Design Shear Stress

Design shear stress, τ*	1.28	MPa
ratio of coupling force, β	1.00	*between 0.0 and 1.0*
Design shear force, V*	835	kN
internal moment lever arm, z	723	mm
width of section	900	mm

Shear Stress Capacity (AS3600-2009)

co-efficient of friction, μ	0.9	*between 0.6 to 0.9*
fully anchored shear reinforcement crossing the interface, Asf	452	mm^2
yield strength of shear reinforcement, fsy	500	MPa
spacing of anchored reinforcement crossing interface, s	300	mm
width of the shear plane, bf	900	mm
permanent distributed load normal to the shear interface per unit length, gp	0	kPa
Asy*fsy/(s*bf)	0.84	MPa
gp/bf	0.00	MPa
cohesion co-efficient	0.4	*between 0.1 to 0.5*
concrete strength, f'c	40	MPa
flexural tensile concrete strength, f'ct	2.28	MPa
kco*f'ct	0.91	MPa
unit shear strength, τu	1.66	MPa
max shear strength, τmax	8.0	MPa
Φ*τu	1.17	MPa
V*max	758	kN

Shear Capacity (AS3600-2001)

Vuf.s	343.2	kN
Vuf.c	414.5	kN
ΦVuf	757.7	kN

TABLE 8.4.3

SHEAR PLANE SURFACE COEFFICIENTS

Surface condition of the shear plane	Coefficients	
	μ	k_{co}
A smooth surface, as obtained by casting against a form, or finished to a similar standard	0.6	0.1
A surface trowelled or tamped, so that the fines have been brought to the top, but where some small ridges, indentations or undulations have been left; slip-formed and vibro-beam screeded; or produced by some form of extrusion technique	0.6	0.2
A surface deliberately roughened— (a) by texturing the concrete to give a pronounced profile; (b) by compacting but leaving a rough surface with coarse aggregate protruding but firmly fixed in the matrix; (c) by spraying when wet, to expose the coarse aggregate without disturbing it; or (d) by providing mechanical shear keys.	0.9	0.4
Monolithic construction	0.9	0.5

8.4.3 Shear stress capacity

The design shear stress at the shear interface shall not exceed $\phi\tau_u$ where—

$$\tau_u = \mu\left(\frac{A_{sf} f_{sy}}{s b_f} + \frac{g_p}{b_f}\right) + k_{co} f'_{ct} \qquad \ldots 8.4.3$$

$$\leq \text{lesser of } (0.2\, f'_c,\ 10 \text{ MPa})$$

where

τ_u = unit shear strength

g_p = permanent distributed load normal to the shear interface per unit length, newtons per millimetre (N/mm)

μ = coefficient of friction given in Table 8.4.3

k_{co} = cohesion coefficient given in Table 8.4.3

b_f = width of the shear plane, in millimetres (mm)

A_{sf} = area of fully anchored shear reinforcement crossing the interface (mm^2)

f_{sy} = yield strength of shear reinforcement not exceeding 500 MPa

s = spacing of anchored shear reinforcement crossing interface

8.4.3 Design shear strength

The design longitudinal shear strength shall be taken as ϕV_{uf} where —

$$V_{uf} = \beta_1 A_s f_{sy} d / s + \beta_2 b_1 d f'_{ct} \leq 0.2 f'_c b_1 d$$

where

β_1, β_2 = the shear plane surface coefficients given in Clause 8.4.4

A_s = cross-sectional area of reinforcement anchored each side of the shear plane

f_{sy} = the yield strength of the reinforcement crossing the shear plane

d = effective depth of the composite beam

s = spacing of reinforcement crossing the shear plane

b_1 = the width of the shear interface

f'_{ct} = the characteristic principal tensile strength of the concrete