CALCULATION ACC. TO API RP 521							
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_S}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db		90.27	
CALCULATION REACTION FORCE							
43	$A_0 = (\pi \times D_0^2) / 4$			F _{r.} (N)		77.54	
44	$F = 129 \times \left(\frac{W_S}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$						

				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2122A/PSV-2123A			12			
3	VALVE MODEL NO.	C3J42/1A21705			13			
4	SIZING DATA				14			
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)	8935.5		18	AREA	REQUIRED (mm²)	646.56
9		RATED (kg/h)	12549		19		SELECTED (mm²)	908
10	REACTION FORCE (N)		3175		20	NOISE LEVEL (db) @ 30m/@1m		109/139
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	24.52			
22		RATIO OF SPECIFIC HEATS		K	1.22			
23		COMPRESSIBILITY		Z	0.97			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		Wreq.	8935.5			
25		SET PRESSURE (barg)		Pset	22			
26		OVER PRESSURE (barg)		Pover	2.2			
27		CONSTANT BACK PRESSURE (barg)			1			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	1			
31		RELIEVING TEMP. (°C)		T	159			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
34		BACK PRESSURE CORRECTION FACTOR		Kb	1			
35		OUTLET DIAMETER (mm)		D0	101.6			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P1=Pset +Pover +Patm (kPa)			P1			2520	
37	P2=Pback +Patm (kPa)			P2			200	
38	PR=P2/P1			PR			0.08	
CALCULATION GAS CONSTANT								
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C			0.03	
CALCULATED RATED DISCHARGE CAPACITY								
40	$W_s = [A_s \times C \times K_d \times P1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Ws (kg/h)			12549	
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Areq. (mm²)			646.56	
NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db			109	
CALCULATION REACTION FORCE								
43	$A_0 = (\pi \times D_0^2) / 4$			Fr. (N)			3175	
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

								
				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2132A/PSV-2133A			12			
3	VALVE MODEL NO.	C1.5G33/1A21705			13			
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)	8935.5		18	AREA	REQUIRED (mm²)	230.30
9		RATED (kg/h)	12610		19		SELECTED (mm²)	325
10	REACTION FORCE (N)		4251		20	NOISE LEVEL (db) @ 30m/@1m		109/139
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	24.52			
22		RATIO OF SPECIFIC HEATS		K	1.27			
23		COMPRESSIBILITY		Z	0.93			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		Wreq.	8935.5			
25		SET PRESSURE (barg)		Pset	62			
26		OVER PRESSURE (barg)		Pover	6.2			
27		CONSTANT BACK PRESSURE (barg)			1			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	1			
31		RELIEVING TEMP. (°C)		T	170			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
34		BACK PRESSURE CORRECTION FACTOR		Kb	1			
35		OUTLET DIAMETER (mm)		D0	76.2			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P1=Pset +Pover +Patm (kPa)			P1			6920	
37	P2=Pback +Patm (kPa)			P2			200	
38	PR=P2/P1			PR			0.03	
CALCULATION GAS CONSTANT								
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C			0.03	
CALCULATED RATED DISCHARGE CAPACITY								
40	$W_s = [A_s \times C \times K_d \times P1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Ws (kg/h)			12610	
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Areq. (mm²)			230.30	
NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db			109	
CALCULATION REACTION FORCE								
43	$A_0 = (\pi \times D_0^2) / 4$			Fr. (N)			4251	
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

								
				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2122B/PSV-2123B			12			
3	VALVE MODEL NO.	C3J42/1A21705			13			
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)	8935.5		18	AREA	REQUIRED (mm²)	646.56
9		RATED (kg/h)	12549		19		SELECTED (mm²)	908
10	REACTION FORCE (N)		3175		20	NOISE LEVEL (db) @ 30m/@1m		109/139
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	24.52			
22		RATIO OF SPECIFIC HEATS		K	1.22			
23		COMPRESSIBILITY		Z	0.97			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		Wreq.	8935.5			
25		SET PRESSURE (barg)		Pset	22			
26		OVER PRESSURE (barg)		Pover	2.2			
27		CONSTANT BACK PRESSURE (barg)			1			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	1			
31		RELIEVING TEMP. (°C)		T	159			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
34		BACK PRESSURE CORRECTION FACTOR		Kb	1			
35		OUTLET DIAMETER (mm)		D0	101.6			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P1=Pset +Pover +Patm (kPa)			P1			2520	
37	P2=Pback +Patm (kPa)			P2			200	
38	PR=P2/P1			PR			0.08	
CALCULATION GAS CONSTANT								
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C			0.03	
CALCULATED RATED DISCHARGE CAPACITY								
40	$W_s = [A_s \times C \times K_d \times P1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Ws (kg/h)			12549	
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Areq. (mm²)			646.56	
NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db			109	
CALCULATION REACTION FORCE								
43	$A_0 = (\pi \times D_0^2) / 4$			Fr. (N)			3175	
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

