



NUCLEP



NUCLEBRAS EQUIPAMENTOS PESADOS S. A.



LAS / ANS Symposium 2008

LOCATION

Itaguaí – south coast of Rio de Janeiro state

85 km from Rio downtown and 120 km to the Angra nuclear plants

AMFJWZ
2002



QUALITY CERTIFICATES

The American Society of Mechanical Engineers

CERTIFICATE OF AUTHORIZATION

The American Society of Mechanical Engineers (ASME) is pleased to announce that the following member has been authorized to use the ASME logo and the ASME mark on its products and services.

MEMBER INFORMATION:
MEMBER NAME: [Name]
MEMBER TYPE: [Type]
MEMBER NUMBER: [Number]

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CERTIFICADO
de Autorización
 El American Society of Mechanical Engineers (ASME) tiene el honor de anunciar que el siguiente miembro ha sido autorizado para utilizar el logo de ASME y el símbolo de ASME en sus productos y servicios.

MEMBER INFORMATION:
MEMBER NAME: [Name]
MEMBER TYPE: [Type]
MEMBER NUMBER: [Number]

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MEMBER INFORMATION:
MEMBER NAME: NUCLEP - Núcleares Equipamentos Pesados S/A
MEMBER TYPE: [Type]
MEMBER NUMBER: [Number]

CERTIFICATE OF AUTHORIZATION
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MEMBER INFORMATION:
MEMBER NAME: [Name]
MEMBER TYPE: NP1
MEMBER NUMBER: [Number]

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MEMBER INFORMATION:
MEMBER NAME: [Name]
MEMBER TYPE: U2
MEMBER NUMBER: [Number]

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MEMBER INFORMATION:
MEMBER NAME: [Name]
MEMBER TYPE: U
MEMBER NUMBER: [Number]

CERTIFICATE OF AUTHORIZATION
 The American Society of Mechanical Engineers (ASME) is pleased to announce that the following member has been authorized to use the ASME logo and the ASME mark on its products and services.

MEMBER INFORMATION:
MEMBER NAME: [Name]
MEMBER TYPE: NS
MEMBER NUMBER: [Number]

CERTIFICATE OF AUTHORIZATION
 The American Society of Mechanical Engineers (ASME) is pleased to announce that the following member has been authorized to use the ASME logo and the ASME mark on its products and services.

MEMBER INFORMATION:
MEMBER NAME: [Name]
MEMBER TYPE: NA
MEMBER NUMBER: [Number]

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers



PRIVATE MARITIME TERMINAL

Located at the Sepetiba bay, 3 km from NUCLEP's workshop.

Connection between the terminal and the workshop through a private road.



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NUCLEAR ACTIVITIES

LOWER PART OF THE REACTOR VESSEL TO ATUCHA II NUCLEAR PLANT - ARGENTINA



**Stress Relieving
Heat treatment**

PRESSURIZER TO ANGRA 3



CONDENSERS TO ANGRA 2

**MANUFACTURING and
ASSEMBLY ON SITE
BY NUCLEP**



SPENT FUEL STORAGE RACKS TO ANGRA 2



**MANUFACTURING and
ASSEMBLY ON SITE
BY NUCLEP**



ACCUMULATORS TO ANGRA 2



PROTOTYPE OF A REACTOR VESSEL TO NUCLEAR SUBMARINES





ANGRA 1 REPLACEMENT STEAM GENERATORS

Design: AREVA NP SAS

Manufacturer: NUCLEP

Fabrication time: 32 months (2 GV)

Individual weight: 345 tons

CLEAN ROOM



Temperature: 24°C
Relative humidity: 50%
Pressure: 1.5 mm ca
Class: 100.000 (Tests indicated a class of 10.000)
Air changes: 10 / h

WELDING FEATURES

- 50 procedures were qualified.
- Processes employed: SAW, SMAW, FCAW, GTAW.
- Stainless steel Cladding
- Nickel alloy cladding
- Tube to tubesheet welds (TIG Orbital): 21.712 welds on both SG



INCONEL CLADDING OF THE TUBESHEET



POLISHING OF TUBESHEET SECONDARY SURFACE



SUB-ASSEMBLY 11



DEEP DRILLING OF TUBESHEET



Each tubesheet: 10.856 holes
 Tubesheet thickness: 600 mm
 Diameter: 19.27 mm (0 / + 0.12)
 Perpendicularity between
 the tubesheet faces: 0.5 mm max.

Total drilling time: 35 days per SG
24 hours a day

More than 1.800 BTA heads were
used (max. per head: 12 holes)

Result: 100% approved.



SA10 - CHANNEL HEAD



SUB-ASSEMBLY 12



Welding of nozzles & accessories

SUB-ASSEMBLY 30 (SA11 + SA12)



**Local stress relieving heat treatment
(electromagnetic induction)**



Transfer to the clean area

SUB-ASSEMBLY 13



SUB-ASSEMBLIES 23, 24, 25 & 26

SA 24



SA 25



SA 23



SA 26



SUB-ASSEMBLY 31

INTRODUCTION OF THE BUNDLE WRAPPER



SA 32 - TRANSFER TO THE CLEAN ROOM



SA 32 (INTERMEDIATE PART)

Sequence of activities

Assembly of the grids



Tubing



Tube to tubesheet welds



Helium leak test



Hydraulic expansion

Profilometry

SA 25 (WRAPPER ROOF)



SA 34 – (UPPER PART – ASSEMBLY OF INTERNALS)



ASSEMBLY OF THE UPPER PART



LAST CIRCUMFERENTIAL WELD



HYDROSTATIC TEST

Test pressure:

Secondary side → 105 bar
Primary side → 214 bar



EDDY CURRENT TEST



Result: 100% approved

ASSEMBLY OF THE CYCLONES



TRANSPORT TO THE MARITIME TERMINAL



TRANSPORT TO ANGRA SITE



**THANKS FOR
YOUR ATTENTION !**

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