



Compressor Specification

Single-Stage, Air-Cooled

Variable-Speed, Oil-Lubricated Rotary Screw

1. Scope

- 1.1. This specification is for a gear driven, oil-lubricated, single-stage, variable speed, air cooled, rotary screw air compressor. The compressor shall be a 110 kW Atlas Copco model GA110VSD+ or pre-approved equivalent.
- 1.2. The compressor shall deliver 55.1 to 321.9 l/s at 8.5 bar in accordance with ISO 1217, Annex E. L/s is FAD litres per second at inlet conditions.
- 1.3. The units shall be manufactured in accordance with this specification. The construction as described in this specification is considered essential and critical to the application. The vendor shall state in his quotation any and all exceptions to the specification.

2. General

- 2.1. The rotary screw air compressor shall be capable of producing and delivering 100% of the required air demand as specified at standard operating conditions.
- 2.2. The compressor shall be designed and supplied as a complete package with all necessary equipment, including but not limited to the following components: inlet filter, air compression element, drive motor, aftercooler with integral moisture separator, oil cooler, cooling fan, variable-frequency drive, microprocessor regulation and control system. All components shall be mounted on a common solid base frame and fully enclosed with a sound attenuating enclosure.
- 2.3. The compressor package shall be rated to operate in ambient conditions from 0°C to 46°C.
- 2.4. The compressor shall be able to operate at any speed in between its minimum and maximum speed.
- 2.5. The compressor must not idle, unload or blow-down the sump when the demand decreases below the minimum flow of the compressor. The compressor shall stop and it shall remain pressurized so that it can immediately come back on-line when required.
- 2.6. The units shall be manufactured by a qualified manufacturer who has been manufacturing air compressors for at least ten (10) years.
- 2.7. The compressor manufacturer shall be certified under ISO 9001 / 9002 quality standards and ISO 14001 environmental standards.
- 2.8. The manufacturer must participate in the Compressed Air & Gas Institute (CAGI) Performance Verification program.
- 2.9. The rotary screw air compressor must be suitable for being installed outdoors under a lean-to and in high dust environments

3. Compressor Enclosure

- 3.1. The compressor shall be enclosed in a steel sound attenuating canopy with removable panels.
- 3.2. The sound attenuating material shall be flame retardant polyurethane foam.

4. Noise Levels

- 4.1. The compressor package shall not exceed 76 dB(A) when measured in the free field conditions at one meter in accordance with the CAGI-Pneurop Test Code.

5. Compressor Element



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- 5.1. The compression profile shall be of the asymmetric profile design with four lobes on the male rotor and six lobes on the female rotor.
- 5.2. The male and female rotors shall have the same diameter.
- 5.3. The element housing shall be of cast iron construction.

6. Drive Motor

- 6.1. The drive motor must be a DC permanent magnet type.
- 6.2. The drive motor must be oil cooled
- 6.3. The drive motor must be inverter duty rated.
- 6.4. The drive motor must be IE4 super premium efficiency
- 6.5. The motor shall conform with NEMA MG 1 for 60Hz applications and IEC 34-1, EN60034-1 for 50 Hz applications.
- 6.6. The inboard motor bearing shall be lubricated by the compressor lubricant and the rear motor bearings shall be greased for the life of the motor.
- 6.7. The complete motor shall be 100% maintenance-free.
- 6.8. Approved manufacturers include:
 - A. Siemens
 - B. WEG
 - C. ABB

7. Drive Arrangement

- 7.1. The drive arrangement shall be a direct-driven design.
- 7.2. The drive system shall be fully enclosed to protect against dirt and dust intrusion.
- 7.3. The drive gear shall be directly mounted on the end of the motor shaft eliminating the need for a coupling.
- 7.4. The driven gear shall be helically cut to exert compensating thrust on the rotors to offset axial loads generated during compression.

8. Cooling System

- 8.1. The compressor package shall be fitted with an aluminum, air-cooled, oil cooler and aftercooler.
- 8.2. The cooling system shall include a axial fan driven by a Totally Enclosed Fan Cooled (TEFC) motor.

9. Integrated Dryer

- 9.1. The compressor shall be fitted with an integrated refrigerated dryer.
- 9.2. The dryer must be integrated inside the compressor canopy and be controlled by the compressor's primary controller.



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- 9.3. The dryer must use R410A refrigerant.
- 9.4. The refrigerant compressor shall be a hermetic piston type design.
- 9.5. The dryer shall include an air-to-air heat exchanger to pre-cool the incoming compressed air and re-heat the exiting compressed air.
- 9.6. The condenser shall have aluminum fins and copper tubes.

10. Moisture Separator

- 10.1. The compressor shall be equipped with a labyrinth style moisture separator integrated in the discharge side of the after-cooler.

