



GE Nuclear Energy

25A5698 SH NO. 1
REV.1

REVISION STATUS SHEET

DOC TITLE SHROUD STABILIZER

LEGEND OR DESCRIPTION OF GROUPS

TYPE: INSTALLATION SPEC

FMF: DRESDEN 2 & 3

MPL NO: PRODUCT SUMMARY SEC. 7

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

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1. SCOPE

- 1.1 Purpose. This specification provides the engineering requirements for installing shroud stabilizers which replace the H1 through H7 horizontal shroud welds in the Dresden reactor assembly.
- 1.2 If any conflict exists between this document and any other document referenced herein, this document shall govern.
- 1.3 This document, along with the reactor modification and installation drawing, defines all the engineering requirements for installation of the shroud stabilizers.
- 1.4 As used herein, the term "Installer" refers to the company or personnel contracted by the Plant Owner to install the shroud stabilizers.

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. 25A5688, Shroud Stabilizers Design Specification
- b. 107E5719, Reactor (Modification & Installation)
- c. 21A2040, Cleaning and Cleanliness Control
- d. D50YP5, Nickel-Graphite Thread Lubricant
- e. 112D6667, Contact, Lower
- f. 112D6638, Lower Stabilizer (lower contact assembly)
- g. 112D6666, Contact, Upper
- h. 112D6642, Upper Stabilizer Assembly (upper spring assembly)
- i. 112D6640, Tie Rod Assembly
- j. 112D6671, Spring, Lower
- k. 112D6677, Nut, Lock
- l. 112D6673, Tie Rod-Spring Assembly



2.1.1 (Continued)

- m. 112D6681, Support, Mid-Shroud
- n. 112D6680, Mid Support Assembly
- o. 112D6664, Support, Lower
- p. 112D6639, Toggle Bolt Assembly
- q. 112D6661, Washer, Toggle Bolt
- r. 112D6660, Nut, Toggle Bolt
- s. 112D6653, Pin, Clevis
- t. 112D6641, Stabilizer Support Assembly
- u. 112D5636, Bracket Yoke Assembly
- v. 112D6645, Ring, Mid Support
- w. 112D6734, Core Plate Wedge Assembly

2.1.2 Supplemental Documents

- a. NEDC-31735P GE BWR Operator's Manual - Materials and Processes

3. DESCRIPTION

3.1 The purpose of the stabilizer installation is to structurally replace horizontal girth welds H1 through H7 in the shroud; weld designations and the design requirements for the stabilizers are defined in the Design Specification, Paragraph 2.1.1.a. The installation of the shroud stabilizers involves electric discharge machining (EDM) of some slots and holes in the existing structure, assembling the stabilizer hardware in the reactor, and preloading the threaded fasteners. No structural welding or defect removal by machining are involved.

4. RESPONSIBILITIES

4.1 The Installer shall accept full responsibility for his work. The Installer shall comply with the requirements of this document and the supporting documents listed herein.



4.2 The Installer shall take the responsibility for coordination of his work with the work of others including the coordination of work planning and radiation monitoring with the Plant Owner.

4.3 The Installer shall be responsible for providing all specialized handling, alignment, and installation equipment, as may be necessary to perform this work, except as otherwise agreed to by the Plant Owner.

4.4 The Installer, except as otherwise agreed to by the Plant Owner, shall be responsible for machining as specified and limited by the applicable modification drawing.

4.5 The Installer shall supply adequately qualified personnel for supervision and for performing the tasks required to complete the stabilizer installation.

5. REQUIREMENTS

5.1 General

5.1.1 During installation, the installer, except as otherwise agreed to by the Plant Owner, shall complete data sheets and quality control checksheets as required by the specifications and instructions listed in this document. The Installer shall also keep log notes, records, etc., for future reference. Video tapes shall be taken of the completed repair. Tabular data entries designated for as-built measurements on the installation drawing shall be recorded.

5.1.2 Procedures and installation equipment shall be developed and designed to minimize the potential of loose parts within the RPV.

5.1.3 Following completion of the installation of the stabilizers, verification, inspection and signoff shall be performed to ensure that all unnecessary objects have been removed from the RPV.

5.1.4 All uncontaminated tools shall be stored in an uncontaminated controlled area and brought to the work area only as needed for fit-up and installation.

5.1.5 Refer to Paragraph 2.1.2.a for miscellaneous consumables approved for use in the reactor vessel.

5.2 Personnel Safety

5.2.1 Radiation Control

5.2.1.1 All work shall be done with the concurrence of and per the instructions of the authorized site Health Physics Personnel. At no time shall their requirements for dosimeter monitors, protective clothing or devices, time limits, exposure limits, etc., be violated.



5.2.1.2 Machining on contaminated surfaces, as required, shall be done in accordance with Health Physics and Safety Personnel requirements.

