

CONTEC
Comissão de Normalização
Técnica

SC-08
Fired Heaters

Fired Heater Assembly

Revalidation

Revalidated em 12/2015.

CONTECComissão de Normalização
Técnica**SC-08**

Fired Heaters

Fired Heater Assembly4th Amendment

This is the 4th Amendment to PETROBRAS N-1637 REV. C, that incorporates the 3rd Amendment, and it is used to alter the text of the Standard in the parts indicated below:

NOTE 1 The news pages with the performed amendments are placed in its corresponding positions.

NOTE 2 The amended pages, indicated the date of the amendment, are placed at the end of this standard, in chronological order, and shall not be used.

CONTENT OF THE 1st AMENDMENT - 12/2012

- Subsection 4.1, g)

Alteration of the text.

- Subsection 10.4

Alteration of the text.

- Section 11

Alteration of the text.

CONTENT OF THE 2nd AMENDMENT - 03/2014

- Section 2

Exclusion of ISO 9712 and BSI BS EN 473.

Inclusion of BSI [BS EN ISO 9712](#).

- Subsection 4.3, Table 1

Exclusion of ISO 9712 and BSI BS EN 473.

Inclusion of BSI [BS EN ISO 9712](#).

CONTENT OF THE 3rd AMENDMENT - 04/2015

- Subsection 1.1:

Replace ISO 13705 by API [STD 560](#).

- Section 2:

Exclusion of PETROBRAS N-1592.

Inclusion of ABNT [NBR 16137](#).

Exclusion of ISO 13705.

- Section 2, NOTE:

Alteration of the text.

- Table 2:

Replace PETROBRAS N-1592 by ABNT [NBR 16137](#).

CONTENT OF THE 4th AMENDMENT - 11/2015

- Subsection 8.3.2:

Exclusion of NOTE.

Fired Heater Assembly

Procedure

This Standard replaces and cancels its previous revision.

The CONTEC - Authoring Subcommittee provides guidance on the interpretation of this Standard when questions arise regarding its contents. The Department of PETROBRAS that uses this Standard is responsible for adopting and applying the sections, subsections and enumerates thereof.

Technical Requirement: A provision established as the most adequate and which shall be used strictly in accordance with this Standard. If a decision is taken not to follow the requirement ("non-conformity" to this Standard) it shall be based on well-founded economic and management reasons, and be approved and registered by the Department of PETROBRAS that uses this Standard. It is characterized by imperative nature.

Recommended Practice: A provision that may be adopted under the conditions of this Standard, but which admits (and draws attention to) the possibility of there being a more adequate alternative (not written in this Standard) to the particular application. The alternative adopted shall be approved and registered by the Department of PETROBRAS that uses this Standard. It is characterized by verbs of a nonmandatory nature. It is indicated by the expression: **[Recommended Practice]**.

Copies of the registered "non-conformities" to this Standard that may contribute to the improvement thereof shall be submitted to the CONTEC - Authoring Subcommittee.

Proposed revisions to this Standard shall be submitted to the CONTEC - Authoring Subcommittee, indicating the alphanumeric identification and revision of the Standard, the section, subsection and enumerate to be revised, the proposed text, and technical/economic justification for revision. The proposals are evaluated during the work for alteration of this Standard.

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SC - 08

Fired Heaters

Introduction

PETROBRAS Technical Standards are prepared by Working Groups - WG (consisting specialized of Technical Collaborators from Company and its Subsidiaries), are commented by Company Units and its Subsidiaries, are approved by the Authoring Subcommittees - SCs (consisting of technicians from the same specialty, representing the various Company Units and its Subsidiaries), and ratified by the Executive Nucleus (consisting of representatives of the Company Units and its Subsidiaries). A PETROBRAS Technical Standard is subject to revision at any time by its Authoring Subcommittee and shall be reviewed every 5 years to be revalidated, revised or cancelled. PETROBRAS Technical Standards are prepared in accordance with PETROBRAS Technical Standard [N-1](#). For complete information about PETROBRAS Technical Standards see PETROBRAS Technical Standards Catalog.

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Foreword

This Standard is the English version (issued in 04/2011) of PETROBRAS N-1637 REV. C 02/2011. In case of doubt, the Portuguese version, which is the valid document for all intents and purposes, shall be used.

1 Scope

1.1 This Standard specifies the conditions required for receipt, storage of components, assembly, and commissioning of fired heaters and auxiliary equipment, designed and manufactured in accordance with API [STD 560](#), used in oil and gas processing units in general.

1.2 This Standard applies to assembly work started as of its date of issuance.

1.3 This Standard contains only Technical Requirements.

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.

PETROBRAS [N-115](#) - Fabricação e Montagem de Tubulações Metálicas;

PETROBRAS [N-133](#) - Welding;

PETROBRAS [N-250](#) - Installation of High Temperature Thermal Insulation;

PETROBRAS [N-1591](#) - Ligas Metálicas e Metais - Identificação Através de Testes pelo Imã e por Pontos;

PETROBRAS [N-1593](#) - Ensaio Não-Destrutivo - Estanqueidade;

PETROBRAS [N-1594](#) - Ensaio Não-Destrutivo - Ultra-Som;

PETROBRAS [N-1595](#) - Ensaio Não-Destrutivo - Radiografia;

PETROBRAS [N-1596](#) - Ensaio Não Destrutivo - Líquido Penetrante;

PETROBRAS [N-1597](#) - Ensaio Não-Destrutivo Visual;

PETROBRAS [N-1598](#) - Non-Destructive Testing - Magnetic Particles;

