SPG 1870

AIR COMPRESSORS FOR SIGNALLING SYSTEMS

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1 Introduction

RailCorp has extensive installations of pneumatically operated signalling equipment. Air operated equipment include Train Stops and Points.

Air is supplied from purpose built compressor houses, each having typically two compressors. The air is reticulated, and adjacent systems may be connected so that one can provide a backup to the other.

The RailCorp Signal Design Principles ESG 100.24 provides the design parameters.

SPG 0714 Compressed Air Systems provides the design, fabrication, installation, testing and commissioning requirements. SPG 0705 Construction of Cable Routes and Signalling Civil Works provides the construction requirements.

This specification is for a compressor for use in these systems.

2 Requirements

2.1 General

- Compressors shall be powered from a 3-phase 415V AC supply at 50Hz and rated to operate 24 hrs/7 days per week.
- Compressors’ maximum working pressure shall be at least 1000kPa (gauge).
- The compressor free air delivery capacity shall be adequate to meet the requirements of the particular application.
- The minimum free air delivery rate of each compressor shall be 10L/s (of free air).
- Compressors usually run at a low duty cycle. Irrespective of the time of operation compressors shall be reliable and operate efficiently in damp environments. In particular, oil within the compressor shall not be contaminated with water condensation. Alternatively, oil-less compressors may be proposed.
- Compressors shall be a standard stock item with a minimum of 10 years spares commitment by the supplier.
- All systems shall incorporate an air reservoir. For smaller installations the air reservoir shall be part of the compressor package.
- Compressors shall be reliable and require minimal maintenance.
- Unless oil-less compressors are proposed, compressors shall have an oil/water separator to ensure only clean air is delivered. Output air quality shall be in accordance with ISO 8573 Class 2.4.2.
- A safety valve shall be provided on pressure containment parts of this system.
- Each compressor shall be integrated or packaged with a dryer for the delivery of dry air.
- The compressor shall be provided with automatic and manual drains, preferably integrated within the dryer. If an air receiver is provided, it shall be provided with an automatic and/or manual drain. The air receiver is to receive only dry air and is not to be used to collect condensate from the drying process.
- Compressor air intake shall be fitted with an inlet filter and silencer.
- Compressors shall be reliable at extremely low duty cycles. Preference shall be given to compressors that can efficiently operate at a range of duty cycles and/or efficiently deliver a range of flow rates. Irrespective of the operating cycle, compressors must not be damaged by condensate from the inlet air within the specified temperature and humidity range. Any oil or grease within the compressor shall not be contaminated or degraded by such condensation. Any condensate shall be removed through auto drains where the filter collects moisture.
2.2 **Compressor Control**

- Compressors shall have a control panel containing the following:
  - An emergency stop button
  - A manually lockable isolation switch
  - Manual changeover control
  - Indication lights for faults and status lights
  - Stop and start push buttons.
  - An interface for viewing and modifying user configurable parameters.
  - Logging facilities.
  - Hours Run, Temperature, Pressure, Motor Thermal Overload, etc readouts.

- Compressors shall be operated in a Lead Lag arrangement controlled by an external controller to ensure even duty cycle, assuming that both compressors are the same size/capacity. This controller shall not be part of the compressor package however, should the external controller fail, the compressor shall continue to operate automatically based on its own integrated pressure transducers and control system.

- Compressor control equipment shall incorporate:
  - Phase failure relays.
  - Overheating protection.
  - Pressure transducers to switch compressors on and off.

Sufficient redundancy shall be provided within the control equipment and pressure transducers such that no unsafe operation can result from a transducer fault.

- Control equipment shall have the facility to receive and transmit system input and output signals, including the following:
  - Inputs:
    - External emergency stop.
    - Remote start/stop.
  - Outputs:
    - System status.
    - Alarm status.
    - System pressures.
    - Compressor data as provided on the control panel for remote monitoring.

The interface shall preferably be via a serial link or Ethernet connection. The message protocol shall be an industry standard interface which is available from several suppliers.

Support for a specific protocol may be a requirement for a site specific compressor replacement.

Alternatively or additionally, hard wired voltage free contact outputs may be provided.

All outputs shall be electrically isolated from the compressor power supply with a 2KV rating. The system to be provided shall be consistent with the location the compressor is to be installed in.

- The compressors shall be able to automatically restart following a power interruption without the need for staff to attend.
- The compressor capacity shall be adequate to meet the requirements of the particular specification.
- Pressure vessel and pressure piping components inside compressors shall comply with or demonstrate equivalence to:
AS2971-2007 Serially Produced Pressure Vessels and/or AS1210-2010 Pressure Vessels

3 Environmental Conditions

- Equipment housing temperatures may reach 70°C.
- Average annual rainfall up to 1500mm per annum with peak rainfall up to 200mm per hour recorded.
- Lightning protection for signalling equipment is specified in SPG 0712 Lightning & Surge Protection Installation Guidelines.
- Insolation – Maximum solar radiation expected is 10.5m per sq metre of surface. It should be assumed that all of the incident heat will be absorbed, as outdoor equipment will not necessarily be painted or free of airborne industrial fallout.
- Noise from the compressor external to the compressor house shall not exceed 15db above ambient night time levels at 10m from the building.
- Compressor noise within the compressor house shall not exceed 50 dB above ambient.
- The dew-point at dryer output should be: ≤ 3°C at 1000 kPa.
- Compressors shall be rated to accommodate inlet air temperatures from 0°C to at least 45°C, with a relative humidity from 0% to 95% non-condensing.

4 Information to be provided

The following technical information is to be provided with the quotation:

- Compressor operating manual.
- Compressor maintenance manual.
- Data sheets detailing all compressor operating parameters.
- Circuit diagrams of the compressors and control equipment.
- Maintenance schedules.
- A complete parts list.
- Material safety data sheets (MSDS’s) of all specified consumables.
- A list of standards and directives complied with and certificates of compliance.
- An assessment of the Hazard Level of each pressure vessel used in the compressor of 5L in volume or greater according to AS4343 Pressure Equipment Hazard Levels. This includes but is not limited to air/oil separators, air/water separators and air receivers that are integrated with or supplied with the compressor.
- Certification documentation for all pressure vessels and compressors.
- Warranty and warranty periods.