

**POLK COUNTY
BOARD OF COUNTY COMMISSIONERS
BARTOW, FLORIDA**

**NOTICE OF INTENT TO SOLE SOURCE
19-712
ABS Turbocompressor HST**

Polk County, a political subdivision of the State of Florida, needs an ABS Turbocompressor HST for the Utilities Division.

It is the intent of Polk County to sole source this purchase to Hydra Service South, Inc.

SUMMARY:

General Description: Furnish (1) Turbocompressor package, accessories, specifications and IOM manuals (or the website link to these manuals). Each blower must be fixed with an outlet flexible joint, back flow barrier, manual isolation valve, blow-off valve, blow off valve silencer, inlet/outlet silencers, motor cooling air outlet silencer, acoustic sound enclosure, VFD, local panel, magnetic bearings and other appurtenances as described in this specification section needed for a complete system. The same supplier needs to be able to furnish the turbocompressor and accessories. The manufacturer needs to be able to include a minimum warranty period of 24 months after shipment.

ITEM AND DESCRIPTION:

System Description: Summary of Specifications

1. Design Requirements:
 - a. Site conditions:
 - i. Elevation: 138 feet (above sea level)
 - ii. Inlet air temperature range: 16 °F to 105 °F
 - iii. Relative humidity range: -50 % to 98 %
 - b. Quantity of turbocompressors: 1
 - c. Air flow rate per turbocompressor: 2800 scfm
 - d. Differential pressure: 9 psi to 13 psi
 - e. Input horsepower per turbocompressor: 200 hp
2. Motor Design Requirements:
 - a. The high-speed permanent magnet type motor shall be as follows:
 - i. Motor horsepower per turbocompressor: 200 hp maximum
 - ii. Volts/Phase/Hertz: 480 volts/3 phase/60 hertz
 - iii. Motor speed: 28,620 rpm
 - iv. Enclosure: IP33D

Manufacturer Testing Requirements:

1. The manufacturer of the turbocompressor package should have the following capability of testing a complete unit at their facility per the requirements below.
 - a. Conduct certified performance testing on the complete turbocompressor package at the manufacturer's facility. The test will be conducted using the actual turbocompressor package being supplied. Testing of cores separately from the package will not be accepted.

Unit Design:

1. The turbocompressor must be of single-stage centrifugal design utilizing oil free, non-contacting magnetic bearing technology with the following design characteristics.
 - a. Turbocompressor will be designed for continuous service capable of providing a minimum of 60 starts per hour
 - b. The unit will not require scheduled lubrication, oil changes, adjustments or maintenance other than changing air filters, VFD fans and back-up batteries for a time period of 20 years after commissioning.
 - c. The rotor will remain levitated at all times while power is being supplied to the turbocompressor. Turbocompressors with rotors that rest on bearings while in the stand by mode with power supplied to the turbocompressor will not be considered as an equal.
 - d. The unit will have a pressure-volume curve which extends from the design system pressure to the upper system surge pressure with a continuously rising pressure characteristic.
 - e. The unit will not surge at or above specified flow rates corresponding to specified differential pressure.
 - f. The maximum input motor horsepower should not exceed specified nameplate horsepower when operating at design flows at 40 degrees C.
 - g. The turbocompressor must deliver oil-free and non-pulsation air at all times to the aeration process.
 - h. The motor and control cabinet components are to be air cooled using ambient air only. Systems that use water cooling are not acceptable or equal.
 - i. Total input power must include all motor, thermal, mechanical and electrical losses of the turbocompressor as well as losses of all auxiliary equipment such as all lubrication systems, cooling systems etc.
 - j. An uninterruptible power supply (UPS) will be included for the magnetic bearing controller sufficiently sized to provide a safe spin down without damaging the high speed unit in the case of a power loss. A monitoring panel will be included indicating the condition of the batteries. The turbocompressor will not be allowed to start if the

UPS batteries are not charged enough to ensure a safe spin down in case of power loss.

