

CONTEC

Comissão de Normalização
Técnica

SC-08

Fired Heaters

Air Preheater - Data Sheet

Revalidation

Revalidated in 03/2017.

Revalidated in 10/2022.

Replace ISO 13705 by API STD 560.

Air Preheater - Data Sheet

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 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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CONTEC

Comissão de Normalização
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SC - 08

Fired Heaters

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 01/2011) of PETROBRAS N-1554 REV. F 06/2010. 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 two Data Sheet forms in the Annexes A and B for air preheater, to be used in the PETROBRAS designs.

1.2 This Standard applies to designs starting from its issue date.

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 (including any amendments) applies.

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

PETROBRAS [N-1521](#) - Identification of Industrial Equipmen;

PETROBRAS [N-1671](#) - Design and Fabrication of Fired Heater;

ABNT [NBR 10778](#) - Forno Tubular Sujeito à Chama - Terminologia;

API [STD 560](#) - Fired Heaters for General Refinery Services.

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 General Requirements

3.1 The API [STD 560](#) data sheet forms based this Standard.

3.2 The Data Sheet in the Annexes A and B are used to record the purchaser's requirements and the design details of the supplier and, after filled out, it shall constitute a permanent document for the equipment.

3.3 The Data Sheet forms in the Annexes A and B are standardized in the A4 size as shown in the:

- a) Annex A: form with units in the Engineering System;
- b) Annex B: form with units in the International System of Units - SI.

3.4 The requirements of PETROBRAS [N-381](#) shall be met for filling out the heading and footnote of the Data Sheet in the Annexes A and B.




3.5 The applicable Annex of PETROBRAS [N-381](#) shall be used if additional space is required for continuing any item which does not fit in the Annex A or B here to.


3.6 The tag number of the equipment with air preheater shall be in accordance with PETROBRAS [N-1521](#) and inserted in the heading space reserved for the title Air Preheater, on the right-hand corner.


3.7 PETROBRAS [N-1671](#) and ABNT [NBR 10778](#) shall be used for filling out the Data Sheet in the Annexes A and B.


3.8 In the filling of Data Sheet in the Annexes A and the B the following requirements shall be followed:

- a) to only fill the applicable fields, eliminating, with a horizontal trace, the not applicable fields to the specific project;
- b) in the blank lines, to add eventual complementary data of the specific project.

<div> PETROBRAS</div>	DATA SHEET				No.				
	CLIENT:							SHEET	of
	JOB:								
	AREA:								
	TITLE: AIR PREHEATER								
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									
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THIS FORM IS PART OF PETROBRAS N-1554 REV. F ANNEX A - SHEET 01/04.									


