

CONTECComissão de Normalização
Técnica**SC-13**

Oil and Gas Pipelines

**Construction, Installation and
Commissioning of Onshore Pipeline****2nd Amendment**

This is the 2nd Amendment to PETROBRAS N-464 REV. K incorporated the 1st 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.

CONTENTS OF THE 1st AMENDMENT - 02/2016

-Foreword:

Replace ABNT NBR 15280-2:2014 by ABNT [NBR 15280-2:2015](#).

- Section 2:

Replace ABNT NBR 15280-2:2014 by ABNT [NBR 15280-2:2015](#).

- Subsection 8.1 to 8.8:

Replace by "8.1 to 8.5.7 Adoption".

- Subsection 8.6:

Include.

- Subsection 8.8.1:

Replace by "8.6.1 Modification".

- Subsection 8.8.2:

Replace by "8.6.2 Replacement".

- Subsection 8.8.3 to 8.9.2:

Replace by "8.6.3 to 8.7.2 Adoption".

- Subsection 8.9.3:

Replace by "8.7.3 Addition" until it reaches the condition established in 8.7.1".

- Subsection 8.7.4:

Include of subsection.

- Subsection 8.7.5:

Include of subsection.

- Subsection 8.9.4 to 8.10.3:

Replace by "8.8 to 8.8.3 Adoption".

- Subsection 10.2 to 10.8:

Exclusion.

- Subsection 10.9:

Replace by "10.1.8 New".

- Subsection 10.2 and 10.3:

Include.

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- Subsection 4.2:

Include.

- Subsection 10.1.8:

Exclusion.

- Subsection 10.2 to 10.3:

Replace by "10.2 Adoption".

- Subsection 10.3:

Include.

Construction, Installation and Commissioning of Onshore Pipeline

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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The use of this Standard by other companies / organizations / government agencies and individuals is the sole responsibility of the users.."

CONTEC

Comissão de Normalização
Técnica

SC - 13

Oil and Gas Pipelines

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.

Foreword (Replacement)

This Standard is the English version (issued in 10/2015) of PETROBRAS N-464 REV. K 09/2015. In case of doubt, the Portuguese version, which is the valid document for all intents and purposes, shall be used.

The sequence of subsections in this Standard follows the same sequence as that used by ABNT [NBR 15280-2:2015](#).

The construction, installation and commissioning of onshore pipelines shall comply with ABNT [NBR 15280-2:2015](#), complemented by the following alterations, in accordance with the definitions set below. The information of each subsection shall be read as follows, whenever it starts with:

- **Addition:** continuation of specific item of ABNT [NBR 15280-2:2015](#);
- **Adoption:** full adoption of specific item of ABNT [NBR 15280-2:2015](#);
- **Modification:** replacement of part of specific item of ABNT [NBR 15280-2:2015](#);
- **New:** insertion of requirement not included in ABNT [NBR 15280-2:2015](#);
- **Removal:** full removal of specific item of ABNT [NBR 15280-2:2015](#);
- **Replacement:** full replacement of specific item of ABNT [NBR 15280-2:2015](#).

1 Scope

1.1 Replacement

This Standard establishes the minimum requirements for construction, installation, commissioning, test and acceptance of onshore pipelines.

1.2 Modification

Replace “part of ABNT [NBR 15280](#)” by “standard”.

1.3 New

This Standard contains Technical Requirements and Recommended Practices.

2 Referenced Standards (Replacement)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition mentioned applies. For undated references, the latest edition of the referenced document applies.

PETROBRAS [N-115](#) - Fabrication and Erection of Metallic Piping;

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

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

PETROBRAS [N-381](#) - Execution of Drawing and Other General Technical Documents;

PETROBRAS [N-442](#) - External Painting of Piping for Onshore Facilities;

PETROBRAS [N-1595](#) - Non-Destructive Testing - Radiography;

PETROBRAS [N-1597](#) - Non-Destructive Testing - Visual Inspection;

PETROBRAS [N-1710](#) - Coding of Technical Engineering Documents;

PETROBRAS [N-1965](#) - Movimentação de Carga Inspeção, Manutenção e Operação de Equipamentos Terrestres;

PETROBRAS [N-2064](#) - Issuance and Revision of Design Documents;

PETROBRAS [N-2200](#) - Signage of Pipeline Right-of-Way and Onshore Production Facility;

PETROBRAS [N-2238](#) - Repair of External Anticorrosive Pipe Coatings;

PETROBRAS [N-2298](#) - Onshore Pipeline Cathodic Protection;

PETROBRAS [N-2328](#) - Field Joint Coating for Buried Pipe;

PETROBRAS [N-2624](#) - Implantação de Faixas de Dutos Terrestres;

PETROBRAS [N-2803](#) - Ensaio Não Destrutivo - Ultrassom Computadorizado e Mecanizado para Inspeção de Soldas;

PETROBRAS [N-2911](#) - Inspection and Repair of External Anticorrosive Pipe Coatings during Construction and Installation of Onshore Pipelines;

ABNT [NBR 5425](#) - Guia para Inspeção por Amostragem no Controle e Certificação de Qualidade;

ABNT [NBR 5732](#) - Cimento Portland Comum;

ABNT [NBR 5733](#) - Cimento Portland de Alta Resistência Inicial;

ABNT [NBR 5735](#) - Cimento Portland de Alto-Forno;

ABNT [NBR 5738](#) - Concreto - Procedimento para Moldagem e Cura de Corpos-de-Prova;

ABNT [NBR 5739](#) - Concreto - Ensaio de Compressão de Corpos-de-Prova Cilíndricos;

ABNT [NBR 6493](#) - Emprego de Cores para Identificação de Tubulações;

ABNT [NBR 6502](#) - Rochas e Solos;

ABNT [NBR 7211](#) - Agregado para Concreto;

ABNT [NBR 7276](#) - Sinalização de Advertência em Linhas Aéreas de Transmissão de Energia Elétrica - Procedimento;

ABNT [NBR 7481](#) - Tela de Aço Soldada - Armadura para Concreto;

ABNT [NBR 12712](#) - Projeto de Sistemas de Transmissão e Distribuição de Gás Combustível;

ABNT [NBR 14842](#) - Soldagem - Critérios para a Qualificação e Certificação de Inspetores para o Setor de Petróleo e Gás, Petroquímico, Fertilizantes, Naval e Termogeração (Exceto Nuclear);

ABNT [NBR 15221-1](#) - Tubos de Aço - Revestimento Anticorrosivo Externo - Parte 1: Polietileno em Três Camadas;

ABNT [NBR 15221-2](#) - Tubos de Aço - Revestimento Anticorrosivo Externo - Parte 2: Polipropileno em Três Camadas;

ABNT [NBR 15221-3](#) - Tubos de aço - Revestimento Anticorrosivo Externo - Parte 3: Epóxi em Pó Termicamente Curado;

ABNT [NBR 15273](#) - Indústrias de Petróleo e Gás Natural - Curvas por Indução para Sistema de Transporte por Dutos;

ABNT [NBR 15280-1](#) - Dutos Terrestres - Parte 1: Projeto;

