PETROBRAS

N-2869	REV. A	ENGLISH	02 / 2016

CONTEC
Comissão de Normalização Técnica

SC-16
Industrial Safety

Safety in Load Handling Operations

1st Amendment

This is the 1st Amendment to PETROBRAS N-2869 REV. A and it is used to alter the text of the Standard in the part indicated below:

NOTE 1 The new page with the performed amendment is placed in its corresponding position.
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

- Subsection 4.26.1:

Inclusion of enumeration d).

PETROBRAS | N-2869 | REV. A | ENGLISH | 01 / 2015

Safety in Load Handling Operations

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.

CONTEC
Comissão de Normalização Técnica

SC - 16
Industrial Safety

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

This Standard is the English version (issued in 02/2015) of PETROBRAS N-2869 REV. A 01/2015. 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 establishes minimum safety guidelines for load handling operations in order to maintain the physical integrity of workers, facilities, equipment and loads handled in compliance with Safety, Environment and Health (SMS, with for abbreviature in Portuguese) standards of PETROBRAS units.

1.2 This Standard is not applied for manual handling and transportation of loads.

1.3 This Standard is applies to procedures started as of its date of issuance.

1.4 The application of this Standard in the case of units of the PETROBRAS System headquartered abroad shall be based on respect for local legislation, as well as for the other applicable requirements. It shall be understood that all existing Brazilian legislations or references pointed out in this Standard may serve as input to its adaptation process.

1.5 This Standard contains Technical Requirements only.

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 applies.

Norma Regulamentadora n° 10 (NR-10) - Segurança em Instalações e Serviços em Eletricidade;

Norma Regulamentadora n° 11 (NR-11) - Transporte, Movimentação, Armazenagem e Manuseio de Materiais;

Norma Regulamentadora n° 12 (NR-12) - Segurança no Trabalho em Máquinas e Equipamentos;

Norma Regulamentadora n° 18 (NR-18) - Condições e Meio Ambiente de Trabalho na Indústria da Construção;

Norma Regulamentadora n° 34 (NR-34) - Condições e Meio Ambiente de Trabalho na Indústria da Construção e Reparação Naval;

PETROBRAS N-1930 - Movimentação de Carga Inspeção, Manutenção e Operação de Guindastes “Offshore”;

PETROBRAS N-1965 - Movimentação de Carga Inspeção, Manutenção e Operação de Equipamentos Terrestres;

PETROBRAS N-2162 - Work Permit;

PETROBRAS N-2170 - Inspeção em Serviços de Acessórios de Movimentação de Carga;

ABNT NBR 13541-2 - Linga de Cabo de Aço - Parte 2: Utilização e Inspeção;

ABNT NBR 16029 - Embalagens - Contentores Intermediários Flexíveis (FIBC) para Produtos Não Perigosos (ISO 21898:2004, MOD);

ABNT NBR ISO 4309 - Equipamentos de Movimentação de Carga - Cabos de Aço - Cuidados, Manutenção, Instalação, Inspeção e Descarte;

ASME B 30.5 - Mobile and Locomotive Cranes.

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 Terms and Definitions

For the purposes of this document, the following term and definition apply.

load handling
operation involving the load, unloading and displacement of materials and equipment inside PETROBRAS units and in areas under its responsibility

4 General Conditions

4.1 All equipment and accessories for load movement shall:

a) be certificated as per the criteria established by PETROBRAS N-1930, N-1965 and N-2170;
b) go through periodic maintenance and inspections, complying with the manufacturer criteria as a minimum;
c) be used within their operational limits (load limit, maximum slope, maximum height, etc.);
d) present its maximum load capacity for work on a visible place, clearly visible and indelibly in its both sides whenever possible.

NOTE It is forbidden to change the equipment operational limits, except:

a) under conditions foreseen by the manufacturer;
b) to reduce the equipment capacity motivated by the endanger of a component or system, assessed and registered by an expert, in order to ensure the traceability; the implementations of actions indicated by this assessment shall be supervised.

