

ECCS TECHNICAL NOTE N°1 – April 2nd 2015

By Cécile Haremza, Technical Secretary

Important note from our Technical Committee 9 – Manufacturing and Erection Standards

(Chairman: Kjetil Myhre) held on 16 March 2015 in the ECCS offices in Brussels:

WELDABILITY ISSUES WITH IMPORTED STEELS

ECCS recommends to be very careful to the chemistry of imported steels, and to check the limits for alloy steels that can be found in EN 10020 (Definition and classification of grades of steel).

During TC9 meeting, ECCS has been alerted that some imported non-alloy steel plates and sections, containing a too high amount of Boron, Chromium and/or Copper, are entering the European steel supply chain. These imported steels are defined as non-alloy steels but, for a steel to qualify as a 'non-alloy structural steel' in accordance with EN 10025-2 the qualities of elements contained in the steel must comply with the strict limits given in EN 10020, Table 1. These steels should be classified as 'Alloy steel' rather than 'non-alloy steel'. The limits for Boron, Chromium and Copper defined in EN 10020 are given below:

Specified Element	Limit value (% by mass)
Boron (B)	0.0008
Chromium (Cr)	0.30
Copper (Cu)	0.40

The main concern is that adding these elements at levels above the limits given in EN 10020 **can significantly affect the properties of the steel during/after welding.**

- Boron levels over 0.0008% by weight significantly increases the hardenability of the steel, which when welded makes the Heat Affected Zone (HAZ) prone to cracking.
- Similarly Chromium at levels above 0.3% by weight can drastically increase cracking in the HAZ. Furthermore, **the cracks may not be evident until 48 hrs after welding.**
- Copper at levels above 0.4% by weight weakens the steel resulting in a cracking phenomenon called '**hot shortness**' after welding or heat treatment. Steels with up to 0.55% copper are permitted in the code; however, EN 10025-2 specifically warns about the risk of 'hot shortness' when copper levels exceed 0.4% (see footnote g in Tables 2 and 4). So for hot and cold forming processes it is prudent to limit copper to 0.4% but for welding and flame straightening a higher limit of 0.45% is reasonable.

Note that steels with high levels of Boron and Chromium can be welded provided an appropriate welding procedure is used; guidance may be obtained from a qualified welding engineer.