

Planning MEMO 53a

Date:	04.10.2011	Sign: sss
Last Rev:	25.10.2012	Sign: sss
Doc. No:	K3-10/53aE	Control: ps
Page 1 of 5		

Capacities and main dimensions TSS 102

The TSS 102 unit differs from the TSS 101 unit, as the 102 unit is stretched 50mm. In addition a rubber box is attached to the inner tube. The dimension of the outer tube is increased to make sufficient space for the rubber box, and with that, the minimum slab thickness for use of the TSS 102 unit will also increase¹⁾. Beside of this, the use of the TSS 102 unit is similar to the use of the TSS 101 unit; see Memo 53 for general information.

The capacity of the steel unit itself only depend upon the position of the global loading, and the anchoring reinforcement, as the anchoring stirrups serve as internal supports for the steel unit. The assumed conditions for the equilibrium and corresponding steel capacity are given in memo 60.

The concrete elements capacity due to local punching shear may in some situations limit the applicable utilization of the steel unit. The punching shear capacity does not only depend on the capacity of the stirrups anchoring the unit, but also the reinforcement pattern in the vicinity of the unit. Important parameters are the units distance to the edge, as well as the thickness of the element. When the unit is located close to the corner, the reinforcement layout of the whole corner will influence on the local punching shear capacity. Detailing of the reinforcement will be of major importance when the concrete is governing the capacity. As the manufactures may have various solutions with respect to reinforcement layout, the final design of the elements and evaluation of punching shear capacity should be carried out under the supervision of structural engineer with knowledge about the behaviour of reinforced concrete.

The different recommended reinforcement patterns given in Memos 57 are in accordance with the reinforcement patterns in precast elements subjected to tests at Sintef, Norway in 2011. Only the local reinforcement in the vicinity of the unit is illustrated in the Memos. The recommended load reductions, due to concrete failure, as given in Figure 2, are established based on results from the tests. Minimum requirements to location and slab thickness can be found in Table 5. The minimum concrete grade to make use of the test results are C35/45.

The TSS 102 units require a slab thickness of 265mm to be fully utilized with the standard reinforcement pattern. Reduced ultimate limit load is recommended when the slab thickness is less than 265mm, see Figure 2. When the TSS 102 units is used in thinner slabs than 265mm, and located closer to the corner than 300mm, shear reinforcement may be used to increase the concrete capacity.

¹⁾ The TSS102 may in special cases fit into slabs with $t=200\text{mm}$ if reduced concrete cover is acceptable. The unit should then be placed centric in the slab, which will slightly reduce the height (h) below the minimum value stated in Figure 1. Ultimate limit load is reduced in this case, see Figure 2.

Date:	04.10.2011	Sign: sss
Last Rev:	25.10.2012	Sign: sss
Doc. No:	K3-10/53aE	Control: ps
Page 2 of 5		