4.2 When planning activities related to load movement, it shall be considered PETROBRAS N-2162 requirements.

4.3 The risk analysis shall be made at least under the following conditions:

a) when using equipment for load handling that release toxic gas in enclosed areas or with little ventilation;
b) when load handling near listed areas;
c) when load handling near to equipment of processes that handle with flammable or toxic gas (e.g. H_2S and CO_2);
d) when load handling having large dimensions and irregular shape;
e) when load handling near to electrical grids;
f) when load handling in flooring under special conditions;
g) when load handling simultaneously to other services (such as assembly, disassembly and maintenance), taking into account the combined risks.

NOTE The conditions not described above shall be assessed in accordance with the situation.

4.4 A load handling plan shall be elaborated for each critical hoisting.

NOTE The definition of critical hoisting and the criteria of the movement of loads plan are defined in PETROBRAS N-1965 and N-1930.

4.5 Before any load handling, it shall be known:

a) the load weight;
b) the load's center of gravity;
c) the load dimensions.

NOTE When weighing loads and calculating the center of gravity, the calculation memory shall keep up with the load movement.

4.6 Each load movement vehicle equipment shall have a sound and visual warning sign.

4.7 The equipment's cabinet shall be free from objects that might move, interfere or obstruct commands and access of the equipment during the operation.

4.8 All equipment shall have a safety checklist and a functionality checklist, which shall be filled out on a daily basis by the operator near to the equipment before starting the load movement.

4.9 Inadequate environmental conditions, especially light and visibility conditions, are restricted to operations of load handling, and shall be taken into account during risk analysis and safety analysis of the task.

NOTE For offshore operations, weather, ocean and unit balance conditions are restricted to load handling operations, and they shall be assessed before starting each operation in accordance with PETROBRAS N-1930.

4.10 Load handling area shall be signaled isolated; it is forbidden the traffic of non-authorized people and vehicles that are not directly involved in the movement.

4.11 The escape route shall be unobstructed during the load handling operation.

4.12 It is forbidden to pass under or stay under the suspended load, even the people involved in the load handling.

4.13 When the load handling, the operator must not move the suspended load above people.

4.14 Handling of personnel by lifting equipment shall comply with the requirements of NR-12, NR-18 and NR-34.

4.15 It is mandatory the use of a guide line when it is necessary to stabilize, the possibility of collision or load turning during the movement.

4.16 The load shall be equally distributed among the slinging sections, and it shall be stabilized and tied.

NOTE For handling pipes and coatings tied as per load choking method, slingings shall passed around the load two times, and it shall be used an accessory to avoid it to slide, as clamps, hooks, gannets for hoisting and king beam. The accessory used shall not damage the steel cable.

4.17 No load handling operations shall be carried out when there are doubts concerning fastening, eyes or accessories used.

4.18 It is forbidden the use of (natural or synthetic) fiber rope to tie or move the load.

4.19 Whenever the operator need to be away of the equipment command position, the load shall be supported and stabilized. The equipment shall be off and shall have its safety devices on as per the manufacturer's manual.

4.20 It must be ensured that the load is fully supported and stable before finishing the operation and removing it off of the load handling equipment.

4.21 The load that is being moved shall be as close as possible of the floor.

4.22 The operator shall comply entirely with the conventional signals of one assistant previously assigned, as per PETROBRAS N-1930 and N-1965 requirements.

NOTE 1 The operator shall comply with the emergency stop signal at any time, even if it is not made by his/her assistant.
NOTE 2 It shall be foreseen other communication means between the operator and the assistant.

4.23 Safety devices for load movement equipment shall be used and kept in perfect conditions of use, pursuant to manufacturer's guidance.

4.24 Equipment's load tables shall be available inside the machine on a mandatory basis for easy consult.

4.25 The traffic of load handling vehicles over chutes and power wiring is forbidden.

4.26 When using unitizing machines (e.g. containers, metallic boxes, metallic baskets, skids, bags, etc.) for load moving, you shall be sure that:

a) there are no loose materials or equipment that can be displaced or provoke unbalance during their movement;
b) doors and hatches are locked (open position for loading and unloading, and closed during the movement);
c) both weight (tare) and capacity in kg are clearly indicated, visible and indelibly at least on one side;
d) lids of metallic boxes have the weight indication clearly indicated, visible and indelibly and in accordance with it, they are open with the help of a load movement equipment.

