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Guidance on Practice for Demineralized Water

GP 60-14

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) GP 60-14. This Guidance on Industry Standard (GP) is based on the following heritage documents from merged BP companies as follows:

Amoco

A FE-BFW-TRTG-G Fabricated Equipment Boiler Feedwater Treating Equipment Guide

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1. Scope

This GP provides guidance for design selection, fabrication, and testing of Demineralized water production packages.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

American Public Health Association (APHA)

SME Standard Methods for the Examination of Water and Wastewater

American Petroleum Institute (API)

RP 650, Appendix F Design of Tanks for Small Internal Pressure

American Society of Mechanical Engineers (ASME)

Book # I00367 Consensus on Operating Practices for the Control of Feedwater and Boiler Water Chemistry in Modern Industrial Boilers

BP Group Engineering Technical Practices (ETPs)

GP 30-20 Guidance on Practice for Miscellaneous Field Instruments
GP 30-25 Guidance on Practice for Field Instrument – General
GP 30-65 Guidance on Practice for Control Panels
GP 30-70 Guidance on Practice for I &C in Vendor Packaged Equipment

3. Symbols and abbreviations

For the purpose of this GP, the following symbols and abbreviations apply:

BFW Boiler Feedwater
EDI Electro Deionization Reversal
NTU Napthalic Test Unit
RO Reverse Osmosis
UF Ultra filtration

4. General requirements

4.1. Overview

Degree of water treatment for use in boilers depends on analysis of water supply source(s), water purity required in boiler and purity of steam delivered to final



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steam user. Typical demineralized water quality requirements are defined in ASME Consensus Standard. Requirements are broken down by type of boiler as defined by the side of the tube that generates steam (water tube or fire tube) and pressure conditions in the boiler. Since requirements for water purification and supply water conditions differ in every plant and even within a plant, programs for exact treatment need to be determined by a specialist.

Specifications in this equipment group deal with some types of equipment commonly used. Other types of equipment are available and are used in some plant locations. As these other types become more common in their application, Company specifications may be developed. Other equipment types include: RO, UF, Flash Evaporation, and EDI Reversal.

4.2. Design performance

- a. BP process engineer shall require water treatment equipment supplier to define performance of equipment considering entire range of water quality likely to be encountered.
- b. BP process engineer shall define the range of inlet water quality by sufficient testing of the proposed water source or from obtained historical data.

Boilers typically require different limits of feedwater purity based on boiler steam pressure. See Table 1. These suggested limits are published in ASME Consensus on Operating Practices for the Control of Feedwater and Boiler Water Chemistry in Modern Industrial Boilers.

This expanded and revised ASME volume presents proper operating practices, which are aimed at minimizing the penalties of severe corrosion or deposition, frequent cleaning requirements, or unscheduled outages in steam generator systems and their auxiliary steam users.

- c. High purity boiler feed water should not be required if production field sites will not use 100% quality steam and steam systems are once-through type.
- d. BP process engineer shall set the desired purity of the treated water based on need. If extremely pure water is required for equipment, such as water injection for a gas turbine, the process engineer should determine if polishing beds are cost effective to be used.

4.3. Design temperature

Maximum fluid temperature typically, less than 149°C (300°F) and at less than 7 bar (100 psig), prior to the BFW pump may change over the life of equipment. It may not be prudent to set a design temperature without a margin for error. A margin between 0°C to 28°C (0°F to 50°F) should normally sufficient.

4.4. Instruments and Controls

- a. Instrument and controls for demineralized water production packages should meet the requirements in GP 30-20, GP 30-25, GP 30-65, and GP 30-70.

4.5. Waste streams

- a. Sludges may be concentrated to optimize disposal cost and easy handling. Dewatering, filter presses, or combination thereof may be used. Facility requirements and local environmental regulations may prevent or encourage certain methods.
- b. Spent acid and caustic should require some level of neutralization prior to discharge to process sewers.

