

AD 493:

Steel grade based on tested samples

The SCI has recently received a number of questions relating to the sampling of existing steelwork to determine the steel grade. In each case, no records of the steelwork exist, so samples have been obtained and tested. For understandable reasons, only a limited number of samples have been obtained, taken from different steel members within the structure. The testing has determined the yield strength and ultimate strength of each sample. The purpose of this Note is to remind engineers that the steel grade designation is related to the characteristic yield strength – which is significantly lower than the average yield strength.

If a large number of samples in one steel grade were obtained and measured, the results would be expected to follow a normal curve as shown in Figure 1.

The minimum yield strength (for example 355 N/mm²) for S355 steel grade is at the extreme left of the distribution. Note that there is always a very small probability that a result might be less than the specified minimum.

If samples of existing steelwork are taken, it should be expected from Figure 1 that generally the

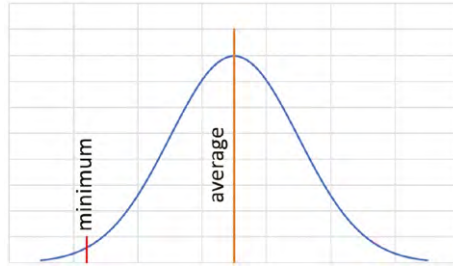


Figure 1: Typical normal distribution

tested strengths should be higher (and sometimes much higher) than the specified minimum for any particular grade.

Engineers are directed to Appendix C of SCI publication P427, which gives the minimum and mean values for test results which may be used to identify the likely steel grade. As an example, if the anticipated steel grade is S355, then according to Table C.1, the minimum and average yield strength of the tested samples should exceed 391 N/mm² and 426 N/mm² respectively.

In a small population of tested results, it is not

sufficient to determine the steel grade simply based on all samples exceeding the specified minimum strength for that steel grade. Unless the average of the test results is significantly higher than the specified minimum, as demanded in P427, the form of the normal curve implies a high probability that other samples will be lower than the specified minimum.

Section C.3.3 of P427 covers a more comprehensive testing regime of members within the same group (same serial size, same function and detailing, as described in section 6.1 of P427). If this more extensive testing is undertaken, the calculated characteristic strengths should be compared to the minimum yield strength and ultimate strength tabulated in the appropriate material standards.

P427 is appropriate for steel used after 1970. The strength values tabulated in P427 are taken from Annex E of the proposed revisions to EN 1993-1-1.

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New and revised codes and standards

From BSI Updates September 2022

BS EN PUBLICATIONS

BS EN ISO 17636-1:2022

Non-destructive testing of welds. Radiographic testing. X- and gamma-ray techniques with film *supersedes* BS EN ISO 17636-1:2013

BS IMPLEMENTATIONS

BS ISO 21931-1:2022

Sustainability in buildings and civil engineering works. Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment. Buildings *supersedes* BS ISO 21931-1:2010

CORRIGENDA TO BRITISH STANDARDS

BS EN ISO 2553:2019

Welding and allied processes. Symbolic representation on drawings. Welded joints *Corrigendum*, July 2022

NEW WORK STARTED

EN 1994-1-2

Design of composite steel and concrete structures. General rules. Structural fire design *will supersede* BS EN 1994-1-2:2005+A1:2014

EN ISO 23387

Building information modelling (BIM). Data templates for construction objects used in the life cycle of built assets. Concepts and principles *will supersede* BS EN ISO 23387:2020

CEN/TS WI 00250283

Design of composite steel and concrete structures. Design of double and single skin steel concrete composite (SC) structures *will supersede* None

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

22/30427287 DC

BS EN ISO 15611 Specification and qualification of welding procedures for metallic materials. Qualification based on previous welding experience *Comments for the above document were required by* 11 September 2022

22/30427291 DC

BS EN ISO 15613 Specification and qualification of welding procedures for metallic materials. Qualification based on pre-production welding test *Comments for the above document were required by* 26 September 2022

22/30427355 DC

BS ISO 630-5 Structural steels. Technical delivery conditions for structural steels with improved atmospheric corrosion resistance *Comments for the above document were required by* 17 September 2022

22/30445368 DC

BS EN ISO 6507-1 Metallic materials. Vickers hardness test. Test method *Comments for the above document were required by* 4 September 2022

22/30455142 DC

BS EN 508-3 Roofing and cladding products from metal sheet. Specification for self-supporting products of steel, aluminium or stainless steel sheet. Stainless steel *Comments for the above document were required by* 20 September 2022