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PRODUCT DATASHEET
A4 SELF-TAPPING SCREWS

Table 01: Standard Product Information

Designed for:	*Stainless steel self-tapping screw (modified version of ISO 1479: 2011 Type C).*
Typical Use:	*Fixing profiled and flat steel sheeting or brackettry to steel substrates in highly corrosive environments.*
Head Type:	*3/8" Hexagonal socket (male) drive with washer compression flange.*
Thread Type:	*Coarse thread with thread pitch of 1.8mm.*
Point Type:	*Modified Type F (ISO 1479: 2011), Type BT (BS 4174: 1972 and ASTM C1513-18).*
Washer Type:	*16mm OD Washer comprising 2mm thick vulcanised EPDM seal and 1.6mm thick profiled stainless-steel compression disc (of same grading as screw).*

Table 02: Usability Data

Product Code	ISO 1479 Designation	Nominal Dimensions (mm)	Threaded Length (mm)	Maximum Overall Build-up (mm)	Steel Tapping Limitations (mm)
A4ST6.3-32	ST 6,3 x 32 – A4-20H - F	6.3 x 32.0	FULL	1.5 – 27.0	1.5 – 15.0
A4ST6.3-50	ST 6,3 x 50 – A4-20H - F	6.3 x 50.0	FULL	1.5 – 45.0	
A4ST6.3-75	ST 6,3 x 75 – A4-20H - F	6.3 x 75.0	50.0	1.5 – 70.0	
A4ST6.3-100	ST 6,3 x 100 – A4-20H - F	6.3 x 100.0	50.0	1.5 – 95.0	

Table 03: Pilot Hole Diameter Specification Chart (listed in mm)

Nominal Diameter (mm)	Substrate Material Strength, R_m (N/mm^2)	Fixture/ Substrate – Overall Thickness to be Self-Tapped by Screw (mm)							
		1.5	1.6	1.8	2.0	2.5	3.0	4.0	5.0–15.0
6.3	< 100	Not recommended.							
	≥ 100 ≤ 255	4.8		5.0			5.5		5.8
	≥ 255 ≤ 455	5.5		5.6		5.7		5.8	
	> 455	Not recommended.							

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.

Installation Instructions

Tooling and equipment required:

1. Magnetic based or fixed base drill with sufficient rigidity and arrangement to ensure pilot holes are drilled perpendicularly to the face of the fixture and substrate. Drill should have sufficient torque to ensure that a hole can be drilled within tolerances. Drill should have coolant dispensing abilities,
2. Non-impacting screwdriver with sufficient torque to insert the screws into the pilot holes and smoothly tap the fixture/ substrate materials. The use of impact tooling (including but not limited to impact wrenches, impact screwdrivers, drill drivers, combi-drills, rotary hammer-drills, hammer-drills, percussion hammers, etc) is strictly forbidden. Where a screwdriver is not available a hand actuated wrench with ratchet feature may be used,
3. HSS (High Speed Steel) or Carbide twist drill of certified diameter (as per table 03) of adequate quality to ensure tolerances of drilled pilot holes,
4. 3/8” hexagonal (female) socket for the installation of the self-tapping screws. The use of oversize imperial or metric sockets (such as a 10.0mm socket) is forbidden. Where a dedicated hexagonal (female) socket is not available, a standard bi-hexagonal (female) socket from a standard “socket-set” may be used,
5. Deburring tool of sufficient quality to adequately remove burring from front face of fixture material and rearface of substrate material,
6. Suitable coolant for drilling pilot holes and suitable cutting oil to aid the self-tapping function of the screws.

Installation procedure steps:

1. Clean surface of the fixture material (and if possible the substrate) where debris is removed using a soft bristled brush. Wipe the area with a solvent (such as acetone) to remove any sticky or oily residues present) and allow the surface to dry at room temperature,
2. Choose and insert a certified HSS or Carbide drill bit into a suitable drilling device. The correct drill bit diameter is determined by the nominal tensile strength of the fixture/ substrate material as well as the overall thickness of material to be drilled. As such the correct drill bit to use can be selected using table 03 below,
3. Arrange the drilling device and drill a pilot hole all the way through the fixture and substrate materials. The pilot hole should be drilled perpendicular to the face of the fixture and substrate materials (note that use of the product where there is an air gap between the rearmost face of the fixture material and the foremost face of the substrate material is strictly forbidden) a deviation from the normal of less than ± 2.5˚ is acceptable; a deviation greater than this is forbidden. The drilling rate should be controlled so that excessive heat or “chatter” is not present and ensure that the pilot hole finish is smooth,
4. Using a deburring tool, remove any burrs from the foremost face of the fixture material and (if possible) the rearmost face of the substrate,
5. Using a pipette, oiler, dripping bottle or other fluid dispensing tool, dispense a small quantity of cutting fluid into the pilot hole,
6. Using a non-impacting screwdriver (or manual ratchet wrench) insert the screw ensuring that perpendicularity within the tolerances set in instruction step 3 is maintained. Insertion shall be slow (below 250 RPM) and with very little pressure imposed axially on the tool by the installer. Insertion shall continue until the screw is “set” as per instruction step 7,.
7. A screw is considered “set” once it is “face tight”, specifically meaning that the EPDM washer compression plate has changed from convex to flat (parallel to the face of the fixture material) and is not overly tightened (over-tightening can be witnessed as the compression plate changing to a concave shape with respect to its original convex form). There should be no residual torque imposed on the screws and if checking the “set” torque of the screw it should be less than 4.0 Nm. Pre-loading or post-tensioning of the screws by torque is strictly forbidden.