2. Minimum flow of each turbocompressor must be no greater than 45% of the maximum flow rate over the entire temperature range.
3. Rotor critical speed must be a minimum of 20% above the operating design speed.
4. Maximum unfiltered peak-to-peak radial or axial displacement of the rotor shaft will not exceed 1.25 mils at all operating speeds when measured at on the motor or the turbocompressor base.
5. Free field (R=infinity) sound pressure level without accessories will not exceed 70 dba at any point 3 feet from the turbocompressor assembly when operating at specified air flow rates and differential pressure.
6. High-Speed Unit: High-speed unit will consist of an integrated turbocompressor – permanent magnet electric motor assembly, with the following components:
 - a. Impeller and Spiral Valute Casing
 - i. The impeller will be shaped from a solid forging on a numerical machining center using CAM technology to ensure consistent efficiency. Semi-open impeller design with 3 dimensional shaped blades optimized for the design range of each turbocompressor. The impeller will be attached directly to the motor shaft using an aircraft technology fastener system without a coupling or keyway. A labyrinth and O-ring seal arrangement on the bottom of the impeller will provide a non-contact seal between the volute and motor. The impeller will be a standard design configuration. Special impellers designed for a specific duty point will not be considered acceptable or equal.
 - ii. The spiral valute casing with horizontal intake and vertical discharge connection will be provided
 - iii. The turbocompressor inlet inducer will be integral to the turbocompressor volute.
 - b. High-Speed Electric Motor
 - i. An air-cooled, VFD compatible, high speed, special duty electric permanent magnet motor specifically designed for high-speed service will be provided.
 - ii. The motor will have Class F winding insulation (with Class H on critical components) with thermal sensors that are tied into the thermal protection surveillance software built into the blower control system.
 - iii. The motor rotor shaft will be supported by magnetic bearings at all times while power is supplied to the turbocompressor providing a smooth vibration free rotation over the entire speed range. Blowers that use bearing systems that contact stationary parts during start up or if power is lost are not an acceptable alternate.
 - iv. The motor will be air cooled by a cooling fan that is

mounted directly to the end of the motor rotor shaft. Units that are cooled by anything other than ambient air will be not be considered as an equal.

- c. The motor and high speed unit will be mounted to a welded steel base/frame separated by rubber mounts. Magnetic Bearing System
 - i. The motor rotor shaft will be continuously levitated in a magnetic field by the digitally controlled magnetic bearing system when power is on. This system will consist of two radial and two axial active magnetic bearings, two rotor position sensors and a magnetic bearing controller (MBC). The position sensors will continuously measure the shaft position and send a signal to the MBC controlling the energy in the active magnetic bearings keeping the motor rotor shaft levitated and centered. There will be no mechanical contact at any time between any moving and stationary surfaces during the turbocompressor operation eliminating friction and wearing of all moving parts. The magnetic bearing system will not require any oil lubrication.
 - ii. The magnetic bearing controller will be an MBC-12 having a maximum input power of 1.3 hp (1 kW).

7. Variable Frequency Drive

- a. A variable frequency drive will be installed in the control cabinet to vary the speed of the turbocompressor providing optimal turbocompressor efficiency at all plant operational demands. The VFD along with the internal controllers software will automatically control the turbocompressor performance based a 4-20mA signal from either an air header pressure transducer, D.O. probes or if in local mode, directly from the local control panel (keypad on the turbocompressor door).
- b. The VFD will be a VACON NXP High Performance model; 6 pulse variable speed drive adequately sized for the turbocompressor motor and mounted inside the integral control cabinet.