5.2.1.3 Radiation control practices shall be used to reduce exposure to workers to levels which are as low as reasonably achievable (ALARA).

5.2.2 Safety Precautions

5.2.2.1 Concern for personnel safety shall govern all work operations. All personnel working in hazardous locations shall be under constant surveillance by other personnel. All electric equipment shall be grounded or double insulated. Welding cables and leads shall be in good condition.

5.2.2.2 All work areas shall be kept neat and orderly. Protective measures and devices shall be used to keep all tools, equipment, and materials from inadvertently dropping into the RPV.

5.2.2.3 Care shall be exercised to keep contamination of articles which must enter and leave contamination zones to a minimum. In all cases, site radiation control requirements shall be met.

5.3 Cleaning and Cleanliness Control

5.3.1 During this stabilizer installation program, cleaning and cleanliness control shall be in accordance with the document listed in paragraph 2.1.1.c. In addition, no graphite lead pencils are allowed to contact stainless steel and nickel alloys.

5.4 Prerequisites

5.4.1 Jet Pump Throat Covers. Prior to the shroud stabilizer installation jet pump throat covers shall be installed as required.

5.4.2 Reactor Temperature. The reactor water temperature shall be less than 100°F, however the RHR shutdown cooling flow must be off whenever the installation activity in progress involves critical remote underwater handling in the annulus area.

6. INSTALLATION REQUIREMENTS

6.1 The installation sequence described below is not itself mandatory, so long as all specified installation requirements are accomplished. To assist in evaluating alternative sequences, the intent of some requirements, which are not self evident, are summarized in the step description.

6.2 Install protective shielding for the feedwater sparger and core spray line during operations that have the potential to damage their components as determined by the installer.



6.3 Go-gage checks shall be performed to ensure there are no weld fillets that interfere with the installation of the lower support.

6.4 Using a go, no-go gage, assure that there is visible clearance between the jet pump lifting eyes and the upper support hardware. Report any potential hardware interference to GENE Engineering for final disposition.

6.5 Using go, no-go gage, assure that there is at least 0.6 inches of clearance between the shroud and each of the ten (10) jet pump riser braces. If there is less than 0.6 inches clearance, measure the clearance and report it to GENE Engineering for disposition prior to installation.

6.6 Measure and record the annulus width at the top guide support ring and at the core plate support ring elevations as shown on the 107E5719 modification and installation drawing. Examine the RPV and shroud contact areas to assure that there are no abrupt discontinuities that would interfere with the repair hardware; if so, EDM spotface these areas flush, as necessary. The surface finish shall be 750 RMS or better. The vessel and shroud contact locations of the final stabilizer parts shall be simulated in taking these measurements.

CAUTION: Several piece parts are to be machined based on in-reactor measurements at a specific reactor azimuth. These parts shall then be designated by specific serial number, as recorded on the as-built data table on drawing 107E5719, for that specific azimuth.

6.7 Based on the in-reactor measurements, machine the RPV contact surface of the lower contact, drawing 112D6667 as shown on the 107E5719 modification and installation drawing. Assemble the lower contact as shown on the lower stabilizer assembly, drawing 112D6638.

6.8 Based on the in-reactor measurements, machine the RPV contact surface of the upper contact, drawing 112D6666, as shown on the 107E5719 modification and installation drawing. Assemble the upper contact as shown on the upper stabilizer assembly, drawing 112D6642.

6.9 Locate the proper location on the shroud as shown on the 107E5719 modification and installation drawing. Machine (EDM) slots in the shroud as specified on the 107E5719 modification and installation drawing. The slot surface finish shall be 750 RMS or better.

6.10 In accordance with the 107E5719 modification and installation drawing, machine (EDM) two holes in shroud support plate. EDM swarf shall be captured to the maximum extent practical.

6.11 Hone the holes in the shroud support plate. To assure the removal of microfissures from the EDM holes in the shroud support plate, the hone operation shall remove a minimum of 0.005 inch from the inside surface of the hole while meeting the final hole size requirement on the 107E5719 modification and installation drawing.



6.12 Install lower support, 112D6664, over the two shroud support plate holes using two toggle bolt assemblies, 112D6639, and two toggle bolt washers, 112D6661, and two toggle bolt nuts, 112D6660, and the two lock nuts, 112D6677, as shown on the 107E5719 modification and installation drawing. Lubricant (D50YP5B) shall be applied to the threaded surfaces. Tension the two toggle bolts to the tensile force specified on the 107E5719 modification and installation drawing, torque the two toggle bolt nuts in accordance with 107E5719 while the toggle bolts are tensioned. Remove the tensioning tooling and tighten the lock nuts in accordance with 107E5719. Inspect to verify correct installation of the lower support. Crimp the toggle bolt lock nuts, and inspect for proper crimping of the retainers.

6.13 Install the clevis pin, 112D6653, in the mating hole of the lower support in accordance with the requirements of the 107E5719 modification and installation drawing.

