PETROBRAS

N-1766	REV. D	ENGLISH	01 / 2011

CONTEC
Comissão de Normalização Técnica

SC-22
Utilities Equipaments

Cooling Tower - Data Sheet

Revalidation

Revalidated em 05/2017.

PETROBRAS

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1st Amendment

This is the 1st Amendment to PETROBRAS N-1766 REV. D and it is used to alter the text of the Standard in the part(s) indicated below:

NOTE 1 The new(s) page(s) with the performed amendment(s) is (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 1st AMENDMENT - 04/2017

- Form - Page 3/4, Field 57:

Replace the term "SPEED:" with "BLADE END SPEED:"

- Form - Page 4/4, Field 146:

Replace the word "HEIGHT OF WATER SUPPLY:" with "HEIGHT OF WATER INTAKE:"

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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
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Introduction

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

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Foreword

This Standard is the English version (issued in 12/2012) of PETROBRAS N-1766 REV. D 01/2011. In case of doubt, the Portuguese version, which is the valid document for all intents and purposes, shall be used.

1 Scope

1.1 This Standard standardizes the Data Sheet form for cooling tower, to be used in the PETROBRAS designs.

1.2 This Standard is applied to designs beginning with its date of issuance.

1.3 This Standard only contains Technical Requirements.

2 Normative References

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

PETROBRAS N-381 - Execution of Drawing and Other General Technical Documents;
PETROBRAS N-1521 - Identification of Industrial Equipment.

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 terms and definitions apply.

3.1 The Data Sheet form is standardized in the A4 format as by the Annex A.

3.2 If necessary the form continuation, utilize the last sheet of the Annex A.

3.3 For filling out the heading and footnote of the Data Sheet the Annex A it shall be met the requirements of the PETROBRAS N-381.

3.4 In the sheet 1/5, in the space beside the equipment name (title), it shall be written the tag number of the cooling tower, in accordance with PETROBRAS N-1521.

PETROBRAS	DATA SHEET	No.	
	CLIENT:		SHEET of
	JOB:		
	AREA:		
	TITLE: COOLING TOWER		

INDEX OF REVISIONS

REV.	DESCRIPTION AND/OR REVISED SHEETS

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE									
DESIGN									
EXECUTION									
CHECK									
APPROVAL									

PETROBRAS

DATA SHEET

No. | REV. | SHEET of

TITLE:

COOLING TOWER

01	SERVICE:			QUANTITY:	
02	MANUFACTURER:			MODEL:	
03	TYPE	MECHANICAL DRAFT: FORCED ☐	INDUCED ☐	Nº. OF CELLS:	
04		COUNTERFLOW: YES ☐	NO ☐	ARRANGEMENT:	
05		CROSS FLOW: YES ☐	NO ☐	FILLING: BAR AND GRID ☐	FILM ☐
06		SIMPLE FLOW ☐	DOUBLE FLOW ☐	HOT WATER DISTRIB SYSTEM:	
07					
08					
09					
10	OPERATING CONDITIONS	TOTAL CAPACITY:	m^3/h	THERMAL LOAD:	W (kcal/h)
11		TEMP. OF HOT WATER:	ºC	ALTITUDE (ABOVE SEA LEVEL):	m
12		TEMP. OF COLD WATER:	ºC	NEXT TO SEA: YES	NO
13		TEMP. OF WET BULB:	ºC		
14		RELATIVE HUMIDITY:	%	SERVICE: CONTINUOUS	INTERMITTENT
15					
16					
17					
18	TOWER DATA	DRAG LOSS:	%	EFFECTIVE WET SURFACE:	m^2
19		EVAPORATION LOSS:	%	EFFECTIVE CROSS SURFACE:	m^2
20		FILLING HEIGHT:	m	HYDRAULIC LOAD:	$m^3/m^2.h$
21		EFFECTIVE TOTAL VOLUME:	m^3	TEMPERATURE OF EXHAUST AIR:	ºC
22		TOTAL SPLASH AREA:	m^2	FIRE WATER:	m^3/h
23		MAKEUP WATER:	m^3/h		
24					
25					
26					
27					
28	STRUCTURAL DESIGN	CELL SIZE: WIDTH: m	LENGTH: m	DIAM. OF WATER OUTLET PIPING:	mm
29		EXTERNAL TOWER DIMENSIONS: LENGTH:	m	BASIN VOLUME:	m^3
30		WIDTH: TOP: m	BASE: m	BASIN DEPTH:	m
31		HEIGHT TO PLATFORM	m	WIND LOAD (DESIGN):	
32		DIAM. OF WATER INLET PIPING:	mm		
33		HEIGHT OF HOT WATER INLET:	m		
34		TOTAL HEIGHT OF BOOSTER:	m		
35					
36					
37					
38					
39	MATERIALS	STRUCTURE:		FAN PLATFORM:	
40		UPPER PLATFORM:		STAIRS:	
41		DROP ELIMINATOR:		ACCESS DOORS:	
42		FILLING:		INTERNAL DOORS:	
43		EXTERNAL COATING:		HANDRAIL:	
44		BARRIERS:		INTERNAL PLATFORM:	
45		ENGINE AND REDUCER SUPPORT:		BLINDS:	
46		DISTRIBUTION NOZZLES:		COLD WATER BASIN:	
47		DIFFUSER		HOT WATER DISTRIBUTION BASIN:	
48		SUPPORTS / ATTACHERS			
49		INTERNAL DISTRIBUTION CHANNELS/PIPES:			

PETROBRAS		**DATA SHEET**	**No.**	**REV.**
				SHEET of
		TITLE: **COOLING TOWER**		

51	**FAN**	QUANTITIES. PER CELL:	ABSORBED POWER: KW (bhp)
52		TYPE: MODEL:	STATIC EFFICIENCY: %
53		MANUFACTURER:	rpm:
54		DIAMETER: m	BLADE MATERIAL:
55		AIR FLOW: m^3/ h	HUB MATERIAL:
56		STATIC PRESSURE: Pa (mm of H_2O)	
57		BLADE END SPEED: m/s	HEIGHT OF FAN PLATFORM.: m
58		NO. OF BLADES / FAN:	WEIGHT: N (kgf)
		SHAFT MECHANIC TREATMENT DEVICE	YES NO
59		BLADE PITCH:	
60		BLADE TILT:	
61		CLEARENCE BETWEEN BLADE ÁND DIFFUSER:	
62			
63	**ENGINE**	BY MANUFACTURER OF TOWER: YES ☐ NO ☐	INSULATION CLASS: -rpm:
64		QUANTITY PER FAN:	POWER REQUIRED: W (hp)
65		TYPE:	POWER RECOMMENDED: W (hp)
66		MODEL:	VOLTAGE V-FREQUENCY: Hz-PHASES
67		MANUFACTURER:	WEIGHT: N (kgf)
68			
69			
70	**REDUCER**	QUANTITY PER FAN:	EFFECTIVE POWER: W (hp)
71		MANUFACTURER:	MECHANICAL EFFICIENCY: %
72		MODEL:	TYPE OF TRANSMISSION
73		REDUCTION FACTOR:	LUBRICATION:
74		SERVICE FACTOR (AGMA):	WEIGHT: N (kgf)
75			
76			
77			
78	**DRIVE SHAFTS AND ES ELASTIC COUPLING**	QUANTITIES OF SHAFTS / CELL:	QUANTITIES OF COUPLINGS / CELL:
79		COUPLINGS: TYPE:	MODEL:
80		SERVICE FACTOR:	
81		MATERIALS: SHAFT/COUPLING:	
82		MANUFACTURER:	
83		BALANCING SYSTEM:	
84			
85			
86			
87	**FLOW CONTROL VALVE**	SERVICE:	
88		Nº. PER CELL: MODEL:	MANUFACTURER:
89		TYPE:	DIAMETER:
90		POSITION:	
91		OPERATION:	
92			
93			
94			
95	**VIBRATION SWITCH**	QUANTITIES PER CELL:	
96		MANUFACTURER:	
97		TYPE:	
98		MODEL:	
99			
100			

