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PRODUCT DATASHEET
SELF TAPPING MASONRY SCREW

Product Details

Designed for: *Fixing timber battens, trunking, track and general components to concrete and masonry substrates.*
Head style: *Countersunk or slotted hexagonal.*
Drive bit: *Phillips No. 2 or No.3 female socket, or, 5/16" hexagonal male socket (with slot).*
Point: *Nail (pyramidal).*
Coating: *EvoShield® 500Hr NSST resistant (Aluminium/ Zinc flake bound in resin).*
Material: *SAE C1022 Carbon steel.*

Product Useability Details

Product Code	Nominal Dimensions (mm)	Fixture Limitations	
		Min. Thickness, t_{min} (mm)	Max. Thickness, t_{max} (mm)
Countersunk (90˚) Headed			
MSCSK4.8-32-2	4.8 x 32	0	7
MSCSK4.8-45-2	4.8 x 45		20
MSCSK4.8-57-2	4.8 x 57		32
MSCSK4.8-70-2	4.8 x 70	30	45
MSCSK4.8-82-2	4.8 x 82	45	57
MSCSK4.8-100-2	4.8 x 100	55	75
MSCSK6.3-32-3	6.3 x 32	0	7
MSCSK6.3-45-3	6.3 x 45		20
MSCSK6.3-57-3	6.3 x 57		32
MSCSK6.3-70-3	6.3 x 70	30	45
MSCSK6.3-82-3	6.3 x 82	45	57
MSCSK6.3-100-3	6.3 x 100	55	75
MSCSK6.3-125-3	6.3 x 125	75	100
MSCSK6.3-150-3	6.3 x 150	100	125
Hexagonal Headed			
MSHH6.3-32-516	6.3 x 32	0	7
MSHH6.3-45-516	6.3 x 45		20
MSHH6.3-57-516	6.3 x 57		32
MSHH6.3-70-516	6.3 x 70	30	45
MSHH6.3-82-516	6.3 x 82	45	57
MSHH6.3-100-516	6.3 x 100	55	75
MSHH6.3-125-516	6.3 x 125	75	100
MSHH6.3-140-516	6.3 x 140	80	105
MSHH6.3-160-516	6.3 x 160	100	125
MSHH6.3-180-516	6.3 x 180	120	145
MSHH6.3-200-516	6.3 x 200	140	165
MSHH6.3-254-516	6.3 x 254	190	215

NOTE: The results expressed in the datasheet are taken as mean loads from a range of empirical tests and are ultimate unfactored loads. Each specifier or end user should make his/ her own decision on what safety factors to use relevant to their design application (such as BS 5950, EN 1991, etc).

Errors and Omissions Excepted.

Technical Data

Product Setting Details			
Substrate Type	**Parameter**	**Screw Nominal Diameter, d_{nom} (mm)**	
		4.8	**6.3**
All types	Nominal Embedment Depth, h_1 (mm)	25	
	Nominal Drill Hole Diameter, d_0 (mm)	4.35	5.15
	Clearance Hole Diameter, d_f (mm)	6	8
	Installation Torque, T_{inst} (Nm)	< 3.0	< 7.0
Non-Cracked Concrete (> 20 MPa < 80 MPa)	Minimum Member Thickness, h_c (mm)	100	
	Minimum Edge Distance, c_{min} (mm)	50	55
	Minimum Spacing, s_{min} (mm)		
Cracked Concrete (> 20 MPa < 80 MPa)	Minimum Member Thickness, h_{min} (mm)	100	
	Minimum Edge Distance, c_{min} (mm)	50	40
	Minimum Spacing, s_{min} (mm)		55

Material Properties				
Parameter	**Symbol**	**Unit**	**Screw Nominal Diameter, d_{nom} (mm)**	
			4.8	**6.3**
Characteristic Yield Strength	f_{yk}	N/mm^2	980	
Characteristic Ultimate Strength	f_{uk}	N/mm^2	1,220	
Characteristc Bending Resistance	$M^0_{Rk,s}$	Nm	11	19
Elongation at Rupture	A_s	%	≤ 8	
Ultimate Torque Capacity	T_{uk}	Nm	7	11
Ultimate Tensile Capacity	$N_{st,m}$	kN	10.8	12.9
Ultimate Shear Capacity	$V_{Rk,s}$	kN	6.5	8.1
Core Hardness	H_c	HV	430	440
Surface Hardness	H_s	HV	630	310

