

Memo

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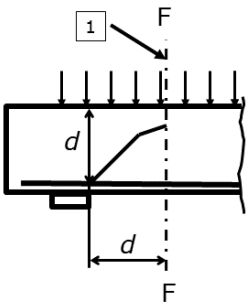
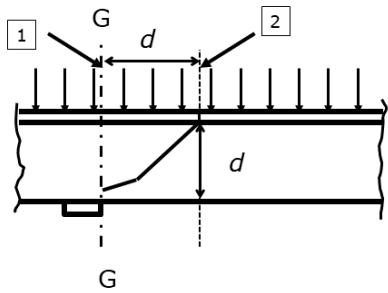
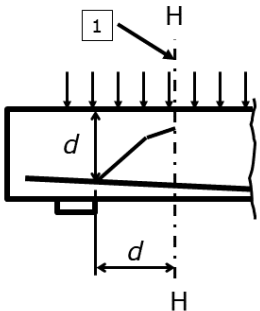
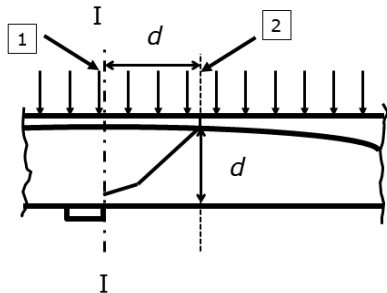
gerrie.dieteren@tno.nl

+31611700543

Aan M.A. Roosen - GPO Rijkswaterstaat
 Van G.G.A. Dieteren
 Onderwerp ROK additions for shear on FprEN1992-1-1:2023
 (date 2023-04)

Datum
 1 februari 2024
 Onze referentie
 2024.M10205

	Addition ROK for shear on FprEN 1992-1-1:2023, date 2023-04 (SC2 N2078)
4.3.3 (1)	The values of γ_s , γ_c and γ_v of Table 4.3 (NDP) shall be used.
5.2.2 (3)	For bridges application of reinforcing steel with ductility class A is not permitted.
8.2.1 (2)	The application of I.8.3.1 (3) to avoid application of minimum reinforcement in linear members is not allowed for design of new structures.
8.2.1 (3)	<i>Replace the note:</i> For d the nominal effective depth d_{nom} should be used.
8.2.1 (4)	Equation (8.20) should be replaced by: $\tau_{Rdc,min} = \frac{9}{\gamma_v} \sqrt{\frac{f_{ck}}{f_{yk}} \cdot \frac{d_{dg}}{d}} \quad (8.20 \text{ ROK})$
8.2.1 (4)	<i>Replace the last sentence:</i> In case of prestressed members without ordinary reinforcement f_{yk} in Formula (8.20 ROK) may be replaced by $f_{p0.1k} - \sigma_{pm,\infty}$ and should be limited to ≤ 500 MPa.
8.2.1 (4)	Correction of typo: Replace text of NOTE 1 by: "For d refer to NOTE in (3)."
8.2.1 (4)	<i>Add the next text:</i> If for design $D_{lower} > 4$ mm is used, the applied value should be included in the specifications for the concrete mix. D_{lower} may be replaced by D_{max} when application of the applied D_{max} in the actual concrete mixture is guaranteed. If D_{lower} is not specified a value of $D_{lower} = 4$ mm should be applied.
8.2.1 (4)	<i>Add to the text of Note 2:</i> D , Upper sieve size in an aggregate categorised as d / D D_{max} Declared value of D of the coarsest fraction of aggregates actually used in the concrete Note that many other requirements for D are an upper limit that may not be exceeded (minimum space between bars imposes a restriction on the maximum aggregate size D_{upper}), but one may then supply a mixture with a smaller maximum aggregate size. For $\tau_{Rd,G}$ on the contrary, the specified value of D_{max} must actually be present in the concrete mixture in normal gradations.
8.2.1 (6)	<i>Add the next text:</i> If for a side the peak of the shear force is located at a distance closer than $2d$ from the edge, this distance should be used as width to average the shear force.

8.2.1 (7)	Correction of typo: Replace in Figure 8.4 V_{td} by V_{tcd} and V_{cd} by V_{bcd}. Replace first sentence by: In members with inclined chords, the design shear force in the web should account for the influence of inclined forces according to Figure 8.4, replacing V_{Ed} by $V_{Ed} + V_{tcd} + V_{bcd}$, where V_{tcd} and V_{bcd} should be taken negative when working in the opposite direction then V_{Ed}.	
8.2.1 (8)	When the equivalent load method is applied this article 8.2.1 (8) is not applicable. Note In the Netherlands the equivalent load method is used in design and assessment.	
8.2.2 (1)	Add the next text: NOTE For the first control section, distinction must be made between areas with sagging and hogging moments. For end support this results in an initial control section at a distance d from the support or geometric discontinuity and for intermediate support of continuous elements in an initial control section at the face of the support or geometric discontinuity, see also Figure 1 ROK.	
		