NOTE Bags shall be used as per ABNT NBR 16029 criteria.

4.26.1 Drums and tanks containing chemicals or liquid fuels:

a) in order to be moved, they shall be hermetically closed and stored in suitable equipment or accessories (baskets, nets, etc.);
b) the shall not be moved in metallic boxes and closed containers;
c) they shall not be spun or rolled over the floor when they are full;
d) shall be free of severe corrosion, breakage or holes, including background.

4.26.2 Regarding loads with live edges, follow ABNT NBR 13541-2 procedure and PETROBRAS N-1965 guidances.

4.27 Completing NR-10, NR-12, NR-18 and NR-34 guidances, the load handling near to electric grids shall be performed primary by adopting the de-energization of the electric grid. When this is not possible, the following protective measures shall be considered:

a) minimum distances established in Table 1;
b) additional protective measures stated by an expert.

Table 1 - Distance for Networks and High Voltage Cables

Voltage (kV)	Minimum Distance (m)
up to 50	3,1
from 51 to 200	4,6
from 201 to 350	6,1
from 351 to 500	7,7
from 501 to 750	10,7
from 751 to 1 000	13,8

Table based on ASME B 30.5

5 Equipment

All load handling equipment shall have a maintenance and inspection plan as per PETROBRAS N-1930 and N-1965.

5.1 Cranes and Crane Trucks

5.1.1 For outrigging, it shall be checked load conditions and capacity of the floor and the equipment position considering possible interferences. In case of unstable floor that may break due to the load over it, suitable supports shall be used (i.e. boards, sleepers, plates) under the outriggers.

5.1.2 To interlock the outriggers is mandatory for operation and displacement in accordance with the manufacturer's recommendations.

5.1.3 The crane maneuver shall be performed at least with the help of one load movement assistant.

5.1.4 The simultaneous load movement through both main and auxiliary systems of the crane is forbidden, except under conditions foreseen by the manufacturer, or in case there is not another safer condition to perform the operation.

5.1.5 When moving the crane in the area, as well as during the functioning of any movable parts of it, the following items shall be complied with:

a) the people involved in support of outrigging activities and other operations that require them to stay inside the isolated area shall be within the visual field of the operator;
b) delimiting and signaling the action radius of equipment's movable parts that present risk of accident before allow the operation.

5.1.6 The boom are dimensioned to hoist free loads, and they are not intended to horizontal or side efforts, which means it is forbidden to pull or drag loads.

5.1.7 During load and unload operations in/out of trucks by using a crane, the truck cabinet shall be unattended.

5.1.8 The boom shall be supported onto its bed whenever the crane is out of operation.

5.1.9 The needs to leave the crane cockpit, the operator shall ensure that all possible security locks and breaks are on, controls are in "neutral" position and the crane is turned off.

5.1.10 The crane truck shall be preferentially operated on the opposite side of the load that is being lifted.

5.2 Forklift

5.2.1 Its traffic shall be on leveled floor under suitable conditions of pavement that is capable to support the forklift weight plus the load weight.

5.2.2 The forklift shall be moved with the fork in low position (near to the floor).

5.2.3 The load shall be lifted in a perfect balance with the fork before moving it.

5.2.4 Always support the load over the two forks.

5.2.5 With the forklift unload, when going up or down a ramp, keep the forklift mast with a slope that does not allow the fork to touch the floor.

5.2.6 When the forklift is load, it shall go down a ramp in the reverse mode.

5.2.7 When the load volume impairs the operator's vision, the displacement operation shall be made by using the reverse mode. In this case, loading and unloading shall be made with the help of an assistant.

5.2.8 Before the operator go out of the forklift, the following steps must be followed:

a) completely low the fork;
b) turn off the engine;
c) put it into reverse gear;
d) apply the parking brake.

NOTE Wheels shall be wedged when the forklift is parked on a slopped area.

5.2.9 Operate it in reduced speed, avoiding sharp leaves and breaks, swerving slowly and avoiding pass over holes of slippery places.

