




BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI 620 014
QUALITY ASSURANCE

SIP:NP:06/01

PAGE : 1 Of 6

PROCEDURE FOR VISUAL INSPECTION OF NON PRESSURE PARTS

REV.	DATE	PREPARED	REVIEWED	APPROVED
00	15/07/96	P.S.Narayanan	A.R.Reddy	V.Raghavendran
01	28/03/04	 A Francis	 G S N Murthy	 C R Raju

REVISION STATUS

REVISION NO:	CLAUSE NO	DETAIL OF REVISION
00	----	1)PR:QE:021/02 renumbered as SIP:NP:06. 2)Editorial corrections for clarity. 3)Clause 3.1 modified.
01	3.1	Code related change
	3.2	For better clarity
	3.2.1	-do-
	3.2.3	Code related change
	3.2.5	For better clarity
	4.4	Code related change

1.0 SCOPE

- 1.1 This procedure details out the visual inspection of all base metal surfaces and weld joints of Non pressure parts.

2.0 REFERENCE DOCUMENTS

AWS D 1.1 & Relevant drawings

3.0 VISUAL INSPECTION OF GAS CUT EDGES

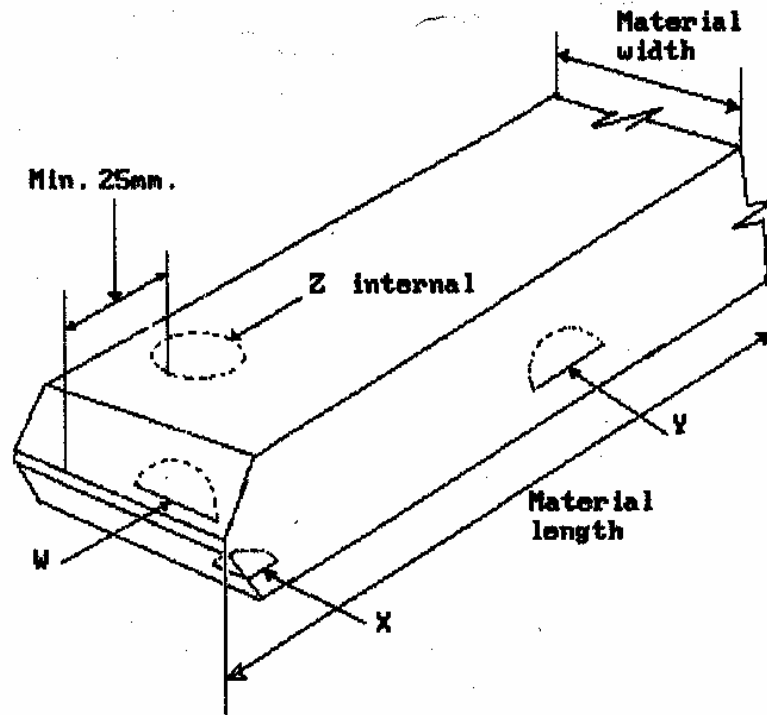
- 3.1 Acceptability and repair of mill induced laminar discontinuities in cut surfaces

Description of Discontinuity	Repair Required
Any discontinuity 25mm in length or less	No repair .
Any discontinuity over 25mm in length and 3mm max. depth (after grinding & confirmation of depth on 10% of total such locations)	No repair
Any discontinuity over 25mm in length with depth over 3mm but not greater than 6mm.	Remove by grinding and weld
Any discontinuity over 25mm in length with depth over 6mm but not greater than 25mm.	Completely remove and weld.
Any discontinuity over 25mm in length with depth greater than 25mm.	See Cl.3.2

- 3.2 For discontinuities over 25mm in length with depth greater than 25mm, discovered by visual inspection (and subsequent grinding for depth assessment) of plate cut edges/ bevel edges before welding or during examination of welded joints by radiography or ultrasonic inspection, following procedure shall be followed:

- 3.2.1 Prior to completing the weld joint, the discontinuities such as (W), (X) or (Y) shall be determined visually (for length) and by NDT (UT, and /or MPI) for depth and recorded for the size and shape of discontinuity as per Fig.1.