Reminders & Tips:

Rotational speed:	Contrary to popular belief; the process of self-tapping does not require high RPMs. In fact, using high RPMs will lower the tapping efficiency of the screws and in some cases: cause the screws to burn out. This is due to the heat built up from friction of the screw against the materials it is trying to tap through. Using your screwdrivers' variable trigger, the most efficient speed is at half speed or lower.
Pressure:	Contrary to popular belief; the process of self-tapping does not require a lot of pressure to be exerted on the back of the tool. Using too much pressure will blunt the threads of the screw and cause it to burn out.
Washer setting:	When using a screw with a washer you should note that the rubber part is slightly smaller than the stainless-steel part. This is so that when the convex washer deforms into a flat washer that the rubber now slightly protrudes around the stainless steel: this increases the weather sealing of the washer. When installing screws with washers you should stop inserting when the compression disc flattens into a flat disc (it is originally shaped in a convex shape). If you keep going past this point you will strip the rubber out from under the compression disc and there will be no weather sealing.
Torque:	When setting the screws, they should only ever be "face-tight" to the surface of the fixture material. This means that when driving the screw, you should stop once the underside of the head contacts the fixture material. If you drive further this will induce a torque stress on the head of the screw, which lowers the mechanical properties of the screws.

Mechanical Properties and Performance

Table 04: Tensile Capacity Properties (as per BS EN ISO 6892-1: 2016)

Thread Type	Cross-sectional Area under Stress, S_o (mm^2)	Upper Yield Limit, R_{eH} (N/mm^2)	Ultimate Tensile Strength, R_m (N/mm^2)	Ultimate Force, F_m (N)	Elongation (%)
Coarse	16.08	306.62	608.52	9,785.00	48

NOTE: Figures provided are ultimate values. Any designers should use factors of safety when using this product. Evolution Fasteners (UK) Ltd advises a conservative factor of safety, $\gamma_M = \geq 3.0$.

Table 05: Shear Capacity Properties (as per MIL-STD-1312-13)

Thread Type	Shear Area, A_v (mm^2)	Ultimate Shear Strength, V_m (N/mm^2)	Ultimate Force, F_V (N)
Coarse	12.86	408.11	5,248.29

NOTE: Figures provided are ultimate values. Any designers should use factors of safety when using this product. Evolution Fasteners (UK) Ltd advises a conservative factor of safety, $\gamma_M = \geq 3.0$.

Table 06: Torque Capacity Properties (as per BS EN ISO 10666: 1998)		
Thread Type	**Torque Area, A_τ (mm²)**	**Torque Strength, τ_m (Nm)**
Coarse	9.11	7.20
NOTE: Evolution Fasteners (UK) Ltd advises that fasteners are not subjected to torque loading or pre-stressing by torque/ tightening. Fasteners should be "face-tight" to fixture/ substrate only.		

Table 07: Hardening and Hardness Properties (as per BS EN ISO 6507-1: 2005)			
Steel Type and Thread Type	**Surface Hardness[1] (HV 1.0)**	**Core Hardness[1] (HV 1.0)**	**Depth of Case Hardening[2] (µm)**
A4-20H/ EN 1.4404/ 316L	465.6	323.7	N/A[3]

