

SCCT Technical Note No. 3

Nitrogen Contents and Nitrogen Binding Elements in Steel Reinforcing Bars

1. The construction Standard CS2:2012 allows a maximum nitrogen content of up to 0.014% by mass for product analysis. Meanwhile, Note b of Table 4 of CS2:2012 permits a higher nitrogen content if it can be demonstrated that there are sufficient quantities of nitrogen binding elements to combine with the nitrogen such that the free nitrogen does not exceed the maximum allowable value. The issue is what are the nitrogen binding elements and how to demonstrate that there are sufficient amount.
2. It is understood from UKCARES that they have similar 'nitrogen' issue in BS 4449:2005+A2:2009, to which CS2:2012 makes reference. The 'nitrogen' issue is yet to be discussed by the European Committee for Iron and Steel Standardization (ECISS/TC 104). In the absence of any other guidance that could be found in the available product standards and after consultation with relevant professional bodies and stakeholders, the SCCT consider that it is reasonably conservative to presume that there is sufficient quantities of nitrogen binding element if the amount of nitrogen (N %) and vanadium (V %) by mass as determined by chemical composition analysis of steel reinforcing bars satisfied the following criteria:
 - (i) $(N \% - 0.012 \%) < (V \% / 7)$; and
 - (ii) in no case shall the total amount of nitrogen (N %) determined exceed 0.025 % by mass.

It is assumed that:
No other nitrogen binding element(s) in the steel reinforcing bar combines with nitrogen except Vanadium.
3. The engineers of Public Works projects may use the above criteria to decide whether the steel reinforcing bars have 'sufficient quantity of nitrogen binding element'.
4. Note b of Table 4 of CS2:2012 will not be amended until there is a decision formed by the ECISS/TC 104 on the 'nitrogen' content issue.

[End]

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