GE Nuclear Energy

25A5689	SH NO. 1
REV. 1	

REVISION STATUS SHEET

DOC TITLE REACTOR PRESSURE VESSEL

LEGEND OR DESCRIPTION OF GROUPS

TYPE: CODE DESIGN SPECIFICATION

FMF: Dresden 2 AND 3

MPL NO: PRODUCT SUMMARY SEC. 7

THIS ITEM IS OR CONTAINS A SAFETY RELATED ITEM ☒ NO ☐ EQUIP CLASS P

REVISION			C
0	RM-01993 APR 06 1995		
1	JL TROVATO MAY 11 1995	RJA	
	CN02638 CHK BY: ER MOHTASHEMI		

PRINTS TO

MADE BY	APPROVALS	GENERAL ELECTRIC COMPANY
A. FORTIN 1/30/95	3/6/95 E.R. MOHTASHEMI	175 CURTNER AVENUE SAN JOSE, CALIFORNIA 95125
CHK BY A. FORTIN 1/31/95	ISSUED MAR 6 1995 R.J. AHMANN	CONT ON SHEET 2

MS-WORD

1. SCOPE

1.1 This document defines the ASME Code design requirements for the reactor pressure vessel stress analysis for the new loads applied to the vessel as a result of the installation of the shroud stabilizers which function to replace the horizontal girth welds H1 through H7 in the shroud. In addition, this design addresses the circumferential jet pump support plate H8 weld, assuming that it is cracked completely through and 360 degrees around.

2. APPLICABLE DOCUMENTS

2.1 General Electric Documents. The following documents form a part of this specification to the extent specified herein.

2.1.1 Supporting Documents

a. Reactor Pressure Vessel Data Sheet — 21A1109AB Rev. 13

b. Reactor Pressure Vessel, Purchase Specification — 21A1109 Rev. 2

c. Reactor Vessel, Purchase Part — 885D660 Rev. 11

Sheet No.	Revision No.
1	6
2	11
3	4
4	8

d. Reactor Thermal Cycles — 921D265 Rev. 1

e. Nozzle Thermal Cycles — 158B7279 Rev. 1

Sheet No.	Revision No.
1	1
2 - 3	0
4	1
5 - 10	0

f. Vessel Flange Bolting — 885D911 Rev.2

g. Nozzle End Preparation — 107C5305 Rev.2

h. Standard Requirements For Core Structure — 21A3319 Rev.5

i. GENE-771-84-1194, Rev. 2; "Dresden Units 2 & 3 Shroud Repair Seismic Analysis".

2.1.2 Supplemental Documents. Documents under the following identities are to be used with this specification:

a. Shroud Stabilizer Hardware Design Specification 25A5688 Rev. 2

2.2 Codes and Standards. The following documents of the specified issue form a part of this specification to the extent specified herein.

2.2.1 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code

a. Section III, 1963 Edition with Addenda through Summer 1964 (Dresden Unit 2)

b. Section III, 1965 Edition with Addenda through Summer 1965 (Dresden Unit 3)

c. Section XI, Rules for Inservice Inspection, 1989 Edition.

2.2.2 Other Documents

a. Dresden Station UFSAR

b. Shroud Support VPF 1248-114-4 (Dresden 2)
VPF 2252-131-3 (Dresden 3)

c. Certified Design Documents (Stress Report) VPF 1248-436-1 (Dresden 2)
VPF 2252-181-1 (Dresden 3)

d. ComEd Technical Requirements Document for Dresden/Quad Cities Core Shroud Repair, NEC-12-4056 Rev.0

e. BWROG - VIP, Core Shroud Repair Design Criteria, latest revision.

f. DRF B13-01749, " Shroud Fix For Dresden 2 & 3".

3. GENERAL DEFINITION

3.1 The purpose of the shroud stabilizers is to structurally replace all of the horizontal welds (H1 through H7) in the shroud. These welds were required to both horizontally and vertically support the core top guide, core support plate, and shroud head, and to prevent core bypass flow to the downcomer region. Weld H8 is a circumferential inconnel-to-inconnel weld between the shroud support ring and jet pump support plate which provides horizontal support for the core shroud. It also resists differential pressure and dead loads (vertical). The core top guide and core support plate horizontally support the fuel assemblies and maintain the correct fuel channel spacing to permit control rod insertion, as well as having other

structural functions. New loads are applied to the reactor pressure vessel as a result of the installation of the shroud stabilizers.

3.2 All of the non ASME Code requirements for the shroud stabilizers are defined in the Document of Paragraph 2.1.2.a. The ASME Code requirements are defined herein.

4. REQUIREMENTS

NOTE(S):

1) The shroud stabilizer hardware will be designed and fabricated to the requirements of GE Specifications 25A5688 and 25A5690, respectively.

