API 618 GI&E Vertical RC meets API 692 requirements

Regarding Seal Gas Booster

Part 1: General Requirements

6.6 Gas Velocities

6.6.1 The dry gas seal support system shall be designed to provide no less than the minimum gas velocities listed in Table 1 for all labyrinths and clearance seals at 2 times maximum design clearance and expected eccentricity.

Table 1—Minimum Gas Velocities

	≤Slow Roll	>Slow Roll
Process side seal	3 m/s (10 ft/s)	5 m/s (16 ft/s)
Intermediate labyrinth	3 m/s (10 ft/s)	3 m/s (10 ft/s)
Separation seal	5 m/s (16 ft/s)	5 m/s (16 ft/s)
NOTE During static conditions with external seal gas or buffer gas and a fixed or blocked in compressor volume, the compressor pressure can rise reducing the labyrinth velocity.		

6.6.1.1 The vendor shall supply supporting calculations for gas velocity compliance. The calculation shall define the total inlet flow and define any expected leakage across seal faces, continuous drain holes, or other leakage sources.

6.6.2 Seal gas for a single or tandem seal shall be supplied at or above the specified minimum velocity limits whenever the compressor is pressurized.

6.6.3 Buffer gas shall be supplied at or above the specified minimum velocity limits whenever the compressor is pressurized.

- **AVTN/BVTN booster series with different cylinder configuration can provide Seal Gas flow more than 30 m3/h and differential pressure even more than 10 bar with max sealing pressure of 300 bar covering the requirement of wide range of compressors and applications.**

Part 3: Dry Gas Seals Support Systems

6.1.17 Threaded connections shall be approved by the purchaser. If approved, threaded connections shall comply with the requirements listed in 9.2.

NOTE 1 Small component size can dictate the use of threaded connections.

NOTE 2 Compression fittings are not threaded connections.

- **AVTN/BVTN series booster has flanged connections according to Project rating.**

6.3.2 Module A—Alternate Seal Gas Supply

If specified, alternate seal gas supply shall be provided the requirements listed in 6.14.

NOTE Refer to 6.15.4 for use of boosters as a potential consideration rather than alternate seal gas.

- **AVTN/BVTN series booster can be an alternate Seal Gas supply taking gas from different source and with twin configuration can have time between maintenance of 16000 hours. With different cylinders configuration can provide Seal Gas flow even more than 30 m3/h with max sealing pressure of 300 bar. It may be used also as startup booster for low-pressure compressor.**

6.15.4 Module B3—Booster

6.15.4.1 Booster(s) shall be provided as shown in Annex B (Module B3) and comply with the requirements listed in 7.4.

- **Confirmed**

NOTE The requirement for a booster could be eliminated if the normal seal gas or alternate seal gas conditions are sufficient to maintain the minimum velocity, listed in Part 1, Table 1, across the process side seal during all normal and alternate operating conditions.

6.15.4.2 A check valve shall be provided in the main seal gas line to ensure no back flow in the system as shown in Annex B (Module B3).

7.4 Booster

7.4.1 If specified, duplex boosters shall be provided. Each booster shall provide the required capacity.

- **Confirmed**

7.4.2 Control of the booster(s) shall be in accordance with the seal gas control method (i.e. flow control or differential pressure control).

- **The capacity of AVTN/BVTN series booster allow any type of control.**

7.4.2.1 Boosters shall automatically start as needed.

- **Confirmed**

7.4.2.2 Controls shall stop the booster manually or automatically as agreed.

- **Confirmed**

NOTE Booster will operate when process compressor is idle and pressurized, as well as when there is insufficient differential pressure provided by the main process compressor.

- **Confirmed**

7.4.3 The vendor shall specify condition requirements for the booster gas supply.

- **Confirmed**

NOTE To meet the gas condition requirements for reliable operation, a pre-filter could be required.

- **Confirmed**

7.4.4 Remote indication shall be provided to indicate booster operating status.

- **Confirmed**

7.4.5 An alarm shall be provided to indicate when the booster fails to start or operate as needed.

- **Confirmed**

7.4.6 Positive displacement booster shall be equipped with a cycle counter.

- **Considering AVTN/BVTN booster performance, Seal Gas System sensors can monitor the correct booster functioning. Under Customer specific requirement, a speed probe can be installed.**

NOTE Boosters have typically been life-limited components and can require replacement based on number of cycles.

