

# Code Case N-659 Implementation

Industry Application

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Inspection ITG

# Requirements

- Blind performance demonstration with representative mock-ups in terms of material, wall thickness, diameter, surface roughness, and configuration
  - Compliance achievable

# Requirements (Cont.)

- Minimum 10 construction flaws for personnel qualification
  - Compliance achievable

# Requirements (Cont.)

- Equivalent of three personnel qualifications for procedure qualification
  - Intent achievable
  - May be impractical for unique joint configurations (small diameter joints require prohibitive number of mock-ups)
  - Reasonable expectation for industry generic procedure approach similar to PDI
  - NRC/industry consensus on 30 individual flaws or smaller number  $>10$  but  $<30$  randomly chosen

# Requirements (Cont.)

- 70% of flaws along fusion line
  - Compliance achievable

# Requirements (Cont.)

- Flaws distributed throughout the weld thickness
  - Compliance achievable

# Requirements (Cont.)

- Flawed and unflawed volume defined in independent grading units
  - Compliance achievable
  - Suggest considering inner 1/3, middle 1/3, and outer 1/3 as separate grading unit bands

# Requirements (Cont.)

- Flaws shall be representative of construction flaws common to the welding process
  - Compliance achievable



# Requirements (Cont.)

- Capable of detecting flaws “having a minimum 2% through-wall depth and within the flaw length acceptance of NB-2553c”
  - Compliance not achievable in many cases
  - A 2 ½ inch schedule 160 weld would require detection of 0.0075 inch TW flaw
  - Alternatives to consider – ASME Section V drilled hole size, ASME Section XI IWB-3500 minimum pre-service through wall dimensions, 10% through wall

# Requirements (Cont.)

- Flaws detected and located within 1 inch of true length and width location
  - Compliance achievable
  - Assure understanding of three dimensional measurement approach
  - Piping weld example – flaw located within 1 inch upstream or downstream and within 1 inch circumferentially around the pipe

# Requirements (Cont.)

- Flaws located within 10% true through wall depth location or within 10% of the sound beam path
  - Compliance not necessary due to length and flaw type acceptance criteria
    - Volumetric flaws dispositioned on length measurement only
    - Planar flaws such as cracks, lack of fusion, or lack of penetration are rejected upon identification

# Requirements (Cont.)

- Minimum of 10 flaws for sizing with random distribution of lengths greater than and less than NB-2553c
  - Compliance achievable

# Requirements (Cont.)

- Maximum flaw length shall not exceed 200% of the acceptance standard
  - Compliance achievable

# Requirements (Cont.)

- For qualification, all flaws shall be correctly identified as acceptable or unacceptable
  - Compliance impractical
  - Alternative 80% correct flaw identification
    - Flaws with lengths near criteria are effected by technique performance error
    - Importance of Planar vs Volumetric categorization
    - Consider personnel measurement against “UT Truth” versus “DE Truth”

# Requirements (Cont.)

- Procedures shall identify equipment and variables and be re-qualified when equipment or variables change
  - Compliance achievable

# Future Considerations

- Move to a length and through wall aspect ratio acceptance criteria similar to ASME Section XI
- Provide guidance for qualifying over a range of thicknesses and diameters