Influence of Concrete Strength on Performance, c_1 (Multiplication Factor)								
Screw Nominal Diameter, d_{nom} (mm)	**Nominal Embedment Depth, h_1 (mm)**	**Concrete Grade**						
		C20/25	**C25/30**	**C30/37**	**C35/45**	**C40/50**	**C50/60**	**>C50/60**
4.8	25.0	0.70	1.00		1.10	1.15	1.20	1.25
6.3					1.15	1.25	1.40	1.50
NOTE: Interpolation is forbidden.								

Influence of Edge Distance on Performance, c_2 (Multiplication Factor)										
Screw Nominal Diameter, d_{nom} (mm)	**% of c_{min}**									
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
4.8	N/A	0.45	0.55	0.60	0.60	0.65	0.70	0.75	0.85	1.00
6.3	N/A		0.65	0.70	0.70	0.75	0.80	0.85	0.90	
NOTE: Interpolation is forbidden.										

Influence of Spacing on Performance, c_3 (Multiplication Factor)										
Screw Nominal Diameter, d_{nom} (mm)	**% of s_{min}**									
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
4.8	N/A		0.55	0.60	0.60	0.65	0.70	0.75	0.85	1.00
6.3			0.65	0.70	0.70	0.75	0.80	0.85	0.90	
NOTE: Interpolation is forbidden.										

Influence of Embedment Depth on Performance, c_4 (Multiplication Factor)		
Embedment Depth, *h* (mm)	**Screw Nominal Diameter, d_{nom} (mm)**	
	4.8	**6.3**
< 25.0	N/A	
25.0	1.00	1.00
35.0	1.10	1.15
45.0	N/A	1.25
> 45.0	N/A	
NOTE: Interpolation is forbidden.		

Ultimate/ Characteristic Loads in kN (unless noted otherwise)				
Parameter	**Tensile**		**Shear**	
Nominal Diameter (mm)	**4.8**	**6.3**	**4.8**	**6.3**
Nominal Embedment Depth, h_1 (mm)	25.0			
Ultimate Load, $N_{Ru,m}$ / $V_{Ru,m}$	3.70	3.90	5.10	7.70
Characteristic Load, N_{Rk} / V_{Rk}	2.60	2.90	4.20	6.30

Where: $N_{Ru,m}$ = Ultimate tensile load,
N_{Rk} = Characteristic tensile load,
$V_{Ru,m}$ = Ultimate shear load,
V_{Rk} = Characteristic shear load.

Design Loads in kN (unless noted otherwise)				
Parameter	**Tensile, N_{Rd}**		**Shear, V_{Rd}**	
Nominal Diameter (mm)	**4.8**	**6.3**	**4.8**	**6.3**
Nominal Embedment Depth, h_1 (mm)	25.0			
Calculated Value	1.30	1.45	2.80	4.20

Where: γ_{mc} = Partial safety factor for tension = 2.0,
γ_{ms} = Partial safety factor for shear = 1.5,
N_{Rd} = Tensile design load,
V_{Rd} = Shear design load.

Recommended Loads/ Safe Working Loads in kN (unless noted otherwise)				
Parameter	**Tensile, N_{rec}**		**Shear, V_{rec}**	
Nominal Diameter (mm)	**4.8**	**6.3**	**4.8**	**6.3**
Minimum Embedment Depth, h_{nom} (mm)	25.0			
Calculated Value	0.96	1.07	1.56	2.33

Where: γ_m = Partial factor of safety = 1.8,
γ_f = Partial factor of safety = 1.5,
N_{rec} = Recommended tensile capacity per fixing,
V_{rec} = Recommended shear capacity per fixing.

