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European Technical Assessment

ETA 15/0768
of 30/11/2015

I General Part

Trade Name	BoxBolt®
Product Family to which the Construction Product Belongs	EC PAC 33
Manufacturer	Access Technologies Limited Unit A2 Cradley Business Park Overend Road Cradley Heath West Midlands B64 7DW
Manufacturing Plant	Access Technologies Limited Unit A2 Cradley Business Park Overend Road Cradley Heath West Midlands B64 7DW
This European Technical Assessment Contains	13 Pages including 04 Annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Regulation (EU) No. 305/2011, on the basis of	EAD 330001-00-0602

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II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical Description of Product and Intended Use

1.1 Technical Description of the Product

The BoxBolt fastener is a steel bolting assembly that is fastened to steelwork by insertion into a predrilled hole from one face and secured on the far side by the expansion of one part of the assembly after insertion. The expansion is achieved by tightening operations on the near side only; no access is required to the far side.

For the range of BoxBolt sizes M6, M8, M10, M12, M16 and M20, the fastener assembly comprises three components a hexagonal head setscrew, a slotted sleeve with integral washer and a conical nut.

BoxBolts are manufactured from either carbon steel or stainless steel. Carbon steel BoxBolts can be hot dip galvanised or electroplated with a zinc based coating. Electroplated coated Boxbolts are used only for dry indoor environment applications.

For the form of installed assembly, see **Error! Reference source not found.** and **Error! Reference source not found.**

2 Specification of the Intended Use in Accordance with the Applicable EAD

The product is intended to fasten together two steel structural components, or a structural steel component and a non-structural component, when the far face of the steelwork is inaccessible; such a situation commonly occurs when a bolted connection is required to a structural hollow section. The connection may be required to resist shear force, tensile force or a combination of shear and tensile forces.

The provisions made in this European Technical Assessment are based on the assumed working life of the BoxBolt for the intended use of 25 years. This working life should not be interpreted as a guarantee given by the manufacturer but should be regarded as an economically reasonable working life that is compatible with the expected working life of the structure.

3 Performance of the Product and References to the Methods Used for its Assessment

BWR	ETAG Clause No.	Characteristic	Assessment of Characteristic
1	4.1	Mechanical Resistance and Stability	See ETA Section 4.1
		Tension Resistance of Assembly	See ETA Section 4.1.1
		Shear Resistance of Assembly	See ETA Section 4.1.2
		Design Resistance for Combined Tension and Slip Forces	See ETA Section 4.1.3
		Mechanical Properties of the Carbon/Stainless Steel Components	See ETA Section 4.1.4
		Mechanical Properties of the Fastener	See ETA Section 4.1.5
2	4.2	Safety in Case of Fire	See ETA Section 4.2
	4.2.1	Reaction to Fire	See ETA Section 4.2.1
3	4.3	Hygiene, Health & the Environment	See ETA Section 4.3
	4.3.3	Content and Release of Dangerous Substances	See ETA Section 4.3.1

4	4.4	Safety and Accessibility in Use	See ETA Section 4.4
5	4.5	Protection against Noise	See ETA Section 4.5
6	4.6	Energy Economy & Heat Retention	See ETA Section 4.6
7	-	Sustainable Use of Natural Resources	See ETA Section 4.7
		Durability	See ETA Section 4.7.1

4 Methods of Verification

4.1 Mechanical Resistance and Stability

The following aspects of performance are relevant to this essential requirement for BoxBolt.

4.1.1 Tension Resistance of Assembly

The characteristic values of tension resistance given in Annex 4 have been determined by test as described in EN 1990 Annex D.

The design values of the tension resistance are determined by dividing by the recommended partial safety factor γ_M given in national regulations of the Member State where the Holo-Bolt fasteners are to be used. In cases where no value is given then $\gamma_M = 1.33$ should be used.

4.1.2 Shear Resistance of Assembly

The characteristic values of shear resistance given in Annex 4 have been determined by test as described in EN 1990 Annex D.

The design values of the shear resistance are determined by dividing by the recommended partial safety factor γ_M given in national regulations of the Member State where the Holo-Bolt fasteners are to be used. In cases where no value is given then $\gamma_M = 1.33$ should be used.

