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**WATER SUPPLIES DEPARTMENT**

**STANDARD SPECIFICATION M-07-01**

**MOTOR-DRIVEN AIR COMPRESSOR**

**UP TO 40 kW FOR INDOOR INSTALLATION**

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**FOR INDOOR INSTALLATION**

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**MOTOR-DRIVEN AIR COMPRESSOR UP TO 40kW**  
**FOR INDOOR INSTALLATION**

**1. GENERAL DESIGN**

The compressor shall be suitable for continuous operation in a tropical climate with a maximum relative humidity of 100% and a maximum ambient temperature of 40°C.

The compressor shall be motor driven, air cooled and of maximum two-stage compression. The maximum sound pressure level measured at 1m from the compressor shall not exceed 90dB(A). Pressure relief valve on the interstage and delivery pipe shall be provided.

The compressor shall comply with the following requirements according to the type provided.

1.1 Reciprocating Compressor

Reciprocating compressor shall be of single acting and oil lubricated type. Unit with an integral air receiver is acceptable unless otherwise specified.

1.2 Rotary Compressor

Rotary compressor shall be of oil injection type. The rotors of the compressor shall be carried on heavy-duty double ball/roller type bearings with long design life. Any intermeshing rotors shall be ground precisely with no relative sliding movement and all moving elements shall be well balanced to reduce the bearing load. The rotors shall be housed in a high quality cast iron casing.

An air valve shall be provided to seal the intake of the compressor when at 'no load' or 'stop' condition, and to prevent air/oil mixture in the compressor to discharge through the air intake.

An efficient oil separator with easily removable filter shall be fitted at the compressor outlet to limit the lubricant being carried over to less than 5 ppm. A full-flow oil filter with replaceable element of 10 micron size shall be fitted in the oil return line to the compressor.

A combined check and minimum pressure valve shall be fitted at the oil separator outlet to ensure that high pressure air cannot flow back into the system and that the rapid rise of air pressure in the oil separator can be attained in order to supply oil for lubrication and cooling.

The oil shall be maintained at an optimum operating temperature of around 55°C to prevent condensation of atmospheric moisture in the system. A thermo-controlled three-way valve shall be provided for

by-passing the oil cooler if necessary.

### 1.3 Oil Free Compressor

Oil-free compressor shall meet the requirements as specified in Clauses 1.1 and 1.2 where applicable. For reciprocating type compressor, the piston in the cylinder shall be fitted with self-lubricating PTFE rings or equivalent materials acceptable for oil-free operation. For rotary type compressor, the intermeshing rotors shall be synchronised through timing gears in such a way that they rotate in a sealing arrangement without touching each other. The rotor shafts shall be provided with air and oil sealing rings to prevent lubrication oil from entering the compression space, thus ensuring completely oil-free air delivery. For rotary sliding vane type compressor, self-lubricating vanes shall be fitted.

## 2. AIR INTAKE SYSTEM

A dry-type air intake filter with replaceable element and an effective silencer shall be fitted to the intake. The silencer shall be located at the downstream of the air filter so that the filter is subjected to the minimum pulsation effect.

## 3. COOLING

Aftercooler and intercooler of fin-tube type, safety valves, pressure gauges and proper drainage arrangement shall be fitted if necessary. Forced draught cooling shall be provided for the compressor block, oil cooler (if applicable), aftercooler and intercooler by an integral fan with a proper metal guard for safety in compliance with the requirements of Factories and Industrial Undertakings Ordinance, Chapter 59.

Any parts with external surface temperature in excess of 60°C which may be accidentally contacted by personnel in normal operation shall be guarded or insulated by proper lagging.

## 4. REGULATION AND CONTROL

The compressor shall be suitable for manual or automatic start/stop control. An automatic unloading device shall be provided for light starting of the compressor motor and for unloaded operation when the maximum setting of the working pressure is reached.

If a pressure switch is specified in the Particular Specification for the automatic control of the compressor, it shall conform to Water Supplies Department (WSD) Standard Specification E-86-11.

5. **LUBRICATION SYSTEM**

The compressor lubrication system shall be fitted with built-in oil pump or splash pin, oil breather cap, sump drain cock (or plug as appropriate) and level sight indicator. If built-in oil pump is fitted, oil filter, oil pressure switch and oil pressure gauge shall be incorporated also. The oil pressure switch and oil pressure gauge if supplied shall conform to WSD Standard Specification E-86-11 and E-86-12 respectively, and the oil pressure switch shall trip the driving motor in case of low oil pressure.

6. **DRIVE ARRANGEMENT**

The compressor may be designed for multi-vee endless belt drive or direct drive through a flexible coupling connected to the driving motor. Means shall be provided for adjusting the tension of the belt for belt drive, or for aligning the motor and the compressor for direct drive. The belt loading shall be designed in such a way that if one belt fails, the remaining belts can also transmit the full load. All exposed moving parts shall be properly guarded for safety.

7. **AIR RECEIVER**

The air receiver should be of welded steel construction and be designed for the maximum pressure of the compressor. Safety valve, drain valve and suitable footing shall be fitted. The receiver shall be hydraulically tested in accordance with a recognized engineering standard or code or the requirements as stipulated in the Boilers and Pressure Vessels Ordinance, Chapter 56, i.e. tested to twice the maximum permissible working pressure where that working pressure does not exceed 7 bars, or tested to one and one-half times the maximum permissible working pressure plus 3.5 bars where such working pressure exceeds 7 bars.

Test pressure and date of testing shall be legibly and permanently marked on the air receiver. Pressure gauges shall be graduated in kPa or in bar.

8. **DRIVING MOTOR**

The driving motor shall conform to WSD Standard Specification E-51-04.

9. **MOTOR STARTER CONTROL CUBICLE**

The motor starter control cubicle shall comply with WSD Standard Specification E-11-02, where applicable. The enclosure shall be a standard mass production product made of fine coated sheet steel of not less than 1.5 mm thick. The emergency stop push button shall be of red mushroom headed stay-put type.

**10. COMPRESSOR MOUNTING**

The compressor and motor shall be mounted on a common bedplate. Effective anti-vibration mountings shall be used to eliminate the transmission of the machine vibrations onto the foundation.

**11. TESTING**

Manufacturer's works test certificates for the compressor, motor, air receiver, and safety valve shall all be submitted. Type test certificates for compressor and motor are acceptable unless otherwise specified.

**12. MANUAL AND PARTS LIST**

Four (4) copies of manufacturer's service and instruction manual, general arrangement drawings and parts list in English shall be provided on delivery of the plant.

- End of Specification -