8. Local Control Panel: A Local Control Panel is mounted on the turbocompressor front panel and consists of a touchpad with display that must perform the following functions:

- a. Display the Turbocompressor Operating Parameters: The turbocompressor functions will be monitored continuously during operation and communicated to the LCP where the following values are displayed below: actual flow volume, output pressure, inlet pressure, operating time in hours, operating time in days, MWh counter, differential pressure at motor cooling air filter, reference flow volume, turbocompressor type, program version, motor supply frequency, current, inverter temperature, motor temperature and inlet temperature.
- b. Fault and Alarm: The turbocompressor system is continuously monitored to assure the turbocompressor and its control systems are

functioning correctly. If the monitoring system detects something that is not functioning properly either an alarm or a fault message appears in the control panel display. If the fault is not critical to the safe operation of the turbocompressor an alarm message will be displayed and the turbocompressor will continue to operate. If the fault is critical to the safe operation of the turbocompressor a fault message will be displayed and the turbocompressor will be automatically taken out of service until the reason for the fault is acknowledged and/or corrected.

- c. The detection system must automatically monitor the following conditions:
 - i. Power Supply Status:
 - Over voltage in main power supply
 - Under voltage in main power supply
 - One phase missing
 - Over/under voltage in auxiliary power supply
 - ii. Process Air Inlet and Outlet:
 - Blockage in the inlet or outlet air piping
 - Overpressure
 - Inlet air temperature too high (surge)
 - iii. Cooling Air Inlet and Outlet:
 - Blockage in the inlet or outlet air piping
 - Cooling air over temperature via motor/VFD over temperature monitoring.
 - Motor temperature
 - VFD temperature
 - Magnetic bearing controller temperature

Accessories:

1. The turbocompressor package should include the following accessories:
 - a. Pneumatically controlled plug type blow off valve integral to the turbocompressor needs to be included to protect the unit during start up and shut down conditions
 - b. An outlet expansion joint will be included and installed as close as possible to the turbocompressor outlet flange
 - c. An internal inlet air filtration system integral to the turbocompressor enclosure will be provided for each turbocompressor adequately sized for the airflow rate of each turbocompressor.
 - d. An inlet silencer will be provided for each turbocompressor and be internal to the blower enclosure
 - e. A flanged outlet silencer will be provided for the turbocompressor inside the blower enclosure.
 - f. A wafer type non-slam single flapper check valve with a cast CF8M body, cast CF8M clam type plate, CF8M hinge pin, metal to metal sealing surface, minimum temperature rating of 302 °F and maximum pressure loss of 0.077 psi will be included. Dual flap check valves will not be

considered equal

- g. A flanged, manual, short body, geared, lug type butterfly shut off valve will be provided for each turbocompressor to isolate the turbocompressor from the process. The manual butterfly shut off valves will have a cast iron body, a 316 SS disc, 420SS pivot shaft and an EPDM seal, a minimum 248 °F temperature rating and a maximum 0.006 psi pressure loss.
- h. Pressure sensors will be installed on the inlet and outlet piping of each turbocompressor
- i. Temperature sensors will be included for the inlet piping, outlet piping and motor
- j. A mass flow meter internal to each blower will be included.

Inspection:

1. Manufacturer's Field Service:

- a. A factory authorized representative should be able to check out and inspect the turbocompressor and installed accessories before the initial start-up and certify that the system has been correctly installed and prepared for start-up. Factory representative should insure proper operation of turbocompressor protection devices including vibration, temperature, and current alarms as well as interlocks with pre-surge.
- b. The factory authorized representative should be able to provide training for owner's personnel in the operation and maintenance of the turbocompressor system.

Should any firm wish to provide information to Polk County, that they are able to provide an equal product, they can email specifications to support their position to Ari Goldstein, Procurement Analyst at arigoldstein@polk-county.net.

All specification submittals must be received by Tuesday, September 24, 2019, prior to 2:00 p.m., no exceptions.

Questions regarding this intent to sole source must be in writing and sent to Ari Goldstein, Procurement Analyst, email: arigoldstein@polk-county.net or fax to (863) 534-6789. All questions must be received by Monday, September 16, 2019, prior to 4:00 p.m.