ABNT [NBR 15280-2:2015](#) - Dutos Terrestres - Parte 2: Construção e Montagem;

ABNT [NBR 15637-1](#) - Cintas Têxteis para elevação de Carga - Parte 1: Cintas Planas Manufaturadas, com Fitas Tecidas com Fios Sintéticos de Alta Tenacidade Formados por Multifilamentos;

ABNT [NBR 16049](#) - Dutos Terrestres - Qualificação e Certificação de Pessoas - Inspetores;

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

ABNT [NBR 16212](#) - Tubos - Estocagem em Área Descoberta;

ABNT [NBR 16381](#) - Dutos Terrestres e Submarinos - Câmara de Pig;

ABNT [NBR NM 67](#) - Concreto - Determinação da Consistência pelo Abatimento do Tronco de Cone;

ABNT [NBR NM 248](#) - Agregados - Determinação da Composição Granulométrica;

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

ABNT [NBR ISO 15589-1](#) - Indústria do Petróleo e Gás Natural - Proteção Catódica para Sistemas de Transporte de Dutos - Parte 1: Dutos Terrestres;

ABNT [NBR ISO/IEC 17024](#) - Avaliação da Conformidade - Requisitos Gerais para Organismos que Certificam Pessoas;

APHA [4500](#) - Standard Methods;

API [RP 1110](#) - Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide;

API [STD 1104](#) - Welding Pipelines and Related Facilities;

ASME [B31.4](#) - Pipeline Transportation Systems for Liquid and Slurries;

ASME [B31.8](#) - Gas Transmission and Distribution Piping Systems;

ASME [BPVC Section IX](#) - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators;

ASTM [A370](#) - Standard Test Methods and Definitions for Mechanical Testing of Steel Products;

ASTM [D638](#) - Standard Test Method for Tensile Properties of Plastics;

ASTM [D792](#) - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement;

ASTM [D882](#) - Standard Test Method for Tensile Properties of Thin Plastic Sheeting;

ASTM [D1505](#) - Standard Test Method for Density of Plastics by the Density-Gradient Technique;

ASTM [E1961](#) - Standard Practice for Mechanized Ultrasonic Testing of Girth Welds Using Zonal Discrimination with Focused Search Units;

AWS [A5.01M/A5.01](#) - Procurement Guidelines for Consumables - Welding and Allied Processes - Flux and Gas Shielded Electrical Welding Processes;

AWS [A5.5/A5.5M](#) - Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding;

BSI [PD 8010-1](#) - Pipelines Systems - Part 1: Steel Pipelines on Land - Code of Practice;

MSS [SP55](#) - Quality Standard for Steel Castings for Valves, Flanges, Fittings and Other Piping Components - Visual Method for Evaluation of Surface Irregularities

NOTE 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 Adoption

4 General Requirements

4.1 to 4.3 Adoption

4.2 Modification

Replace in m) "pipes, field joints, aboveground sections and repairs" for "field joints and repairs".

4.4 Modification

Replace "4.4.1 to 4.4.22" by "4.4.1 to 4.4.23"

4.4.1 to 4.4.22 Adoption

4.4.23 New

The requirements of PETROBRAS [N-1965](#) for operation, maintenance, inspection and testing of load handling equipment shall be met.

4.5 to 4.7 Adoption

4.7.1 Replacement

Technical documents shall be prepared in digital media, according to PETROBRAS [N-381](#), PETROBRAS [N-2064](#) and PETROBRAS [N-1710](#), in accordance with design requirements, considering the same mapping accuracy. These documents shall be delivered according to Clause 10.

4.7.2 Adoption

5 Specific Requirements

5.1 Adoption

5.2 Storage and preservation of materials

5.2.1 Adoption

5.2.2 Pipes

5.2.2.1 Adoption

5.2.2.2 Replacement

Nylon slings shall be used (or similar material) for pipes handling during loading and unloading activity, according to ABNT [NBR 15637-1](#), with appropriate width or steel cables with pipe hooks to avoid damage in the pipes. These hooks shall be coated with softer material than the pipe material, with hooks being designed to fit the inside curvature of the pipes. Coated pipes can be moved in storage yard, by forklifts with extendable hooks, protected by rubber or plastic. Steel cables can be used directly in the concrete-coated pipe body, since it does not cause damage to the concrete.

5.2.2.3 New

Pipes shall be kept permanently clean, preventing accumulation of foreign material inside the pipe.

5.2.2.4 New

Pipes stored up to 100m apart from transmission lines (69 kV or above) shall be grounded in order to prevent the accumulation of static electric charge.

5.2.3 to 5.2.7 Adoption

5.2.8 Anti-corrosion coating material

5.2.8.1 General

5.2.8.1.1 Addition

Additionally shall meet the requirements of PETROBRAS [N-2328](#).

5.2.8.1.2 Addition

Additionally shall meet the requirements of PETROBRAS [N-2328](#).

5.2.8.2 and 5.2.8.3 Adoption

5.2.9 Adoption

5.2.10 Welding consumables

5.2.10.1 Replacement

Electrodes, rods and wire rolls, in its original packaging, shall be stored in accordance with PETROBRAS [N-133](#).

5.2.10.2 to 5.2.10.4 Adoption

5.2.11 Adoption

5.3 Survey and staking of right-of-way, working width or working space

5.3.1 General

5.3.1.1 Adoption

5.3.1.2 Addition

The topographic and cadastral survey of right-of-way and the presentation of modified route shall be executed according to PETROBRAS [N-2624](#).

5.3.1.3 to 5.3.1.6 Adoption

5.3.2 and 5.3.3 Adoption

5.4 Working width preparation

5.4.1 Adoption

5.4.2 Rural area

5.4.2.1 Modification

Replace NOTE "it is recommended grading the working width with the width strictly necessary for pipeline laying, avoiding lowering the original grade" by "it is recommended grading the working width with the width strictly necessary for pipeline laying". **[Recommended Practice]**"

5.4.2.2 to 5.4.2.9 Adoption

5.4.2.10 Modification

Replace paragraph c) "it shall have ramp, route and drainage conditions compatible with vehicles and equipment to be used" by "it shall have ramp, route and drainage conditions compatible with vehicles and equipment that will pass through the working width".

5.4.2.11 and 5.4.2.12 Adoption

5.4.2.13 Modification

Include at the end of the subclause "[Recommended Practice]".

5.4.2.14 Removal

5.4.2.15 and 5.4.2.16 Adoption

5.4.2.17 Addition

NOTE 1 Eventual canalizations and deviations of watercourses only can be performed by means of prior authorization by public body.

NOTE 2 Eventual canalizations and deviations of watercourses shall be temporary, bringing back to initial condition at the end of the works.

5.4.2.18 to 5.4.2.22 Adoption

5.4.2.23 Replacement

The use of germicides, bactericides, and herbicides during work performance should be avoided.
[Recommended Practice]

5.4.2.24 New

Right-of-way burning for clearance purpose shall not be used.

