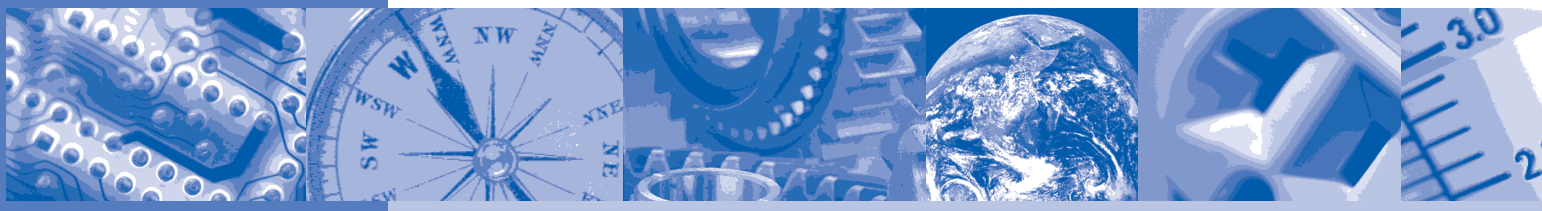
ANSI/ISA–S77.42.01–1999



Fossil Fuel Power Plant Feedwater Control System — Drum Type

Approved 15 March 2000

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Fossil Fuel Power Plant Feedwater Control System — Drum Type

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Preface

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Certain metric units that are not a part of the SI system are in common accepted use. This document uses *bar* as a pressure measurement that is convertible to kilopascals by multiplying by 100. Functional drawings in the annex are provided using established power industry conventions.

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This document is part of a series of standards developed by ISA's SP77.40 Committee, Boiler Controls, under the direction of the SP77 Committee, Fossil Power Plant Standards. It should be used in conjunction with the other SP77 series of standards for safe, reliable, and efficient design, construction, operation, and maintenance of fossil-fired power plants. It is not intended that this document establish any procedures or practices that are contrary to any other standard in this series.

A variety of feedwater control systems have been developed and used over the years to maintain drum level within limits and at the required setpoint. This document is intended to establish minimum requirements for steam temperature control.

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This standard was approved for publication by the ISA Standards and Practices Board on 15 December 1999.

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CONTENTS

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1 Scope

The standard is intended to assist in the development of design specifications covering the measurement and control of feedwater systems in boilers with steaming capacities of 200,000 lb/h (25 kg/s) or greater. The safe physical containment of the feedwater shall be in accordance with applicable piping codes and standards and is beyond the scope of this standard.

2 Purpose

The purpose of this standard is to establish the minimum criteria for the control of levels, pressures, and flow for the safe and reliable operation of drum-type feedwater systems in fossil power plants.

3 Definitions

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

3.2 cascade control:
a control action in which the output of one controller is the setpoint for another controller.

3.3 controller:
any manual or automatic device or system of devices for the regulation of boiler systems to keep the boiler at normal operation. If automatic, the device or system is motivated by variations in temperature, pressure, water level, time, flow, or other influences**.**

3.4 drum (steam):
a closed vessel designed to withstand internal pressure. A device for collecting and separating the steam/water mixture circulated through the boiler.

3.5 feedwater flow control system:
a control system that uses input signals derived from the process for the purpose of regulating feedwater flow to the boiler to maintain adequate drum level according to the manufacturer’s recommendations.

3.6 mass feedwater flow rate:
the mass flow rate of all water delivered to the boiler; it is derived either from direct process measurements and/or calculations from other parameters. When volumetric feedwater flow rate measurement techniques are employed and the feedwater temperature at the flow-measuring element varies 100°F (37.8°C), the measured (indicated) flow shall be compensated for flowing feedwater density to determine the true mass feedwater flow rate.

3.7 mass steam flow rate:
the mass flow rate of steam from the boiler, derived either from direct process measurements and/or calculations from other parameters. If volumetric steam flow-rate measuring techniques are employed, the measured (indicated) flow shall be compensated for flowing steam density to determine the true mass steam flow rate.

3.8 primary/secondary control loop controller:
the controller that adjusts the setpoint for the secondary control loop controller in the cascade control action scheme.