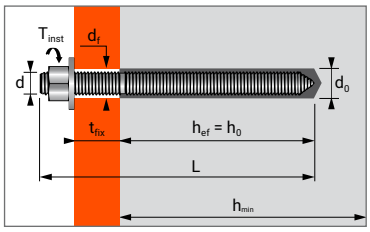
MULTI-MAX XTREM

ETA - 22/0824

Vinylester resin, for use in cracked and non-cracked concrete and seismic performance categories C1 & C2



CHARACTERISTICS

Zn ZINC COATED STEEL · A4 STAINLESS STEEL · X XTREM · WRAS APPROVED PRODUCT

TECHNICAL DATA

RANGE	Min. anchor depth (mm) h_{ef}	Max. thick. of part to be fixed (mm) t_{fix}	Min. thick of base material (mm) h_{min}	Thread diameter (mm) d	Drilling depth (mm) h_0	Drilling diameter (mm) d_0	Clearance diameter (mm) d_f	Total anchor length (mm) L	Tighten torque (Nm) T_{inst}	Code* SPIT stud zinc coated steel	Code* SPIT stud stainless steel A4
M8X110	80	15	110	8	80	10	9	110	10	060215	060222
M10X130	90	20	120	10	90	12	12	130	20	060216	060223
M12X160	110	25	140	12	110	14	14	160	30	060217	060224
M16X190	125	35	160	16	125	18	18	190	60	060218	060225
M20X260	170	65	220	20	170	25	22	260	120	060219	060226
M24X300	210	63	265	24	210	28	26	300	200	060220	060227
M30X380	280	70	350	30	280	35	33	380	400	060221	-
MULTI-MAX XTREM cartridge 300 ml										060238	

* These are SPIT studs, for standard Studs (zinc coated or stainless steel versions) see catalogue.

APPLICATION

- Steel profiles
- Fixing machinery (resistant to vibration)
- Storage tanks, pipes
- Signs
- Guard rails
- Electrical insulated fixings

FIELD OF USE

Installation temperature:
- -10°C / +30°C

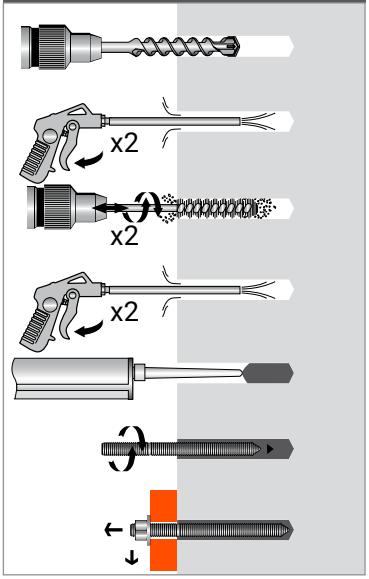
In-Service temperature range:
- -40°C /+80°C

Installation conditions:
- Category 1: Dry or wet concrete
- Category 2: Flooded holes

ANCHOR MECHANICAL PROPERTIES

SIZE			M8	M10	M12	M16	M20	M24	M30
SPIT studs									
f_{uk}	[N/mm²]	Min. tensile strength	520	520	520	520	520	520	520
f_{yk}	[N/mm²]	Yield strength	420	420	420	420	420	420	420
$M^0_{Rk,s}$	[Nm]	Characteristic bending moment	19	37	66	166	325	561	1125
Studs grade 8.8									
f_{uk}	[N/mm²]	Min. tensile strength	800	800	800	800	800	800	800
f_{yk}	[N/mm²]	Yield strength	640	640	640	640	640	640	640
$M^0_{Rk,s}$	[Nm]	Characteristic bending moment	30	60	105	266	519	898	1799
Studs grade A4-70									
f_{uk}	[N/mm²]	Min. tensile strength	700	700	700	700	700	700	-
f_{yk}	[N/mm²]	Yield strength	350	350	350	350	350	350	-
$M^0_{Rk,s}$	[Nm]	Characteristic bending moment	26	52	92	233	454	786	-

INSTALLATION



SETTING TIME

TEMPERATURE	MAX. TIME FOR INSTALLATION	CURING TIME
-10°C ▸ -5°C	30 min.	24 h
-4°C ▸ 0°C	20 min.	300 min.
1°C ▸ 5°C	15 min.	210 min.
6°C ▸ 10°C	10 min.	145 min.
11°C ▸ 20°C	6 min.	85 min.
21°C ▸ 30°C	4 min.	50 min.

