



EPRI

ELECTRIC POWER
RESEARCH INSTITUTE

***Current PDI Process for
Determining Ultrasonic
Equipment Equivalencies Using
Current Appendix VIII
Requirements***

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Code Requirements/PDI Process

- *Article VIII-1000 Scope*
 - *VIII-1100 General*
 - *(f) Instrument characterization described in Supplement 1 is optional. When Supplement 1 is selected, both the original and substituted equipment shall be characterized*
- PDI Interpretation
 - Supplement 1 addresses requirements for evaluating electronic characterization of an ultrasonic system. You only get here if;
 - 1) A essential component is changed in the system
 - 2) You choose to use this process in lieu of VIII-4100 (e) through (h)

Code Requirements/PDI Process

- *Article VIII-2000 General Examination System Requirements*
 - *VIII-2100 Procedure Requirements*
 - *(b) The procedure shall specify a single value or range of values for the variables listed in VIII-2100 (d)*
 - *VIII-2100 (d) (1) Instruments or systems, including manufacturer and model or series of pulser, receiver, and amplifier.*
- PDI Process
 - PDI initially captures the manufacturer and model of instruments during the initial successful qualification of the instrument
 - This model number ties the instrument to its essential components such as the pulser, receiver and amplifier
 - Some systems (mainly advanced automated systems specific to a vendor) have interchangeable components and in those cases the internal components of the system are tracked separately
 - In addition, the essential instrument settings are also captured and the values are placed on Table 2 and unless re-qualified or expanded upon these settings shall be used for all future testing

Code Requirements/PDI Process

- *Article VIII-3000 Qualification Requirements*
 - *VIII-3130 (a) Any two procedures with the same essential variables [VIII-2100(d)] are considered equivalent. Pulsers, search units, and receivers that vary within the tolerances specified in VIII-4100 are considered equivalent. -----*
- PDI Process
 - If documentation is provided from the manufacturer that documents that the components are the same (manufacturer and model) they are considered equivalent
 - The equivalent combinations are listed on Table 3
 - For instruments, evaluations are performed to ensure that they have the same essential instrument settings documented on Table 2.
 - The PDA continually monitors candidates during all performance demonstrations and if any issues related to equipment are noted further investigations are performed.

Code Requirements/PDI Process

- *Article VIII-4000 Essential Variable Tolerances*
 - *VIII-4100 Pulsers, Receivers and Search Units*
 - *The qualified procedure may be modified to replace pulsers, receivers, or search units without requalification when the following conditions are met.*
- PDI Process/Interpretation
 - If an instrument contains the same pulser/reciever, but has a different model number they are considered equivalent because the essential component as defined above has not been replaced so VIII-4000 tests are not required.
 - The PDA verifies all calibrations and instrument settings to ensure that the instruments can be calibrated and used in the same fashion that they were qualified.
 - Later versions of the ASME Code have been revised to provide additional clarification of the intent which is consistent with PDI's position
 - *Components of the same manufacturer, and model or series, are substitutable without further consideration. The qualified procedure may be modified to replace pulsers, receivers, or search units without requalification when the following conditions are met.*

Additional Assurances that Process Works

- We are operating within the bounds of the Code
- There are ~ 23 different (non-equivalent) manual instruments qualified with the existing Generic procedures
- There are over ~58,000 search unit instrument combinations successfully qualified with these instruments
- To date we have never had an instrument fail to successfully qualify if the correct instrument settings were used
- To date we have never witnessed a candidate fail due to a malfunctioning instrument that was properly calibrated and checked prior to use
- Candidate organizations in most cases use their own manual instruments for qualification thus the PDA evaluates a wide variety of different instruments of the same model number, but with different serial numbers and have witnessed no variations in performance

Summary

- The current process used by PDI is in compliance with ASME Code requirements