

CONTEC

Comissão de Normalização
Técnica

SC-27

Non Destructive Tests

**Alloys and Metal
- Identification - Photographic Standards**

Revalidation

Revalidated in 12/2010.

ALLOYS AND METAL - IDENTIFICATION - PHOTOGRAPHIC STANDARDS

Standardization

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.

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Introduction

PETROBRAS Technical Standards are prepared by Working Groups – GTs (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 CONTEC Plenary Assembly (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 standard PETROBRAS N-1. For complete information about PETROBRAS Technical Standards see PETROBRAS Technical Standards Catalog.

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FOREWORD

This Standard PETROBRAS N-2508 REV. A MAY/2003 is the Standard PETROBRAS N-2508 AUG/93, with no alteration in its contents.

1 SCOPE

1.1 This Standard sets out a standardization method for photographic records of magnet and Spot Testing for alloys and metals.

1.2 This Standard applies to standardizations started from the date of its edition.

1.3 This Standard contains only Technical Requirements.

2 SUPPLEMENTARY DOCUMENTS

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

PETROBRAS N-1590	- Ensaio Não-Destrutivo - Qualificação de Pessoal;
PETROBRAS N-1591	- Ligas Metálicas e Metais - Identificação Através de Testes Pelo Imã e por Pontos;;
PETROBRAS N-1592	- Non-Destructive Testing - Identification of Materials.

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 DEFINITIONS

For the purposes of this Standard the definitions this Standards PETROBRAS N-1591 and N-1592 are adopted.

4 IDENTIFIABLE MATERIALS

Classes of materials identified in this Standard are those set forth in Standard PETROBRAS N-1591. The tests included in this Standard are the following:

- a) QS.01 – Nitric Acid Passivation Test;
- b) QS.02 – Ferrous Alloys Identification Test;
- c) QS.03 – Cast Iron Identification Test;
- d) QS.04 – Molybdenum Identification Test;
- e) QS.05 – Nickel Identification Test;
- f) QS.06 – Chrome Identification Test;
- g) QS.07 – Low Molybdenum Identification Test;
- h) QS.08 – Low Nickel Identification Test;
- i) QS.09 – Copper Sulphate Test;
- j) QS.10 – Copper Identification Test;

- k) QS.11 – Monel^{®1)} Classification Test;
- l) QS.12 – High Chrome Identification Test;
- m) QS.13 – Identification Test for Chromium Stabilizing Element in Stainless Steels AISI-321 (Titanium) and AISI-347 (Niobium);
- n) QS.14 – Identification Test for Brass Inhibitor Element (Antimony, Phosphorus or Arsenic);
- o) PE.01 – Chrome Identification Test;
- p) PE.02 – Molybdenum Identification Test;
- q) PE.03 – Nickel Identification Test;
- r) PE.04 – Copper Identification Test;
- s) PE.05 – Cobalt Identification Test;
- t) PE.06 – Carbon Content Identification Test;
- u) PE.07 – Ferrous Alloys Identification Test.

5 PHOTOGRAPHIC RECORDS

5.1 Photographic records were obtained from ISO (ASA) 64 or 100 color films.

5.2 Photographic records measured 3,00 cm x 2,00 cm.

5.3 A reflex photography camera with micro lens was used.

5.4 Identification items can be found beside the photographic records:

- a) chronological numbering;
- b) test;
- c) description;
- d) material.

5.5 Pictures in Annex A show SC Tests (simple chemical attack) and EP (electrochemical polarization), as below:

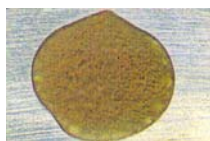
- a) QS.01 – pictures number 01 to 06;
- b) QS.02 – pictures number 07 and 08;
- c) QS.03 – pictures number 09 and 10;
- d) QS.04 – picture number 11;
- e) QS.05 – pictures number 12 and 13;
- f) QS.06 – pictures number 14 to 18;
- g) QS.07 – pictures number 19 to 21;
- h) QS.08 – pictures number 22 to 25;
- i) QS.09 – pictures number 26 and 27;
- j) QS.10 – pictures number 28 to 30;
- k) QS.11 – pictures number 31 and 32;
- l) QS.12 – pictures number 33 to 36;
- m) QS.13 – pictures number 37 to 39;

¹⁾ MONEL is the trademark of the type suitable for the manufacture of internal valves and other pipeline components for corrosion resistance. This information is intended to facilitate the users to use this Standard and it does not mean a product recommendation made by PETROBRAS. It is possible to use an equivalent product, provided that it leads to the same result.

- n) QS.14 – pictures number 40 to 43;
- o) PE.01 – picture number 44;
- p) PE.02 – picture number 45;
- q) PE.03 – picture number 46;
- r) PE.04 – picture number 47;
- s) PE.05 – pictures number 48 and 49;
- t) PE.06 – pictures number 50 and 51;
- u) PE.07 – picture number 52.