5.4.3 Adoption

5.5 Trench excavation and preparation

5.5.1 to 5.5.4 Adoption

5.5.5 Addition

Include at the end of the Note: "**[Recommended Practice]**"

5.5.6 to 5.5.9 Adoption

5.5.10 Addition

Include at the end of paragraph d): "... and 5.5.18;" and at the end of paragraph j): "**[Recommended Practice]**"

5.5.11 Adoption

5.5.12 Addition

Include at the end of the Note: "**[Recommended Practice]**"

5.5.13 and 5.5.14 Adoption

5.5.15 Addition

Include at the end of subclause "... and 5.5.18" and at the end of the Note: "[**Recommended Practice**]".

5.5.16 and 5.5.17 Adoption

5.5.18 New

All excavation where there are people working inside the trench shall have stability (trench side and bottom) checked by calculation, with minimum safety factor of 1.2. When necessary a specific shoring shall be designed in order to ensure this minimum safety factor.

5.6 Hauling, stringing and handling (including loading and unloading) of pipes and other materials

5.6.1 to 5.6.14 Adoption

5.6.15 Replacement

No material or equipment shall be hauled inside the pipes, including small diameter pipes.

5.7 Pipe bending

5.7.1 Replacement

Pipe cold bending or natural bend pipe shall meet this Standard, the requirements of ABNT [NBR 15280-1](#) (for oil pipelines) and the requirements of ABNT [NBR 12712](#) (for gas pipelines). Induction bending shall meet ABNT [NBR 15273](#) and the design requirements. For induction bending, shall be selected between the pipes available on work site, those with actual higher thickness and higher carbon equivalent, in order to compensate wall thickness and mechanical properties losses resulting from the process.

5.7.2 to 5.7.7 Adoption

5.8 Adoption

5.9 Welding

5.9.1 Modification

Replace "a) for oil pipelines - ASME [B31.4](#)" by "a) for pipelines - [ASME B31.4](#) and PETROBRAS [N-133](#)";

Replace "b) for gas pipelines - ASME [B31.8](#)" by "b) for gas pipelines - [ASME B31.8](#) and PETROBRAS [N-133](#)".

5.9.2 to 5.9.4 Adoption

5.9.4.1 New

Welding procedure qualification shall include inspection of welded joints, by radiographic examination according to PETROBRAS [N-1595](#), or mechanized ultrasonic testing according to PETROBRAS [N-2803](#).

5.9.4.2 New

Welding procedure qualification shall include Charpy V-notch test in the weld metal and in Heat-Affected Zone (HAZ), as follows

- a) the specimens shall be taken from one upper quadrant and one lower quadrant. In each quadrant, they shall be taken 2mm below the surface, as described as follows:
 - three specimens with a notch centered in the weld metal;
 - three specimens with a notch at the HAZ centerline (the notch shall be positioned so as to incorporate the largest possible part of HAZ)
- b) the longitudinal centerline of the specimen shall be perpendicular to the weld and to the notch centerline, oriented by thickness (perpendicular in relation to the surface), in such a way that the crack will propagate parallel to the weld;
- c) the specimens for the Charpy test shall be etched prior to the opening of the notch, so as to allow it to be done in the correct location;
- d) the specimens shall be tested and prepared in accordance with ASTM [A370](#). Full-size specimens shall be used. The acceptance criteria shall be as per table C.9;
- e) in case of use of sub-size specimens, the acceptance criteria shall be proportional to the thickness, and as per table C.9;
- f) test temperature shall be 0°C.

5.9.4.3 New

Welding procedure qualification shall include hardness tests on the weld metal, HAZ and base metal shall be included as follows:

- a) the specimens shall be taken from two quadrants (upper and lower quadrants);
- b) the Vickers method shall be used with 10 kgf load;
- c) the hardness profile shall be surveyed for each specimen as per Figure C.11;
- d) no value shall be greater than 250 HV10

5.9.4.4 New

Even though consumables approved by a Product Certification Body are being used, a specific WPS (Welding Procedure Specification) shall be issued for each applied commercial brand, without any new qualification.

5.9.4.5 New

In case of nominal mechanical properties (yield and tensile strength) of welding consumables specified by applicable AWS are lower than the mechanical properties of the pipes, consumable procurement shall be according to Schedule J of AWS [A 5.01](#). Every certificate of Schedule J lot shall prove that its mechanical properties are in accordance with the mechanical properties of base metal of the pipe to be welded. Whenever the applicable AWS specification/classification does not have Charpy impact requirements, the test shall be performed at 0°C temperature and the absorbed energy criteria shall be according to Table C.9.

NOTE This requirement does not apply to consumable that will be used only on root pass.

5.9.4.6 New

The coated electrodes furnished according to AWS [A5.5](#) specification shall exhibit the suffix P1 or P2, in relation to the grade of pipe to be welded.

5.9.5 to 5.9.16 Adoption

5.9.17 Addition

Include at the end of subclause: "[**Recommended Practice**]".

5.9.18 Adoption

5.9.19 Replacement

Whenever an external line up clamp is used, the length of root pass shall be symmetrically distributed on at least 50 % of the circumference, before line up clamp removal and shall also meet 5.9.21, related to pipe string movement.

NOTE 1 The alignment of the pipes before tie-in welding shall prevent residual stresses, which can compromise the pipeline integrity throughout its lifetime. The pipes shall not be subjected to previous stress, in other words, they shall be kept aligned without application of an external force.

NOTE 2 The ends of pipe strings to be welded shall be uncovered at least two pipes on each pipe string.

5.9.20 to 5.9.23 Adoption

5.9.24 Replacement

The alignment of pipes of different nominal thicknesses shall be according to ASME [B 31.4](#), for oil pipelines, and ASME [B 31.8](#), for gas pipelines.

NOTE 1 It is recommended the use of transition ring. [**Recommended Practice**]

NOTE 2 It is recommended to replace the ultrasonic testing by radiographic examination in case of transition of walls with inner chamfer. [**Recommended Practice**]

5.9.25 to 5.9.27 Adoption

5.9.28 Addition

Include “, immediately before of the start of each pass.” after “incidence”

5.9.29 to 5.9.33 Adoption

5.9.34 Replacement

The time interval between the first and the second weld passes shall not be greater than 30 min and shall not be greater than 48 hours for the other weld passes.

5.9.35 to 5.9.42 Adoption

5.9.43 Replacement

Repair is not allowed in weld areas previously repaired.

5.9.44 to 5.9.47 Adoption

5.10 Inspection after welding

5.10.1 Replacement

For oil and gas pipelines, the extent of the nondestructive testing of welded joints and fabricated assemblies is as follows:

- a) visual inspection: 100% of joints, around the entire circumference as per PETROBRAS [N-1597](#);
- b) inspection through radiographic examination as per PETROBRAS [N-1595](#) or mechanized ultrasonic testing as per PETROBRAS [N-2803](#): 100% of joints, around the entire circumference.

5.10.2 Adoption

5.10.3 Replacement

Whenever ultrasonic testing is used for girth weld inspection, this shall be performed by mechanical equipment that meets the requirements of ASTM [E1961](#) able to provide reproducible and permanent digital records, covering 100% of weld volume in the entire circumference.