- **Time between maintenance is typically 8000 hours.**

7.4.7 The booster shall be sized to provide the seal gas normal flow. The vendor shall supply the basis for these requirements for the range of all specified utility conditions.

- **Confirmed**

NOTE Sizing criteria does not account for wear in the booster.

7.4.8 The purchaser shall approve the use of multiple boosters in parallel operation to meet the seal gas normal flow requirements.

- **Not required, AVTN/BVTN series booster can provide enough capacity for any type of application.**

NOTE During pressurization or static conditions, a single positive displacement booster capacity could be insufficient to maintain the minimum velocity required.

- **AVTN/BVTN series booster can provide enough capacity for any type of application.**

7.4.9 The vendor shall provide the maximum pressure the booster can develop blocked in. For gas-driven boosters, maximum pressure developed shall be based on the range of motive gas conditions.

- **Confirmed, Booster should have block valves locked open, Otherwise a PSV may be needed.**

7.4.10 For rod and shaft seals, leakage shall be monitored to identify damaged or worn seals and vented to a safe location.

- **Confirmed**

7.4.11 Booster(s) shall be mounted to allow free draining of both supply and discharge lines away from the booster to prevent liquid collection.

- **Confirmed, anyway AVTN/BVTN series is an Oil Free compressor.**

7.4.12 Provisions shall be provided to allow removal of the booster(s) during operation from the seal gas conditioning system.

- **Confirmed**

7.4.13 Booster shall be 316/316L stainless steel. The purchaser shall approve the selection of nonmetallic sealing materials.

- **In order to reduce friction between piston rings and cylinder, coated carbon steel cylinder is used. Booster should be installed upstream Dry Gas Seal Filters or provide downstream additional filter.**

7.4.14 If specified, alternate booster materials shall be provided.

- **Confirmed**

7.4.15 All connections in seal gas service shall be flanged. If approved by the purchaser, threaded connections may be used in the motive gas service.

- **Confirmed**

7.4.16 Boosters shall be rigidly mounted to panel or skid.

- **Confirmed**

7.4.17 If specified, pulsation dampeners shall be provided to reduce pressure pulsations during booster operation.

- **Confirmed**

7.4.18 Booster shall have provisions for testing while the main process compressor is in service, as well as when idle and depressurized.

- **Confirmed**

7.4.19 The vendor shall specify**,** the motive gas quality and utility requirements for gas-driven booster(s). This should include but not be limited to dew point requirements or limitations, particle content, volume, minimum and maximum pressure, and temperature limits.

- **Booster is electric motor driven.**

7.4.19.1 The purchaser and vendor shall agree on motive gas filter requirements and selection.

- **Not required**

7.4.19.2 For gas-driven boosters, design shall prevent motive gas from contacting process gas due to seal leakage.

- **Not required**

7.4.19.3 Motive gas solenoid or actuated valve(s) shall fail open.

- **Confirmed**

7.4.19.4 If specified, motive gas exhaust shall be vented to a safe location.

- **Not required**

7.7.1 Transfer valves shall be provided for all duplex components. All transfer valves should be identical throughout the system. Alternate valving arrangements may be provided for coolers, separators, and boosters if approved by the purchaser.

- **Confirmed**

Table 9—Recommended Alarms for Gas Conditioning Unit

Parameter	L	LL	H	HH	Recommended Value
Separator level			X	X	80 % design level (H) 100 % design level (HH)
Booster pressure or flow	X				Value to be agreed.
Booster cycles			X		Booster vendor to provide recommended value.
Motive gas pressure	X				Based on minimum outlet pressure requirements.
Heater element temperature				X	Heater vendor to provide recommended value.

- **Confirmed**

13 Dry Gas Seal Support System Inspection and testing

13.3.3.12 Pressure boosters shall be run to demonstrate operability.

- **Confirmed**

13.3.3.12.1 Booster(s) shall operate in a smooth manner within the manufacturer's limits.

- **Confirmed**

13.3.3.12.2 Vibration levels shall be within the manufacturer's limits.

- **Confirmed**