6.14 Complete the tie rod-spring assembly. Assemble the tie rod, assembly drawing 112D6640, with the lower spring, drawing 112D6671 (drill pin hole and install lock pin), and the lower stabilizer, drawing 112D6638 as shown on the tie-rod spring assembly drawing 112D6673 (lower stabilizer is rotated 180° from that shown on drawing). Lubricant (D50YP5B) shall be applied to the threaded surfaces.

6.15 Temporarily protect the exposed tie rod thread from damage.

CAUTION: Maneuvering of the tie rod-spring assembly must be done with extreme care to avoid damaging reactor hardware such as the jet pump sensing lines.

6.16 Install the tie rod-spring assembly, 112D6673, in accordance with the requirements of the 107E5719 modification and installation drawing. Maneuver lower spring clevis over clevis pin and support vertically.

6.17 Position the bracket yoke assembly, 112D5636, in the reactor vessel at the proper elevation above the tie-rod thread protector. The yoke is to be suspended at an elevation which facilitates assembly with the upper support assemblies.

6.18 Position the right-hand and left-hand stabilizer support assemblies, 112D6641P001 and P002, outboard of the respective ends of the bracket yoke assembly. Then position the upper stabilizer support assemblies in the shroud flange pockets, in accordance with the requirements of the 107E5719 modification and installation drawing.

6.19 Remove the temporary thread protection from the tie rod. Install the tie rod nut and torque in accordance with the requirements of the 107E5719 modification and installation drawing. Verify that the tie rod nut is properly locked by its retainers. Lubricant (D50YP5B) shall be applied to the nut threaded surfaces.



6.20 Rotate and position the lower stabilizer assembly, 112D6638, as shown on the 107E5719 modification and installation drawing. Verify that the lower stabilizer assembly latch is engaged in the tie rod slot.

6.21 Measure the radial gap from the tie rod to the vessel wall and the radial gap from the tie rod to the shroud outside surface at the mid support elevation in accordance with 107E5719. Bowing of the tie rod should be minimized while taking these measurements. The vessel contact locations of the mid support shall be simulated in taking these measurements. Based on this in-reactor measurement, machine the contact surfaces of the mid support, drawing 112D6681, in accordance with the requirements of the 107E5719 modification and installation drawing.

6.22 Install the mid support assembly, 112D6680, in accordance with the requirements of the 107E5719 modification and installation drawing. Verify that the mid support latches are engaged over the mid support ring (112D6645).

6.23 Install upper stabilizer (spring) assemblies, 112D6642, in accordance with the requirements of the reactor modification drawing. Lubricant (D50YP5B) shall be applied to the 0.50 inch slot areas and the jacking bolt (threaded and sliding surfaces). Engage with stabilizer support assembly and adjust the jacking bolt as specified on the 107E5719 modification and installation drawing to preload the upper spring. Check that the spring retainers are properly engaged to lock the jacking bolt.

6.24 Remove the protective shielding for the feedwater sparger and core spray line.

6.25 Repeat steps 6.2 through 6.24 for the installation of stabilizer hardware at the remaining azimuth locations.

6.26 If required, install the Core Plate Wedge Assemblies, 112D6734, in accordance with the requirements of the 107E5719 modification and installation drawing.

7. EXAMINATION AND TESTING

7.1 Visual Examination. Visually examine the stabilizer installation preparations to verify that all of the required holes have been machined in the proper locations and that all debris has been removed from the area. Visually examine the installed stabilizers to verify compliance with the 107E5719 modification and installation drawing.

8. RECORDS AND SUBMITTALS

8.1 Prior to implementation of this stabilizer installation program, the following procedures shall be submitted by the Installer and approved by the Owner.



8.1 (Continued)

- a. Installation and inspection procedures including sequence data sheets, measurement data sheets, quality control checksheets, drawings, sketches, instructions, etc..
- b. Cleaning and cleanliness control procedures.
- c. Machining procedures as applicable.
- d. As-built drawing (data required by 107E5719).

8.2 After implementation of this stabilizer installation program, all recorded data records, photographs, video tapes, logs, etc., shall be submitted by the Installer to the Owner for file and information within 30 days. The 107E5719 modification and installation drawing shall be updated to incorporate the in-reactor as-built measurements, and the as-built measurements with corresponding serial numbers of the parts machined as part of the installation process. One copy shall be submitted to GENE within 30 days.

9. DEVIATIONS AND SUBSTITUTIONS

9.1 All deviations, as a result of damaged equipment, nonconforming conditions, or any proposal by the Installer for substitutions, modifications, or relaxation of the specified materials, procedures or design shall be submitted to the Owner for consideration and approval.

Enclosure 4

GENE Installation Specification, 25A5698, Revision 1

Dresden 2 and 3 - Shroud Stabilizer Installation