MULTI-MAX XTREM

MINIMUM THICKNESS OF CONCRETE, CHARATERISTIC & MINIMUM DISTANCES FOR SPACING, EDGE

SIZE			M8	M10	M12	M16	M20	M24	M30
Anchorage depth	h_{ef}	[mm]	80	90	110	125	170	210	280
Minimum thickness of base material	h_{min}	[mm]	110	120	140	160	220	265	350
Characteristic edge and spacing distance for full anchor capacity	$C_{cr} \geq$	[mm]	120	135	165	187,5	255	315	420
	$S_{cr} \geq$	[mm]	240	270	330	375	510	630	840
Minimum distances for non-cracked concrete	C_{min}	[mm]	35	40	50	65	80	96	120
	$S \geq$	[mm]	35	40	50	65	80	96	120
	S_{min}	[mm]	35	40	50	65	80	96	120
	$C \geq$	[mm]	35	40	50	65	80	96	120

CHARACTERISTIC RESISTANCES [kN]

Characteristic resistances are shown as informative, and have to be used by application of safety factors .

In tensile loads, the table below shows bond strength in N/mm². All dimensions can be installed with embedment length between 7d to 20d.

The characteristic tensile load is determined with the formular: $N^0_{Rk,p} = \Pi.d\ h_{ef}\ .\ \tau_{Rk}$

TENSILE

NON-CRACKED CONCRETE – C20/25

SIZE		M8	M10	M12	M16	M20	M24	M30
$h_{ef\ min}$	[mm]	64	80	96	128	160	192	275
$h_{ef\ max}$	[mm]	160	200	240	320	400	480	600
$\tau_{Rk,uncr}$	[N/mm²]	11	10	9,5	9	8,5	8	5,5

CRACKED CONCRETE – C20/25

SIZE		M8	M10	M12	M16	M20	M24	M30
$h_{ef\ min}$	[mm]	64	80	96	128	160	192	275
$h_{ef\ max}$	[mm]	160	200	240	320	400	480	600
$\tau_{Rk,cr}$	[N/mm²]	-	5,5	5,5	5,5	5	5	-

SHEAR

CRACKED AND NON-CRACKED CONCRETE – C20/25 to C50/60

SIZE		M8	M10	M12	M16	M20	M24	M30
$h_{ef\ min}$	[mm]	64	80	96	128	160	192	275
$h_{ef\ max}$	[mm]	160	200	240	320	400	480	600
SPIT studs								
V_{Rks}	[kN]	*9,2*	*15,0*	*21,0*	*39,0*	*61,0*	*88,0*	*140,0*
Studs grade 8.8								
V_{Rks}	[kN]	*15,0*	*23,0*	*34,0*	*63,0*	*98,0*	*141,0*	*224,0*
Studs grade A4-70								
V_{Rks}	[kN]	*13,0*	*20,0*	*30,0*	*55,0*	*86,0*	*124,0*	*140,0*

RECOMMENDED LOADS OF ONE ANCHOR WITHOUT INFLUENCE OF SPACING & CONCRETE EDGE [kN]

Recommended values are determined from performances given in the ETA, and are guaranteed for spacing ≥ S_{cr} and edge distance ≥ C_{cr}.

TENSILE

NON-CRACKED CONCRETE – C20/25

SIZE		M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]	80	90	110	125	170	210	280
SPIT studs								
N_{Rec}	[kN]	8,7	11,2	15,6	22,4	36,0	50,3	49,4
Studs grade 8.8								
N_{Rec}	[kN]	8,8	11,2	15,6	22,4	36,0	50,3	49,4
Studs grade A4-70								
N_{Rec}	[kN]	8,8	11,2	15,6	22,4	36,0	50,3	49,4

CRACKED CONCRETE – C20/25

SIZE		M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]	80	90	110	125	170	210	280
SPIT studs								
N_{Rec}	[kN]	-	6,2	9,1	13,7	21,2	31,4	-
Studs grade 8.8								
N_{Rec}	[kN]	-	6,2	9,1	13,7	21,2	31,4	-
Studs grade A4-70								
N_{Rec}	[kN]	-	6,2	9,1	13,7	21,2	31,4	-

$N_{Rec} = \min [N_{Rd,p}\ ;\ N_{Rd,c};\ N_{Rd,s}] / \gamma_F\ ;\ \gamma_F = 1,4$

