

Table C5: Characteristic resistance under Fire exposure for design acc. to TR 020

Essential characteristics			Performance			
			M8	M10	M12	M16
Tension steel failure mode						
$FR_{k,s,fi,30}$	Duration = 30 minutes	[kN]	0,5	1,1	1,8	3,3
$FR_{k,s,fi,60}$	Duration = 60 minutes	[kN]	0,4	0,9	1,5	2,7
$FR_{k,s,fi,90}$	Duration = 90 minutes	[kN]	0,3	0,7	1,2	2,2
$FR_{k,s,fi,120}$	Duration = 120 minutes	[kN]	0,3	0,6	1,0	1,8
Pull-out failure mode						
$FR_{k,p,fi,30}$	Duration = 30 minutes	[kN]	1,3	2,3	3,0	6,3
$FR_{k,p,fi,60}$	Duration = 60 minutes	[kN]	1,3	2,3	3,0	6,3
$FR_{k,p,fi,90}$	Duration = 90 minutes	[kN]	1,3	2,3	3,0	6,3
$FR_{k,p,fi,120}$	Duration = 120 minutes	[kN]	1,0	1,8	2,4	5,0
Concrete cone failure mode						
$FR_{k,c,fi,30}$	Duration = 30 minutes	[kN]	2,9	5,0	7,9	12,3
$FR_{k,c,fi,60}$	Duration = 60 minutes	[kN]	2,9	5,0	7,9	12,3
$FR_{k,c,fi,90}$	Duration = 90 minutes	[kN]	2,9	5,0	7,9	12,3
$FR_{k,c,fi,120}$	Duration = 120 minutes	[kN]	2,3	4,0	6,3	9,9
$s_{cr,N}$	Characteristic spacing	[mm]	4 x h_{ef}			
$c_{cr,N}$	Characteristic edge distance	[mm]	2 x h_{ef}			
s_{min}	Minimum spacing	[mm]	50	50	60	70
c_{min}	Minimum edge distance	[mm]	$c_{min} = 2 h_{ef}$ if fire attack from more than one side, the edge distance of the anchor has to be $\geq 300\text{mm}$ and $\geq 2 h_{ef}$			
$\gamma_{M,fi}$	Partial safety factor	[-]	1,0 ¹⁾			
Shear steel failure without lever arm						
$VR_{k,s,fi,30}$	Duration = 30 minutes	[kN]	0,7	1,5	2,5	4,7
$VR_{k,s,fi,60}$	Duration = 60 minutes	[kN]	0,6	1,2	2,1	3,9
$VR_{k,s,fi,90}$	Duration = 90 minutes	[kN]	0,4	0,9	1,7	3,1
$VR_{k,s,fi,120}$	Duration = 120 minutes	[kN]	0,4	0,8	1,4	2,5
Shear steel failure with lever arm						
$M^0_{Rk,s,fi,30}$	Duration = 30 minutes	[Nm]	0,7	1,9	3,9	10,0
$M^0_{Rk,s,fi,60}$	Duration = 60 minutes	[Nm]	0,6	1,5	3,3	8,3
$M^0_{Rk,s,fi,90}$	Duration = 90 minutes	[Nm]	0,4	1,2	2,6	6,7
$M^0_{Rk,s,fi,120}$	Duration = 120 minutes	[Nm]	0,4	1,0	2,1	5,3
Shear concrete pry-out failure						
k	Factor in equation (5.6) of ETAG Annex C § 5.2.3.3	[mm]	1,0	2,0		
Shear concrete edge failure						
The characteristic resistance $V^0_{Rk,c,fi}$ in C 20/25 to C5 0/60 concrete is determined by: $V^0_{Rk,c,fi} = 0,25 \times V^0_{Rk,c}$ ($\leq R90$) and $V^0_{Rk,c,fi} = 0,20 \times V^0_{Rk,c}$ (R120) with $V^0_{Rk,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature acc. ETAG 001, Annex C, 5.2.3.4.						

¹⁾ In absence of other national regulations

MTP-ssA4

Design according to TR 020
 Characteristic resistance under Fire exposure - BWR 2

Annex C5