NOTE In case of fabricated assemblies, components or tie-ins, where the use of mechanical equipment is not possible, manual equipment able to provide reproducible and permanent digital records can be used, covering 100% of weld volume in the entire circumference.

5.10.4 and 5.10.5 Adoption

5.11 Anti-corrosion external coating and thermal insulation - field joints and repairs

5.11.1 Replacement

All field joints of buried pipelines with external anti-corrosion coating shall be coated according to PETROBRAS [N-2328](#). All field joints of buried pipelines with thermal insulation shall be coated and insulated

5.11.2 and 5.11.3 Adoption

5.11.4 Addition

Include at the end of the subclause "[**Recommended Practice**]".

5.11.5 to 5.11.7 Adoption

5.11.8 Replacement

External painting in aboveground section shall be performed, according to PETROBRAS [N-442](#) and considering environmental conditions established in the design, with colors according to ABNT [NBR 6493](#). Aboveground sections operating with heated product, without polyurethane foam insulation, shall be provided with thermal insulation according to PETROBRAS [N-250](#), ensuring to the external surface a temperature below 60 °C

5.11.9 Adoption

5.11.10 New

A visual inspection and a discontinuity testing shall be performed in the receiving of pipes with anti-corrosion coating and prior to lowering into the pipe section into the trench. Visual inspection shall only be performed on thermally insulated pipes. The damages found on pipes with anti-corrosion external coating shall be repaired according to PETROBRAS [N-2911](#).

5.12 Lowering into the trench

5.12.1 to 5.12.10 Adoption

5.12.11 Addition

Include at the end of the Note "[**Recommended Practice**]".

5.12.12 to 5.12.14 Adoption

5.13 Adoption

5.14 Protection, reinstatement and cleanup

5.14.1 to 5.14.15 Adoption

5.14.16 Addition

Include at the end of the subclause "and meet the following requirements:

- a) wherever there is machine or heavy load traffic, the location shall be ripped prior to vegetative restoring, at least 30 cm deep. In case of underground drainage structures, lower depths can be adopted.
- b) use of native species of grasses and herbs appropriate to erosion control on areas to be protected shall be prioritized, without risking pipe integrity or constraints for right-of-way inspection;
- c) natural revegetation can be used (without seeding or planting) in areas not susceptible to erosion or where the organic soil was preserved (including the presence of propagules or seeds of plant species)
- d) wherever slope is higher than 5°, seeding shall be followed by the installation of a device which prevents leaching of seeds and loss of soil due to erosion (example: anti-erosion biodegradable blanket), up to vegetation development.

NOTE 1 It is recommended the use of plant species with different root depths, for the vegetation reinstatement of cutting slopes, embankments or natural slopes, avoiding the use of grass turf. **[Recommended Practice]**

NOTE 2 it is recommended the use of grass species equal to or lower than 80 cm high, when in maturity, unless when these are required by the owners. **[Recommended Practice]**

5.14.17 Replacement

The definition of areas that require vegetation protection, as well as sowing methods, terrain preparation, soil analysis and correction, pest control and fertilization, shall be subject to specific detailed design of protection and reinstatement to be prepared by a qualified professional under the responsibility of the contractor.

5.14.18 to 5.14.20 Adoption

5.14.20.1 New

In case of reinstatement of terrains used during construction works, the same requirements established for reinstatement of the working width shall be met

5.14.20.2 New

Bushes, leaves, vegetable and animal residues, branches and woods may be used as a protection against post-construction erosion, provided that they comply with the requirements of environmental bodies.

5.14.21 New

The type of vegetation to be used for vegetation protection shall be defined by specific design mentioned in 5.14.17.

5.14.22 New

Trench interceptor dikes shall be constructed on sections with finished longitudinal grade of the working width greater than 20 %, aiming to protect the trench backfilling material against internal erosion. These structures shall meet the following criteria:

- a) they shall be constructed with material capable of supporting terrain settlement;
- b) they shall not be located over welded joints;
- c) whenever the dike construction is performed after the trench backfill and is necessary to excavate over the pipeline, a visual inspection shall be performed with holiday detector in order to check the coating integrity before dike construction.

5.15 Right-of-way and pipeline signage

5.15.1 Replacement

The signage of pipelines and the right-of-way shall be according to PETROBRAS [N-2200](#).

5.15.2 and 5.15.3 Adoption

5.15.4 Modification

Replace "specific designs for line markers" by "specific designs of signage".

5.15.5 Adoption

5.16 Crossings and water crossings

5.16.1 to 5.16.10 Adoption

5.16.11 Replacement

The execution of water crossing, independently of construction technique used, shall consider all determinations imposed by the public authority responsible by the watercourse to be crossed, especially with regard to restrictions for navigation, dredging, and widening of watercourse.

5.16.12 and 5.16.13 Adoption

5.16.13.1 New

Bathymetric surveys shall be carried out by one of the following methods

- a) conventional method / topography;
- b) sounding with a ground penetrating radar;
- c) locating pipe with the electromagnetic conduction technique (PCM-type) together with a digital fathometer;
- d) seismic survey using a sub-bottom profiler".

5.16.13.2 New

The methods described in 5.16.13.1 shall provide:

- a) digital output of field surveys and electronic storage;
- b) profile of the bottom terrain and the pipeline location, with consequent pipe string lowering;
- c) link to the DGPS (Differential Global Positioning System), operating in real-time;
- d) location results with an accuracy better than 10 cm on the horizontal plan and 10% deep on the vertical plan;
- e) maximum spacing of 5m between check points on the pipe string.

5.16.14 Adoption

6 Cleaning, Filling and Gauging (Adoption)

7 Hydrostatic testing

7.1 to 7.6.1 Adoption

7.6.2 Modification

Replace "external surface of buried pipeline" by "external surface (metallic wall) of buried pipeline".

7.6.3 to 7.8.3 Adoption

7.8.4 Modification

Replace "right after lowering" by "before and after lowering".

7.8.5 to 7.9.1 Adoption

7.9.2 Modification

Replace "should" by "shall".

7.9.2.1 New

In addition to the criteria mentioned in 7.9.2, out-of-roundness (difference between the largest and the smallest external diameters measured in the same pipe cross-section) greater than 5 % shall be considered unacceptable, in any extension.

7.9.2.2 New

Anomalies deemed unacceptable shall be confirmed through field inspection (correlation), with removal of external anti-corrosion coating of the pipe.

7.9.2.3 New

Anomalies confirmed as unacceptable shall be corrected by cutting and replacing the pipe, or the affected length.

7.9.2.4 New

A caliper pig inspection report shall be issued, recording all detected anomalies, followed by technical report, in accordance with the acceptance criteria and field inspection results.

7.9.3 to 7.11 Adoption

8 Pipeline Commissioning

8.1 to 8.5.7 Adoption

8.6 Components and Fabricated Assemblies Installation

8.6.1 Modification

Replace "ABNT NBR ISO 15589-1" by "ABNT [NBR ISO 15589-1](#) and PETROBRAS [N-2298](#)."