Example Calculations Including Performance Multiplication Factors		
Example	**Parameter**	**Calculation**
MSHH6.3-57-516 holding down 20.0mm C18 timber batten to C40/50 concrete slab of thickness 150mm, 70mm from edge of slab and 80mm spacing from next anchor.	Ultimate tensile capacity of the fixing	$N^{Actual}_{Ru,m} = (N_{Ru,m} \times c_1 \times c_2 \times c_3 \times c_4)$ $N^{Actual}_{Ru,m} = (3.9\ k\text{N}) \times 1.25 \times 0.80 \times 0.80 \times 1.15)$ $N^{Actual}_{Ru,m} = 3.588\ k\text{N}$
	Characteristic tensile capacity of the fixing	$N^{Actual}_{Rk} = N^{Actual}_{Ru,m} / \gamma_{inst}$ $N^{Actual}_{Rk} = 3.588\ k\text{N} / 1.4$ $N^{Actual}_{Rk} = 2.563\ k\text{N}$
	Safe working tensile capacity of the fixing	$N_{rec} = N^{Actual}_{Rk} / (\gamma_m \times \gamma_f)$ $N_{rec} = 2.563\ k\text{N} / 1.8 \times 1.5$ $N_{rec} = 2.563\ k\text{N} / 2.7$ $N_{rec} = 0.947\ k\text{N}$
	Ultimate shear capacity of the fixing	$V^{Actual}_{Ru,m} = (V_{Ru,m} \times c_1 \times c_2 \times c_3 \times c_4)$ $V^{Actual}_{Ru,m} = (7.7\ k\text{N}) \times 1.25 \times 0.80 \times 0.80 \times 1.15)$ $V^{Actual}_{Ru,m} = 7.084\ k\text{N}$
	Characteristic shear capacity of the fixing	$V^{Actual}_{Rk} = V^{Actual}_{Ru,m} / \gamma_{inst}$ $V^{Actual}_{Rk} = 7.084\ k\text{N} / 1.2$ $V^{Actual}_{Rk} = 5.903\ k\text{N}$
	Safe working shear capacity of the fixing	$V_{rec} = V^{Actual}_{Rk} / (\gamma_m \times \gamma_f)$ $V_{rec} = 5.903\ k\text{N} / 1.8 \times 1.5$ $V_{rec} = 5.903\ k\text{N} / 2.7$ $V_{rec} = 2.186\ k\text{N}$
	Check for combined shear and tension failure	$\left(\frac{V_{DESIGNED}}{V_{rec}}\right)^2 + \left(\frac{N_{DESIGNED}}{N_{rec}}\right)^2 \leq 1.0$

ABOUT OUR TESTING

All performance figures where derived from empirical testing (where applicable) performed by Evolution Testing Services (a trading name of Evolution Fasteners (UK) Ltd), which is a UKAS accredited testing laboratory (Accreditation No. 7485). The following tests were performed in the preparation of this datasheet (note that tests marked "NC" are not included on our Schedule of Accreditation):

Testing Procedures

Test/ Parameter	Standard/ Method/ Procedure
Characteristic yield strength NC	**BS EN ISO 6892-1: 2016** "Metallic materials. Tensile testing. Part 1: Method of test at room temperature".
Characteristic ultimate strength NC	**BS EN ISO 6892-1: 2016** "Metallic materials. Tensile testing. Part 1: Method of test at room temperature".
Characteristic bending resistance NC	**BS EN 409: 2009** "Timber structures. Test methods. Determination of the yield moment of dowel type fasteners".
Elongation at rupture NC	**BS EN ISO 6892-1: 2016** "Metallic materials. Tensile testing. Part 1: Method of test at room temperature".
Ultimate torque capacity NC	**BS EN ISO 10666: 1999** "Drilling screws with taping screw threads. Mechanical and functional properties".
Ultimate tensile capacity NC	**BS EN ISO 6892-1: 2016** "Metallic materials. Tensile testing. Part 1: Method of test at room temperature".
Ultimate shear capacity NC	**MIL-STD-1312-13** "Military Standard: Fastener test methods (method 13). Double shear test".
Core hardness	**BS EN ISO 6507-1: 2018** "Metallic materials. Vickers hardness test. Test method".
Surface hardness	**BS EN ISO 6507-1: 2018** "Metallic materials. Vickers hardness test. Test method".
Ultimate tensile load NC	**BS 5080-1: 1993** "Structural fixings in concrete and masonry. Method of test for tensile loading".
Ultimate shear load NC	**BS 5080-2: 1986** "Structural fixings in concrete and masonry. Method of test for shear loading".
Corrosion resistance	**BS EN ISO 9227: 2017** "Corrosion tests in artificial atmospheres. Salt spray tests".

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