Table 08: Mechanical Performance of Substrate with respect to Fasteners.							
Withdrawal (Pull-Out) Resistance (Ultimate) as per BS EN 14566: 2008 & A1: 2009[4] in Newtons							
Nominal Diameter (mm)	**Steel Substrate (S355JR) Thickness (f_y = 355 N/mm²)**						
	1.2mm	**1.6 mm**	**2.0mm**	**2.5mm**	**3.0mm**	**4.0mm**	**≥ 5.0 mm**
6.3	2,600	3,260	4,340	5,430	6,520	8,690	9,780
Substrate Shear (Block Tearing) Resistance (Ultimate) as per Zulassung Z-14.1-4[6,5] in Newtons							
Nominal Diameter (mm)	**Steel Substrate (S355JR) Thickness (f_y = 355 N/mm²)**						
	1.2mm	**1.6 mm**	**2.0mm**	**2.5mm**	**3.0mm**	**4.0mm**	**≥ 5.0 mm**
6.3	1,040	1,300	1,730	2,170	2,790	4,410	5,240
NOTE: Figures provided are ultimate values. Any designers should use factors of safety when using this product. Evolution Fasteners (UK) Ltd advises a conservative factor of safety, γ_M = ≥ 3.0.							

Table 09: Pull-Over Resistance (Ultimate) as per BS EN 14566: 2008 & A1: 2009[6]		
Area of Head Resistance Load, A_{Head} (mm²)	**Steel Fixture (S355JR) Thickness (f_y = 355 N/mm²)**	
	0.6mm	**1.2mm**
50.27	2,400	4,100
NOTE: Figures provided are ultimate values. Any designers should use factors of safety when using this product. Evolution Fasteners (UK) Ltd advises a conservative factor of safety, γ_M = ≥ 3.0.		

1 BS EN ISO 898-1: 2013,
2 BS EN 14566: 2008 & A1: 2009,
3 Austenitic stainless steel cannot be case hardened without Nitriding process,
4 Interpolation between values is permitted,
5 Only applies to standard plate substrates. Profiled SFS, etc will have different values: these can be calculated using the calculations for block tearing in BS 5950-1: 2000 or BS EN 1993-1-1: 2005 & A1: 2014.
6 Interpolation between values is not permitted.

Chemical Composition

Table 10: Chemical Composition of EN 1.4404/ A4-20H/ SAE 316L Stainless Steel									
C (%)	Mn (%)	P (%)	S (%)	Si (%)	N (%)	Mo (%)	Cr (%)	Ni (%)	Fe (%)
≤ 0.08	≤ 2.000	≤ 0.045	≤ 0.030	≤ 0.750	≤ 0.100	2.000 (min.)	16.500 – 18.500	10.000 – 13.000	Balance

C = Carbon, Mn = Manganese, P = Phosphorus, S = Sulphur, Si = Silicon, N = Nitrogen, Mo = Molybdenum, Cr = Chromium, Ni = Nitrogen and Fe = Iron.

Other information

Conversion of Imperial Wire Gauge to Metric sizes:

Table 11: Gauge to Metric Conversion	
Gauge (g)	Millimetres (mm)
4	2.9
6	3.5
8	4.2
10	4.8
12	5.5
14	6.3
18	8.0

Electrogalvanic corrosion:
It should be noted that dissimilar metals only react when in the constant presence of an electrolyte. As the products use an EPDM washer this completely negates the possibility of electrogalvanic corrosion as it forms a hermetic seal.

Such electrogalvanic corrosion can only occur in the event that improper installation destroys the EPDM washer. In such an instance, the stainless steel is in a passive state and will have a cathodic potential greater than the mild steel or aluminium the screws are used in. Thus, the substrate will corrode to protect the integrity of the screw.

The rate of corrosion is influenced by the surface contact area, electrolyte type and cathodic potential of the dissimilar metals.

ABOUT OUR TESTING

7485

All test results were derived from empirical testing performed by ETAS (Evolution Testing & Analytical Services), a UKAS (United Kingdom Accreditation Service) accredited testing laboratory (Accreditation No. 7485). The following tests were performed to the following standards.

Testing Procedures

Test/ Parameter	Standard/ Method/ Procedure
Ultimate Tensile	**ISO 6892-1: 2009** *"Metallic materials – tensile testing – Part 1: Method of test at room temperature".*
Ultimate Shear	**MIL-STD-1312-13** *"Military Standard: Fastener test method (Method 13) Double shear test".*
Pull Out (Withdrawal Force)	**EN 14566: 2009** *"Mechanical fasteners for gypsum plasterboard systems. Definitions, requirements and test methods".*
Pull Over	**EN 14592: 2008** *"Timber structures. Dowel type fasteners. Requirements".*
Hardness	**ISO 650 7-1: 2005** *"Metallic materials – Vickers hardness test – Part 1: Test method".*
Corrosion Resistance	**EN ISO 9227: 2012** *"Corrosion tests in artificial atmospheres. Salt spray tests".*
Drilling Time Test	**EN 14566: 2009** *"Mechanical fasteners for gypsum plasterboard systems. Definitions, requirements and test methods".*

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