8.6.2 Replacement

Fabrication, assembly and installation of components and fabricated assemblies shall be performed according to PETROBRAS [N-115](#).

NOTE Hydrostatic test shall meet the requirements of 7.8.

8.6.3 to 8.7.2 Adoption

8.7.3 Addition

Include “, until it reaches the condition established in 8.7.1”.

8.7.4 Adoption

8.7.5 Modification

Replace "described in 8.9.1" by "described in 8.7.1"

8.8 to 8.8.3 Adoption

9 Inspection of The External Anti-Corrosion Coating - After Backfill

9.1 Modification

Replace “anti-corrosion coating, through a fault location method by field inspection” by “anti-corrosion coating, through a pipeline current mapper (PCM) with complementary technique A-frame”.

9.2 Adoption

10 Documentation

10.1 As-built documents

10.1.1 Modification

Replace “Drawings in plan and profile to a scale, at least, equal to cadastral and topographic survey, containing the following elements:” by "Plan and profile georeferenced drawings, compatible with a geographic information system (GIS), to a scale, at least, equal to cadastral and topographic survey, containing the following elements:" and include new paragraphs:

"q) location of protection and stability works of the right-of-way;"

"r) location of protection and underground signage installed for the pipeline (casing, protection mesh, concrete slab, geotextile fabric, concrete jacket, etc.)".

10.1.2 and 10.1.3 Adoption

10.1.4 Modification

Replace "shall indicate pipeline UTM coordinates in its entire length" by "shall be georeferenced, indicating pipeline UTM coordinates in its entire length".

10.1.5 Adoption

10.1.6 Replacement

All drawings mentioned in 10.1.5 shall be issued in digital format.

NOTE Horizontal scale of 1:200 should be used. **[Recommended Practice]**

10.1.7 Replacement

A pipe stringing spreadsheet according to 4.7.2, including UTM coordinates of welded joints and updating as built information.

10.2 Adoption

10.3 Addition

Include “g) photographic survey report for the main construction stages.”

Annex A - Definitions

A.1 to A.28 Adoption

A.29 Replacement

dike

retaining wall constructed inside a trench, to contain the trench backfilling and provide support to the pipeline, during its lifetime

A.30 to A.75 Adoption

A.76 Replacement

water crossing

buried, trenchless or aerial pipeline section across rivers, streams, lakes, dams, channels and permanently flooded areas, or over deep depressions, grottos and other natural geographical features, where the pipeline section is necessarily aerial

A.77 to A.83 Adoption

Annex B - Criteria for Material Receiving Inspection**B.1 General**

B.1.1 to B.1.4 Adoption

B.1.5 New

All unidentified and uncertified metallic materials shall be subject to steel and metal alloys recognition in accordance with ABNT [NBR 16137](#), confronting the results with the required specification.

B.2 to B.12 Adoption

B.13 Modification

Replace “ABNT NBR ISO 15589-1” by “ABNT [NBR ISO 15589-1](#) and PETROBRAS [N-2298](#).”

Annex C - Tables and Figures

Table C.1 Addition

NOTE 1 Whenever is not possible the application of external polyethylene or polypropylene three-layer coating or fusion bonded epoxy coating on buried sections, polyethylene tapes shall be applied on pipes with diameter less than 6 in, according to PETROBRAS N-2238.

NOTE 2 The polyethylene tape shall not be used in rocky soil and horizontal directional drilling.

Tables C.2 to C.4 Adoption

Table C.5 Removal

Tables C.6 to C.8 Adoption

Table C.9 New

Table C.9 - Acceptance Criteria for Charpy-V Test

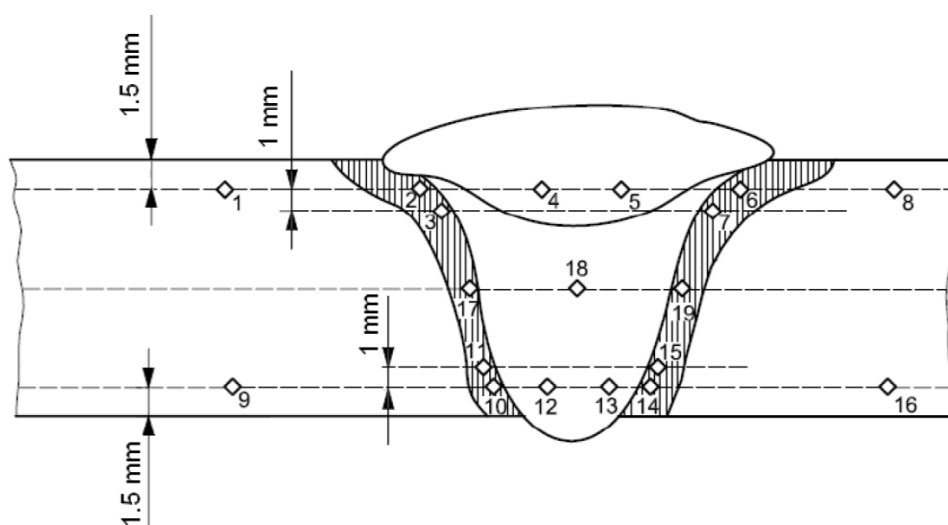
Pipe Grade	Average of three specimens (J)	Minimum individual (J)
B	27	22
X42		
X46		
X52		
X56		
X60	36	29
X65	40	32
X70		
X80	56	45

Figures C.1 and C.2 Adoption

Figures C.3-a.to C.7-b Removal

Figures C.8 to C.10 Adoption

Figure C.11 New



- NOTE 1 The hardness impressions 2, 3, 6, 7, 10, 11, 14, 15, 17 and 19 entirely within the HAZ and located as close as possible to the fusion boundary.
- NOTE 2 The top line of survey positioned so that impressions 2 and 6 coincide with the HAZ of the final run.

Figure C.11 - Hardness Profile

INDEX OF REVISIONS	
REV. A, B, C, D, E and F	
There is no index of revisions	
REV. G	
Affected Parts	Description of the Alteration
1.3	Included
2	Revised
3	Revised
4	Excluded
4.2.7	Excluded
4.8.5	Excluded
4.10.6	Excluded
4.13.7	Excluded
5	Renumbered
5.1.1	Included
5.1.2.4	Included
4.6.9	Renumbered
5.1.3.1 up to 5.1.3.3	Revised
5.1.4.1	Revised
5.1.5.1 and 5.1.5.8	Revised
5.1.6.1	Revised
5.1.7.1 and 5.1.7.2	Revised
5.1.8.1	Revised
5.1.9.1	Revised
5.1.9.2	Included
5.2.1.1 paragraph b)	Revised
5.2.2.1	Revised
5.2.2.3	Included
5.2.3.2	Included
5.2.6.1	Revised
5.4.1 a 5.4.3	Revised
5.5	Revised
5.6.1 paragraph e)	Included