		DATA SHEET		No.		REV.		
		AREA:				SHEET		of
		TITLE:						
		AIR PREHEATER						
1	SERVICE:			LOCATION			REV	
2	MANUFACTURER							
3	MODEL							
4	QUANTITY REQUIRED							
5	HEAT EXCHANGE AREA, m ²							
6	WEIGHT, kgf							
7	APPROXIMATE DIMENSIONS (a x l x c), m							
8	PERFORMANCE DATA							
9	OPERATING CASE:							
10								
11	AIR SIDE:	INLET FLOW, kg/h						
12		INLET TEMPERATURE, °C						
13		OUTLET TEMPERATURE, °C						
14		PRESSURE DROP: ALLOWABLE, mm H ₂ O						
15		CALCULATED, mm H ₂ O						
16		ABSORBED HEAT, kcal/h						
17	FLUE GAS SIDE:	FLOW, kg/h						
18		INLET TEMPERATURE, °C						
19		OUTLET TEMPERATURE, °C						
20		PRESSURE DROP: ALLOWABLE, mm H ₂ O						
21		CALCULATED, mm H ₂ O						
22		HEAT EXCHANGED, kcal/h						
23	AIR FLOW BYPASS, kg/h							
24	TOTAL AIR FLOW FOR BURNERS, kg/h							
25	MIXED AIR TEMPERATURE, °C							
26	FLUE GAS COMPOSITION, % MOLAR (O ₂ /N ₂ /H ₂ O/CO ₂ /SO _x)							
27	FLUE GAS SPECIFIC HEAT, kcal / kg.°C							
28	FLUE GAS DEW POINT TEMPERATURE, °C							
29	MINIMUM METAL TEMPERATURE: ALLOWABLE, °C							
30	CALCULATED, °C							
31	MISCELLANEOUS							
32	MINIMUM AMBIENT AIR TEMPERATURE, °C							
33	ELEVATION ABOVE SEA LEVEL, m							
34	RELATIVE HUMIDITY, %							
35	EXTERNAL COLD AIR BYPASS (YES / NO)							
36	THERMOCOUPLES ON COLD SIDE (YES / NO): QUANTITY REQUIRED							
37	ACCESS DOORS: QUANTITY / SIZE / LOCATION							
38	INSULATION: INTERNAL / EXTERNAL							
39	CLEANING MEDIUM: (STEAM / WATER)							
40	PRESSURE, kgf/cm ²							
41	TEMPERATURE, °C							
42								
43	MECHANICAL DESIGN							
44	FLUE GAS DESIGN TEMPERATURE, °C							
45	DIFFERENTIAL DESIGN PRESSURE, mm H ₂ O							
46	SEISMIC FACTOR							
47	PAINTING REQUIREMENTS							
48	LEAK TEST							
49	WIND LOAD ON STRUCTURE, kgf/m ²							
50	AIR LEAKAGE (MAXIMUM GUARANTEED), %							
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52	NOTES							
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		DATA SHEET		No.	REV.	
		AREA:			SHEET	of
		TITLE:				
		AIR PREHEATER				
CONSTRUCTION DATA						
1	I TUBULAR:				REV	
2	NUMBER OF PASSES					
3	NUMBER OF TUBES PER BLOCK					
4	NUMBER OF BLOCKS					
5	SURFACE TYPE					
6	TUBE MATERIAL					
7	TUBE WALL THICKNESS, mm					
8	BLOCK WITH GLASS (YES / NO)					
9	NUMBER OF TUBES WITH GLASS					
10	AIR INTERCONNECTING DUCT: QUANTITY					
11	(BOLTED / WELDED)					
12	SUPPLIED WITH CLIPS					
13	WATER WASHING: (YES / NO)					
14	TYPE: (OUT OF SERVICE / IN SERVICE)					
15	LOCATION					
16						
17	II PLATE:					
18	NUMBER OF PASSES					
19	NUMBER OF PLATES PER BLOCK					
20	NUMBER OF BLOCKS					
21	PLATE THICKNESS, mm					
22	AIR CHANNEL WIDTH, mm					
23	FLUE GAS CHANNEL WIDTH, mm					
24	SPACING BETWEEN AIR SIDE PLATES, mm					
25	SPACING BETWEEN FLUE GAS SIDE PLATES, mm					
26	MATERIAL: PLATE					
27	SPACER					
28	PANEL					
29	AIR INTERCONNECTING DUCT: QUANTITY					
30	(BOLTED / WELDED)					
31	SUPPLIED WITH CLIPS					
32	WATER WASHING: (YES / NO)					
33	TYPE: (OUT OF SERVICE / IN SERVICE)					
34	LOCATION					
35						
36	III HEAT PIPE:					
37	NUMBER OF PIPES					
38	PIPE OUTSIDE DIAMETER / WALL THICKNESS, mm					
39	PIPE MATERIAL					
40	PIPE PER ROW					