								
				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID			11	CALCULATION NOTES			
2	TAG No.	PSV-2132B/PSV-2133B		12				
3	VALVE MODEL NO.	C1.5G33/1A21705		13				
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520				15
6	FLUID STATE	GAS		16				
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)	8935.5	18	AREA	REQUIRED (mm²)	230.30	
9		RATED (kg/h)	12610	19		SELECTED (mm²)	325	
10	REACTION FORCE (N)		4251	20	NOISE LEVEL (db) @ 30m/@1m		109/139	
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE	EQUATION VALUE		
21	FLUID DATA	MOLECULAR WEIGHT		M	24.52			
22		RATIO OF SPECIFIC HEATS		K	1.27			
23		COMPRESSIBILITY		Z	0.93			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		Wreq.	8935.5			
25		SET PRESSURE (barg)		Pset	62			
26		OVER PRESSURE (barg)		Pover	6.2			
27		CONSTANT BACK PRESSURE (barg)			1			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	1			
31		RELIEVING TEMP. (°C)		T	170			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
34		BACK PRESSURE CORRECTION FACTOR		Kb	1			
35		OUTLET DIAMETER (mm)		D0	76.2			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P1=Pset +Pover +Patm (kPa)			P1		6920		
37	P2=Pback +Patm (kPa)			P2		200		
38	PR=P2/P1			PR		0.03		
CALCULATION GAS CONSTANT								
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C		0.03		
CALCULATED RATED DISCHARGE CAPACITY								
40	$W_s = [A_s \times C \times K_d \times P1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			W _s (kg/h)		12610		
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			A _{req.} (mm²)		230.30		
NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db		109		
CALCULATION REACTION FORCE								
43	$A_0 = (\pi \times D_0^2) / 4$			F _r (N)		4251		
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2122C/PSV-2123C			12			
3	VALVE MODEL NO.	C3J42/1A21705			13			
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)	8935.5		18	AREA	REQUIRED (mm²)	646.56
9		RATED (kg/h)	12549		19		SELECTED (mm²)	908
10	REACTION FORCE (N)		3175		20	NOISE LEVEL (db) @ 30m/@1m		109/139
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	24.52			
22		RATIO OF SPECIFIC HEATS		K	1.22			
23		COMPRESSIBILITY		Z	0.97			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		Wreq.	8935.5			
25		SET PRESSURE (barg)		Pset	22			
26		OVER PRESSURE (barg)		Pover	2.2			
27		CONSTANT BACK PRESSURE (barg)			1			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	1			
31		RELIEVING TEMP. (°C)		T	159			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
34		BACK PRESSURE CORRECTION FACTOR		Kb	1			
35		OUTLET DIAMETER (mm)		D0	101.6			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P1=Pset +Pover +Patm (kPa)			P1			2520	
37	P2=Pback +Patm (kPa)			P2			200	
38	PR=P2/P1			PR			0.08	
CALCULATION GAS CONSTANT								
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C			0.03	
CALCULATED RATED DISCHARGE CAPACITY								
40	$W_s = [A_s \times C \times K_d \times P1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Ws (kg/h)			12549	
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Areq. (mm²)			646.56	
NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db			109	
CALCULATION REACTION FORCE								
43	$A_0 = (\pi \times D_0^2) / 4$			Fr. (N)			3175	
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