REV. G	
Affected Parts	Description of the Alteration
5.6.6	Revised
5.7.5	Revised
5.7.6 paragraph b)	Revised
5.8.4 paragraph j)	Revised
5.8.7 and 5.8.8	Revised
5.9.2 Note	Included
5.9.19 paragraph a)	Included
5.10.2 Note	Renumbered
5.10.7	Revised
5.10.9 Note	Revised and Renumbered
5.11.1 paragraphs a) e b)	Revised
5.13.4	Revised
5.13.9 paragraph a)	Excluded
5.13.13	Revised
5.13.16	Revised
5.13.17	Included
5.14.1	Revised
5.14.4 paragraph c)	Revised
5.16.1 Note	Renumbered
5.16.5	Revised
5.16.10 and 5.16.11	Revised
5.17 and 5.18	Revised
TABLE 1	Included
6	Included
7	Renumbered
8	Included
9.1	Revised and Renumbered
9.3	Included
9.4	Renumbered
ANNEX A	Included
ANNEX B	Renumbered
TABLE C-3	Included

REV. H	
Affected Parts	Description of the Alteration
All	Revised
REV. J	
Affected Parts	Description of the Alteration
1 up to 3	Revised
4	Included
4.1	Included
4.2	Revised and Renumbered
4.3	Revised and Renumbered
4.4	Revised and Renumbered
4.4.1 up to 4.4.6	Renumbered
4.4.7	Renumbered and Revised
4.4.8	Renumbered
4.4.9	Revised and Renumbered
4.4.10 up to 4.4.12	Renumbered
4.4.13 up to 4.4.22	Included
4.5, 4.5.1, 4.5.2, 4.5.3	Revised and Renumbered
4.6	Included
4.7	Renumbered
4.7.1 and 4.7.2	Revised and Renumbered
4.7.3	Renumbered
5	Revised and Renumbered
5.1	Renumbered
5.2	Revised and Renumbered
5.2.1	Included
5.2.2	Renumbered
5.2.2.1 and 5.2.2.2	Revised and Renumbered
5.2.2.3	Renumbered
5.2.2.4	Revised and Renumbered
5.2.2.5 up to 5.2.2.15	Included
5.2.3 up to 5.2.7	Revised and Renumbered
5.2.8 up to 5.2.11.4	Included

REV. J	
Affected Parts	Description of the Alteration
5.3, 5.3.1, 5.3.2	Revised and Renumbered
5.4	Included
5.5 up to 5.5.6	Revised and Renumbered
5.5.7 and 5.5.8	Included
5.5.9 up to 5.5.12	Revised and Renumbered
5.5.13 up to 5.5.16	Included
5.5.17 up to 5.5.20	Revised and Renumbered
5.5.21	Included
5.5.22 up to 5.5.24	Revised and Renumbered
5.6	Included
5.7	Renumbered
5.7.1 up to 5.7.3	Revised and Renumbered
5.7.4	Included
5.7.5 e 5.7.6	Revised and Renumbered
5.7.7	Included
5.7.8 up to 5.7.10	Revised and Renumbered
5.7.11	Included
5.7.12	Revised and Renumbered
5.7.13 and 5.7.14	Included
5.7.15	Revised and Renumbered
5.7.16	Included
5.7.17	Revised and Renumbered
5.8 up to 5.8.13	Revised and Renumbered
5.8.14 up to 5.8.15	Included
5.9 up to 5.9.4	Revised and Renumbered
5.9.5	Included
5.9.6	Revised and Renumbered
5.9.7	Included
5.9.8	Revised and Renumbered
5.10 and 5.10.1	Revised and Renumbered
5.10.2 up to 5.10.4	Included
5.10.5 and 5.10.6	Revised and Renumbered

REV. J	
Affected Parts	Description of the Alteration
5.11	Renumbered
5.11.1	Revised and Renumbered
5.11.2	Included
5.11.3	Revised and Renumbered
5.11.4 up to 5.11.4.5	Included
5.11.5 up to 5.11.10	Revised and Renumbered
5.11.11 up to 5.11.16	Included
5.11.17 up to 5.11.19	Revised and Renumbered
5.11.20	Included
5.11.21 up to 5.11.24	Revised and Renumbered
5.11.25 e 5.11.26	Included
5.11.27 up to 5.11.29	Revised and Renumbered
5.11.30 up to 5.11. 39	Included
5.11.40	Removed
5.11.41 and 5.11.42	Included
5.11.43 up to 5.11.47	Revised and Renumbered
5.11.48	Included
5.12 up to 5.12.5	Revised and Renumbered
5.13 e 5.13.1	Revised and Renumbered
5.13.2 up to 5.13.9	Included
5.13.10	Revised and Renumbered
5.14 up to 5.14.7	Revised and Renumbered
5.14.8 up to 5.14.10	Included
5.14.11 and 5.14.12	Revised and Renumbered
5.14.13	Included
5.14.14	Revised and Renumbered
5.14.15	Included
5.15	Included
5.15.1 and 5.15.2	Revised and Renumbered
5.15.4	Revised and Renumbered
5.15.5 up to 5.15.7	Included
5.15.8 up to 5.15.10	Revised and Renumbered

REV. J	
Affected Parts	Description of the Alteration
5.16 up to 5.16.2	Revised and Renumbered
5.16.3	Included
5.16.4	Renumbered
5.16.5 and 5.16.6	Included
5.16.7	Revised and Renumbered
5.16.8 up to 5.16.13	Included
5.16.14 up to 5.16.20	Revised and Renumbered
5.16.21	Removed
5.17	Revised and Renumbered
5.17.1 up to 5.17.4	Included
5.18	Renumbered
5.18.1	Revised and Renumbered
5.18.2	Included
5.18.3 up to 5.18.8	Revised and Renumbered
5.19 e 5.19.1	Revised and Renumbered
5.19.2 up to 5.19.5	Included
5.19.6 and 5.19.7	Revised and Renumbered
5.19.8 and 5.19.9	Included
5.19.10	Revised e Renumbered
5.19.11	Removed
5.19.12	Revised and Renumbered
5.19.13 up to 5.19.13.2	Revised and Renumbered
5.19.14	Revised and Renumbered
6	Renumbered
6.1	Included
6.2 up to 6.5	Revised and Renumbered
6.6	Included
6.6.1 up to 6.6.4	Revised and Renumbered
6.6.5	Removed
6.6.6 up to 6.6.9	Revised and Renumbered
6.6.10	Included
6.6.11	Revised and Renumbered

REV. J	
Affected Parts	Description of the Alteration
6.7	Revised and Renumbered
7.9	Included
7.9.1	Removed
7.9.2	Revised and Renumbered
7.9.2.1	Included
7.9.2.2 up to 7.9.2.5	Revised and Renumbered
7.9.3 and 7.9.4	Included
7.10	Revised and Renumbered
7.11	Included
7.12	Revised and Renumbered
8	Renumbered
8.1	Revised and Renumbered
8.2 up to 8.4	Included
8.5	Included
8.6	Revised and Renumbered
8.7 up to 8.7.3	Renumbered and Revised
8.8	Renumbered
8.8.1	Included
8.8.2 up to 8.8.9	Renumbered and Revised
8.8.10 up to 8.8.14	Included
8.9	Renumbered
8.9.1 up to 8.9.5	Renumbered and Revised
9	Renumbered
9.1 and 9.1.2	Renumbered and Revised
10	Included
10.1 up to 10.3	Removed
11	Revised
11.1	Revised
11.4 up to 11.14	Renumbered and Revised
11.15	Included
11.16	Renumbered
ANNEX A	Included

