

Portishead B Power Station

Boiler House Equipment

The boiler house is designed for a single row of twelve 300,000 pounds per hour boilers. The first eight boilers are pulverised fuel fired while the remaining Nos. 9-12 boilers are installed for oil firing but designed to facilitate conversion to pulverised fuel firing if required. The steam conditions at the superheater outlet are 950 pounds per square inch and 925 degrees Fahrenheit, with an economiser feed temperature of 385 degrees Fahrenheit. The boilers have radiant combustion chambers, and the walls are completely water-cooled by means of close pitched tubes. Each unit is supported from the main building structure and is so arranged that all the expansion takes place vertically downwards.

Each steam unit is equipped with Bailey superheat control equipment; the primary and secondary multiple loop-elements of the superheater itself are of the self-draining type arranged in high and low temperature sections in the path of the gases. The superheaters are provided with permanent thermo-couples and instruments to record the and/or metal temperature of the elements. Two desuperheaters with automatic temperature equipment and the necessary drains and sampling points are provided with each boiler. The economisers are designed on the contra-flow system, flue gases flowing downwards, and feed water upwards. Provision is made for the gases to by-pass the economiser when the units are starting up or are operating on light load.

Two air preheaters of the rotary regenerative type are provided for each boiler. Each preheater is designed to handle half the total air requirements and raise the air temperature from 80 degrees Fahrenheit to that required by the pulverising mills and burners. Flue gas by-passes are not installed, but facilities are provided to control the element temperature at low load.

A complete system of electrically-operated fully-sequenced soot-blowing equipment is installed, the steam supply being drawn from the secondary superheater headers. The blowers are arranged to operate in the direction of the gas flow, and are so mounted that they can be removed for examination and repairs while the boiler is on load. Cooling air for the blowers is provided by an air scoop situated in the delivery side of each of the forced draught fans.

The draught plant comprises two forced draught and two induced draught fans situated at basement level, and twin air pre-heaters used together with mechanical grit arrestors and electrostatic precipitators. In the event of the loss of one of the above items, as an emergency condition 60 per cent of maximum continuous rating loading can be carried. Both the forced draught and induced draught fans are driven by induction regulator controlled variable-speed alternating current motors.

The automatic control for each boiler unit is based on the regulation of total combustion air quantity proportional to the boiler load and co-ordinated adjustment of fuel feed to the mills irrespective of the calorific value of the fuel and of furnace draught, so that between 100 per cent and 60 per cent of maximum continuous rating the output of steam is controlled automatically. A master controller connected to and actuated by the pressure in the steam receiver, transmits impulses to relays which in turn regulate the compressed air supply to the power cylinders, which, by suitable linkage, regulate the motor speed control gear on fans and fuel feeders.

The system is arranged so that under normal operating conditions each boiler may be controlled automatically as an independent unit, subject only to a master pressure control, common to each pair of boilers, and to a control unit sensitive to the steam flow from each separate boiler. The arrangement incorporates automatic means of reducing the mill feeder output in the event of partial or total choking of the mill, and reinstating normal fuel flow when such a blockage is cleared.