

# Portishead B Power Station

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## Turbines

The turbine house is 700 feet long, and the width between crane rail centres is 55 feet. The six 65,000-kilowatt turbo-alternators are arranged in pairs in "line-ahead" fashion, having steam end to steam end, with the circulating water pump pits between sets. Designed steam conditions are 900 pounds per square inch and 900 degrees Fahrenheit at the turbine stop valve, with 28.9 inches vacuum and a final feed temperature of 385 degrees Fahrenheit.

The turbines are two-cylinder units: the high and low pressure turbine rotors are rigidly coupled together, and the cylinders are provided with annular steam belts at the various extraction points to enable steam to be drawn from the complete periphery instead of from localised areas, to preserve thermal balance. Inter-stage drainage is provided where necessary to collect and lead condensed steam to heater belts or to the exhaust chamber.

The main bearings are of the spherically seated type lined with anti-friction metal. Each bearing is provided with four pads, under each of which a selection of liners is fitted to permit fine adjustment in any direction when aligning the rotors. The thrust block is of the Michell type and is combined with the high-pressure inlet end journal. The bolted coupling connecting the high and low pressure turbine rotors is positioned inside the low-pressure cylinder adjacent to the gland. The rotors are mounted on a bearing at each end of the shaft with a third bearing interposed between the high-pressure and low-pressure cylinders. High-pressure turbine glands are steam sealed, and low-pressure glands water sealed at all speeds.

Emergency stop and governor valves of the balanced pressure type are provided for each turbo-set. The emergency valves are operated automatically by duplicate emergency overspeed governors on the main turbine shaft—set to operate at 3,300 revolutions per minute. The emergency valves may also be tripped instantly by hand. Speed regulation is effected by a centrifugal governor operating the governor valves through an oil relay system. Hand and motor operated speed control gear enables the turbine speed to be raised or lowered by 5 per cent above or below normal while at no load. Each set is fitted with load pay-off gear to progressively reduce load automatically should the vacuum fall below 25 inches Hg. At 22 inches vacuum, speeder gear reduces the load to zero and at 20 inches vacuum the steam trip is operated. In the event of steam pressure to the turbine falling below 90 per cent of normal, pressure-operated unloading gear reduces the steam demand of the turbine. This condition could arise through failure of the ignition or other combustion trouble at the boilers. If pressure continues to fall, the throttle steam flow is reduced by 10 per cent of the full load flow by the time the pressure has fallen to 85 per cent of normal. To provide the turbine operator with a guide to conditions regarding axial expansion, running clearances, and the degree of eccentricity of the rotor, a comprehensive system of supervisory control is installed on a panel adjacent to the high pressure cylinder of each turbo-set.

## Condenser

Each turbine exhausts to a single horizontal condenser. This has a cooling surface of 58,600 square feet and is split vertically so that either half can be opened up for on load cleaning. Because of serious trouble with graphitic corrosion that has been experienced in this part of the country, a special protective treatment has been given to the manifolds and condenser water boxes. The water boxes are also electrically insulated from the condenser tube plates.

The turbines are mounted on 58 feet Ordnance datum level, while the condensers are situated low down on — 11 feet Ordnance level, and the exhausts from the turbines are connected to the condenser by twin steel trunkings. The total volume to be exhausted when raising vacuum is 17,770 cubic feet, and the equipment is designed for raising vacuum and running up to speed in approximately 40 minutes using a steam exhauster and two three-stage steam ejectors.