PETROBRAS [N-1617](#) - Application of Refractory Castable;

PETROBRAS [N-1618](#) - Thermal Insulation Material;

PETROBRAS [N-1644](#) - Construction of Reinforced Concrete Foundations and Structures;

PETROBRAS [N-1728](#) - Castable Refractory;

PETROBRAS [N-1890](#) - Ceramic Fiber Linings;

PETROBRAS [N-1910](#) - Castable Lining Design;

ABNT [NBR NM ISO 9712](#) - Ensaio Não Destrutivo - Qualificação e Certificação de Pessoal;

ABNT [NBR 16137](#) - Ensaios Não Destrutivos - Teste por Pontos - Identificação de Materiais";

ABNT [NBR 14842](#) - Critérios para a Qualificação e Certificação de Inspetores de Soldagem;

ISO [8501-1](#) - Preparation of Steel Substrates Before Application of Paints and Related Products - Visual Assessment of Surface Cleanliness - Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates After Overall Removal of Previous Coatings;

ISO [17024](#) - Conformity Assessment - General Requirements for Bodies Operating Certification of Persons;

API [RP 551](#) - Process Measurement Instrumentation;

API [STD 560](#) - Fired Heaters for General Refinery Services;

ASME BPVC [Section I](#) - Rules for Constructions of Power Boilers;

ASME [B31.3](#) - Process Piping;

BSI [BS EN ISO 9712](#) - Non-Destructive Testing - Qualification and Certification of NDT Personnel.

NOTE 1 The contents of ABNT [NBR NM ISO 9712](#) are identical to those in BSI [BS EN ISO 9712](#).

NOTE 2 For documents referred in this Standard and for which only the Portuguese version is available, the PETROBRAS department that uses this Standard should be consulted for any information required for the specific application.

3 Terms and Definitions

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

3.1

manufacturer

company responsible for the complete fabrication of the fired heater or for partial fabrication thereof in those cases in which fabrication is complemented at the job site

3.2

erector

company in charge of erecting the fired heater at the job site

3.3

designer

firm or organization in charge of preparing any design stage of the fired heater (conceptual design, thermal design, detailed design, fabrication design etc.)

3.4

steam system

an assembly of fired heater elements related to water heating and steam generation/superheating

3.5

alloy identification test

test intended to identify the metal alloy of a component, also referred to as Positive Material Identification (PMI)

4 GENERAL CONDITIONS

4.1 Assembly work shall be performed in accordance with the erector's assembly procedures, prepared according to the fired heater manufacturer's assembly and preservation procedure and the approved documents prepared by the designer, containing at least the following items:

- a) receiving inspection criteria;
- b) method for storage of preassembled parts and/or sections;
- c) sequence and instructions for assembly of fired heaters and auxiliary equipment;
- d) lifting plan;
- e) stress relief heat treatment method;
- f) hydrostatic test method;
- g) smoke test method as standard PETROBRAS;
- h) chemical cleaning method or carryover cleaning method or both;
- i) preservation plan for drainable and non-drainable systems;
- j) preservation plan for auxiliary equipment;
- k) refractory drying and heating method;
- l) hibernation plan (if required);
- m) preparation plans for startup, pre-operation, and assisted operation.

4.2 Qualification of welding procedures as well as the performance of welding and inspection of all welds shall be in accordance with PETROBRAS [N-133](#).

4.3 Welders/welding operators, welding inspectors and non-destructive test inspectors/operators shall be qualified according to Table 1.

TABLE 1 - PERSONNEL QUALIFICATION

Task	Performed in Brazilian territory	Performed abroad
Welders and welding operators	PETROBRAS N-133	Design code
Welding Inspectors	ABNT NBR 14842	ISO 17024
Non destructive test inspectors and operators	ABNT NBR NM ISO 9712	BS EN ISO 9712

4.4 Non-destructive testing and the respective acceptance criteria are presented in Table 2.

Table 2 - Non-Destructive Tests

Non-destructive Test	Execution	Acceptance criteria
Alloy identification test (PMI)	PETROBRAS N-1591 and ABNT NBR 16137 (see Note)	No deviations are acceptable
Leak test	PETROBRAS N-1593	No leak indication is acceptable
Ultrasonic test	PETROBRAS N-1594	ASME BPVC Section I (steam systems) ASME B31.3 (other systems)
Radiography	PETROBRAS N-1595	ASME BPVC Section I (steam systems) ASME B31.3 (other systems)
Liquid penetrant	PETROBRAS N-1596	ASME BPVC Section I
Visual	PETROBRAS N-1597	Specific inspection procedure for component
Magnetic particles	PETROBRAS N-1598	ASME BPVC Section I
NOTE As an alternative, a portable alloy identifier based on spectrometry or x-ray fluorescence may be used.		

5 Receiving Inspection

This Sections specifies minimum requirements for the receiving inspection of prefabricated modules and/or individual components of the fired heater to be performed by the erector.

5.1 General Receiving Conditions

5.1.1 The erector shall make sure received items are in accordance with the Designer's approved documents, performing such additional inspections as may be deemed necessary.

5.1.2 Equipment parts shall be perfectly identified according to the manufacturer's fabrication drawings and assembly procedures.

5.1.3 Before removing from transportation vehicles prefabricated modules and/or components, the erector shall ensure that all lifting devices and reinforcements specified by the Manufacturer are properly installed. Damages caused by failure to follow the Manufacturer's instructions are the responsibility of the erector.

5.1.4 Any damage or nonconformity shall be reported in writing to the Manufacturer and PETROBRAS.