

4.2 MATERIALS

Recommended materials for all parts of the vessel, including those welded directly to that vessel, are given in Appendix D. All materials for use in vessels need to fulfil the following requirements:

- the minimum impact values (Charpy V notch) at the required impact test temperatures given in Table D.2 of PD 5500.
- the carbon content of steels used is not to exceed 0.23%, except for forgings for which the carbon content is not to exceed 0.25%.
- In addition, one of the following requirements for carbon equivalent based on ladle analysis is to be satisfied:

$$- C_{eq} = C + Mn/6 \leq 0.43 \quad (1)$$

$$- C_{eq} = C + Mn/6 + (Cr + Mo + V)/5 + (Cu + Ni)/15 \leq 0.45 \quad (2)$$

Formula (1) may be used if the material standard specifies C and Mn only. Otherwise formula (2) is to be used, in which case all the elements mentioned are to be determined per heat.

- All steel plates are to be through-thickness tensile tested in accordance with BS EN 10164 and have a reduction in area of at least 35%.
- All steel plates shall have been ultrasonically tested at the mill in accordance with the requirements of BS EN 10160:
 - Table 4 material body examination S1
 - Table 5 material edge examination E2.
- Materials not included in Appendix D may be used provided they meet the criteria given above plus the following restrictions:
 - their specified minimum yield strength does not exceed that of the steel grades given in Appendix D
 - steels are to have guaranteed impact properties at test temperature in accordance with the requirements laid down in PD 5500 Table D.2
 - only fully killed steels are to be used.

Production weld test plates should be prepared at a rate of two test plates per 100 m of butt weld or part thereof (circumferential plus longitudinal). These will be considered representative of the welding on the vessel, or on a group of similar vessels made of the same material and ordered to the same specification with the same welding

procedure. One plate of each pair should be tested and the other retained for retesting if necessary.

All procedure qualification and production weld test plate welds are to be subjected to hardness testing in accordance with BS EN 1043-1. The maximum acceptable hardness in the weld, HAZ or parent plate should be 248 HV 10.

The production test should be carried out using the same procedure as for the welding procedure qualification.