

Non-stainless steel grades

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Untreated non-stainless steel is not commonly used in precast construction due to the long-term danger of corrosion. It may however be galvanised to give better performance. It is often used for beams, lifting devices, and temporary fixings where the risk of corrosion is not critical. In such instances, non-stainless is preferable since it is not only far cheaper but also stronger than stainless steel.

Steel grades:

'Normal' steel members were for many years covered by BS 4360:1990 "Specification for weldable structural steels" but this is now withdrawn and superseded by a host of other standards too numerous to list

Members such as beams and columns are generally available in two 'standard' grades of material. These were traditionally known as grade 43 and grade 50. Grade 43 is the basic steel grade commonly available. Grade 50 is higher yield steel, but if specified then care should be taken that the material is actually available within the required delivery period. There is also a grade 55, but this has a cost implication and is used less.

The current steel design standard BS5950-1:2000 uses a different terminology to specify steel grades. Grade 43 is now known as S275, grade 50 is S355, and grade 55 is S460. These are based on the design strength of the material.

Thus for example the yield strengths for 10 mm thick plate are

S275 (grade 43) steel = 275 N/mm²
S355 (grade 50) steel = 355 N/mm²

In comparison, grade 1.4301 stainless steel = 210 N/mm²

Fasteners (bolts):

The most commonly used bolts in structural connections are grade 4.6 black bolts and 8.8 high strength bolts. Grade 4.6 is the basic steel grade commonly available and would be used unless specified otherwise for design reasons. As with steel members, the standards have changed recently and are numerous.

To give a similar indication of the relative strengths of steels, typical ultimate capacities for M20 bolts are

Stainless (class 50)	42.7 kN
Stainless (class 70)	91.5 kN
Grade 4.6 steel	47.8 kN
Grade 8.8 steel	110.2 kN

A further grade of bolt is also available, known as 'High Strength Friction Grip'. These are expensive and require special detailing.

Grade 4.6 bolts should not be used where there may be stress reversals except where due to wind only.