4.1.3 Design Resistance for Combined Tension and Shear Forces

The characteristic values of resistance under combined tensile and shear shall be calculated according to EN 1993-1-8.

4.1.4 Mechanical Properties of the Carbon/Stainless Steel Components

The mechanical properties of the carbon steel / stainless parts shall be proved by an inspection certificate 3.1 according to EN 10204.

4.1.5 Mechanical Properties of the Fastener

The mechanical properties of the structural fasteners shall be in accordance with EN ISO 4017, EN 14399-1, 15048-1, EN ISO 3506, EN ISO 898, EN ISO 7380, and EN ISO 10642.

4.2 Safety in Case of Fire

4.2.1 Reaction to Fire

BoxBolt is classified as Performance Class A1.

4.3 Hygiene, Health and the Environment

4.3.1 Content and Release of Dangerous Substances

Based on the declaration by the Manufacturer, the product does not contain harmful or dangerous substances as defined in the EU database.

Note:

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

4.4 Safety and Accessibility in Use

Assessed under BWR 1.

4.5 Protection against Noise

Not Relevant

4.6 Energy Economy and Heat Retention

Not Relevant

4.7 Sustainable Use of Natural Resources

4.7.1 Durability

The durability of the product shall be achieved by coating. The durability of the product in environmental conditions corresponding to corrosivity classifications defined in ISO 9223 is given in Table 2.

Table 2:

Corrosivity Class	Galvanized Steel	Stainless Steel
C1	more than 50 years	more than 50 years
C2	more than 50 years	more than 50 years
C3	more than 20 years	more than 20 years

4.8 General Aspects Related to the Performance of the Product

4.8.1 Manufacturing

The Boxbolts are manufactured in the factory in accordance with the provisions of this European Technical Assessment as identified during inspection of the plant by BM TRADA.

Changes to the product or production process, which could result in this deposited data/information being incorrect, should be communicated to BM TRADA before the changes are introduced. BM TRADA will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA will be necessary.

4.8.2 Installation

The fitness of the fastener assembly for the intended use is given under the conditions that installation complies with the manufacturer's instructions. In particular that the fastener is installed in a hole whose dimensions are within the stated tolerance on hole diameter; that faces of the components to be fastened together are brought into contact before the assembly is tightened; that the tightening torque is at least the minimum stated value.

4.8.2.1 Installation Instructions

It is manufacturer's responsibility to ensure that the specific instructions for installation are provided to the purchaser. This information may be made by reproduction of the respective parts of the European Technical Assessment. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The installation of the Boxbolt is only to be carried out according to the provisions of the manufacturer. The manufacturer will provide assembly instructions to the installer.

The nominal sizes are M6, M8, M10, M12, M16 and M20

4.8.1 Design of Connections Using the Product

The characteristic values of material resistance given in Annex 4 may be used as characteristic values when verifying structural adequacy in accordance with Eurocode 3.

It is important to note that these characteristic values are valid for the assembly itself but in any connection detail the design resistance of the connection may be limited to a lesser value (than the sum of the resistances of the fasteners) by the structural components that are connected. For example, when the thickness of the connected component is small, pull-out failure may occur before failure of any of the assemblies.

4.8.2 Serviceability

The performance of the product in service shall not be adversely affected by the forces applied to it.

4.8.3 Packaging, Transport and Storage

The products should be packed in either boxes or bags bearing the manufacturer's name, product type, nominal size, quantity, date of manufacture and batch reference details.

4.8.1 Use, Maintenance & Repair

The assessment of the fitness for use is based on the assumption that maintenance is not required during the assumed intended working life.

Should damage to any assembly occur during the service life, connections should be replaced.

5 Assessment & Verification of Constancy of Performance

5.1 AVCP System

According to Decision 1999/176/EC of the European Commission¹, the System(s) of Assessment and Verification of Constancy of Performance (see Annex V of Regulation (EU) No. 305/2011) given in Table 3 applies.

