

Annex A14.1 (normative)

Equivalent material strengths from tests of samples

Note: This Annex is a mandatory part of this Code.

A14.1.1 Structural steel

Coupon specimens for determination of the yield and ultimate tensile strengths of structural steel shall be tested in accordance with CSA G40.20. At least three coupons shall be obtained from the components being evaluated.

The “equivalent” yield strength of each coupon shall be its reported yield strength. If a coupon is obtained from the flange of a rolled member, its equivalent yield strength may be taken as 1.05 times the reported yield strength.

The yield strength, f_y , used for evaluation shall be calculated as follows:

$$f_y = (\bar{f}_y - 28) \exp(-1.3k_s V)$$

where \bar{f}_y and V are, respectively, the average value and coefficient of variation of the yield strengths, and k_s is obtained from Table A14.1.1, in which n is the number of strength tests.

Table A14.1.1
Coefficient of variation modification factor, k_s
(See Clauses A14.1.1 and A14.1.3.)

n	k_s
3	3.46
4	2.34
5	1.92
6	1.69
8	1.45
10	1.32
12	1.24
16	1.14
20	1.08
25	1.03
30 or more	1.00

A14.1.2 Concrete

The compressive strength of sound concrete shall be determined from the strengths of cores obtained from the components being evaluated. The core tests shall be conducted in accordance with CAN/CSA-A23.2.

The strength of cores smaller than 100 mm diameter shall be adjusted to approximate the equivalent strengths of 100 mm diameter cores. The appropriate strength-correction factor shall be determined from cores of both diameters obtained from the components being evaluated.

It may be assumed that the strengths of 100 and 150 mm diameter cores are equivalent.

The equivalent strength of 100 mm diameter cores shall be increased by 8% for cores soaked 40 h in water or reduced by 5% for cores dried 7 d in air before testing.

The equivalent specified compressive strength, f'_c , used for evaluation shall be calculated as follows:

$$f'_c = 0.9\bar{f}_c \left[1 - 1.28 \left[(k_c V)^2 / n + 0.0015 \right]^{0.5} \right]$$

where \bar{f}_c is the average core strength, modified to account for the diameter and moisture condition of the core, V is the coefficient of variation of the core strengths, n is the number of cores tested, and k_c is obtained from Table A14.1.2.

Table A14.1.2
Coefficient of variation modification factor, k_c
(See Clause A14.1.2.)

n	k_c
2	2.40
3	1.47
4	1.28
5	1.20
6	1.15
8	1.10
10	1.08
12	1.06
16	1.05
20	1.03
25 or more	1.02

A14.1.3 Reinforcing steel

Coupon specimens for determining the yield and ultimate tensile strengths of reinforcing steel shall be tested in accordance with CAN/CSA-G30.18. At least three coupons, taken from different bars, shall be obtained from the components being evaluated.

The yield strength, f_y , used for evaluation shall be calculated as follows:

$$f_y = (\bar{f}_y - 24) \exp(-1.3k_s V)$$

where \bar{f}_y and V are, respectively, the average value and coefficient of variation of the yield strengths, and k_s is obtained from Table A14.1.1, in which n is the number of strength tests.