

स्टैटिक ईक्विपमेंट (प्रेशर वैसल्स हीट
एक्सचेन्जर्स) के
आवश्यक कठोरता के लिए
मानक विनिर्देश

**STANDARD SPECIFICATION
FOR
HARDNESS REQUIREMENT
OF
STATIC EQUIPMENTS
(PRESSURE VESSELS, HEAT EXCHANGER)**

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1.0 SCOPE

This specification covers general requirement of hardness of base metal, weld and heat-affected-zone (HAZ) and is applicable to all C-½ Mo, Cr-Mo steels and other materials whenever asked for in drawings/ specifications/standards. All testing shall be done after PWHT.

2.0 HARDNESS REQUIREMENTS

Hardness in base metals, weld and heat affected zone as per ASTM E10 shall not exceed the following:

For P1 materials	- 200 BHN
For P3 & P4 materials	- 225 BHN
For P5 & P6 materials	- 235 BHN

3.0 WELDING QUALIFICATION TEST

3.1. For each welding procedure qualification six tests shall be made, three in weld metal and three in HAZ. Hardness requirements shall be as per cl. 2.0 above.

3.2. In addition to the requirement of 3.1 above, Vickers Micro hardness test shall be made on a full cross-section at 25 mm intervals beginning at 3 mm from the top surface with 5 kg load or with a load approved by the authorized inspector. Tests shall be made at each level for each of the following locations as per ASTM E 92:

Three tests shall be made in the weld metals, two tests in HAZ and one test in the base metal in accordance with Fig.1 and the hardness shall not exceed the following in base metal, weld metal and HAZ.

For P1 materials	- 210 VHN
For P3 & P4 materials	- 237 VHN
For P5 & P6 materials	- 247 VHN

4.0 PRODUCTION TEST

4.1 All pressure containing weld metals are to be checked for hardness of weld and HAZ after PWHT but before hydro-test. The hardness shall not exceed the value stipulated.

4.2 Each longitudinal seam shall be checked both internally and externally near the center and at one end.

4.3 Each circumferential weld shall be checked at four locations approximately 90° apart, both internally and externally.

4.4 Each nozzle weldments shall be checked at two locations, 180° apart, both internally and externally.

5.0 APPROVAL

In case the hardness as obtained on production test is more than the limit specified in 2.0 above, the vendor shall submit the corrective procedure to lower the hardness in writing to EIL and/or authorized inspection agency for review/approval.

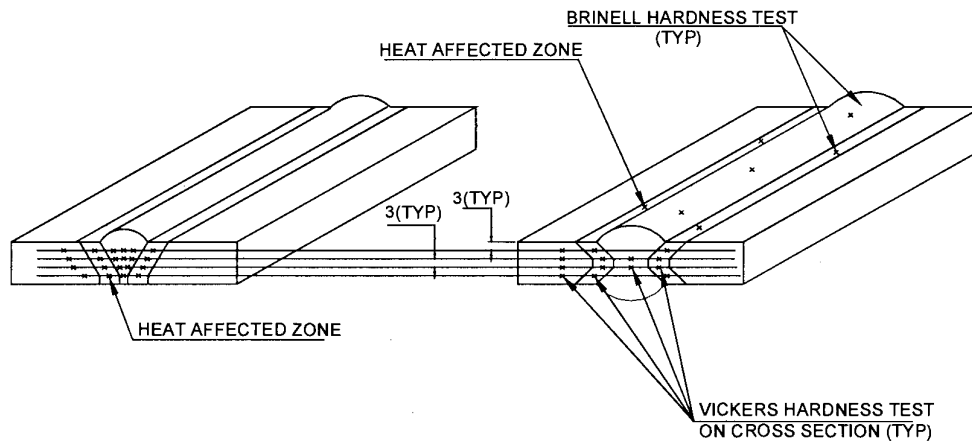


FIG.1- HARDNESS REQUIREMENT ON TEST COUPONS