								
				Savasoft V1.0 β - KIASA Safety Valve Sizing Software				
1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	PSV-2132C/PSV-2133C			12			
3	VALVE MODEL NO.	C1.5G33/1A21705			13			
4	SIZING DATA			14				
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	GAS			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)	8935.5		18	AREA	REQUIRED (mm²)	230.30
9		RATED (kg/h)	12610		19		SELECTED (mm²)	325
10	REACTION FORCE (N)		4251		20	NOISE LEVEL (db) @ 30m/@1m		109/139
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	MOLECULAR WEIGHT		M	24.52			
22		RATIO OF SPECIFIC HEATS		K	1.27			
23		COMPRESSIBILITY		Z	0.93			
24	SIZING DATA	REQUIRED DISCHARGE CAPACITY (kg/h)		Wreq.	8935.5			
25		SET PRESSURE (barg)		Pset	62			
26		OVER PRESSURE (barg)		Pover	6.2			
27		CONSTANT BACK PRESSURE (barg)			1			
28		VARIABLE BACK PRESSURE (barg)			0			
29		BUILT UP BACK PRESSURE (barg)			0			
30		TOTAL BACK PRESSURE (barg)		Pback	1			
31		RELIEVING TEMP. (°C)		T	170			
32		RUPTURE DISC COEFFICIENT		Kc	1			
33		DISCHARGE COEFFICIENT		Kd	0.88			
34		BACK PRESSURE CORRECTION FACTOR		Kb	1			
35		OUTLET DIAMETER (mm)		D0	76.2			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
36	P1=Pset +Pover +Patm (kPa)			P1			6920	
37	P2=Pback +Patm (kPa)			P2			200	
38	PR=P2/P1			PR			0.03	
CALCULATION GAS CONSTANT								
39	$C = 0.03948 \times \left\{ K \times \left[\frac{2}{K+1} \right]^{\frac{K+1}{K-1}} \right\}^{0.5}$			C			0.03	
CALCULATED RATED DISCHARGE CAPACITY								
40	$W_s = [A_s \times C \times K_d \times P1 \times K_b \times K_c] / \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Ws (kg/h)			12610	
CALCULATION REQUIRED ORIFICE AREA								
41	$A_{req} = \frac{W_{req.}}{C \times K_d \times P1 \times K_b \times K_c} \times \sqrt{\frac{(T + 273.15) \times Z}{M}}$			Areq. (mm²)			230.30	
NOISE CALCULATION ACC. TO API RP 521								
42	$L_{30} = L + 10 \log \left[0.5 \times \frac{W_s}{3600} \times \left(91.2 \times \left(\frac{K \times (T + 273.15)}{M} \right)^{0.5} \right)^2 \right]$			db			109	
CALCULATION REACTION FORCE								
43	$A_0 = (\pi \times D_0^2) / 4$			Fr. (N)			4251	
44	$F = 129 \times \left(\frac{W_s}{3600} \right) \times \sqrt{\frac{K \times (T + 273.15)}{(K + 1) \times M}} + \frac{(A_0 \times P_0)}{1000}$							

1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	RV-2200 A-B-C			12			
3	VALVE MODEL NO.	C1E22/1C21705			13			
4	SIZING DATA				14			
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	LIQUID			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)#(L/min)	6775.32#131		18	AREA	REQUIRED (mm ²)	81.26
9		RATED (kg/h)	12840.75		19		SELECTED (mm ²)	154
10					20			
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	VISCOSITY (cP)		μ	19.38			
22		SPECIFIC GRAVITY		SG	0.86			
23	SIZING DATA	REQUIRED DISCHARGE CAPACITY(kg/h)		W _{req.}	6775.32			
24		SET PRESSURE (barg)		P _{set}	7			
25		OVER PRESSURE (barg)		P _{over}	0.7			
26		CONSTANT BACK PRESSURE (barg)			0			
27		VARIABLE BACK PRESSURE(barg)			0			
28		BUILT UP BACK PRESSURE(barg)			0			
29		TOTAL BACK PRESSURE(barg)		P _{back}	0			
30		RELIEVING TEMP. (°C)		T	70			
31		RUPTURE DISC COEFFICIENT		K _c	1			
32		DISCHARGE COEFFICIENT		K _d	0.65			
33		ORIFICE AREA (mm ²)		A	154			
34		VISCOSITY CORRECTION FACTOR INITIAL		K _{v,i}	1			
35		VISCOSITY CORRECTION FACTOR FINAL		K _{v,f}	0.98			
36		BACK PRESSURE CORRECTION FACTOR		K _w	1			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
37	P ₁ =P _{set} +P _{over} +P _{atm} (kPa)			P ₁			870	
38	P ₂ =P _{back} +P _{atm} (kPa)			P ₂			100	
CALCULATION REQUIRED ORIFICE AREA								
39	$Q_i = (W_{req} \times 1000)/(60 \times 998 \times G)$			lit/min			131.57	
40	$A_{req} = \frac{11.78 \times Q_i}{K_d K_w K_c K_{v,f}} \sqrt{\frac{G}{(P_1 - P_2)}}$			mm ²			81.26	
CALCULATION REYNOLDS NUMBER								
40	$Re_i = (Q_i \times 18800 \times G)/(\mu \times \sqrt{A})$			R _i			12295.98	
41	$Re_f = (Q_s \times 18800 \times G)/(\mu \times \sqrt{A})$			R _f			16763.02	
CALCULATED RATED DISCHARGE CAPACITY								
42	$Q_s = \frac{K_d K_w K_c K_{v,f} A_s}{11.78} \sqrt{\frac{(P_1 - P_2)}{G}}$			lit/min			249.35	
43	$W_s = (Q_s \times 60 \times 998 \times G)/(1000)$			kg/h			12840.75	

