

SLR Document Changes: GALL-SLR AMP XI.M12

Overview of Purpose of the Changes: The “acceptance criteria” program element of GALL-SLR AMP XI.M12 is changed to add the 2019 Edition of ASME Code, Section XI, Non-mandatory Appendix C, which provides flaw evaluation procedures for cast austenitic stainless steel (CASS) with ferrite content ≥ 20 percent.

Basis of the Changes

Non-mandatory Appendix C to the 2019 Edition of ASME Code, Section XI provides the flaw evaluation procedures for CASS with ferrite content ≥ 20 percent. [1] The prior edition of the Code did not provide flaw evaluation methods for CASS with ferrite content ≥ 20 percent. The flaw evaluation procedures in the 2019 Edition of the Code were developed by considering the ferrite content, fracture toughness, tensile data of CASS materials and the relevant elastic-plastic correction factors (Z-factors) as a function of ferrite content.

Currently, rulemaking activities are ongoing to incorporate by reference the 2019 Edition of ASME Code, Section XI in 10 CFR 50.55a. Given the ongoing rulemaking status, the NRC staff finds that Appendix C to the 2019 Edition of ASME Code, Section XI may be used in GALL-SLR AMP XI.M12 until the appendix is formally incorporated by reference in 10 CFR 50.55a. Once the appendix is incorporated by reference in 10 CFR 50.55a, the program may use the appendix as incorporated by reference in 10 CFR 50.55a.

Reference:

1. PVP2017-66100, “Technical Basis for Flaw Acceptance Criteria for Cast Austenitic Stainless Steel Piping,” D.J. Shim et al., Proceedings of the ASME 2017 Pressure Vessels and Piping Conference, July 16-20, 2017, Waikoloa, Hawaii, United States.
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Document Changes:

GALL-SLR AMP XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)”

The “acceptance criteria” program element of GALL-SLR AMP XI.M12 is changed as follows. The strikeout portion is deleted and the underlined portion is added.

6. **Acceptance Criteria:** Flaws detected in CASS components are evaluated in accordance with the applicable procedures of ASME Code, Section XI. The ~~most recent versions~~ of the ASME Code, Section XI incorporated by reference in 10 CFR 50.55a (~~2007 edition through 2008 addenda e.g., 2010 and 2013 Editions~~), does not contain any evaluation procedures applicable to CASS with ferrite content ≥ 20 percent. (Nonmandatory Appendix C to the 2013 Edition of ASME Code, Section XI states that flaw evaluation methods for CASS with $\geq$

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20 percent ferrite are currently in the course of preparation.) Nonmandatory Appendix C to the 2019 Edition of ASME Code, Section XI has not been yet incorporated by reference in 10 CFR 50.55a. However, it provides flaw evaluation procedures for CASS with ferrite content ≥ 20 percent. The procedures may be used for flaw evaluations or flaw tolerance evaluations in this program until Nonmandatory Appendix C to the 2019 Edition of ASME Code, Section XI is incorporated by reference in 10 CFR 50.55a. Once it is incorporated by reference in 10 CFR 50.55a, the evaluation procedures, as incorporated by reference in 10 CFR 50.55a, are used in this program. This program may also use the flaw evaluation or flaw tolerance evaluation methods in the NRC-approved code cases that are documented in the latest revision of Regulatory Guide 1.147. Therefore, methods used for evaluations of flaws detected in CASS piping or components containing ≥ 20 percent ferrite, and methods used for flaw tolerance evaluations of such components, must be approved by the NRC staff on a case-by-case basis until such methods are incorporated into editions of the ASME Code, Section XI or code cases that are incorporated by reference in 10 CFR 50.55a, or in NRC-approved code cases, as documented in the latest revision to Regulatory Guide (RG) 1.147. NUREG/CR-4513, Revision 1 provides methods for predicting the fracture toughness of thermally aged CASS materials with delta ferrite content up to 25 percent.

The clean version of the changed program element is shown below:

6. **Acceptance Criteria:** Flaws detected in CASS components are evaluated in accordance with the applicable procedures of ASME Code, Section XI. The recent versions of the ASME Code, Section XI incorporated by reference in 10 CFR 50.55a (e.g., 2010 and 2013 Editions) do not contain any evaluation procedures applicable to CASS with ferrite content ≥ 20 percent. (Nonmandatory Appendix C to the 2013 Edition of ASME Code, Section XI states that flaw evaluation methods for CASS with ≥ 20 percent ferrite are currently in the course of preparation.) Nonmandatory Appendix C to the 2019 Edition of ASME Code, Section XI has not been yet incorporated by reference in 10 CFR 50.55a. However, it provides flaw evaluation procedures for CASS with ferrite content ≥ 20 percent. The procedures may be used for flaw evaluations or flaw tolerance evaluations in this program until Nonmandatory Appendix C to the 2019 Edition of ASME Code, Section XI is incorporated by reference in 10 CFR 50.55a. Once it is incorporated by reference in 10 CFR 50.55a, the evaluation procedures, as incorporated by reference in 10 CFR 50.55a, are used in this program. This program may also use the flaw evaluation or flaw tolerance evaluation methods in the NRC-approved code cases that are documented in the latest revision of Regulatory Guide 1.147. NUREG/CR-4513, Revision 1 provides methods for predicting the fracture toughness of thermally aged CASS materials with delta ferrite content up to 25 percent.