

Customer Name Colin Gunning
 Company Gunning Services
 Location
 Quote # 9024330
 Reference
 Valve PSV/Tag Number

Quote Revision
 Rev.: _____
 Quote Contact _____



Meggan.Tuck

ENG-1047000
 5.08
 21-Nov-2024

Please reference Quote Number on all corresponding Purchase Orders.
 Quote is only valid for 30 days from the sized on date.

SIZED ON
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MERCER VALVE CO., INC.[®]
 "AUTO SEAT TECHNOLOGY"[®]

Fluid Data	GAS/VAPOR	REQUIRED CAPACITY	Air	140 scfm
	MOLECULAR WEIGHT	SPECIFIC GRAVITY	28.97	1
	GAS COEFFICIENT	k-RATIO OF SPECIFIC HEATS	356.1	1.4
	COMPRESSIBILITY FACTOR		1.000	
	REQUIRED AREA	FLOW COEFFICIENT	0.0401 in ²	0.818
	LIQUID 1	REQUIRED CAPACITY		
	SPECIFIC GRAVITY	DENSITY		
	VISCOSITY	VISCOSITY CORRECTION FACTOR		
	REQUIRED AREA	FLOW COEFFICIENT		
	LIQUID 2	REQUIRED CAPACITY		
	SPECIFIC GRAVITY	DENSITY		
	VISCOSITY	VISCOSITY CORRECTION FACTOR		
REQUIRED AREA	FLOW COEFFICIENT			
Process Conditions	SUPERIMPOSED CONST BP	SUPERIMPOSED VARIABLE BP	0 psig	0 psig
	BUILT-UP BP	TOTAL BACK PRESSURE	0 psig	0 psig
	OPERATING TEMP	RELIEVING TEMPERATURE	70 °F	70 °F
	OPERATING PRESSURE	ATMOSPHERIC PRESSURE		14.696 psia
	SET PRESSURE	CDTP	200 psig	
	OVER PRESSURE	INLET PRESSURE LOSSES	20 psig / 10 %	0 psig / 0 %
		FLOWING PRESSURE		234.696 psia
	DISCHARGE COEFFICIENT AND AREAS	VALVE CERTIFICATION / DESIGN CODE	ASME Certified	ASME BPVC, SECTION XIII UV STAMPED
	SYSTEM TYPE		Set on Air	Blocked Flow
Sizing Results	TOTAL REQUIRED AREA	Rupture Disk Correction	0.0401 in ²	1.0
	SELECTED ORIFICE AREA	SELECTED ORIFICE	0.062 in ²	C ORIFICE
	MAXIMUM CAPACITY OF GAS AT OVER PRESS.			216.3 scfm
	MAXIMUM CAPACITY OF LIQUID 1 AT OVER PRESS.			
	MAXIMUM CAPACITY OF LIQUID 2 AT OVER PRESS.			
	TAG CAPACITY			218 SCFM AIR
	DECIBEL LEVEL	SINGLE OUTLET REACTION FORCE	95.06 dB @ 100 ft	8.84 lbf
Materials	INLET BASE / BODY MATERIAL		(R) - Stainless Steel / LCC Carbon Steel	
	SEAT	O-RINGS	(T) - 15% GLASS FILLED PTFE	(5) - BUNA N (LOW TEMP) 75 DURO
	SOUR SERVICE	TRIM MATERIALS	NO	(U) - 316 SS DISK & NOZZLE
	ADJ SCREW	ADJ BUSHING	STNLS STL	STNLS STL
	SPRING	DISK	17-7 PH STNLS STL	316 STNLS STL
	NOZZLE MATERIAL	NOZZLE TYPE	316 STNLS STL	SEMI NOZZLE
	CAP TYPE	INLET PIPE TAP	(2) - OPEN LIFT LEVER	NO
Valve Information	VALVE SERIES		9100 SERIES CONVENTIONAL SPRING OPERATED VALVE	
	FLANGED OR THREADED		Threaded	
	VALVE P/N:	REPAIR KIT P/N:	91-06CR2T06U5	1C2T5U1
	TEST GAG		NO	
	INLET AND OUTLET		(06) - ½" MNPT x 1" FNPT	
	CENTER TO FACE DIMENSIONS		A = 3.202 ± 0.062 in. (81.3 ± 1.6 mm.)	B = 1.906 ± 0.062 in. (48.4 ± 1.6 mm.)
	VALVE TEMP RANGE	VALVE PRESS RANGE	-50°F to 225°F (-46°C to 107°C)	
		125psig to 230psig (861.8kPag to 1585.8kPag)		
Pricing Information	Quantity	Lead Time (ARO)	1	
	Price Per Valve (US\$)	Total Valve Price (US\$)		
Comments				