5.2.10 It is mandatory the use of sound and visual signals during operations.

5.3 Overhead Crane, Gantry, Motorized Derrick and Hoist

5.3.1 Keep the command switches identified regarding the related equipment.

5.3.2 Do not leave the command switch in traffic areas.

5.3.3 When the overhead crane is stopped, the bushes shall be out of the traffic area in a safe height and with the retrieved at the maximum retrieve.

5.3.4 Keep the bush in the plumb line above the load to be lifted, in order to impair it to be dragged.

5.3.5 Reverse movements shall not be performed, except under conditions foreseen by the manufacturer.

5.3.6 Sharp movements shall not be performed in order to reduce the load swaying.

5.37 The safety devices that limits the route (bush, transversal trolley, bearing race) shall be installed and shall be in perfect conditions of use.

5.4 Tackle and Tirfor

5.4.1 When starting to move the load, the chain shall be carefully handled to allow the load to be lifted a few centimeters to check the balance and the tying.

5.4.2 The safety device that limits the route cannot be used to weigh the load.

5.4.3 The safety device that limits the route cannot be used as a device to stop the operation.

6 Accessories

6.1 The accessories shall be visually inspected before starting the load handling. For use and inspection purposes, ABNT NBR ISO 4309 and PETROBRAS N-2170 shall be adopted.

6.2 Hoisting accessories shall have a load capacity equal to or above the weight of the load to be hoisted. The load capacity of these accessories and the inspection date shall be easy to identify.

6.3 The accessories shall not be painted in order to enable potential irregularities to be visible and to maintain their original features.

6.4 Hooks from extension cables for offshore operations shall have safety locks that avoid accidental hooking on loads or obstacles.

7 Qualification and Training

7.1 The minimum qualification of operators shall meet the requirements of NR-11, NR-12, NR-18, NR-34, as well as operational trainings based on manufacturer's manual for equipment and accessories.

7.2 Operators shall have a documentation that prove the required qualification for load movement activity.

8 Protective Equipment

8.1 When load handling, the basic Personal Protective Equipment (EPI, with for abbreviature in Portuguese) shall be used in the area or unit where the operation is performed.

8.2 The EPI or Collective Protective Equipment (EPC, with for abbreviature in Portuguese) required, specific for load movement shall be described in the risk analysis.

INDEX OF REVISIONS	
REV. A	
Affected Parts	**Description of Alteration**
All	Revised

4.26.1 Drums and tanks containing chemicals or liquid fuels:

a) in order to be moved, they shall be hermetically closed and stored in suitable equipment or accessories (baskets, nets, etc.);
b) the shall not be moved in metallic boxes and closed containers;
c) they shall not be spun or rolled over the floor when they are full.

4.26.2 Regarding loads with live edges, follow ABNT NBR 13541-2 procedure and PETROBRAS N-1965 guidances.

4.27 Completing NR-10, NR-12, NR-18 and NR-34 guidances, the load handling near to electric grids shall be performed primary by adopting the de-energization of the electric grid. When this is not possible, the following protective measures shall be considered:

a) minimum distances established in Table 1;
b) additional protective measures stated by an expert.

Table 1 - Distance for Networks and High Voltage Cables

Voltage (kV)	Minimum Distance (m)
up to 50	3,1
from 51 to 200	4,6
from 201 to 350	6,1
from 351 to 500	7,7
from 501 to 750	10,7
from 751 to 1 000	13,8

Table based on ASME B 30.5

5 Equipment

All load handling equipment shall have a maintenance and inspection plan as per PETROBRAS N-1930 and N-1965.

5.1 Cranes and Crane Trucks

5.1.1 For outrigging, it shall be checked load conditions and capacity of the floor and the equipment position considering possible interferences. In case of unstable floor that may break due to the load over it, suitable supports shall be used (i.e. boards, sleepers, plates) under the outriggers.

5.1.2 To interlock the outriggers is mandatory for operation and displacement in accordance with the manufacturer's recommendations.

5.1.3 The crane maneuver shall be performed at least with the help of one load movement assistant.

5.1.4 The simultaneous load movement through both main and auxiliary systems of the crane is forbidden, except under conditions foreseen by the manufacturer, or in case there is not another safer condition to perform the operation.