/ANNEX A

ANNEX A - PHOTOGRAPHIC STANDARDS



PICTURE NR 01
TEST: QS-01
MATERIAL: CARBON STEEL
DESCRIPTION: Instant reaction/
violent with dark green or brown
coloring



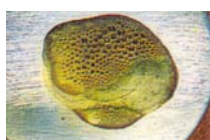
PICTURE NR 10
TEST: QS-03
MATERIAL: CARBON STEEL
DESCRIPTION: No reaction



PICTURE NR 02
TEST: QS-01
MATERIAL: CARBON STEEL
DESCRIPTION: Instant
reaction/violent with
dark green or brown coloring



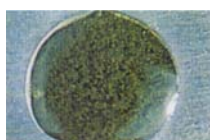
PICTURE NR 11
TEST: QS-04
MATERIAL: AISI 316
DESCRIPTION: Pink coloring



PICTURE NR 03
TEST: QS-01
MATERIAL: CARBON STEEL
DESCRIPTION: Instant
reaction/violent with
dark green or brown coloring



PICTURE NR 12
TEST: QS-05
MATERIAL: NICKEL STEEL
DESCRIPTION: Pink coloring



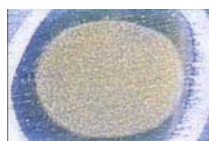
PICTURE NR 04
TEST: QS-01
MATERIAL: CAST IRON
DESCRIPTION: Instant
reaction/violent with
dark green or brown coloring



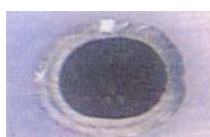
PICTURE NR 13
TEST: QS-05
MATERIAL: CARBON STEEL
DESCRIPTION: Light brown



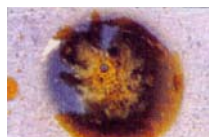
PICTURE NR 05
TEST: QS-01
MATERIAL: ALLOY STEEL
1,25 % Cr – 0,5 % Mo
DESCRIPTION: Weak reaction
with green or light brown coloring



PICTURE NR 14
TEST: QS-06
MATERIAL: CARBON STEEL
DESCRIPTION: Light green with
sol. 09



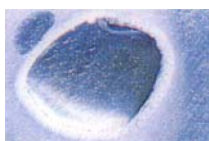
PICTURE NR 06
TEST: QS-01
MATERIAL: AISI 4140
DESCRIPTION: Weak reaction
with green or light brown color



PICTURE NR 15
TEST: QS-06
MATERIAL: CARBON STEEL
DESCRIPTION: Dark brown -
strong reaction – sol. 10



PICTURE NR 07
TEST: QS-02
MATERIAL: ALLOY STEEL
2,25 % Cr – 1,0 % Mo
DESCRIPTION: Dark green-blue
color



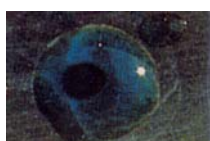
PICTURE NR 16
TEST: QS - 06
MATERIAL: ALLOY STEEL
2,25 % Cr – 1,0 % Mo
DESCRIPTION: No coloring -
sol. 09



PICTURE NR 08
TEST: QS-02
MATERIAL: INCONEL
DESCRIPTION: Other color
than green-blue



PICTURE NR 17
TEST: QS-06
MATERIAL: ALLOY STEEL
2,25 % Cr – 1,0 % Mo
DESCRIPTION: Dark brown -
sol. 10



PICTURE NR 09
TEST: QS-03
MATERIAL: FoFo
DESCRIPTION: Copper deposit -
instant change from blue to black
color



PICTURE NR 18
TEST: QS-06
MATERIAL: ALLOY STEEL Cr
5%
DESCRIPTION: Dark brown
remains without color - quick
reaction



PICTURE NR 19
TEST: QS-07
MATERIAL: AISI 4140
DESCRIPTION: characteristic
reaction - sol. 11



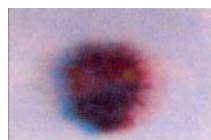
PICTURE NR 29
TEST: QS-10
MATERIAL: MONEL
DESCRIPTION: Mix sol. 02
+ sol. 08



PICTURE NR 20
TEST: QS-07
MATERIAL: AISI 4140
DESCRIPTION: removal + sol. 11
+ sol. 14



PICTURE NR 30
TEST: QS-10
MATERIAL: MONEL
DESCRIPTION: Deposition of
copper in carbon steel



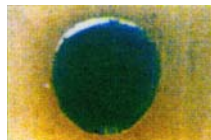
PICTURE NR 21
TEST: QS-07
MATERIAL: AISI 4140
DESCRIPTION: Pink coloring



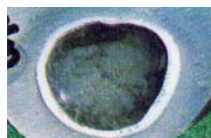
PICTURE NR 31
TEST: QS-11
MATERIAL: MONEL K500
DESCRIPTION: Black stain on
surface



