 TORUS	[REDACTED] · Owner VS-101 VENT STACK DATASHEET	Document No.	[REDACTED] MEC-DS-005		
		Revision / Date	A · September 29, 2026		
		Issue purpose	Issued for Review		
MECHANICAL · VS-101 VENT STACK DATASHEET					
Rev.	Date	Revision description	Prepared	Reviewed	Approved
A	2026-09-29	Issued for Review			

GENERAL

The general data for VS-101 are given in Table 1. The 25 ft height is adequate only because the station is blown down one section at a time, which the operating procedures shall require; simultaneous blowdown of all sections would need a stack of about 43 ft.

Table 1: General Data

Field	Value	Field	Value
Tag	VS-101	Quantity	One
Service	Open vertical discharge of all relief, blowdown and maintenance vents through header 8"-V-1070-S1	Type	Self-supported NPS 8 stainless steel stack with helical strakes
P&ID	 PRO-DWG-109	Plot location	Station grid (40, 160)
Height basis	 PRO-CAL-007 dispersion and radiation, one section blown down at a time	Codes	ASME B31.8 (pressure), ASCE 7-22 (wind), AISC 360-22 (stack as a member)

SERVICE AND DESIGN CONDITIONS

The service and design conditions are given in Table 2.

Table 2: Service and Design Conditions

Field	Value	Field	Value
Design pressure	275 psig at 100 °F (header backpressure basis)	Design temperature	-150 °F to 150 °F
Low temperature reason	Joule-Thomson cooling of gas across the restriction orifices	Height above grade	25 ft
Inlets to header	All vent branches, including 2 in line 1077 from PSV-161	Wind	ASCE 7-22, 108 mph, Exposure C, Risk Category II (HOLD H-06)

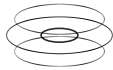
MATERIALS

The materials are listed in Table 3. Stainless steel was selected over impact-tested carbon steel because the discharge can reach -150 °F, below the useful range of carbon steel.

Table 3: Materials

Component	Material	Note
Stack pipe	ASTM A312 TP304/304L dual-certified SMLS, NPS 8 Sch 40S	Piping class S1
Flanges / fittings	A182 F304/304L / A403 WP304/304L	Class 150 RF
Bolting	A193 B8M Class 2 / A194 8M	S1
Strakes	304L plate, three-start	Top 8 ft
Base plate and gussets	SA-36	Isolated from the stainless by an insulating kit
Anchor bolts	F1554 Grade 36, 3/4 in	Four on a 15 in bolt circle



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DIMENSIONS AND ELEVATIONS

Dimensions are given in Table 4.

Table 4: Dimensions and Elevations

Field	Value	Field	Value
Pipe	OD 8.625 in x 0.322 in wall	Grade at base	EL 1152.25 ft
Tip	EL 1177.25 ft, plain open end cut square, no cap	Header inlet N1 centerline	EL 1154.10 ft
Base plate	3/4 in x 20 in square, four gussets, non-shrink grout	Foundation	Drilled pier by civil

NOZZLES

The nozzle schedule is given in Table 5.

Table 5: Nozzle Schedule

Mark	Size	Rating / face	Service	Location	Connects to
N1	8 in	Cl 150 RF	Vent header inlet	Side, near base	8"-V-1070-S1 (slope 1:200 to stack)
N2	2 in	Cl 150 RF	Base drain	Base	HV-180A ball valve with plug
N3	1 in	Cl 150 RF	Nitrogen purge / snuffing	Base	HV-180B, plugged

INTERNALS AND ACCESSORIES

Accessories are listed in Table 6. The base drain is not piped to T-101 because the tank roof inlet is above the stack base and the drain cannot flow by gravity.

Table 6: Accessories

Field	Value
Base drain	HV-180A, 2 in Class 150 S1 ball valve with plug; a portable collection pan at the base is emptied by vacuum truck
Strakes	Three-start helical, pitch 5D, height 0.1D, top 8 ft
Lightning protection	Air terminal and down conductor per NFPA 780

INSPECTION AND TESTING

Inspection and testing are given in Table 7.

Table 7: Inspection and Testing

Field	Value
Pressure test	Hydrotest with the vent header, 415 to 420 psig at the high point, 425 psig maximum (MEC-CAL-003)
Test water	Chloride 50 ppm maximum; drained and dried within 24 h
Welds	100 % RT of butt welds; PT of strake and attachment welds

PAINTING AND INSULATION

Painting is given in Table 8.



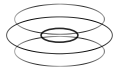
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Table 8: Painting

Field	Value
Stainless	Not painted
Base plate and gussets	Per  SPC-SPC-010
Insulation	None

WEIGHTS

Weights and foundation loads are given in Table 9.

Table 9: Weights

Condition	Weight (lb)	Basis
Empty / operating	1,300	Pipe, base plate, strakes and fittings
Test, stack full of water	1,800	With the header test
Foundation shear (ASD)	300	0.6 W plus tip thrust
Foundation moment (ASD, ft-lb)	5,440	0.6 W plus tip thrust

DESIGN CALCULATIONS SUMMARY

Table 10 summarizes the stack checks, using the dual-certified 304/304L minimum yield of 30,000 psi. The straked top 8 ft is taken with a drag coefficient of 1.2 on a projected width of 1.2 D, because strakes raise the drag while suppressing vortex response. Lock-in occurs at a common wind speed and the Scruton number is marginal, which is why the strakes are specified.

Table 10: Design Calculations Summary

Check	Basis	Limit	Result
Wall at 275 psig	$t = PD/(2SF)$, SMYS 30,000 psi, F = 0.5	0.079 in	0.322 in
Wind force	ASCE 7-22, $K_e = 0.956$, $\alpha = 9.8$, $z_g = 2,460$ ft, C_f 0.7 / 1.2 straked	None	340 lb, base moment 5,090 ft-lb
Tip thrust	PSV-101 rated flow, open discharge	None	95 lb
Bending	AISC 360-22 F8, compact round, $\Omega = 1.67$, $F_y = 30,000$ psi	Ratio 1.0	Ratio 0.16
Natural frequency	Cantilever, $E = 28,300$ ksi	None	3.55 Hz
Vortex shedding	Strouhal 0.2; Scruton number at 0.2 % damping	Sc above about 15	Lock-in at 9 mph; Sc 18
Anchor bolt tension	4 M / (n BC) -0.6 W / n	9,610 lb	4,160 lb

NOTES AND HOLDS

- Final height and diameter follow  PRO-CAL-007; site wind data are HOLD H-06.
- Blowdown tip thrust through RO-181, RO-182 and RO-183 is below the PSV-101 case, TBV by process.

VENDOR DATA REQUIRED

Fabrication drawing with strake details, weld procedures for 304L, test records, weight.