SHEAR

CRACKED AND NON-CRACKED CONCRETE – C20/25 to C50/60

SIZE		M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]	80	90	110	125	170	210	280
SPIT studs								
V_{Rec}	[kN]	*5,1*	*8,6*	*12,0*	*22,3*	*34,9*	*50,3*	*80,0*
Studs grade 8.8								
V_{Rec}	[kN]	*8,6*	*13,1*	*19,4*	*36,0*	*56,0*	*80,6*	*128,0*
Studs grade A4-70								
V_{Rec}	[kN]	*6,0*	*9,2*	*13,7*	*25,2*	*39,4*	*56,8*	*64,1*

$V_{Rec} = V_{Rd,s} / \gamma_F\ ;\ \gamma_F = 1,4$

Nota: The values indicated *in italics and underlined* correspond to steel failure

MULTI-MAX XTREM

i-Expert Software

Design resistances for static and seismic and loads are determined from performances given in the ETA, and are guaranteed for spacing ≥ S_{cr} and edge distance ≥ C_{cr}. For project with reduced spacing and edge distance, we recommend to use SPIT i-Expert software to design your project according to EN 1992-4.

DESIGN RESISTANCE FOR STATIC LOADS IN NON-CRACKED CONCRETE [kN]

TENSILE

SIZE			M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]		80	90	110	125	170	210	280
SPIT studs		C20/25	*12,2*	15,7	21,9	31,4	50,4	70,4	69,1
$N_{Rd,uncr}$	[kN]	C40/50	*12,2*	19,3	26,9	38,6	62,0	86,6	85,0
Studs grade 8.8		C20/25	12,3	15,7	21,9	31,4	50,4	70,4	69,1
$N_{Rd,uncr}$	[kN]	C40/50	15,1	19,3	26,9	38,6	62,0	86,6	85,0
Studs grade A4-70		C20/25	12,3	15,7	21,9	31,4	50,4	70,4	69,1
$N_{Rd,uncr}$	[kN]	C40/50	*13,9*	19,3	26,9	38,6	62,0	86,6	85,0

Distances S_{cr} and C_{cr} must be fulfilled

$N_{Rd,uncr} = \min[N_{Rk,p,uncr} / \gamma_{Mc} ; N_{Rk,s} / \gamma_{Ms,N}]$

γ_{Mc} = 1,8 (M8-M24) ; γ_{Mc} = 2,1 (M30)

SPIT studs & Studs grade 8.8 : $\gamma_{Ms,N}$ = 1,5 ; Studs grade A4-70 : $\gamma_{Ms,N}$ = 1,87

SHEAR

SIZE			M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]		80	90	110	125	170	210	280
SPIT studs									
$V_{Rd,s}$	[kN]	≥C20/25	*7,2*	*12,0*	*16,8*	*31,2*	*48,8*	*70,4*	*112,0*
Studs grade 8.8									
$V_{Rd,s}$	[kN]	≥C20/25	*12,0*	*18,4*	*27,2*	*50,4*	*78,4*	*112,8*	*179,2*
Studs grade A4-70									
$V_{Rd,s}$	[kN]	≥C20/25	*8,3*	*12,8*	*19,2*	*35,3*	*55,1*	*79,5*	*89,7*

$V_{Rd,s} = V_{Rk,s} / \gamma_{Ms,V}$

SPIT studs & Studs grade 8.8 : $\gamma_{Ms,V}$ = 1,25 ; Studs grade A4-70 : $\gamma_{Ms,V}$ = 1,56

DESIGN RESISTANCE FOR STATIC LOADS IN CRACKED CONCRETE [kN]

TENSILE

SIZE			M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]		80	90	110	125	170	210	280
SPIT studs / Studs grade ≥ 5.8 / Studs grade A4-70									
$N_{Rd,cr}$	[kN]	≥C20/25	-	8,6	12,7	19,2	29,7	44,0	-

Distances S_{cr} and C_{cr} must be fulfilled

$N_{Rd,cr} = \min[N_{Rk,p,cr} / \gamma_{Mc} ; N_{Rk,s} / \gamma_{Ms,N}]$

γ_{Mc} = 1,8 (M8-M24) ; γ_{Mc} = 2,1 (M30)

SPIT studs & Studs grade 8.8 : $\gamma_{Ms,N}$ = 1,5 ; Studs grade A4-70 : $\gamma_{Ms,N}$ = 1,87