PICTURE NR 22
TEST: QS-08
MATERIAL: AISI 4340
DESCRIPTION: Reaction with sol.
22



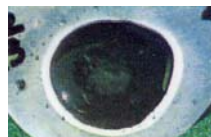
PICTURE NR 32
TEST: QS-11
MATERIAL: MONEL 400
DESCRIPTION: Green-blue stain



PICTURE NR 23
TEST: QS-08
MATERIAL: AISI 4340
DESCRIPTION: Mix sol. 22
+ sol. 23



PICTURE NR 33
TEST: QS-12
MATERIAL: AISI 316
DESCRIPTION: Light green liquid
+ gas



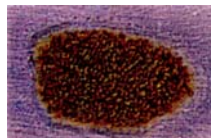
PICTURE NR 24
TEST: QS-08
MATERIAL: AISI 4340
DESCRIPTION: Mix sol. 22
+ sol. 23 + sol. 24



PICTURE NR 34
TEST: QS-12
MATERIAL: AISI 317
DESCRIPTION: No reaction



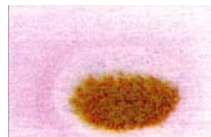
PICTURE NR 25
TEST: QS-08
MATERIAL: AISI 4340
DESCRIPTION: Pink coloring



PICTURE NR 35
TEST: QS-12
MATERIAL: AISI 304
DESCRIPTION: Dark green



PICTURE NR 26
TEST: QS-09
MATERIAL: ALLOY STEEL 2.25%
Cr 1.0 % Mo
DESCRIPTION: sol. 01



PICTURE NR 36
TEST: QS-12
MATERIAL: AISI 310
DESCRIPTION: Green-blue



PICTURE NR 27
TEST: QS-09
MATERIAL: ALLOY STEEL
2,25 % Cr - 1,0 % Mo
DESCRIPTION: Copper
deposition



PICTURE NR 37
TEST: QS-13
MATERIAL: AISI 321
DESCRIPTION: Green-yellow
stain



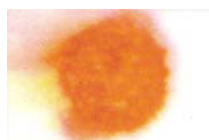
PICTURE NR 28
TEST: QS-10
MATERIAL: MONEL
DESCRIPTION: Reaction with
sol. 02



PICTURE NR 38
TEST: QS-13
MATERIAL: AISI 321
DESCRIPTION: : Grayish
stain in center, green-
yellow toward the margin



PICTURE NR 39
TEST: QS-13
MATERIAL: AISI 347
DESCRIPTION: Deeper grayish stain in the center and green-yellow toward the margin



PICTURE NR 46
TEST: PE-03
MATERIAL: AISI 310
DESCRIPTION: Pink coloring



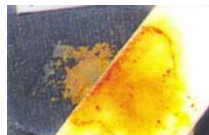
PICTURE NR 40
TEST: QS-14
MATERIAL: BRASS WITH INHIBITOR
DESCRIPTION: Blue solution



PICTURE NR 47
TEST: PE-04
MATERIAL: MONEL
DESCRIPTION: Dark coloring



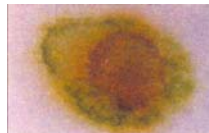
PICTURE NR 41
TEST: QS-14
MATERIAL: BRASS WITH INHIBITOR
DESCRIPTION: dark gray stain



PICTURE NR 48
TEST: PE-05
MATERIAL: ²⁾STELLITE®
DESCRIPTION: Brick color



PICTURE NR 42
TEST: QS-14
MATERIAL: BRASS W/O INHIBITOR
DESCRIPTION: Green-Blue solution



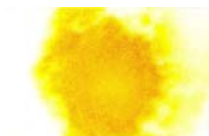
PICTURE NR 49
TEST: PE-05
MATERIAL: STELLITE®
DESCRIPTION: Green color



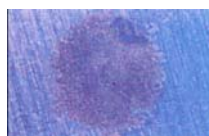
PICTURE NR 43
TEST: QS-14
MATERIAL: BRASS W/O INHIBITOR
DESCRIPTION: Yellow stain



PICTURE NR 50
TEST: PE-06
MATERIAL: CARBON STEEL AISI 1045
DESCRIPTION: Dark gray to black



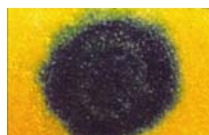
PICTURE NR 44
TEST: PE-01
MATERIAL: AISI 310
DESCRIPTION: Yellow color



PICTURE NR 51
TEST: PE-06
MATERIAL: CARBON STEEL AISI 1020
DESCRIPTION: Light gray



PICTURE NR 45
TEST: PE-02
MATERIAL: AISI 316
DESCRIPTION: Pink color



PICTURE NR 52
TEST: PE-07
MATERIAL: CARBON STEEL
DESCRIPTION: Blue color

²⁾ STELLITE is a trade name for a product used in the manufacturing of hard-faced casings for packers and valve seats. This information is intended to facilitate the users to use this Standard and it does not mean a product recommendation made by PETROBRAS. It is possible to use an equivalent product, provided that it leads to the same result.



INDEX OF REVISIONS

REV. A

[illegible]