Fig.1 EDGE DISCONTINUITIES IN CUT PLATE



- 3.2.2 The repair of the discontinuity by welding shall be allowed in case area of discontinuity does not exceed 4% of the cut area with the following exceptions. If the width of the discontinuity or the aggregate width of discontinuities on any transverse section, as measured perpendicular to the plate length, exceeds 20% of the plate width, the limit of 4% area shall be reduced by percentage amount of the width exceeding 20% (e.g., if the discontinuity is 30% of plate width, the area of discontinuity cannot exceed 3.6% of the plate area). The discontinuity on the cut edge of the plate shall be gouged out to a depth of 25mm beyond its intersection of the surface by chipping, or carbon arc gouging, or grinding and blocked off by welding with manual shielded metal arc process in layers not exceeding 3mm in the thickness.

- 3.2.3 If discontinuity (Z) not exceeding the allowable area is discovered after the joint has been completed and is determined to be 25mm or more away from the face of the weld, as measured on the plate surface, no repair of discontinuity is required. If the discontinuity (Z) is less than 25mm away from the weld, it shall be gouged out to a distance of 25mm from the fusion zone of the weld by chipping, air carbon arc gouging or grinding. It shall then be blocked off by welding with low hydrogen SMAW process for at least four layers not to exceed 3mm thickness per layer. Submerged arc or other welding process may be used for remaining layers.
- 3.2.4 If the area of discontinuity (W), (X), (Y) or (Z) exceeds the allowable limits of Cl.3.2.2, the plate or sub-component shall be rejected.
- 3.2.5 The aggregate length of weld repair shall not exceed 20% of length of plate surface being repaired.
- 4.0 **VISUAL INSPECTION OF WELDS**
- 4.1 Visual examination of welds shall be performed after completion of welding and subsequent cooling to room temperature. However for ASTM A514 and A517 steels visual examination of welds shall be performed only after 48 hours of completion of welding.
- 4.2 All welds shall be cleaned to remove slag, spatter etc. and visually examined for defects like crack, undercut, porosity, lack of fusion etc.
- 4.3 The welds shall also be examined for size, shape and reinforcement.

4.4 ACCEPTANCE CRITERIA AND DISPOSITION DETAILS ARE AS FOLLOWS

<u>Nature of defects</u>	<u>Acc. norms</u>	<u>Disposition</u>
1) Crack, Lack of fusion, Overlap	Not accepted	Confirm by LPI/MPI, repair and retest.
2) Crater (Except at the ends of stitch welds outside the required length)	Not accepted	Fill by weld deposit.
3) Undercut		
For T < 25.mm	Up to 1.0 mm accepted. (Upto 2.0 mm if within 50mm for any 300 mm weld Length.)	To be ground & merged/welded otherwise.
For T => 25.4 mm	Up to 2 .0 mm accepted.	>2.0mm to be ground and merged/welded
4) Porosity- Transverse Butt Welds	Piping porosity not permitted	
Porosity for other Butt/Fillet welds	One pore of <= 2.5 mm for Each 100 mm of Weld length is permitted. (*)	(*)Combined length of pores in fillet welds in web to stiffener: 10mm for 25 mm weld & 20mm for 300mm weld is however acceptable.
<u>Weld contour</u>		
1) Face of fillet	Flat or concave(meeting the throat) accepted. convexity is acceptable as below. 2mm for weld width <= 8mm 3mm for weld width > 8mm < 25 mm 5mm for weld width >= 25 m	
2) Size (Minimum)	As per drawing. Under size permitted as below(*) 2mm for nominal size ≤ 5mm 2.5mm for nominal size 6mm 3mm for nominal size ≥ 8 mm * if undersized weld length is less than of 10% of the total weld length.	
3) Reinforcement (groove)	Max. 3 mm	