41	NUMBER OF ROWS					
42	PIPE PASS, mm					
43	PIPE ARRANGEMENT (SQUARE / TRIANGULAR), mm					
44			AIR SIDE	GAS SIDE		
45	FINS: TYPE					
46	(HEIGHT, mm x THICKNESS, mm x NUMBER / m)					
47	MATERIAL					
48	ACTUAL LENGTH, m					
49	HEAT EXCHANGE AREA, m ²					
50	MAXIMUM ALLOWABLE IMMERSION TEMPERATURE, °C					
51	SOOT BLOWER: (YES / NO)					
52	TYPE					
53	LOCATION					
54	NOTES					
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		DATA SHEET		No.		REV.		
		AREA:				SHEET		of
		TITLE						
		AIR PREHEATER						
CONSTRUCTION DATA								
1	IV REGENERATIVE:						REV	
2	MOUNTING:		<input type="checkbox"/> SIDE BY SIDE <input type="checkbox"/> DUCT OVER DUCT		SHAFT POSITION:		<input type="checkbox"/> HORIZONTAL <input type="checkbox"/> VERTICAL	
3	IMPELLER:	DIAMETER, mm						
4		SPEED, rpm						
5		TOTAL WEIGHT, kgf						
6	MAIN DRIVE:	TYPE						
7		VOLTAGE, V						
8		POWER, kW						
9		SPEED, rpm						
10	AUXILIARY DRIVE:	TYPE						
11		VOLTAGE, V						
12		POWER, kW						
13		SPEED, rpm						
14	REDUCTION GEAR SPECIFICATION:							
15	BEARING SPECIFICATION:							
16				COLD ZONE	INTERMEDIATE ZONE	HOT ZONE		
17	BASKETS:	DEPTH, mm						
18		THICKNESS, mm						
19		MATERIAL FILLER						
20		TYPE						
21	CASING:	MATERIAL						
22		CORROSION ALLOWANCE, mm						
23		PAINTING						
24	THERMAL INSULATION:	MATERIAL						
25		THICKNESS, mm						
26		COLD FACE TEMPERATURE, °C						
27	FIRE PROTECTION:	(YES / NO)						
28		TYPE:						
29	ROTARY SENSOR:	(YES / NO)						
30		TYPE OF CONTACT						
31	NOTES							
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		DATA SHEET		No.		REV.		
		AREA:				SHEET		of
		TITLE:						
		AIR PREHEATER						
1	SERVICE:			LOCATION			REV	
2	MANUFACTURER							
3	MODEL							
4	QUANTITY REQUIRED							
5	HEAT EXCHANGE AREA, m ²							
6	WEIGHT, kN							
7	APPROXIMATE DIMENSIONS (a x l x c), m							
8	PERFORMANCE DATA							
9	OPERATING CASE:							
10								
11	AIR SIDE:	INLET FLOW, kg/h						
12		INLET TEMPERATURE, °C						
13		OUTLET TEMPERATURE, °C						
14		PRESSURE DROP: ALLOWABLE, Pa						
15		CALCULATED, Pa						
16		ABSORBED HEAT, MW						
17	FLUE GAS SIDE:	FLOW, kg/h						
18		INLET TEMPERATURE, °C						
19		OUTLET TEMPERATURE, °C						
20		PRESSURE DROP: ALLOWABLE, Pa						
21		CALCULATED, Pa						
22		HEAT EXCHANGED, MW						
23	AIR FLOW BYPASS, kg/h							
24	TOTAL AIR FLOW FOR BURNERS, kg/h							
25	MIXED AIR TEMPERATURE, °C							
26	FLUE GAS COMPOSITION, % MOLAR (O ₂ /N ₂ /H ₂ O/CO ₂ /SO _x)							
27	FLUE GAS SPECIFIC HEAT, kJ / kg.°C							
28	FLUE GAS DEW POINT TEMPERATURE, °C							
29	MINIMUM METAL TEMPERATURE: ALLOWABLE, °C							
30	CALCULATED, °C							
31	MISCELLANEOUS							
32	MINIMUM AMBIENT AIR TEMPERATURE, °C							
33	ELEVATION ABOVE SEA LEVEL, m							
34	RELATIVE HUMIDITY, %							
35	EXTERNAL COLD AIR BYPASS (YES / NO)							
36	THERMOCOUPLES ON COLD SIDE (YES / NO): QUANTITY REQUIRED							
37	ACCESS DOORS: QUANTITY / SIZE / LOCATION							
38	INSULATION: INTERNAL / EXTERNAL							
39	CLEANING MEDIUM: (STEAM / WATER)							
40	PRESSURE, kPa							
41	TEMPERATURE, °C							
42								
43	MECHANICAL DESIGN							
44	FLUE GAS DESIGN TEMPERATURE, °C							