11. Electronic Water Drain

- 11.1. The compressor will have a zero loss electronic water drain plumbed to the aftercooler.
- 11.2. These drains shall discharge no compressed air during removal of the condensate.
- 11.3. The zero loss drains shall be monitored by the microprocessor controller.
- 11.4. A manual condensate drain shall also be included.

12. Inlet Air Filter

- 12.1. The filter shall be a paper cartridge type and be factory installed inside the compressor enclosure.
- 12.2. The filter shall have the following SAE fine efficiency ratings:

1 micron:	98.0%
2 microns:	99.5%
3 microns:	99.9%
- 12.3. The filter shall be equipped with a differential pressure indicator for monitoring by the control system.
- 12.4. The service interval of the filter must be at least 4,000 hours.

13. Oil System

- 13.1. The oil system shall include an ASME approved air/oil separator with oil level indicator. The service interval of the separator element must be at least 8,000 hours.
- 13.2. The oil filter shall be a spin-on type with an integrated bypass valve. The oil filter element will have a 12 micron beta 75 rating and the service interval must be at least 8,000 hours.
- 13.3. The oil temperature shall be regulated by means of a thermostatic bypass valve. Oil circulation is achieved through differential pressure.
- 13.4. The oil must be synthetic and rated for a change interval of 8,000 hours.
- 13.5. The oil system must use o-rings to provide a positive seal. No gaskets can be used.

14. Electric Cubicle



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- 14.1. The control cubicle must be designed to NEMA 3R or IP 54 standards.
- 14.2. The cubicle must include a cooling fan and vent to force ambient air through the cubicle.
- 14.3. The variable speed drive of the main motor must be IP 5X or equivalent
- 14.4. The compressor package shall have adequate filtration provisions to comply with or exceed EMC directives 8/C9/EEC and 89/336/EEC.
- 14.5. An RFI filter shall be integrated into the VSD package to significantly reduce harmonic distortion of the VSD
- 14.6. A line reactor shall be integrated into the VSD package to eliminate harmonic distortion of the power supply from the converter. The impedance of the line reactor shall be no more than 3% and no less than 2%
- 14.7. The VSD compressor package shall be immune to damage induced by VSD current pulses for optimum performance and service lifetime.
- 14.8. Motor bearings shall be insulated for protection against EDM craters induced by VSD current pulses, ensuring maximum bearing lifetime.
- 14.9. Motor and compressor couplings shall be isolated from each other with no metal contact between them. A flexible drive coupling with rubber buffers shall be used.
- 14.10. High frequency bonding straps shall be installed between the earth level of the inverter and the motor to eliminate induced currents on the motor frame.
- 14.11. The printed circuit boards of the variable speed drive shall be epoxy coated to prevent damage caused by moisture or aggressive environments

15. Regulating and Control System

- 15.1. The compressor shall have a regulating system which is of the variable-speed design, controlled by an air compressor discharge pressure sensor which senses the pressure variations at the compressor discharge and adjusts the speed of the compressor to maintain a stable discharge pressure.
- 15.2. The full variable-speed regulation shall be combined with start / stop regulation to automatically stop the compressor as required during low demand periods without idling or unloading the compressor.



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- 15.3. The compressor shall be equipped with an onboard microprocessor controller which will control, monitor and protect the operation and condition of the air compressor.
- 15.4. The controller shall have a 3.5" color display.
- 15.5. The controller shall allow programming of two pressure set points.
- 15.6. Time based start / stop and changeover of the pressure set point shall be programmable.
- 15.7. The controller must be capable of automatically restarting the compressor in the event of a voltage failure.
- 15.8. The controller must be capable of graphing any of the measured temperature or pressure inputs on the display. The time frame of the graph shall be adjustable from 4 minutes to 10 days.
- 15.9. The compressor shall be able to be controlled locally, remotely or via a local area network.
- 15.10. The controller must be equipped with auxiliary contacts for external indication of automatic or manual load control, general warning and general shutdown conditions.
- 15.11. The controller must be capable of providing remote monitoring by a PC through the local Ethernet system via an Ethernet port on the controller.
- 15.12. The controller must be capable of providing remote monitoring via a iPhone, iPad, or Android phone or tablet.
- 15.13. The controller shall monitor the hours of operation and output a message on the display to notify the operator to provide preventative maintenance in accordance with the factory approved service plan.
- 15.14. The control system shall have the capability to monitor the following items:
 - Discharge air pressure
 - Element outlet temperature
 - Ambient temperature
 - Compressor status
 - Motor overload status
 - Running hours
 - Loaded hours
 - Regulator hours
- 15.15. Compressor protective functions shall include:
 - Emergency stop
 - Element outlet temperature
 - Service warnings
 - Drive and cooling fan motor overload

16. Shipment and Delivery Preparation

- 16.1. The compressor must be packaged on a wooden skid and fully enclosed with a wooden enclosure.

17. General Installation Requirements

- 17.1. Upon placement on a level surface and connection to essential utilities, the unit shall be provided available for immediate operation.
- 17.2. The compressor must not require bolting to the floor.