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Fluid Properties	Variable Name	Symbol	Input Value	Equation Value
Gas	Molecular Weight	M	28.97	28.97
	Ratio of Specific Heats	k	1.4	1.4
	Compressibility	Z	1	1
Process Conditions	Gas Required Flow	V	140 scfm	140 scfm
	Set Pressure	Pset	200 psig	200 psig
	Over Pressure	Pover	10 %	20 psig
	Inlet Line Loss	Ploss	0 %	0 psig
	Variable Superimposed Back Pressure	Pvs	0 psig	0 psig
	Constant Superimposed Back Pressure	Pcs	0 psig	0 psig
	Built-up Back Pressure	Pbu	0 psig	0 psig
	Atmospheric Pressure	Patm	14.696 psia	14.696 psia
	Relieving Temperature	T1	70 °F	529.67 °R
	Rupture Disk Correction	Kc	1	1
Noise Level Distance	d	100 ft	100 ft	
Valve Data	Gas Discharge Coefficient	KdGAS		0.818
	Outlet Diameter	Do		0.957 in
	Actual Valve Orifice Area	ATAG		0.062 in ²
	ASME Certified Flow Coefficient KdTag			0.818

Calculations	Symbol	Equation	Equation Result
Flowing Pressure	P1	$P1 = Pset + Pover - Ploss + Patm$	234.7 psia
Total Back Pressure	P2	$P2 = Pvs + Pcs + Pbu + Patm$	14.696 psia
Pressure Ratio	PR	$PR = P1 / P2$	16
Critical Flow Nozzle Pressure	Pcf	$Pcf = P1 * [2 / (k + 1)] ^ { k / (k - 1) }$	123.986 psia
Sonic Flow Verification		$Pcf < Pback ==> SONIC FLOW$	
Gas Constant	C	$C = 520 * \{ k * [2 / (k + 1)] ^ { (k + 1) / (k - 1) } \} ^ { 0.5 }$	356.1
Gas Required Area	AGAS	$AGAS = V * (T1 * Z * M) ^ { 0.5 } / (6.32 * C * KdGAS * P1 * Kc)$	0.0401 in ²

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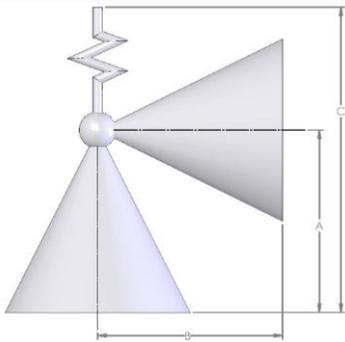
Calculations	Symbol	Equation	Equation Result
Total Required Area	A	A = AGAS	0.0401 in ²
Selected Orifice		C ORIFICE	0.062 in²
Tag Flowing Pressure	P1TAG	P1TAG = Pset + 10% OverPress + Patm Std	234.7 psia
Tag Capacity	VTAG	VTAG = 18.331 * A * P1TAG * KdTAG	218 SCFM AIR
Maximum Gas Flow Rate	Vmax	Vmax = 6.32 * C * KdGAS * P1 * Kc * A / (T1 * Z * M) ^ 0.5	216.25 scfm
Mass Flow	W	W = Vmax * M / 6.32	991.26 lb/hr

Noise Level Calculations

SoundPressureLevel	L	Calculated from Figure 18 in API 521	57.7 dB
Noise Level at 100 ft (30 m)	L100	L100 = L + 10 * log (0.214967 * W * k * T1 / M)	95.06 dB
Noise Level at distance d	Ld	Ld = L100 - 20 * log (d / 100)	95.06 dB

Reaction Forces

Outlet Static Pressure	Po	Po = Max Allowable Over Pressure	14.696 psia
Outlet Area	Ao	Ao = (π * Do ^ 2) / 4	0.719 in ²
Gas Reaction Force for Open Discharge	FrGas	FrGas = W / 366 * { (k * T1) / [(k + 1) * M] } ^ 0.5 + [(Po - Patm) * Ao]	8.84 lbf



Picture may not be representative of actual valve

A = 3.202 ± 0.062 in. (81.3 ± 1.6 mm.)

B = 1.906 ± 0.062 in. (48.4 ± 1.6 mm.)