

CONTECComissão de Normalização
Técnica**SC-14**Painting and Anticorrosive
Coatings**HIGH-TEMPERATURE INDICATING PAINT****2nd Amendment**

This is the 2nd Amendment to PETROBRAS N-1514 REV. B, 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 position(s).

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 2nd AMENDMENT - 02/2014**- Section 2**

Exclusion of PETROBRAS N-1288, N-1318, N-1358 and ABNT NBR 5840.

Inclusion of ABNT [NBR 15442](#) and ISO [3233](#).

- Subsection 6.2

Cancelled.

- Subsection 6.3

Alteration of the text.

- Table 2

Alteration of the text.

- Subsection 6.5.2.3

Cancelled.

HIGH-TEMPERATURE INDICATING PAINT

Specification

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 clauses 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 the verb forms "shall," "it is necessary...," "is required to...," "it is required that...," "is to...," "has to...," "only ... is permitted," and other equivalent expressions having an 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 the verbal form "should" and equivalent expressions such as "it is recommended that..." and "ought to..." (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 clause(s) to be revised, the proposed text, and technical/economic justification for revision. The proposals are evaluated during the work for alteration of this Standard.

"The present Standard is the exclusive property of PETRÓLEO BRASILEIRO S.A. - PETROBRAS, for internal use in the Company, and any reproduction for external use or disclosure, without previous and express authorization from the owner, will imply an unlawful act pursuant to the relevant legislation through which the applicable responsibilities shall be imputed. External circulation shall be regulated by a specific clause of Secrecy and Confidentiality pursuant to the terms of intellectual and industrial property law."

Foreword

PETROBRAS Technical Standards are prepared by Working Groups - WG (consisting of specialists from PETROBRAS and its Subsidiaries), are commented by PETROBRAS Units and PETROBRAS Subsidiaries, are approved by the Authoring Subcommittees - SCs (consisting of specialists from the same specialty, representing the various PETROBRAS Units and PETROBRAS Subsidiaries), and ratified by the Executive Nucleus (consisting of representatives of the PETROBRAS Units and PETROBRAS 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 standard N-1. For complete information about PETROBRAS Technical Standards see PETROBRAS Technical Standards Catalog.

CONTEC

Comissão de Normalização
Técnica

SC - 14

Painting and Anticorrosive
Coatings

FOREWORD

This Standard is the English version (issued in AUG/2008) of PETROBRAS standard N-1514 REV. B MAR/2007, which is the Revalidation of PETROBRAS standard N-1514 REV. A DEC/2001, including its Amendment AUG/2008. 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 characteristics verifiable in the laboratory required for receipt of the high-temperature indicating paint.

1.2 This Standard applies to specifications starting from of its issue date.

1.3 This Standard only contains Technical Requirements.

2 SUPPLEMENTARY DOCUMENTS

The documents listed below are mentioned in the text and contain valid requirements for the present Standard.

PETROBRAS N-1288	- Inspeção de Recebimento de Recipientes Fechados;
PETROBRAS N-1358	- Sólidos por Volume - Determinação pelo Disco de Aço;
PETROBRAS N-1661	- Zinc Ethyl Silicate Paint;
ABNT NBR 5839	- Coleta de Amostras de Tintas e Vernizes;
ISO 8501-1	- Preparation of Steel Substrates before Application of Paints and Related Products;
ASTM D 562	- Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity using a Stormer - Type Viscometer;
ASTM D 1005	- Standard Test Method for Measuring of Dry-Film Thickness of Organic Coatings Using Micrometres;
ASTM D 1640	- Standard Test Methods for Drying, Curing, for Film Formation of Organic Coatings at Room Temperature.

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.

APPLICATION

3.1 The paint covered by this Standard is intended to be used to indicate localized heating on the outside of reactors, pressure vessels, pipelines, piping, and other equipment. Such heating may result from flaws on the refractory coating or in the thermal insulation of the equipment. In those cases, a noticeable change will occur in the color of the paint applied outside the equipment.

3.2 Two types of paint are specified, based on the temperatures at which the color changes occur, as described in TABLE 1.

TABLE 1 - COLOR CHANGES BASED ON TEMPERATURE

Color Variation Range	Type 1	Type 2
color up to 180 °C		dark blue
color up to 260 °C	dark green	
between 20 °C and 230 °C		change in color to greenish light blue in 36 h to 60 h
at 260 °C		change to light color in a few hours, becoming white in 24 h
at 290 °C	displacement observed after 3 weeks	
at 315 °C	displacement noticeable after 18 h	
at 400 °C	change in color to white after 3 h	

3.3 The application of this paint shall be compatible with zinc ethyl silicate paint (PETROBRAS standard [N-1661](#)) used as primer.

4 GENERAL CONDITIONS

4.1 Appearance

The paint shall be in a homogeneous state, with no deposits, skinning, and thickening, in a recently opened can.

4.2 Supply and Packaging Units

4.2.1 Supply and package units shall be established by mutual agreement between the purchaser and the supplier.

4.2.2 The format of the cans shall be straight circular cylindrical.

4.2.3 It is forbidden to use cork to seal can lids.

4.3 State and Filling of Containers

Containers shall be maintained in good conditions, be duly labeled or marked on the side according to the requirements of this Standard. Containers shall contain at least the quantity corresponding to the respective indication.

4.4 Dilution

When necessary, in order to facilitate application, this paint may be diluted with a suitable solvent indicated by the manufacturer.

4.5 Marking

Containers shall bring, on the label or on their body, at least the following information, which shall not be indicated on the lid:

- a) PETROBRAS standard N-1514;
- b) High-temperature indicating paint;
- c) type 1 or 2;
- d) solvent to be used and maximum quantity permitted;
- e) manufacturer's name and address;
- f) quantity contained in container, liters and in kg;
- g) product expiration date;
- h) number or sign identifying manufacture lot;
- i) number and date of Material Supply Authorization.

