

STANDARDS AUSTRALIA

Amendment No. 1
to
AS 5100.5:2017
Bridge design
Part 5: Concrete

CORRECTION

The 2017 edition of AS 5100.5 is amended as follows; the amendment(s) should be inserted in the appropriate place(s).

SUMMARY: This Amendment applies to the Clauses 8.2.1.2, 8.2.1.3, 8.2.1.5, 8.2.2.1, 8.2.3.3, 8.2.4, 8.2.4.1, 8.2.4.2, 8.2.4.3, 8.2.4.4, 8.2.4.5, 8.2.4.6, 8.2.4.7, 8.2.4.10, 8.2.5, 8.2.5.2, 8.2.5.5, 8.2.7, 8.2.8, 8.2.9.1, 8.2.9.3 and Equations 8.2.1.7 and 8.5.3.1.

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Clause 8.2.1.2

Delete clause text and *replace* with the following:

Torsional effects shall be considered in regions where—

$$T^* > 0.25 \phi T_{cr} \quad \dots 8.2.1.2(1)$$

where

$$T_{cr} = 0.33 \sqrt{f'_c} \frac{A_{cp}^2}{u_c} \sqrt{1 + \frac{\sigma_{cp}}{0.33 \sqrt{f'_c}}} \quad \dots 8.2.1.2(2)$$

and

A_{cp} = total area enclosed by outside perimeter of concrete section

T_{cr} = torsional cracking moment

u_c = the length of the outside perimeter of concrete cross-section

σ_{cp} = average intensity of effective prestress in concrete at the centroid, or at the junction of the web and flange when the centroid lies inside the flange

where T^* is calculated on an uncracked sectional analysis.

Where torsional effects need to be considered but torsional strength is not required for the equilibrium of the structure and the torsion in a member is induced solely by the angular rotation of adjoining members, the structure may be reanalysed with a torsional stiffness of 20% of the uncracked stiffness and the members designed for the reduced torsion and corresponding moment and shear, provided the minimum torsion reinforcement requirements of Clause 8.2.5.5 and the detailing requirements of Clause 8.3.3 are satisfied.

For cellular structures:

$$\frac{A_{cp}^2}{p_c} \leq 2A_o b_v \quad \dots 8.2.1.2(3)$$

where

A_o = area enclosed by shear flow path, including any area of holes therein

b_v = effective width of the critical web (see Clause 8.2.1.5)

The equivalent factored shear force (V_{eq}^*) at any section for co-existing applied shear (V^*) and applied torsion (T^*) shall be taken equal to the following:

(a) For solid sections:

$$V_{eq}^* = \sqrt{(V^*)^2 + \left[\frac{0.9T^* u_h}{2A_o} \right]^2} \quad \dots 8.2.1.2(4)$$

(b) For box sections:

$$V_{eq}^* = V^* + \frac{T^* d_s}{2A_o} \quad \dots 8.2.1.2(5)$$

where

u_h = perimeter of the centre-line of the closed transverse torsion reinforcement

d_s = distance from the extreme compression fibre to the centroid of non-prestressed tensile reinforcement

Clause 8.2.1.3

Replace the last paragraph with:

In this case, P_v shall be taken as zero for the determination of the shear capacity in Clauses 8.2.1.6, 8.2.3.1, 8.2.3.3, 8.2.4.5 and 8.2.7.

Clause 8.2.1.5

Delete clause text and *replace* with the following:

The effective web width (b_v) at a section in a member shall be taken as the sum of the width of the webs within the effective shear depth (d_v). In determining b_v at a particular level, for prestressing ducts with $d_d \geq b_w/8$:

$$b_v = \Sigma(b_w - k_d \Sigma d_d) \quad \dots 8.2.1.5$$

where

b_w = width of a single web

Σd_d = sum of the diameters of prestressing ducts, if any, in a horizontal plane across the web

k_d = 0.5 for grouted steel duct

= 0.8 for grouted plastic duct

= 1.2 for ungrouted duct

NOTES:

1 k_d may be reduced in the presence of reinforcement transverse to the plane of the web.

2 For solid circular sections, b_w may be taken as the diameter.

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Equation 8.2.1.7

Replace Equation 8.2.1.7 with:

$$A_{sv,min} = 0.08\sqrt{f'_c}b_v s / f_{sy,f} \geq 0.35b_v s / f_{sy,f} \quad \dots 8.2.1.7$$

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Clause 8.2.2.1

In the first paragraph, *delete* ‘strut and tie’ and *replace* with ‘strut-and-tie’.

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Clause 8.2.3.3

Delete clause text and *replace* with the following:

In no case shall the ultimate shear strength (V_u) at any section be taken as greater than—

$$V_{u,max} = 0.55f'_c b_v d_v \left(\frac{\cot(\theta_v) + \cot(\alpha_v)}{1 + \cot^2(\theta_v)} \right) + P_v; \text{ or} \quad \dots 8.2.3.3(1)$$

$$= 0.55 \left[0.9f_{cp} b_v d_v \left(\frac{\cot(\theta_v) + \cot(\alpha_v)}{1 + \cot^2(\theta_v)} \right) \right] + P_v, \text{ at transfer} \quad \dots 8.2.3.3(2)$$

where

$V_{u,max}$ = ultimate shear strength limited by web crushing failure

d_v = effective shear depth (see Clause 8.2.1.9)

and

θ_v = angle between the axis of the concrete compression strut and the longitudinal axis of the member (see Clause 8.2.4.2)

α_v = angle between the inclined shear reinforcement and the longitudinal tensile reinforcement

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Clause 8.2.4

Replace clause title with ‘Concrete contribution to ultimate shear strength of a beam (V_{uc})’.

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Clause 8.2.4.1

Delete clause text and *replace* with the following:

The shear strength shall be calculated as follows:

$$V_{uc} = k_v \sqrt{f'_c} b_v d_v \quad \dots 8.2.4.1$$

where $\sqrt{f'_c}$ shall not exceed 8.0 MPa; and

k_v shall be determined in accordance with either—

- (a) Clause 8.2.4.2—modified compression field theory (general); or
- (b) Clause 8.2.4.6—modified compression field theory (simplified).