REV. J	
Affected Parts	Description of the Alteration
ANNEX B	Included
ANNEX C	Included
REV. K	
Affected Parts	Description of the Alteration
Preface	Revised
1 up to 1.3	Revised
2 e 3	Revised
4, 4.2 and 4.4	Revised
4.4.7 and 4.4.9	Revised
4.4.13 and 4.4.22	Revised
4.4.23	Included
4.5, 4.5.2, 4.5.3 e 4.5.4	Revised
4.7, 4.7.1 and 4.7.2	Revised
4.7.3	Excluded
5.2.2.1 up to 5.2.2.4	Revised
5.2.2.5 up to 5.2.2.15	Excluded
5.2.3 and 5.2.3.6	Revised
5.2.8.1, 5.2.8.1.1 and 5.2.8.1.2	Revised
5.2.8.2 and 5.2.8.3	Revised
5.2.8.4 up to 5.2.8.7	Excluded
5.2.10 and 5.2.10.1	Revised
5.2.11 and 5.2.11.1	Revised
5.2.11.4	Revised
5.3, 5.3.1.2, 5.3.2 and 5.3.3	Revised
5.4, 5.4.1, 5.4.1.3 and 5.4.1.8	Revised
5.4.2, 5.4.2.1, 5.4.2.10 and 5.4.2.13	Revised
5.4.2.14	Excluded
5.4.2.17 and 5.4.2.23	Revised
5.4.2.24	Included
5.4.3 and 5.4.3.2	Revised
5.4.3.8 and 5.4.3.9	Included

REV. K	
Affected Parts	Description of the Alteration
5.5, 5.5.1, 5.5.4 and 5.5.5	Revised
5.5.10 up to 5.5.12	Revised
5.5.15 and 5.5.18	Revised
5.5.19 up to 5.5.24	Excluded
5.6 and 5.6.7	Revised
5.6.11 up to 5.6.15	Included
5.7 and 5.7.1	Revised
5.7.3 up to 5.7.5	Revised
5.7.8 up to 5.7.17	Excluded
5.8	Revised
5.8.7 up to 5.8.15	Excluded
5.9 and 5.9.1	Revised
5.9.3.2	Revised
5.9.4	Revised
5.9.4.1 up to 5.9.4.6	Included
5.9.6	Revised
5.9.9 up to 5.9.47	Included
5.10 and 5.10.1	Revised
5.10.3 and 5.10.5	Revised
5.10.6	Excluded
5.11, 5.11.1 and 5.11.4	Revised
5.11.4.1 up to 5.11.4.5	Excluded
5.11.8 and 5.11.10	Revised
5.11.11 up to 5.11.48	Excluded
5.12 and 5.12.1	Revised
5.12.4 and 5.12.5	Revised
5.12.6 up to 5.12.14	Included
5.13, 5.13.1 up to 5.13.3	Revised
5.13.7 up to 5.13.10	Revised
5.14, 5.14.1 and 5.14.5	Revised
5.14.11 up to 5.14.13, 5.14.15	Revised
5.14.16 up to 5.14.22	Included

REV. K	
Affected Parts	Description of the Alteration
5.15 and 5.15.1	Revised
5.15.3	Included
5.15.4	Revised
5.15.6 up to 5.15.10	Excluded
5.16, 5.16.3 and 5.16.4	Revised
5.16.8, 5.16.11 and 5.16.13	Revised
5.16.13.1 and 5.16.13.2	Included
5.16.14	Revised
5.16.15 up to 5.16.21	Excluded
5.17, 5.18 and 5.19	Excluded
6.3, 6.4, 6.6.5 and 6.6.8	Revised
6.6.11	Excluded
7, 7.2 e 7.3	Revised
7.6, 7.6.2, 7.8 and 7.8.4	Revised
7.9.1, 7.9.2 and 7.9.2.1	Revised
7.9.2.2	Revised and Renumbered
7.9.2.3 up to 7.9.2.5	Renumbered
7.10	Revised
7.11.1	Excluded
7.11.2 up to 7.11.4	Renumbered
7.12	Renumbered
8, 8.1 up to 8.3	Revised
8.5, 8.6 and 8.6.5	Revised
8.7, 8.8 and 8.9	Revised
8.10	Included
9.1	Revised
9.1.1 and 9.1.2	Excluded
10 up to 10.3	Revised
10.4 up to 10.9	Included
11	Excluded
A.29 and A.76	Revised
A.76	Revised

[illegible]

ASTM [E1961](#) - Standard Practice for Mechanized Ultrasonic Testing of Girth Welds Using Zonal Discrimination with Focused Search Units;

AWS [A5.01M/A5.01](#) - Procurement Guidelines for Consumables - Welding and Allied Processes - Flux and Gas Shielded Electrical Welding Processes;

AWS [A5.5/A5.5M](#) - Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding;

BSI [PD 8010-1](#) - Pipelines Systems - Part 1: Steel Pipelines on Land - Code of Practice;

MSS [SP55](#) - Quality Standard for Steel Castings for Valves, Flanges, Fittings and Other Piping Components - Visual Method for Evaluation of Surface Irregularities

NOTE 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 Adoption

4 General Requirements

4.1 to 4.3 Adoption

4.4 Modification

Replace "4.4.1 to 4.4.22" by "4.4.1 to 4.4.23"

4.4.1 to 4.4.22 Adoption

4.4.23 New

The requirements of PETROBRAS [N-1965](#) for operation, maintenance, inspection and testing of load handling equipment shall be met.

4.5 to 4.7 Adoption

4.7.1 Replacement

Technical documents shall be prepared in digital media, according to PETROBRAS [N-381](#), PETROBRAS [N-2064](#) and PETROBRAS [N-1710](#), in accordance with design requirements, considering the same mapping accuracy. These documents shall be delivered according to Clause 10.

4.7.2 Adoption

5 Specific Requirements

5.1 Adoption

5.2 Storage and preservation of materials

10.1.6 Replacement

All drawings mentioned in 10.1.5 shall be issued in digital format.

NOTE Horizontal scale of 1:200 should be used. **[Recommended Practice]**

10.1.7 Replacement

A pipe stringing spreadsheet according to 4.7.2, including UTM coordinates of welded joints and updating as built information.

10.1.8 New

A photographic survey report for the main construction stages

10.2 and 10.3 Adoption

AMENDED SHEET IN 06/2016
DO NOT USE

Foreword (Replacement)

This Standard is the English version (issued in 10/2015) of PETROBRAS N-464 REV. K 09/2015. In case of doubt, the Portuguese version, which is the valid document for all intents and purposes, shall be used.

The sequence of subsections in this Standard follows the same sequence as that used by ABNT [NBR 15280-2:2014](#).