Capacities and main dimensions TSS 102

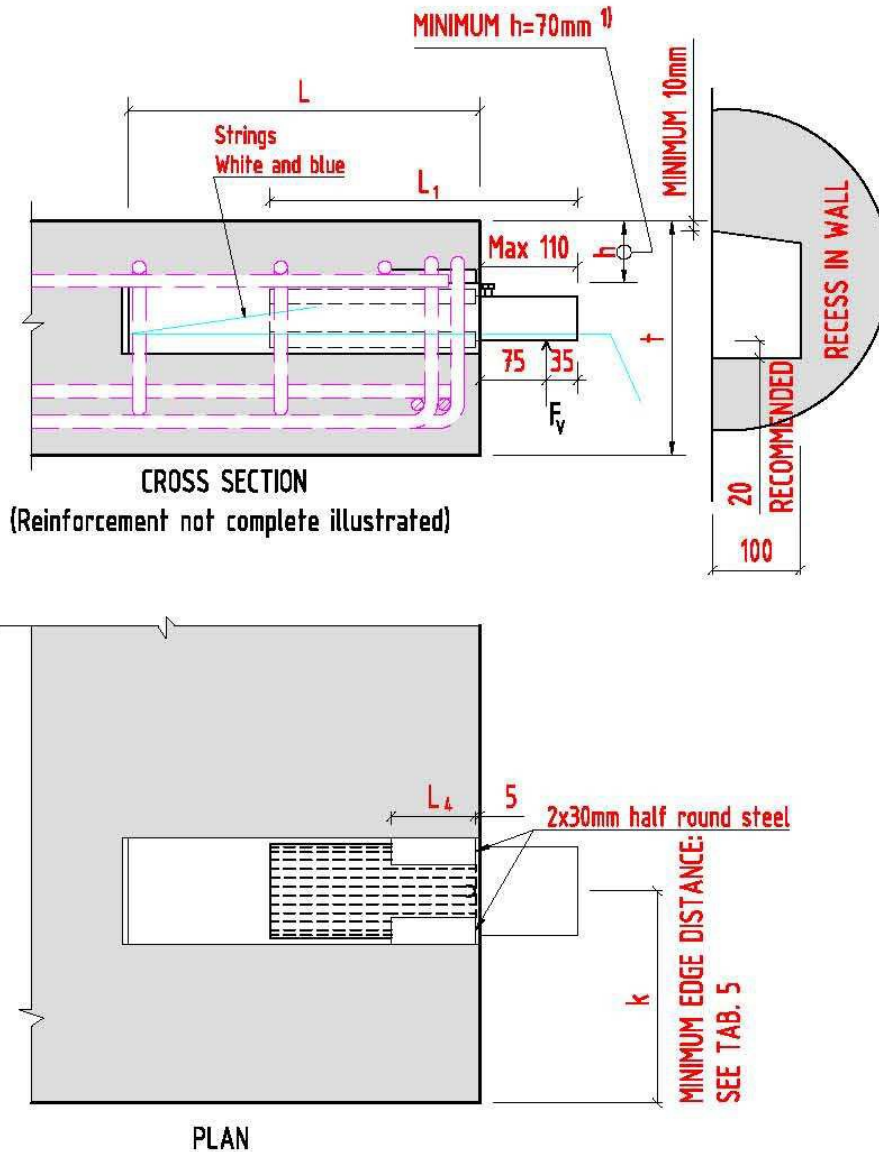


Figure 1: TSS dimensions.¹⁾

¹⁾ The TSS102 may in special cases fit into slabs with $t=200\text{mm}$ if reduced concrete cover is acceptable. The unit should then be placed centric in the slab, which will slightly reduce the height (h) below the minimum value stated in Figure 1. Ultimate limit load is reduced in this case, see Figure 2.

Capacities and main dimensions TSS 102

TSS 102

Unit	Outer tube b/h/t	Inner tube b/h/t	Clearances between tubes	
			Vertically	Horizontally
mm	120/80/5	100/50/6	4 (rubber)	10 (steel)

Table 1: Tube dimensions.

Unit	L	L ₁	L ₄
mm	397	347	95
in	15.6	13.7	3.7

Table 2: Dimensions.

Unit	Vertical load F _v
kN	100
kips	22

Table 3: Maximum capacity of the steel unit.

Unit	Minimum slab thickness- due to available space (t)
mm	220 ¹⁾
in	8.7

Table 4: Minimum slab thickness – due to available space.

Unit	Slab thickness (t)	Minimum edge distance ²⁾ (k)
mm	265	180
in	10.4	7.1

Table 5: Recommended minimum slab thickness to take advantage of the steel unit capacity, see Figure 1 and Figure 2.

¹⁾ The TSS102 may in special cases fit into slabs with t=200mm if reduced concrete cover is acceptable. The unit should then be placed centric in the slab, which will slightly reduce the height (h) below the minimum value stated in Figure 1. Ultimate limit load is reduced in this case, see Figure 2.

²⁾ Special requirements to the reinforcement pattern in the corner, see Memo 57

Capacities and main dimensions TSS 102

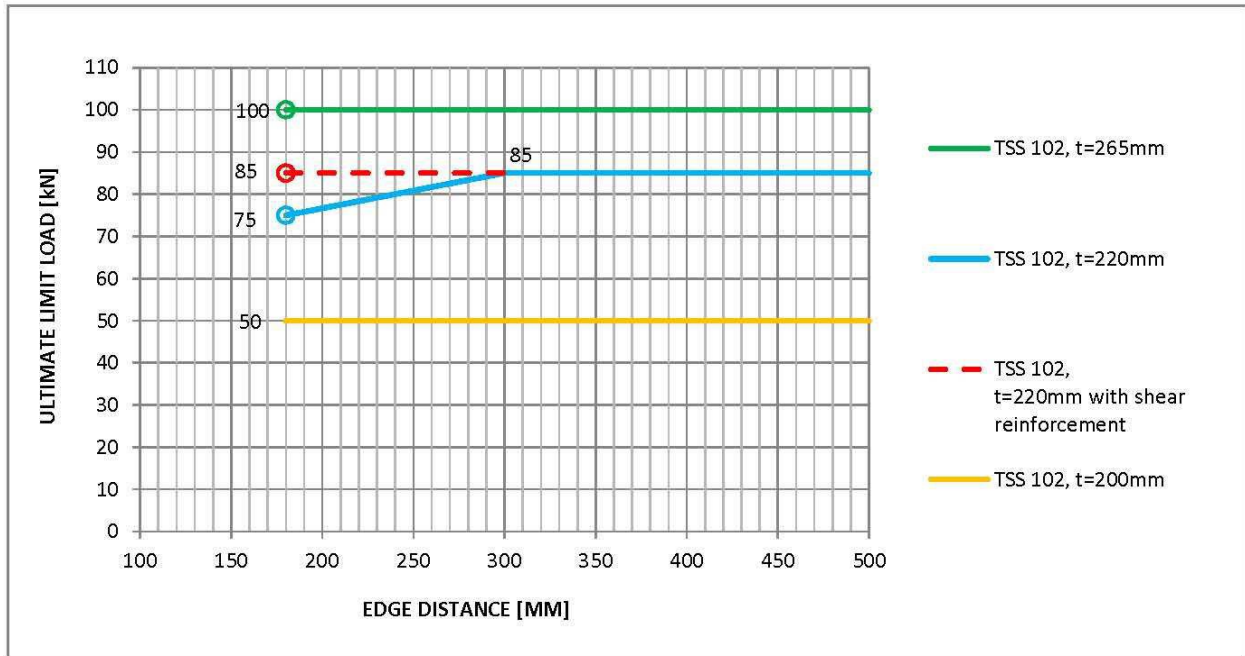


Figure 2: Recommended ultimate limit load when using TSS 101 with slab thicknesses $t=220\text{mm}-265\text{mm}$.¹⁾

¹⁾ The TSS102 may in special cases fit into slabs with $t=200\text{mm}$ if reduced concrete cover is acceptable. The unit should then be placed centric in the slab, which will slightly reduce the height (h) below the minimum value stated in Figure 1. Ultimate limit load is reduced in this case, see Figure 2.

Planning MEMO 53a

Date:	04.10.2011	Sign: sss
Last Rev:	25.10.2012	Sign: sss
Doc. No:	K3-10/53aE	Control: ps
Page 5 of 5		

Capacities and main dimensions TSS 102

REVISION	
Date:	Description:
04.10.2011	First edition.
25.10.2012	Included capacity TSS102, slab thickness t=200mm.