



INSPECTION AND TESTING AS PER ASME SECTION III

INTERGRANULAR CORROSION TEST PROCEDURE
 RADIOGHRAPHIC TEST PROCEDURE
 ULTRASONIC TEST PROCEDURE
 VISUAL INSPECTION PROCEDURE





1- INTERGRANULAR CORROSION TEST PROCEDURE

The objective of this procedure is to control and detect susceptibility to Intergranular attack associated with the precipitation of chromium carbides in AISI 321 austenitic stainless steels material used in construction of vessel in accordance with ASTM A262 (Practice A & E). This type of corrosion also named Intergranular corrosion or "IGC". This procedure shall be used to assure non-susceptibility of welded area or reactor vessel after welding process according to approved WPS, probably repairs and eventual (partial or full) heat treatment of reactor vessel parts.







2-RADIOGHRAPHIC TEST PROCEDURE

2-1 REFERENCES:

- > ASME SEC III-SUB SECTION NB
- > ANSI, ASME Sec. VIII Div. 1, UW-51, 52 & Appendix 4
- > ANSI/ASME Sec. V Art2
- > ASTM-E-94 Non-destructive testing.
- > ASTM-E-149 Control quality of radiography testing
- > ASNT Recommended practices no. SNT-TC-1A for NDT personal qualification and certification (1996 Edition with 1998 Add)





Location Marker

Placement

Film

Film

Side T-

Either

275.1

(b)(1)

Source

Source

Side T- Side T 277.1(a) 275.2 Side T-

Side

T-275.1

(b)(1)















3- ULTRASONIC TEST PROCEDURE

3-1 REFERENCES:

ASME Code Sec III subsection NB ASME Code Sec. V Non-Destructive Examination SNT-TC-1A EN 473/ISO 9712 ASTM A435 straight beam ultrasonic examination of steel plate. ASTM A578 straight beam ultrasonic examination of plain & clad steel plate for special application.





3- ULTRASONIC TEST PROCEDURE

3-2 EXAMINATION PROCEDURE

3-2-1 WELD and HAZ :

The scanning shall be performed at gain setting at least two times the primary reference level(+6db). Evaluation shall be performed with respect to the primary reference level.

The volumes shall be scanned by straight and angle beam techniques as described in details.

Two angle beams, having nominal angles of 45° and 60° with respect to a perpendicular to the examination surface shall generally be used.





3- ULTRASONIC TEST PROCEDURE

3-2-2 BASE METAL :

The equipment shall be of the pulse-echo straight beam type. The transducer is normally 1 to 11/8 in. [25 to 30 min] in diameter or 1 in [25 mm] square however any transducer having a minimum active area of 0.7 inP2P[450 mmP2P] may be used . The test shall be performed by direct contact method.

3-2-3 THICKNESS MEASUREMENT:

Procedures used for ultrasonic examination for thickness determination shall conform to the following standards in article 23, as applicable:

a) SE-114 recommended practice for ultrasonic pulse-echo straight-beam testing by the contact method
c) SE-797 standard practice for thickness measurement by manual contact

c) SE-797 standard practice for thickness measurement by manual contact ultrasonic method.





4-1 REFERENCES:

ASME Sec. III subsection NB. ASME sec V- Non Destructive Examination Article 9 ASME sec II - part c, welding rods, Electrode and filler metal, SFA 5.4 & 5.9. ASME sec. IX welding and brazing & qualification.





4-2 Inspection Procedure

- Visual inspection procedure shall be done in three major steps:
- A) inspection before welding,
- B) inspection during welding
- C) inspection after welding

4-2-1 Inspection before welding

A: Part size and geometry controlB: Base & filler metal controlC: holds point controlD: weld document controlE: joint preparationF: fitup inspection

TABLE NB-4232-1 MAXIMUM ALLOWABLE OFFSET IN FINAL WELDED JOINTS		
Section Thickness, in. (mm)	Direction of Joints	
	Longitudinal	Circumferential
Up to $\frac{1}{2}$ (13), incl.	$\frac{1}{4}t$	¹ / ₄ t
Over $\frac{1}{2}$ to $\frac{3}{4}$ (13 to 19), incl.	$^{1}\!/_{8}$ in. (3 mm)	¹ / ₄ t
Over $\frac{3}{4}$ to $1\frac{1}{2}$ (19 to 38), incl.	$\frac{1}{8}$ in. (3 mm)	$\frac{3}{16}$ in. (5 mm)
Over 1½ to 2 (38 to 50), incl.	¹ ⁄ ₈ in. (3 mm)	¹ ∕ ₈ t
Over 2 (50)	Lesser of $1^{1}/_{6}t$ or ${}^{3}/_{8}$ in. (10 mm)	Lesser of $\frac{1}{8}t$ or $\frac{3}{4}$ in. (19 mm)





4-2-2 Inspection during Welding

A: cleaning & weld joint preparation (Cleaning of joint preparation surface before welding shall be visually inspected according to ASME SEC III-NB-4412 & NB 4424 requirement.)
B: welding process control
C: preheat, inter-pass temperature -Preheating method shall be according ASME SEC III- NB-4612
- Lowest permissible temperature for welding shall be inspected before welding and shall meet the requirement of ASME sec III-SUB NB.





4-2-3 Inspection after Welding

A: VT inspection of weld B: NDT request

Maximum Reinforcement, in. (mm)
$\frac{3}{32}$ (2.5)
$\frac{1}{8}$ (3)
$\frac{5}{32}$ (4.0)
$\frac{7}{32}(5.5)$
¹ / ₄ (6)
$\frac{5}{16}(8)$

Table NB-4426.1 (thickness of weld reinforcement for vessel, pump and valves)