

NDT Procedure for Weld Visual Inspection

A Nondestructive testing (NDT) Procedure suitable for Weld Visual Inspections. This is a sample VT procedure and may be required to be modified as per specific requirements.

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PROCEDURE FOR VISUAL INSPECTION OF WELDS

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1.0 SCOPE

1.1 This procedure defines the method of visual examination of materials and welds used in Pressure Vessels.

2.0 REFERENCE

ASME Sec.V, and Sec. VIII Division I / Edition 2004 -Addenda 2005

3.0 EQUIPMENT

3.1 Equipment used for visual examination shall include

- a) Measuring instruments and gauges
- b) Templates for measuring Edge preparation and fillet welds
- c) Spirit levels
- d) Magnifying lenses and Mirrors
- e) Shims
- f) Plumb

3.2 Wherever required, calibrated instruments shall be used for examination

4.0 TECHNIQUE

4.1 Direct visual examination shall be used.

4.2 If required, mirrors and magnifying lenses will be used to improve the angle of vision and to assist examination.

4.3 The minimum light intensity at the examination surface will be 1000 Lux.

5.0 SURFACE CONDITION

5.1 Surface prepared by gas cutting or arc cutting for welding shall be uniform and smooth and shall be free of all loose scale and slag accumulations.

5.2 The surface to be welded shall be clean and free of scale, rust, oil, grease, slag, detrimental oxides and other deleterious foreign materials.



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5.3 As welded surfaces are permitted. However, the surface of the welds shall be sufficiently free from coarse ripples, grooves, overlaps, abrupt ridges and valleys.

5.4 The surfaces of the finished welds shall be suitable to permit proper interpretation of radiographic and other required nondestructive examination.

5.5 The surface of the fillet weld shall merge smoothly with the surfaces joined.

6.0 METHOD OF EXAMINATION

6.1 The material specification and dimensions shall be verified based on applicable drawing.

6.2 Edge preparation and weld fit up shall be verified with respect to the applicable drawing & WPS.

6.3 Fit up alignment shall be verified using steel rules and spirit level.

6.4 Groove angle and root gap shall be verified using templates.

6.5 Employment of qualified welder and usage of correct welding consumables shall be verified with 'List of Qualified Welders' and WPS.

6.6 Weld surface(s) shall be verified for the finish and cleanliness.

6.7 Fillet welds shall be verified using fillet gauges.

6.8 Cleanliness of Inside bore shall be inspected using hand lamp or Torch light.

7.0 ACCEPTANCE STANDARD OF BUTT WELDS

7.1 Cracks, Pin holes and lack of fusion are not acceptable

7.2 Alignment tolerance shall not exceed the value given in Table-I. Below.

TABLE -I
Alignment Tolerance

Section Thickness (mm)	Joint Categories	
	A	B, C and D
Upto 13.0, incl.	1/4 t	1/4 t
Over 13.0 to 19.0, incl.	3.2mm	1/4 t
Over 19.0 to 38.0, incl.	3.2mm	4.8mm
Over 38.0 to 51.0, incl.	3.2mm	1/8 t
Over 51.0	Lesser of 1/16 t or 10 mm	Lesser of 1/8 t or 19mm

't' is the nominal thickness of the thinner section at the joint

7.3 The reduction in thickness shall not reduce the material of the adjoining surfaces below the minimum required thickness at any point.

7.4 The reduction in thickness shall not exceed 0.8 mm or 10% of the nominal thickness of the adjoining surface, whichever is less.

7.5 Concavity due to the welding process on the root side of a single welded circumferential butt weld is permitted, when the resulting thickness of the weld is at least equal to the thickness of the thinner member of the two sections being joined and the contour of the concavity is smooth.

7.6 The Thickness of the weld reinforcement on each face shall not exceed the value given in Table II
Thickness of weld reinforcement

Material Nominal Thickness	Maximum Reinforcement (mm)	
	Categories B & C Butt welds	Other Welds
Less than 2.4	2.4	0.8
2.4 to 4.8, incl.	3.2	1.6
Over 4.8 to 13.0, incl.	4.0	2.4
Over 13.0 to 25.0, incl.	4.8	2.4

8.0 ACCEPTANCE STANDARD FOR FILLET WELDS

8.1 Fillet welds shall meet the requirements of applicable drawing.

8.2 The reduction of the thickness of the base metal due to the welding process at the edges of the fillet weld shall be as per Cl. 7.3 and 7.4.

9.0 PERSONNEL QUALIFICATION

9.1 Examination shall be conducted by personnel trained and qualified to carry out visual examination.

10.0 REPORTING

10.1 After the completion of the visual examination, the results shall be entered in the Visual Inspection Report TNE-VTR-05 Rev '0.'

11.0 Attachments:

11.1 Visual Inspection Report TNE-VTR-05 Rev '0.'