Inspection of Fired Boilers and Heaters

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Inspection of Fired Boilers and Heaters

1 Scope

This recommended practice (RP) covers the inspection practices for fired boilers, process heaters, and furnaces used in petroleum refineries and petrochemical plants. The practices described in this document are focused to improve equipment reliability and plant safety. The intent is to provide inspection practices that accurately capture appropriate data, both onstream and off-stream, to assess current and future performance of the equipment.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Standard 530, *Calculation of Heater-tube Thickness in Petroleum Refineries*

API Recommended Practice 538, *Industrial Fired Boilers for General Refinery and Petrochemical Service*

API Standard 560, *Fired Heaters for General Refinery Services*

API Recommended Practice 571, *Damage Mechanisms Affecting Fixed Equipment in the Refining Industry*

API Recommended Practice 572, *Inspection Practices for Pressure Vessels*

API Recommended Practice 578, *Guidelines for a Material Verification Program (MVP) for New and Existing Assets*

API Standard 579-1/ASME [1] FFS-1, *Fitness-For-Service*

API Recommended Practice 580, *Risk-Based Inspection*

API Recommended Practice 584, *Integrity Operating Windows*

API Recommended Practice 585, *Pressure Equipment Integrity Incident Investigation*

API Recommended Practice 936, *Refractory Installation Quality Control—Inspection and Testing Monolithic Refractory Linings and Materials*

API Recommended Practice 941, *Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants*

API Recommended Practice 970, *Corrosion Control Documents*

API Recommended Practice 939-C, *Guidelines for Avoiding Sulfidation (Sulfidic) Corrosion Failures in Oil Refineries*

AISC M015L [2], *Manual of Steel Construction, Load and Resistance Factor Design*

[1] American Society of Mechanical Engineers International, Two Park Avenue, New York, New York 10016-5990, www.asme.org.

[2] American Institute of Steel Construction, 130 East Randolph, Suite 2000, Chicago, Illinois, 60601, www.aisc.org.

AISC M016, *Manual of Steel Construction, Allowable Stress Design*

ASME B31.1, *Power Piping*

ASME *Boiler and Pressure Vessel Code, Section I: Rules for Construction of Power Boilers*

ASME *Boiler and Pressure Vessel Code, Section IX: Welding, Brazing, and Fusing Qualifications*

ASTM A297 [3], *Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application*

ASTM A530, *Standard Specification for General Requirements for Specialized Carbon and Low Alloy Steel Pipe*

NACE SP0170 [4], *Protection of Austenitic Stainless Steels and Other Austenitic Alloys from Polythionic Acid Stress Corrosion Cracking During a Shutdown of Refinery Equipment*

NBBI NB 23 [5], *National Board Inspection Code*

3 Terms, Definitions, and Acronyms

For the purposes of this document, the following terms and definitions apply.

3.1 Terms and Definitions

3.1.1
air preheater
A heat transfer apparatus through which combustion air is passed and heated by a medium of higher temperature, (i.e. combustion products, steam, or other fluid).

3.1.2
air preheater (direct exchange type)
Air preheaters that exchange heat directly between flue gas and air.

3.1.3
air preheater (external heat source type)
Air preheaters that utilize low-temperature heat from an external source (e.g. low-pressure steam) to improve heater or boiler efficiency.

3.1.4
air preheater (indirect exchange type)
Air preheaters that use water or hot oil to cool the flue gas. The heated water or oil is used to preheat incoming combustion air.

3.1.5
anchor
A metallic or refractory device that holds the refractory or insulation in place.

[3] ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, 19428-2959, www.astm.org.

[4] NACE International, 15835 Park Ten Place, Houston, Texas 77084, www.nace.org.

[5] The National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, Ohio 43229, www.nationalboard.org.