	a) Definition of control sections for sagging moment (left) and hogging moment (right) in case of reinforced members	
		
	b) Definition of control sections for sagging moment (left) and hogging moment (right) in case of prestressed members	
	Key 1. Determination of the design shear force for control section F-F, G-G, H-H and I-I (see 8.2.2 (1) and Figure 8.7) 2. Determination of the optimized design shear force for control section G-G and I-I (see 8.2.2 (8) and Figure 8.8)	
	Figure 1 ROK – Definition of control sections	

8.2.2 (2)	For linear or planar members the design value of the shear stress resistance should be taken as: $\tau_{Rd,c} = k_{vd} \frac{0,66}{\gamma_v} \left(100 \rho_l f_{ck} \frac{d_{dg}}{d} \right)^{\frac{1}{3}} \geq \tau_{Rdc,min} \quad (8.27 \text{ ROK})$ With $k_{vd} = 1 \quad \text{for } d \leq 500 \text{ [mm]}$ $k_{vd} = 1,35 \left(100 \rho_l \frac{d_{dg}}{d} \right)^{1/10} \leq 1,0 \quad \text{for } d > 500 \text{ [mm]}$ NOTE For higher members the shear stress resistance might be overestimated therefore additional correction with coefficient k_{vd} (see equation I.8) is required.
8.2.2 (2)	The value of d should be determined as shown in Figure 1 ROK, i.e. the value corresponding to the intersection of the assumed shear crack plane with the longitudinal tension reinforcement. NOTE See also 8.2.2(6) for members with several layers of ordinary and or prestressing reinforcement
8.2.2 (2)	<i>Add the next text:</i> NOTE A_{sl} is the area of tensile reinforcement at a distance d beyond the section considered which is representative for the force that can be applied on the reinforcement assuming loading until design yield strength f_{yd}. For reinforcement that is fully anchored at a distance d from the control section this is equal to the cross sectional area of the reinforcement (see Figure 8.7 control section A-A, B-B and C-C). For reinforcement that is not fully anchored a reduction has to be applied which can be determined based on the assumption of a linear increase in the allowable stress over the anchoring area from 0 at the end of the bar to f_{yd} at l_{bd} (see Figure 8.7 control section D-D and E-E (spliced reinforcement with curtailment)). For laps fulfilling the requirements of 11.5 and with comparable reinforcement layout at both sides of the lap, A_{sl} is constant over the whole length of the lap.
8.2.2 (3)	<i>Add the next text:</i> For determination of a_{cs} only the internal forces (V_{Ed} en M_{Ed}) belonging to the load case giving maximum shear with coexistent bending and that giving maximum bending with coexistent shear need to be considered. For prestressed concrete elements a_{cs} can be calculated as a function of the internal forces at the control section including the effect of the applied prestressing. NOTE 1 To determine M_{Ed} in a control section shifting of the M_{Ed}-line according to 12.3 is not necessary. This effect is taken into account with the definition of A_{sl} (see also Figure 8.7). NOTE 2 Application of an envelope of all load cases, for both V_{Ed} and M_{Ed}, may result in significant lower values of the shear stress resistance $\tau_{Rd,c}$.
8.2.2 (5)	This article may not be applied.
8.2.2 (12) ROK	For prestressed members distinction should be made between regions uncracked in bending and regions cracked in bending. Regions uncracked in bending are areas where the flexural tensile stress for the persistent and transient design situation, including effects of imposed deformations is smaller than $f_{ctk,0,05}/\gamma_c$. For the determination of the flexural tensile stress V_{Ed} with coexistent M_{Ed} should be applied.

	In the regions uncracked in bending the shear resistance should also be checked by verification of the principal stress according to 13.5.5 (2). To determine the shear resistance in regions uncracked in bending following applies: $U.C._{ABB} \leq U.C._{ATB}$ shear resistance according to 13.5.5 (2) leading $U.C._{ABB} > U.C._{ATB}$ shear resistance according to equation (8.27) leading where $U.C._{ABB} = \tau_{Ed} / \tau_{Rd,C}$ with $\tau_{Rd,C}$ according to equation (8.27) $U.C._{ATB} = \sigma_{1Ed} / f_{ctd}$ NOTE Comparison with test results made clear that in regions uncracked in bending the shear resistance might be overestimated with equation (8.27). This overestimation is overcome by limiting $U.C._{ABB}$ with $U.C._{ATB}$.
8.2.3 (3)	If prestressed tendons are neglected in the calculation of the centroid of the tensile reinforcement these should also be neglected in the verification of the tension chord capacity to resist F_{td} .
8.2.3 (7) + 8.2.3 (8)	The average strain ϵ_x could be determined based on a detailed cross sectional analysis ("doorsnede-berekening") in which the effect of the additional tensile axial force N_{vd} is taken into account (f.i. by shifted M_{Ed} -line).
13.5.5 (2)	The limitation of the effective depth to 500 mm does not apply.