

1 Scope

This standard covers the design requirements and operator interface for steam turbine bypass systems for drum and once-through steam generators and combined cycle plants. Hardware configurations are suggested to obtain the minimum design requirements to obtain a safe and operable system. Both fixed percentage bypass and variable pressure systems are covered.

It is applicable to boilers with steam capacities of 200,000 lb/hr (25 kg/s) or greater.

2 Purpose

This standard establishes the minimum requirements for design specifications to implement steam turbine bypass systems and hardware configurations for drum and once-through, fossil fuel power plant boilers.

The turbine bypass system should provide for cold start-up, warm start, hot restart, load rejection, turbine shutdowns, and unit trips. The system shall be designed to provide pressure, temperature, and flow control of steam around and through the turbine by controlling each bypass valve, isolation valve, and associated desuperheater. The desuperheating function may be integral with the bypass valve. The turbine bypass system does not interface with the turbine control and supervisory system. The turbine bypass system is set to maintain steam pressure, and any coordination with the turbine is through interaction with the process as the turbine demands more or less steam. There is no direct interconnection of control systems.

3 Definitions

The following definitions are included to clarify their use in this standard and may not correspond to the use of the word in other texts. For other definitions, see ISA-51.1, *Process Instrumentation Terminology*.

3.1 alarm:

an indication used to alert an operator about an abnormal operating condition.

3.2 automatic tracking:

the action of a control system to automatically track a setpoint or the process variable without any other corrective mechanisms.

3.3 boiler:

the entire vessel in which steam or other vapor is generated for use external to itself, including the furnace, consisting of waterwall tubes; the firebox area, including burners and dampers; the convection area, consisting of any superheater, reheater, and/or economizer sections as well as drums, generating tubes, and headers.

3.4 condenser backpressure elements:

a multiple breakdown diffuser, normally installed in the steam condenser neck, used to generate a positive back pressure upstream of the condenser vacuum and to reduce the kinematic energy of steam from an external source other than the turbine exhaust.

3.5 controller:

any automatic, semi-automatic, or manual device or system of devices used to regulate the boiler turbine, or any other equipment within defined parameters. If automatic, the device or system responds to variations in temperature, pressure, water level, flow, or other control variables.

3.6 differential producer:

a measuring element that is inserted in a process flow path and used to create a pressure drop that is proportional to the square of the volumetric flow rate.