SHEAR

SIZE			M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]		80	90	110	125	170	210	280
SPIT studs									
$V_{Rd,s}$	[kN]	≥C20/25	-	*12,0*	*16,8*	*31,2*	*48,8*	*70,4*	-
Studs grade 8.8									
$V_{Rd,s}$	[kN]	≥C20/25	-	*18,4*	*27,2*	*50,4*	*78,4*	*112,8*	-
Studs grade A4-70									
$V_{Rd,s}$	[kN]	≥C20/25	-	*12,8*	*19,2*	*35,3*	*55,1*	*79,5*	-

$V_{Rd,s} = V_{Rk,s} / \gamma_{Ms,V}$

SPIT studs & Studs grade 8.8 : $\gamma_{Ms,V}$ = 1,25 ; Studs grade A4-70 : $\gamma_{Ms,V}$ = 1,56

DESIGN RESISTANCE FOR SEISMIC LOADS CATEGORY C1 [kN]

TENSILE

SIZE			M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]		80	90	110	125	170	210	280
SPIT studs / Studs grade ≥ 5.8 / Studs grade A4-70									
$N_{Rd,C1}$	[kN]	≥C20/25	-	8,6	12,7	19,2	24,9	44,0	-

Distances S_{cr} and C_{cr} must be fulfilled

$N_{Rd,C1} = \min[N_{Rk,p,eq,C1} / \gamma_{Mc} ; N_{Rk,s,eq,C1} / \gamma_{Ms,N}]$

γ_{Mc} = 1,8 (M8-M24) ; γ_{Mc} = 2,1 (M30)

SPIT studs & Studs grade 8.8 : $\gamma_{Ms,N}$ = 1,5 ; Studs grade A4-70 : $\gamma_{Ms,N}$ = 1,87

SHEAR

SIZE			M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]		80	90	110	125	170	210	280
SPIT studs									
$V_{Rd,s,C1}$	[kN]	≥C20/25	-	*7,2*	*10,4*	*22,4*	*30,4*	*40,8*	-
Studs grade 8.8									
$V_{Rd,s,C1}$	[kN]	≥C20/25	-	*11,2*	*16,8*	*36,0*	*48,8*	*64,8*	-
Studs grade A4-70									
$V_{Rd,s,C1}$	[kN]	≥C20/25	-	*7,7*	*11,5*	*25,0*	*34,0*	*45,5*	-

$V_{Rd,s,C1} = V_{Rk,s,eq,C1} / \gamma_{Ms,V}$

SPIT studs & Studs grade 8.8 : $\gamma_{Ms,V}$ = 1,25 ; Studs grade A4-70 : $\gamma_{Ms,V}$ = 1,56

DESIGN RESISTANCE FOR SEISMIC LOADS CATEGORY C2 [kN]

TENSILE

SIZE			M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]		80	90	110	125	170	210	280
SPIT studs / Studs grade ≥ 5.8 / Studs grade A4-70									
$N_{Rd,C2}$	[kN]	≥C20/25	-	-	2,8	4,9	9,5	-	-

Distances S_{cr} and C_{cr} must be fulfilled

$N_{Rd,C2} = \min[N_{Rk,p,eq,C2} / \gamma_{Mc} ; N_{Rk,s,eq,C2} / \gamma_{Ms,N}]$

γ_{Mc} = 1,8 (M8-M24) ; γ_{Mc} = 2,1 (M30)

SPIT studs & Studs grade 8.8 : $\gamma_{Ms,N}$ = 1,5 ; Studs grade A4-70 : $\gamma_{Ms,N}$ = 1,87

SHEAR

SIZE			M8	M10	M12	M16	M20	M24	M30
h_{ef}	[mm]		80	90	110	125	170	210	280
SPIT studs									
$V_{Rd,s,C2}$	[kN]	≥C20/25	-	-	*12,8*	*17,6*	*28,0*	-	-
Studs grade 8.8									
$V_{Rd,s,C2}$	[kN]	≥C20/25	-	-	*20,0*	*28,8*	*44,8*	-	-
Studs grade A4-70									
$V_{Rd,s,C2}$	[kN]	≥C20/25	-	-	*14,1*	*19,9*	*31,4*	-	-

$V_{Rd,s,C2} = V_{Rk,s,eq,C2} / \gamma_{Ms,V}$

SPIT studs & Studs grade 8.8 : $\gamma_{Ms,V}$ = 1,25 ; Studs grade A4-70 : $\gamma_{Ms,V}$ = 1,56

Nota: The values indicated *in italics and underlined* correspond to steel failure