



GE Nuclear Energy

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DOCUMENT TITLE STABILIZER INSTALLATION

LEGEND OR DESCRIPTION OF GROUPS

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MPL NO: PRODUCT SUMMARY SEC. 7

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

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1. SCOPE

1.1 Purpose. This specification provides the engineering requirements for installing stabilizers which replace the H1 through H7 horizontal shroud welds in the Peachbottom 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. 25A5580, Shroud Stabilizers
- b. 105E1455, Reactor (Modification & Installation)
- c. 21A2040, Cleaning and Cleanliness Control
- d. D50YP5, Nickel-Graphite Thread Lubricant
- e. 112D6355, Contact, Lower
- f. 112D6360, Lower Stabilizer (lower contact assembly)
- g. 112D6357, Contact, Upper
- h. 112D6347, Upper Stabilizer Assembly (upper spring assembly)
- i. 112D6349, Tie Rod Assembly
- j. 112D6351, Spring, Lower
- k. 112D6331, Ring, Mid Support
- l. 112D6358, Tie Rod-Spring Assembly
- m. 112D6356, Support, Mid
- n. 112D6359, Mid Support Assembly
- o. 112D6490, Support, Lower



- p. 112D6495, Toggle Bolt Assembly
- q. 112D6493, Washer, Toggle Bolt
- r. 112D6494, Nut, Toggle Bolt
- s. 112D6505, Pin, Clevis
- t. 112D6348, Stabilizer Support Assembly

2.1.2 Supplemental Documents

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

2.2 Codes and Standards. The following codes and standards of the latest issue (or 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

None

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 2.1.1.a design specification. 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 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 Fuel Removal. Prior to the shroud stabilizer installation sufficient fuel assemblies shall be removed as necessary for installation access in the vicinity of the core plate wedges.

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

5.4.3 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 Shroud head bolt (SHB) lug sets which straddle the 45, 135, 225, and 315 degree azimuths, on the shroud, are specified, on the 105E1455 modification and installation drawing, for locating the stabilizer support installation and for machining shroud head flange slots. These SHB lugs shall be determined and independently verified as a prerequisite to any physical work at each of the four installation locations. Prior to removing the shroud head (SHBs may be unlatched), a common scribe line shall be made on both the shroud and shroud head at each of the four installation locations, in accordance with the 105E1455 modification and installation drawing. This scribe line will then become the datum for locating the slots in the shroud head flange and installing the stabilizer support assemblies on the shroud flange.

6.3 Go-gage checks shall be performed on: the shroud flange and steam dam width for fit-up with the upper support (also checks for possible prior damage to the steam dam), and the jet pump restrainer bracket to RPV inside diameter clearance, 5.4 inch minimum, to allow passage of the lower spring (temporarily ignoring the jet pump restrainer bracket guide plates).

6.4 Install protective shielding for the feedwater sparger and core spray line.

NOTE: The below step is a contingency, which will only be performed if there is insufficient clearance to complete the installation.

6.5 If required, machine (EDM) the jet pump restrainer bracket guide plates, as shown on the 105E1455 modification and installation drawing. EDM swarf shall be captured to the maximum extent practical.



6.6 Measure and record the annulus width at the top guide support ring and at the core support ring elevations as shown on the 105E1455 modification and installation drawing. Examine the RPV and shroud contact areas to assure that there are no abrupt discontinuities; if so, EDM spotface these areas flush. 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 105E1455, for that specific azimuth.

6.7 Based on the in-reactor measurements, machine the RPV contact surface of the lower contact, drawing 112D6355, as shown on the 105E1455 modification and installation drawing. Assemble the lower contact as shown on the lower stabilizer assembly, drawing 112D6360.

6.8 Based on the in-reactor measurements, machine the RPV contact surface of the upper contact, drawing 112D6357, as shown on the 105E1455 modification and installation drawing. Assemble the upper contact as shown on the upper stabilizer assembly, drawing 112D6347.

6.9 Working in the equipment pool, locate the proper datum on the shroud head flange as shown on the 105E1455 modification and installation drawing. Machine (EDM) slots in the shroud head flange as specified on the 105E1455 modification and installation drawing.

6.10 In accordance with the 105E1455 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 hole 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 105E1455 modification and installation drawing.

6.12 Install lower support, 112D6490, over the two shroud support plate holes using two toggle bolt assemblies, 112D6495, and two toggle bolt washers, 112D6493, and two toggle bolt nuts, 112D6494, as shown on the 105E1455 modification and installation drawing. Lubricant (D50YP5B) shall be applied to the threaded surfaces. Tension the two toggle bolts to the specified load, and tighten the toggle bolt nuts. Inspect to verify the installation of the lower support. Crimp the toggle bolt nuts, and inspect for proper crimping of the retainers.

6.13. Install the clevis pin, 112D6505, in the mating hole of the lower support in accordance with the requirements of the 105E1455 modification and installation drawing.

6.14 Complete the tie rod-spring assembly. Assemble the tie rod, assembly drawing 112D6349, with the lower spring, drawing 112D6351 (Drill pin hole and install lock pin.), and the lower stabilizer, drawing 112D6360 as shown on assembly drawing 112D6358. 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, 112D6358, in accordance with the requirements of the 105E1455 modification and installation drawing. Maneuver lower spring clevis over clevis pin and support vertically.
- 6.17 Position the stabilizer support assembly, 112D6348, over the tie rod. Lower the stabilizer support assembly over the steam dam and locate properly on shroud flange in accordance with the requirements of the 105E1455 modification and installation drawing.
- 6.18 Rotate and position the lower stabilizer assembly, 112D6360, as shown on the 105E1455 modification and installation drawing. Verify that the lower stabilizer assembly latch is engaged in the tie rod slot.
- 6.19 While forcing the upper end of the tie rod radially inward, taking up clearance (0.25 inch diametral) in the support block's clearance hole, measure the radial gap from the tie rod to the vessel wall at the mid support elevation. The tie rod itself should not be bowed while taking this measurement. 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 112D6356, in accordance with the requirements of the 105E1455 modification and installation drawing. Complete the mid support assembly as shown on the mid support assembly drawing, 112D6359.
- 6.20 Remove the temporary thread protection from the tie rod. Install the tie rod nut and torque in accordance with the requirements of the 105E1455 modification and installation drawing; continue to force the upper end of the tie rod radially inward during tensioning. Verify that the tie rod nut is properly locked by its retainers. Lubricant (D50YP5B) shall be applied to the nut threaded surfaces.
- 6.21 Install the mid support in accordance with the requirements of the 105E1455 modification and installation drawing. Verify that the mid support latch is engaged in the tie rod slot.
- 6.22 Install upper stabilizer (spring) assembly, 112D6347, 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 moving surfaces). Engage with stabilizer support assembly and adjust the jacking bolt as specified on the 105E1455 modification and installation drawing to preload the upper spring. Check that the spring retainers are properly engaged to lock the jacking bolt.
- 6.23 Remove the protective shielding for the feedwater sparger and core spray line.



6.24 Repeat steps 6.3 through 6.23 for the installation of stabilizer hardware at the remaining azimuthal locations. Step 6.9 is envisioned as an independent parallel activity.

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 105E1455 modification and installation drawing. To minimize inspection time, personnel exposure, and tooling requirements, installation requirements, as indicated on the installation drawing, may be verified by tool design, process control and mockup qualification testing.

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.

- 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 105E1455).

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 105E1455 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.