45	DIFFERENTIAL DESIGN PRESSURE, Pa							
46	SEISMIC FACTOR							
47	PAINTING REQUIREMENTS							
48	LEAK TEST							
49	WIND LOAD ON STRUCTURE, N/m ²							
50	AIR LEAKAGE (MAXIMUM GUARANTEED), %							
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52	NOTES							
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	DATA SHEET		No.	REV.
	AREA:		SHEET of	
	TITLE:			
		AIR PREHEATER		
CONSTRUCTION DATA				
1	I TUBULAR:			REV
2	NUMBER OF PASSES			
3	NUMBER OF TUBES PER BLOCK			
4	NUMBER OF BLOCKS			
5	SURFACE TYPE			
6	TUBE MATERIAL			
7	TUBE WALL THICKNESS, mm			
8	BLOCK WITH GLASS (YES / NO)			
9	NUMBER OF TUBES WITH GLASS			
10	AIR INTERCONNECTING DUCT: QUANTITY			
11	(BOLTED / WELDED)			
12	SUPPLIED WITH CLIPS			
13	WATER WASHING: (YES / NO)			
14	TYPE: (OUT OF SERVICE / IN SERVICE)			
15	LOCATION			
16				
17	II PLATE:			
18	NUMBER OF PASSES			
19	NUMBER OF PLATES PER BLOCK			
20	NUMBER OF BLOCKS			
21	PLATE THICKNESS, mm			
22	AIR CHANNEL WIDTH, mm			
23	FLUE GAS CHANNEL WIDTH, mm			
24	SPACING BETWEEN AIR SIDE PLATES, mm			
25	SPACING BETWEEN FLUE GAS SIDE PLATES, mm			
26	MATERIAL: PLATE			
27	SPACER			
28	PANEL			
29	AIR INTERCONNECTING DUCT: QUANTITY			
30	(BOLTED / WELDED)			
31	SUPPLIED WITH CLIPS			
32	WATER WASHING: (YES / NO)			
33	TYPE: (OUT OF SERVICE / IN SERVICE)			
34	LOCATION			
35				
36	III HEAT PIPE:			
37	NUMBER OF PIPES			
38	PIPE OUTSIDE DIAMETER / WALL THICKNESS, mm			
39	PIPE MATERIAL			
40	PIPE PER ROW			
41	NUMBER OF ROWS			
42	PIPE PASS, mm			
43	PIPE ARRANGEMENT (SQUARE / TRIANGULAR), mm			
44			AIR SIDE	GAS SIDE
45	FINS: TYPE			
46	(HEIGHT, mm x THICKNESS, mm x NUMBER / m)			
47	MATERIAL			
48	ACTUAL LENGTH, m			
49	HEAT EXCHANGE AREA, m ²			
50	MAXIMUM ALLOWABLE IMMERSION TEMPERATURA, °C			
51	SOOT BLOWER: (YES / NO)			
52	TYPE			
53	LOCATION			
54	NOTES			
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		DATA SHEET		No.		REV.		
		AREA:				SHEET		of
		TITLE						
		AIR PREHEATER						
CONSTRUCTION DATA								
1	IV REGENERATIVE:						REV	
2	MOUNTING:		<input type="checkbox"/> SIDE BY SIDE	<input type="checkbox"/> DUCT OVER DUCT	SHAFT POSITION:		<input type="checkbox"/> HORIZONTAL <input type="checkbox"/> VERTICAL	
3	IMPELLER:	DIAMETER, mm						
4		SPEED, rpm						
5		TOTAL WEIGHT, kN						
6	MAIN DRIVE:	TYPE						
7		VOLTAGE, V						
8		POWER, kW						
9		SPEED, rpm						
10	AUXILIARY DRIVE:	TYPE						
11		VOLTAGE, V						
12		POWER, kW						
13		SPEED, rpm						
14	REDUCTION GEAR SPECIFICATION:							
15	BEARING SPECIFICATION:							
16			COLD ZONE	INTERMEDIATE ZONE	HOT ZONE			
17	BASKETS:	DEPTH, mm						
18		THICKNESS, mm						
19		MATERIAL FILLER						
20		TYPE						
21	CASING:	MATERIAL						
22		CORROSION ALLOWANCE, mm						
23		PAINTING						
24	THERMAL INSULATION:	MATERIAL						
25		THICKNESS, mm						
26		COLD FACE TEMPERATURE, °C						
27	FIRE PROTECTION:	(YES / NO)						
28		TYPE:						
29	ROTARY SENSOR:	(YES / NO)						
30		TYPE OF CONTACT						
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INDEX OF REVISIONS

REV. A, B, C e D

There is no index of revisions.

REV. E

Affected Parts

Descrição da Alteração

Revalidation

REV. F

Affected Parts

Descrição da Alteração

Forms

Adapted to API STD 560