5 SPECIFIC CONDITIONS

5.1 This paint, when examined with respect to sedimentation, shall be easily homogenized.

5.2 This paint shall display stability when stored in a closed can, allowing it to be used up to 10 months after it is supplied, and the paint shall be stored at a maximum temperature of 35 °C.

5.3 The quantitative requirements of this paint are found in TABLE 1 and in items 5.4 and 6.5.3.

5.4 This paint may be diluted with up to 5 % of the original volume, for brush or gun application, with the solvent indicated by the manufacturer. After dilution, in the settling test, the paint shall be easily homogenized. The material obtained after dilution of the paint shall display a uniform consistency, without thickening, skinning and gelling.

6 INSPECTION

6.1 The purchaser is responsible for checking at the factory or at the place of delivery if the conditions indicated in items 4.2, 4.3, and 4.5 are satisfied and for rejecting any supply that fail to satisfy those conditions.

6.2 Cancelled - Contents of the 2nd Amendment - 01/2014

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6.3 For checking the conditions indicated in items 4.2, 4.3, and 4.5, ABNT [NBR 15542](#) shall be used.

6.4 Sampling

6.4.1 The supplier shall prepare the sample for the tests, in accordance with the method of ABNT [Standard NBR 5839](#), in the presence of the PETROBRAS inspector, previously requested to witness it, and then send it to the laboratory, requesting at this time the presence of the PETROBRAS inspector to witness the sample preparation process.

6.4.2 The laboratory selected for testing is contingent upon prior agreement between the supplier and PETROBRAS.

6.5 Tests

6.5.1 The tests to be performed are those contained in TABLE 2 and in item 6.5.3.

TABLE 2 - CHARACTERISTICS OF PAINT AS RECEIVED

Tests	Requirements				Method to be Used(Standards)
	Type 1		Type 2		
	min.	max.	min.	max.	
Solids by volume, %	46.0	-	45.0	-	ISO 3233
Consistency, UK	60.0	70.0	65.0	70.0	ASTM D 562
Drying time to touch, h	-	4.0	-	0.5	ASTM D 1640
Drying time to repainting, h	-	24.0	-	16,0	ASTM D 1640
Thickness per coat. μm	25	-	25	-	ASTM D 1005

6.5.2 For the performance of the tests indicated in TABLE 2 the indications presented in items 6.5.2.1 to 6.5.2.3 shall be observed.

6.5.2.1 The dry films for the tests referred to in TABLE 2 shall have a thickness of $25 \mu\text{m} \pm 2 \mu\text{m}$.

6.5.2.2 The test panels shall be made in AISI-1020 carbon steel plate and the dimensions shall be 150 mm x 100 mm and at least 4 mm of thickness. Surface preparation shall be performed by abrasive blasting to near white metal, grade Sa 2 1/2 of ISO [8501-1](#) standard. The anchor profile shall be 50 μm to 70 μm , angular type.

6.5.2.3 Cancelled - Contents of the 2nd Amendment - 02/2014.

6.5.3 Test panels with the paint applied shall be subjected to the temperatures indicated in TABLE 1, based on the type, observing the changes in color in the ranges of the temperature levels reached, according to the type of paint (1 or 2), which is being examined. The coloring observed shall be in accordance with the provisions in item 3.2 and in TABLE 1.

7 ACCEPTANCE AND REJECTION

7.1 Simply on the basis of the results of the general inspection pursuant to the terms of Chapter 6 of this Standard, the purchaser shall accept or reject the manufacture lot or batch.

7.2 If the results of the inspection in Chapter 6 of this Standard are satisfactory, the inspector shall take the samples according to item 6.4 and send them to the laboratory to perform the tests contained in item 6.5.

7.3 In case all the tests satisfy the requirements of Chapter 6 of this Standard, the lot shall be accepted; in case one or more of these tests fail to satisfy those requirements, the lot shall be rejected.

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PETROBRAS N-1318	- Aplicação de Películas de Tinta com Pincel a Painéis de Ensaio;
PETROBRAS N-1358	- Sólidos por Volume - Determinação pelo Disco de Aço;
PETROBRAS N-1661	- Zinc Ethyl Silicate Paint;
ABNT NBR 5839	- Coleta de Amostras de Tintas e Vernizes;
ABNT NBR 5840	- Exame Prévio e Preparação para Ensaios de Amostras de Tintas e Vernizes;
ISO 8501-1	- Preparation of Steel Substrates before Application of Paints and Related Products;
ASTM D 562	- Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity using a Stormer - Type Viscometer;
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6 INSPECTION

6.1 The purchaser is responsible for checking at the factory or at the place of delivery if the conditions indicated in items 4.2, 4.3, and 4.5 are satisfied and for rejecting any supply that fail to satisfy those conditions.

6.2 For checking the conditions indicated in item 4.1, the inspection shall be conducted in accordance with the method described in ABNT [NBR 5840](#).

6.3 For checking the conditions indicated in items 4.2, 4.3, and 4.5, PETROBRAS Standard [N-1288](#) shall be used.

6.4 Sampling

6.4.1 The supplier shall prepare the sample for the tests, in accordance with the method of ABNT Standard [NBR 5839](#), in the presence of the PETROBRAS inspector, previously requested to witness it, and then send it to the laboratory, requesting at this time the presence of the PETROBRAS inspector to witness the sample preparation process.

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6.5.2.3 Panels shall be painted with a paintbrush according to PETROBRAS standard [N-1318](#).