1	VALVE ID				11	CALCULATION NOTES		
2	TAG No.	RV-2201 A/B/C			12			
3	VALVE MODEL NO.	C1E22/1C21705			13			
4	SIZING DATA				14			
5	DESIGN CODE	ASME SECTION VIII	SIZING STD.	API 520	15			
6	FLUID STATE	LIQUID			16			
7	CALCULATION SUMMARY							
8	DISCHARGE CAPACITY	REQUIRED (kg/h)#(L/min)	6775.32#131		18	AREA	REQUIRED (mm ²)	81.26
9		RATED (kg/h)	12840.75		19		SELECTED (mm ²)	154
10					20			
VARIABLE TYPE		VARIABLE NAME		SYMBOL	INPUT VALUE		EQUATION VALUE	
21	FLUID DATA	VISCOSITY (cP)		μ	19.38			
22		SPECIFIC GRAVITY		SG	0.86			
23	SIZING DATA	REQUIRED DISCHARGE CAPACITY(kg/h)		W _{req.}	6775.32			
24		SET PRESSURE (barg)		P _{set}	7			
25		OVER PRESSURE (barg)		P _{over}	0.7			
26		CONSTANT BACK PRESSURE (barg)			0			
27		VARIABLE BACK PRESSURE(barg)			0			
28		BUILT UP BACK PRESSURE(barg)			0			
29		TOTAL BACK PRESSURE(barg)		P _{back}	0			
30		RELIEVING TEMP. (°C)		T	70			
31		RUPTURE DISC COEFFICIENT		K _c	1			
32		DISCHARGE COEFFICIENT		K _d	0.65			
33		ORIFICE AREA (mm ²)		A	154			
34		VISCOSITY CORRECTION FACTOR INITIAL		K _{v,i}	1			
35		VISCOSITY CORRECTION FACTOR FINAL		K _{v,f}	0.98			
36		BACK PRESSURE CORRECTION FACTOR		K _w	1			
CALCULATION UPSTREAM RELIEVING PRESSURE, BACK PRESSURE								
37	P ₁ =P _{set} +P _{over} +P _{atm} (kPa)			P ₁			870	
38	P ₂ =P _{back} +P _{atm} (kPa)			P ₂			100	
CALCULATION REQUIRED ORIFICE AREA								
39	$Q_i = (W_{req} \times 1000)/(60 \times 998 \times G)$			lit/min			131.57	
40	$A_{req} = \frac{11.78 \times Q_i}{K_d K_w K_c K_{v,f}} \sqrt{\frac{G}{(P_1 - P_2)}}$			mm ²			81.26	
CALCULATION REYNOLDS NUMBER								
40	$Re_i = (Q_i \times 18800 \times G)/(\mu \times \sqrt{A})$			R _i			12295.98	
41	$Re_f = (Q_s \times 18800 \times G)/(\mu \times \sqrt{A})$			R _f			16763.02	
CALCULATED RATED DISCHARGE CAPACITY								
42	$Q_s = \frac{K_d K_w K_c K_{v,f} A_s}{11.78} \sqrt{\frac{(P_1 - P_2)}{G}}$			lit/min			249.35	
43	$W_s = (Q_s \times 60 \times 998 \times G)/(1000)$			kg/h			12840.75	