PETROBRAS	**DATA SHEET**	**No.**		**REV.**
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	TITLE: **COOLING TOWER**			

101	**WATER CHARACTERISTICS**	PARAMETER	CIRCULATING WATER	MAKEUP WATER
102		pH		
103		TOTAL ALKALINITY ($CaCO_3$)	mg/L	mg/L
104		TOTAL HARDNESS ($CaCO_3$):	mg/L	mg/L
105		SULFATE (SO_4)	mg/L	mg/L
106		CHLORIDE (Cl^-)	mg/L	mg/L
107		IRON (Fe^{++})	mg/L	mg/L
108		SUSPENDED SOLIDS	mg/L	mg/L
109		ORGANIC MATTER (COD)	mg/L	mg/L
110		CONDUCTIVITY	µS/cm	µS/cm
111		SILICA	mg/L	mg/L
112				
113				
114				
115				
116				

117	**CONTAMI NANTS**	IN WATER:
118		
119		IN AIR:
120		

121	**CHARACTERISTICS OF FILLING**	TYPE OF FILLING:			
122		DENSITY OF FILLING (Bar / Grld / FILM BY m^3):			
123		DIMENSIONS OF FILLING BY CELL:	m X	m X	m
124		DIMENSIONS OF ELEMENT:	mm X	mm X	mm
125		DISTANCE BETWEEN FILLING ELEMENTS:		mm HORIZONTAL	mm VERTICAL
126		FILLING VOLUME (TOTAL / CELL)			
127		WET AREA BY VOLUME OF FILLING:			m^2/m^3
128		SPLASH AREA BY VOLUME OF FILLING:			m^2/m^3
129		FREE AREA FOR FLOWING OF AIR BY CELL:			m^2/CELL
130		FREE AREA FOR FLOWING OF WATER BY CELL:			m^2/CELL
131		WATER/AIR RATIO (CONN):			
132		CHARACTERISTICS OF TOWER (ka V/L):			
133		TYPE OF FILLING SUPPORT:			
134		TYPE OF DROPS ELIMINATOR:			
135		NO. OF PITCHES OF DROPS ELIMINATOR:			
136					
137					
138					
139					

140	**WATER DISTRIBUTOR SYSTEM**	INPUT FLANGE:	QUANTITY:	DIAMETER:	INCHES
141					
142		DIAMETER OF LATERAL DISTRIBUTOR:			
143		TYPE OF DISTRIBUTION SYSTEM:			
144		PRESSURE REQUIRED IN INPUT FLANGE:			kPa (kgf/ cm^2):
145		LOSS OF LOAD IN DISTRIBUTOR SYSTEM:			kPa (kgf/ cm^2):
146		HEIGHT OF WATER INTAKE:		m	
147					
148					
149					
150					

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There is no index of revisions.	
REV. C	
Affected Parts	**Description of Alteration**
	Revalidacion
REV. D	
Affected Parts	**Description of Alteration**
All	Revised

WORKING GROUP - WG-22-09

Members			
Name	**Department**	**Telephone**	**Key**
Joao Carlos Pattaro	REPLAN/EM/IE-II	853-7717	RPQL
Pedro Augusto Mattos Maciel da Silva	ENGENHARIA/IEABAST/EAB/ENPRO	819-3383	EENY
Rubens Andre Bignetti	ENGENHARIA/IEABAST/EAB/ENPRO	819-3382	CTVU
Tsutomo Iwane	AB-RE/TR/AER	814-4585	DP14
Technical Secretary			
Pedro Salum Benjamin	ETM-CORP/NORTEC	719-0445	E11C