

Ref. to DWGs.
B6-151 - P50-001
B6-151A - P50-001
B6-350-P50-001
B6-353-P50-001
B6-352-P50-001
B6-350A-P50-001

SERVICE AND INSTRUMENT AIR SYSTEM

General

Compressed air at 100 psig is required for local instruments, supervisory controls, control drives, and for miscellaneous operating and maintenance services. Both instrument and service air are furnished by six instrument air compressors. Not all compressors are required for normal use and the spare units are used as standbys which will start automatically through pressure switches located on the instrument air header.

Each air compressor supplies air to its aftercooler. The discharge of all compressors are tied together with provisions for isolating each. Pressure relief valves on discharge of the compressors are set for 125 psig.

The three air receivers discharge to a common header under normal conditions.

Service Air

Boilers 1, 2 and 3 and Turbines 1 and 2 Area

Service air takes off from the common header through a 2" line to a pressure control valve located just over the east end of the Instr. shop and out through a 2" line to the service air system. The control valve shuts off the service supply in the event the instrument air supply drops to 65 psig. A 2" bypass is located around this control valve for emergency use.

Boilers 4 and 5 and Turbine 3 Area

Service air for this area takes off from the 3" discharge of the air receiver located near #4 air compressor to a 2" pressure control valve and out through a 2" line to the service air system. These control valves work similar to that on the service air system for Boilers 1, 2 and 3. A 2" bypass is located around the control stations.

Instrument Air System

General

Instrument air is provided through a common header connecting all air compressors to provide optimum reliability. However, in event of equipment outage or major leakage, isolating valves are provided. A working knowledge of the location of these valves is essential for all operators.

Boilers 1, 2 and 3 and Turbines 1 and 2 Area

Instrument air is taken from the header through a 2" line to the air dryer. A 2" bypass is located around the air dryer. A pressure control valve

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SERVICE AND INSTRUMENT AIR SYSTEM (cont'd)

and a low-pressure alarm are located in this line to open and give warning in the event of low pressure on the air dryer discharge. Annunciators for these alarms are found on the mechanical vertical board and the process auxiliary board. Following the air dryer, the instrument air line passes through a Cuno filter and on to the instrument air system. A high-temperature alarm and a low-pressure alarm are located after the filters. Instrument air pressure is also indicated on the mechanical vertical board.

Our air system is interconnected to the Water Treating Plant system through two 2" lines. One is tied directly into their air receiver (upstream of the air dryer) and the other comes off their instrument air system (downstream of the air dryer). The valving in these lines (located at process pipeway southeast of #1 Turbine) is so arranged that we can take air from Water Treating any time our system pressure is lower than theirs. For them to take air from us, we have to open the bypasses around the check valves.

Boilers 4 and 5 and Turbine 3 Area

Instrument air is taken from the discharge header of the air receiver for #4 and #5 air compressors through a 3" line to air dryer #2. A 2" bypass is located around the air dryer. A pressure control valve and a low-pressure alarm are located in this line to open and give an alarm in event of low pressure on the air dryer discharge. Following the air dryer, the instrument air line passes through a Cuno filter and on to the instrument air systems on both boilers. A high-temperature alarm and low-pressure alarm are located after the filter with annunciators found on the mechanical vertical board and process auxiliary board.

Air Compressors

Nos. 1 and 2

These two compressors are 7 x 7 Class RXB Gardner-Denver heavy duty horizontal, single-stage, double-acting, water-cooled air compressors with non-lubricated cylinders. Each is rated to deliver 100 cfm at 100 psig discharge pressure. Cooling water is controlled by a solenoid valve tied into the compressor so that water flows only when the compressor motor is running. A filter-silencer is provided at the intake to each compressor. Each is v-belt driven by a 20-hp, three-phase, 60-cycle, 440-volt, squirrel cage, 1750-rpm induction type motor.

No. 3

This is a 10 x 11 non-lubricated water-cooled single horizontal compressor. It is rated to deliver 232 cfm at 100 psig. Cooling water is controlled in the same manner as Nos. 1 and 2. This compressor is V-belt driven by a 50-hp, 440-volt motor.

SERVICE AND INSTRUMENT AIR SYSTEM (CONT'D.)

Nos. 4 and 5

These compressors are made by Worthington Corporation and are size 10 x 11, water-cooler with non-lubricated cylinders. Each is rated to deliver 230 cfm at 100 psig discharge pressure, and is V-belt driven by a 60-hp, 440 volt motor.

No. 6

This compressor is made by Chicago Pneumatic and is size 12½ x 11, water-cooled, with non-lubricated cylinder. It is rated to deliver 330 cfm at 100 psig discharge pressure, and is V-belt driven by a 75 hp, 440 volt motor.

No. 7

This compressor is made by Ingersoll-Rand and is water-cooled, with non-lubricated cylinder. It is rated to deliver 525 cfm at 100 psig discharge pressure and is V-belt driven by a 125-hp, 440 volt motor.

Aftercoolers

Each of the seven air compressors is equipped with a suitable aftercooler and moisture separator. The primary function of the aftercooler is the removal of superheated vapor entrained in the air as it is discharged from the compressor.

Air Receivers

The air receivers are designed to operate at 150 psig and are equipped with safety valves, pressure gauges, and condensate drains.

Air Dryers

No. 1

This dual tower silica gel dryer operates on an eight-hour fully automatic cycle. Each tower has a capacity for drying 120 cfm of free air at 100 psig from saturation at 110°F to a final dew-point of 0°F.

The compressed air enters the tower on drying service through a four-way plug valve. The air dried during passage through the silica gel bed and discharges ready for use through the lower four-way plug valve.

At the end of each eight-hour absorption cycle, the towers are shifted automatically as controlled by the program timer by means of a pneumatic cylinder operated by a solenoid.

The saturated tower is taken off drying service and is reactivated by heating the dessicant bed by means of imbedded steam coils and 235 psig steam. After four hours of heating, the steam valve closes automatically and the tower goes through a four-hour cool-down period. A small amount of pre-dried air (from the in-service tower) which is metered by a flow-rator, is bled through the tower being reactivated for the full eight hours to purge moisture liberated during the heating cycle.

SERVICE AND INSTRUMENT AIR (contd)

No. 2

Air dryer #2 operates in an identical manner to #1. Capacity is 240 cfm with a reversal cycle of eight hours.

No. 3

Air dryer #3 operates in an identical manner to #1 and #2. Capacity is 400 cfm with a reversal cycle of eight hours.

After-Filters

Air dryer #1 has a Cuno filter connected to the outlet line. Air dryers #2 and #3 have tandem Cuno filters connected to their outlet lines.