2) The core shroud was not supplied as an ASME Code Component. However, Section XI requires Inservice Inspection (ISI) of the core support structures.

3) The required Replacement Program is different than most Replacement Programs, because the stabilizers are not a direct replacement. Instead, the structural functions of the shroud horizontal welds are replaced by new components. Any defects found in the horizontal welds H1-H7 and weld H8 also are acceptable after the installation of the stabiliziers.

4.1 The shroud stabilizers change the points of application of the forces applied to the reactor pressure vessel and jet pump support plate from the core shroud. These new forces shall be analyzed in accordance with the original Codes of Construction (documents of Paragraphs 2.2.1.a & 2.2.1.b).

4.2 The new forces and their points of application are defined in Figure 1, and in Table 1. The values given in Table 1 shall be combined with the forces defined in the Design Specification (documents of Paragraphs 2.1.1.a through 2.1.1.e), for the analysis of the RPV.

4.3 The original purchase specification for the reactor pressure vessel (document of Paragraph 2.1.1.b) specified that the boundary of jurisdiction of Section III of the ASME Code (documents of Paragraph 2.2.1.a & b) shall include all attachments to the pressure boundary parts, but does not include the components that are welded to the attachments. Thus, the jurisdiction of the original Code of Construction included all weld build up pads used to attach internal components to the reactor pressure vessel, but did not include the shroud support within the boundary of Code jurisdiction. The boundary of ASME Code jurisdiction is shown in Figure 2.

4.4 The analysis required by this Design Specification shall be Certified, to the applicable ASME Boiler and Pressure Vessel Code (Paragraphs 2.2.1 a & b, for Dresden 2 & 3 respectively).

5.0 PROFESSIONAL ENGINEER CERTIFICATION

To the best of my knowledge and belief, this Design Specification satisfies the requirements of the ASME Boiler and Pressure Vessel Code; 1) 1963 Edition with Addenda through Summer 1964 (Dresden 2) & 2) 1965 Edition with Addenda through Summer 1965 (Dresden 3).

Signature: Edward R Mohtashemi Date: 5/11/95

License Number: _____ State: California

ENVELOPE OF ADDITIONAL MECHANICAL DESIGN LOADS

FORCE	NORMAL LBS	UPSET THERMAL LBS	UPSET WITH OBE LBS	EMERGENCY LBS	FAULTED LBS
F1	———	———	93000	186000	190000
F2	———	———	12000	23000	24000
F3	———	———	67000	134000	140000
F4 (Envelope Of Cracked/un-Cracked Shroud)					
WITH PRE-LOAD	98000	170000	194000	408000	408000
WITHOUT PRE-LOAD	25000	25000	123000	339000	339000

F_1, F_2, F_3 and F_4 are discrete loads applied over a small area. At any one point in time, F_1 F_2 and F_3 are each applied to one location. At any one point in time, F_4 is applied to 4 locations 90° apart for the installation of four shroud stabilizer assemblies. The load F4 shown is the maximum and applies to one tie rod 180° apart, while, remaining 3 tie rods have loads much lower than F4 values shown above.

F_1, F_2 & F_3 loads are from document of Paragraph 2.1.1.i.

The stress intensities shall meet the allowables of the ASME Code, Section III, for the load combinations defined by the Dresden UFSAR. The original Code of Construction did not include Emergency and Faulted load combinations. Emergency and Faulted load combinations shall meet the allowables as defined by the Dresden UFSAR for the reactor pressure vessel.