The construction, installation and commissioning of onshore pipelines shall comply with ABNT [NBR 15280-2:2014](#), complemented by the following alterations, in accordance with the definitions set below. The information of each subsection shall be read as follows, whenever it starts with:

- **Addition:** continuation of specific item of ABNT [NBR 15280-2:2014](#);
- **Adoption:** full adoption of specific item of ABNT [NBR 15280-2:2014](#);
- **Modification:** replacement of part of specific item of ABNT [NBR 15280-2:2014](#);
- **New:** insertion of requirement not included in ABNT [NBR 15280-2:2014](#);
- **Removal:** full removal of specific item of ABNT [NBR 15280-2:2014](#);
- **Replacement:** full replacement of specific item of ABNT [NBR 15280-2:2014](#).

1 Scope

1.1 Replacement

This Standard establishes the minimum requirements for construction, installation, commissioning, test and acceptance of onshore pipelines.

1.2 Modification

Replace “part of ABNT [NBR 15280](#)” by “standard”.

1.3 New

This Standard contains Technical Requirements and Recommended Practices.

2 Referenced Standards (Replacement)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition mentioned applies. For undated references, the latest edition of the referenced document applies.

PETROBRAS [N-115](#) - Fabrication and Erection of Metallic Piping;

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

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

PETROBRAS [N-381](#) - Execution of Drawing and Other General Technical Documents;

PETROBRAS [N-442](#) - External Painting of Piping for Onshore Facilities;

PETROBRAS [N-1595](#) - Non-Destructive Testing - Radiography;

PETROBRAS [N-1597](#) - Non-Destructive Testing - Visual Inspection;

ABNT [NBR 15273](#) - Indústrias de Petróleo e Gás Natural - Curvas por Indução para Sistema de Transporte por Dutos;

ABNT [NBR 15280-1](#) - Dutos Terrestres - Parte 1: Projeto;

ABNT [NBR 15280-2](#) - Onshore Pipelines - Part 2: Construction and Installation;

ABNT [NBR 15637-1](#) - Cintas Têxteis para elevação de Carga - Parte 1: Cintas Planas Manufaturadas, com Fitas Tecidas com Fios Sintéticos de Alta Tenacidade Formados por Multifilamentos;

ABNT [NBR 16049](#) - Dutos terrestres - Qualificação e Certificação de Pessoas - Inspetores;

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

ABNT [NBR 16212](#) - Tubos - Estocagem em Área Descoberta;

ABNT [NBR 16381](#) - Dutos Terrestres e Submarinos - Câmara de Pig;

ABNT [NBR NM 67](#) - Concreto - Determinação da Consistência pelo Abatimento do Tronco de Cone;

ABNT [NBR NM 248](#) - Agregados - Determinação da Composição Granulométrica;

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

ABNT [NBR ISO 15589-1](#) - Indústria do Petróleo e Gás Natural - Proteção Catódica para Sistemas de Transporte de Dutos - Parte 1: Dutos Terrestres;

ABNT [NBR ISO/IEC 17024](#) - Avaliação da Conformidade - Requisitos Gerais para Organismos que Certificam Pessoas;

APHA [4500](#) - Standard Methods;

API [RP 1110](#) - Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide;

API [STD 1104](#) - Welding Pipelines and Related Facilities;

ASME [B31.4](#) - Pipeline Transportation Systems for Liquid and Slurries;

ASME [B31.8](#) - Gas Transmission and Distribution Piping Systems;

ASME [BPVC Section IX](#) - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators;

ASTM [A370](#) - Standard Test Methods and Definitions for Mechanical Testing of Steel Products;

ASTM [D638](#) - Standard Test Method for Tensile Properties of Plastics;

ASTM [D792](#) - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement;

ASTM [D882](#) - Standard Test Method for Tensile Properties of Thin Plastic Sheet;

ASTM [D1505](#) - Standard Test Method for Density of Plastics by the Density-Gradient Technique;

7.6.2 Modification

Replace "external surface of buried pipeline" by "external surface (metallic wall) of buried pipeline".

7.6.3 to 7.8.3 Adoption

7.8.4 Modification

Replace "right after lowering" by "before and after lowering".

7.8.5 to 7.9.1 Adoption

7.9.2 Modification

Replace "should" by "shall".

7.9.2.1 New

In addition to the criteria mentioned in 7.9.2, out-of-roundness (difference between the largest and the smallest external diameters measured in the same pipe cross-section) greater than 5 % shall be considered unacceptable, in any extension.

7.9.2.2 New

Anomalies deemed unacceptable shall be confirmed through field inspection (correlation), with removal of external anti-corrosion coating of the pipe.

7.9.2.3 New

Anomalies confirmed as unacceptable shall be corrected by cutting and replacing the pipe, or the affected length.

7.9.2.4 New

A caliper pig inspection report shall be issued, recording all detected anomalies, followed by technical report, in accordance with the acceptance criteria and field inspection results.

7.9.3 to 7.11 Adoption

8 Pipeline Commissioning

8.1 to 8.8 Adoption

8.8.1 Modification

Replace "ABNT NBR ISO 15589-1" by "ABNT [NBR ISO 15589-1](#) and PETROBRAS [N-2298](#)."

8.8.2 Replacement

Fabrication, assembly and installation of components and fabricated assemblies shall be performed according to PETROBRAS [N-115](#).

NOTE Hydrostatic test shall meet the requirements of 7.8.

8.8.3 to 8.9.2 Adoption

8.9.3 Addition

Include “, until it reaches the condition established in 8.9.1”.

8.9.4 to 8.10.3 Adoption

9 Inspection of the External Anti-Corrosion Coating - After backfill

9.1 Modification

Replace “anti-corrosion coating, through a fault location method by field inspection” by “anti-corrosion coating, through a pipeline current mapper (PCM) with complementary technique A-frame”.

9.2 Adoption

10 Documentation

10.1 As-built documents

10.1.1 Modification

Replace “Drawings in plan and profile to a scale, at least, equal to cadastral and topographic survey, containing the following elements:” by “Plan and profile georeferenced drawings, compatible with a geographic information system (GIS), to a scale, at least, equal to cadastral and topographic survey, containing the following elements:” and include new paragraphs:

“q) location of protection and stability works of the right-of-way;”

“r) location of protection and underground signage installed for the pipeline (casing, protection mesh, concrete slab, geotextile fabric, concrete jacket, etc.)”.

10.1.2 and 10.1.3 Adoption

10.1.4 Modification

Replace “shall indicate pipeline UTM coordinates in its entire length” by “shall be georeferenced, indicating pipeline UTM coordinates in its entire length”.

10.1.5 Adoption

10.1.6 Replacement

All drawings mentioned in 10.1.5 shall be issued in digital format.

NOTE Horizontal scale of 1:200 should be used. **[Recommended Practice]**

10.1.7 Replacement

A pipe stringing spreadsheet according to 4.7.2, including UTM coordinates of welded joints and updating as built information.

10.2 to 10.8 Adoption

10.9 New

Photographic survey of main construction stages.

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