Seismic Performance

52.1 Installation and seismic performance details in Cracked Concrete

Certification: CISMA Report Anchors exposed to seismic actions - NTC 022 and European Technical Approval ETA-10/0276											
Anchor Size, d_b (mm)	Installation details				Optimum dimensions*			Reduced Characteristic Capacity**			
	Drilled hole diameter, d_h (mm)	Fixture hole diameter, d_f (mm)	Anchor effective depth, h (mm)	Tightening torque, T_r (Nm)	Edge distance, e_c (mm)	Anchor spacing, a_c (mm)	Concrete Substrate Thickness, b_m (mm)	Seismic Shear (Steel), $V_{Rd,s,sis}$ (kN)#	Seismic Tension $N_{Rd,sis}$ (kN)		
									Concrete compressive strength, f'c		
									20 MPa	30 MPa	40 MPa
M10	15	17	70	50	105	210	140	6.8	10.6	13.0	15.0
M12	18	20	80	80	120	240	160	12.3	14.6	17.8	20.6
M16	24	26	100	120	150	300	200	24.2	20.4	24.9	28.8
M20	28	32	125	200	185	375	250	41.6	27.3	33.3	38.5

#Note: Steel shear capacities allow for the clearance hole (fixture hole diameter d_f) published in the table above.
***Note:** For shear loads acting towards an edge or where these optimum dimensions are not achievable, please contact a Ramset Engineer to verify capacity or use the Strength Limit State Design process for seismic capacity on pages 283-290.
****Note:** All Reduced Characteristic Seismic Capacities are based on a single anchor. For multiple anchor design use the Strength Limit State Design process for seismic capacity on pages 283-290.
Note1: For anchor sizes M10, M12, and M16, performance data is based on European Technical Approval Category 1 Seismic Capacity in accordance with ETAG001 Annex E.
Note2: For anchor size M20, performance data is based on CISMA Report Anchors exposed to seismic actions – NTC 022.
Note3: European Technical Approval for Category 2 Seismic Capacity in accordance with ETAG001 Annex E is pending.

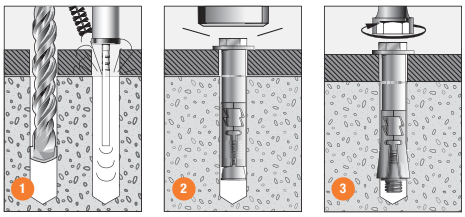
FOR DETAILED STRENGTH LIMIT STATE SEISMIC DESIGN DATA ON SpaTec™, REFER TO PAGES 283-290

52.2 DESCRIPTION AND PART NUMBERS

Anchor size, d_b (mm)	Drilled hole diameter, d_h (mm)	Effective Length, L_e (mm)	Fixture thickness, t (mm)	ETA Description Number	Part Number		
					Zinc (Hex Hd)	Zinc (C/ Sunk Hd)	Zinc (Hex Nut -Thr'd Rod)
M10	15	90 97 105	20 27 35	V10-15/20 TF10-15/27 E10-15/35	SP10105 - -	- SP10105F -	- - 050692*
M12	18	90 105 125	10 25 45	V12-18/10 V12-18/25 E12-18/45	SP12105 SP12120 -	- - -	- - 050699*
M16	24	125 155 200	25 55 100	V16-24/25 E16-24/55 E16-24/100	SP16145 - -	- - -	- 050707* 050708*
M20	28	150 185 225	25 60 100	V20-28/25 E20-28/60 E20-28/100	SP20170 - -	- - -	- 050713* 050714*

* Lead times apply

Installation



1. Drill or core a hole to the recommended diameter and depth using the fixture as a template. Clean the hole thoroughly with a hole cleaning brush.
   Remove the debris with a hand pump, compressed air, or vacuum.
2. After ensuring that the anchor is assembled correctly, insert the anchor through the fixture and drive with a hammer until the washer contacts the fixture.
3. Tighten the bolt with a torque wrench to the specified assembly torque.

52.3 ENGINEERING PROPERTIES

Refer to page 284.

Effective depth, h (mm)

$h = L_e - t$
t = total thickness of material(s) being fixed