TABLE 1

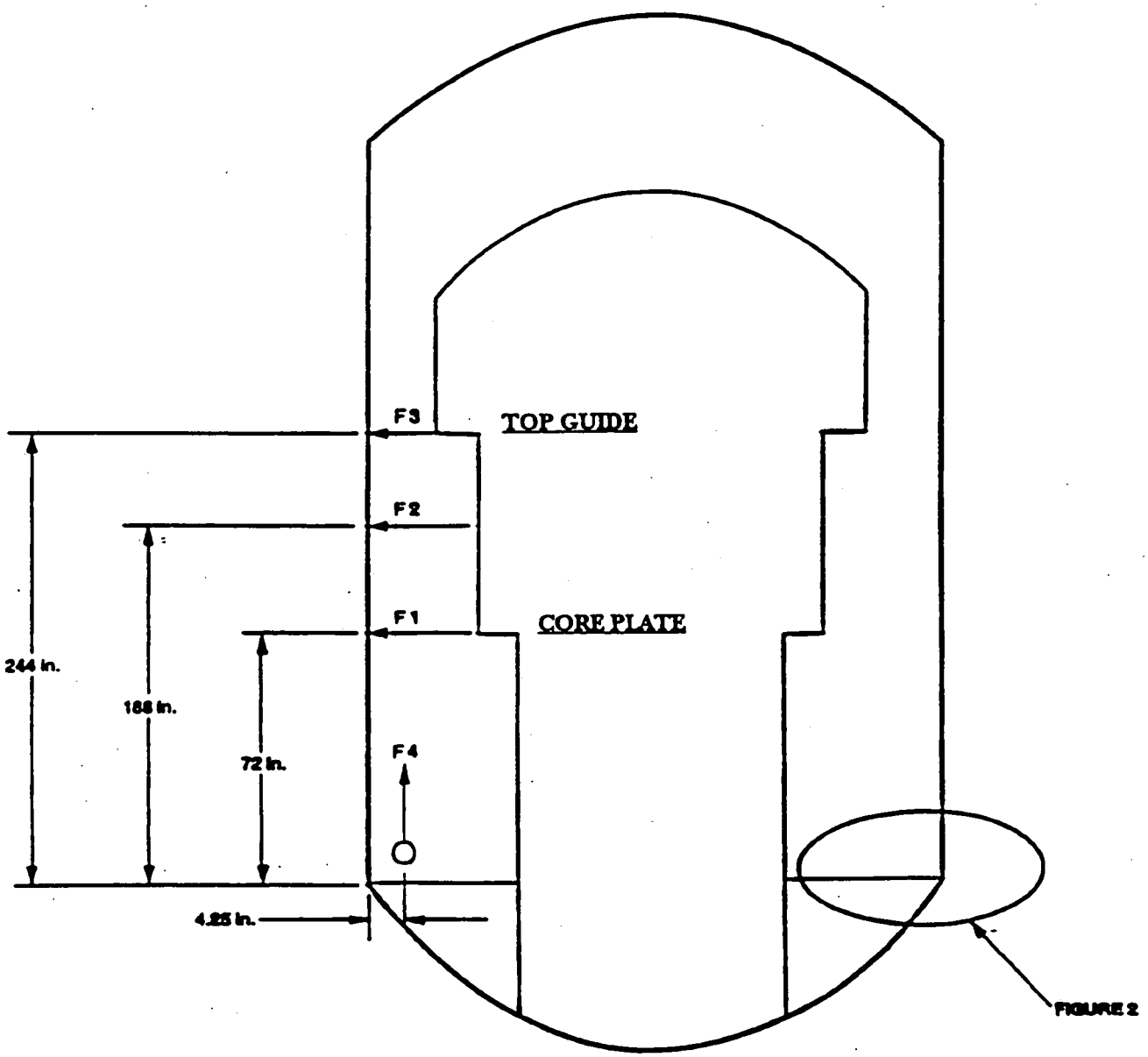

Figure 1. Application of Design Mechanical Loads

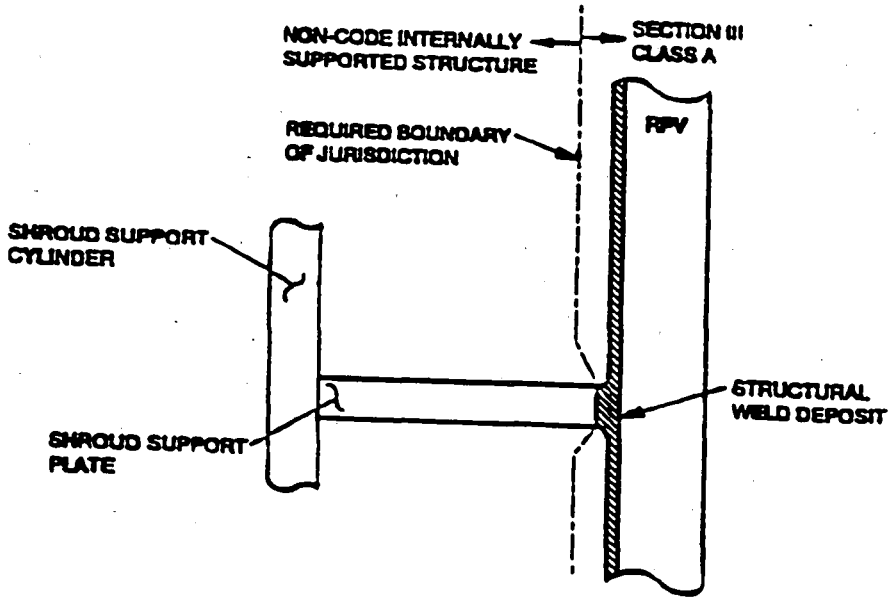

Figure 2. Boundary of ASME Code Jurisdiction

Enclosure 2

GENE Code Design Specification, 25A5689, Revision 1

Dresden 2 and 3 - Reactor Pressure Vessel