Table 3: System of Assessment and Verification of Constancy of Performance

Product	Intended Use	AVCP System
Structural connectors, metallic rivets, bolts (nuts and washers) and H.R Bolts (High Strength Friction Grip0 Bolts), Studs, Screws, Railway Fasteners	For use in Structural Metallic Works	2+

The System of Attestation and Verification of Constancy of Performance referred to above is defined as follows.

System 2+: Certification of the Conformity of the Factory Production Control (FPC) by a Notified Certification Body on the basis of:

a) **Tasks for the Manufacturer**

- (1) Initial Type Testing of the Product
- (2) Factory Production Control
- (3) Further testing of samples taken from the factory in accordance with a prescribed test plan.

b) **Tasks for the Notified Body**

- (4) Initial Inspection of Factory and of Factory Production Control
- (5) Continuous surveillance, assessment and approval of factory production control

Note: *In addition to the above, the manufacturer shall make a Declaration of Performance (DoP) of the product.*

6 Technical Details necessary for the Implementation of the AVCP System, as foreseen in the applicable EAD

6.1 Tasks for the Manufacturer

6.1.1 Initial Type Testing of the Product

Initial Type Testing (ITT) has been undertaken under the responsibility of Access Technologies Limited to verify that the production line/s in question is able to manufacture products in conformity with this ETA.

Whenever a change occurs in materials or production process which would significantly change the above characteristics, the tests or assessments shall be repeated for the appropriate characteristics.

¹ Official Journal of the European Communities

6.1.2 Factory Production Control (FPC)

The Manufacturer has a Factory Production Control (FPC) system and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of policies, procedures and work instructions. This FPC system ensures that the product is in conformity with this European Technical Assessment.

The Manufacturer shall only use raw materials or components that are supplied with the relevant inspection documents. All incoming raw materials shall be subject to inspection, verification, controls and tests (as applicable) by the manufacturer.

The results of FPC are recorded and evaluated. These records include but are not limited to:

- Product specification and designation, basic materials and components
- Type(s) of Control testing
- Date of manufacture of the product and date of testing of the product or basic material and components;
- Result of control and testing and, if appropriate, comparison with requirements;
- Signature of the person responsible for FPC

These records shall be presented to BM TRADA upon request.

6.2 Tasks of Notified Bodies

6.2.1 Initial Inspection of Factory and of Factory Production Control

The Notified Body shall ascertain that the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the product according to the specifications mentioned in Section 2, as well as to the Annexes to this European Technical Assessment.

6.2.2 Continuous Surveillance

The Notified Body shall visit the each Production Unit / Factory twice a year for regular inspection. It shall be verified that the system of factory production control and the specified manufacturing process is maintained in accordance with this European Technical Assessment.

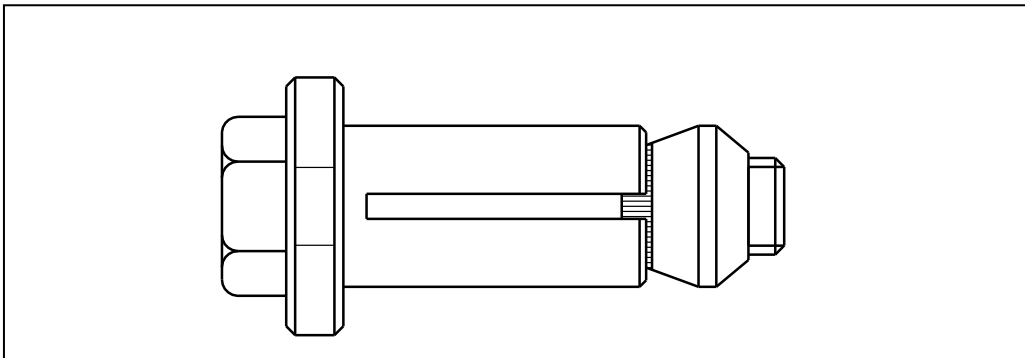
The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to BM TRADA. In cases where the provisions of this European Technical Assessment and the prescribed test plan are no longer fulfilled, the conformity certificate shall be withdrawn.

Issued in High Wycombe, United Kingdom on 00/00/2015 by

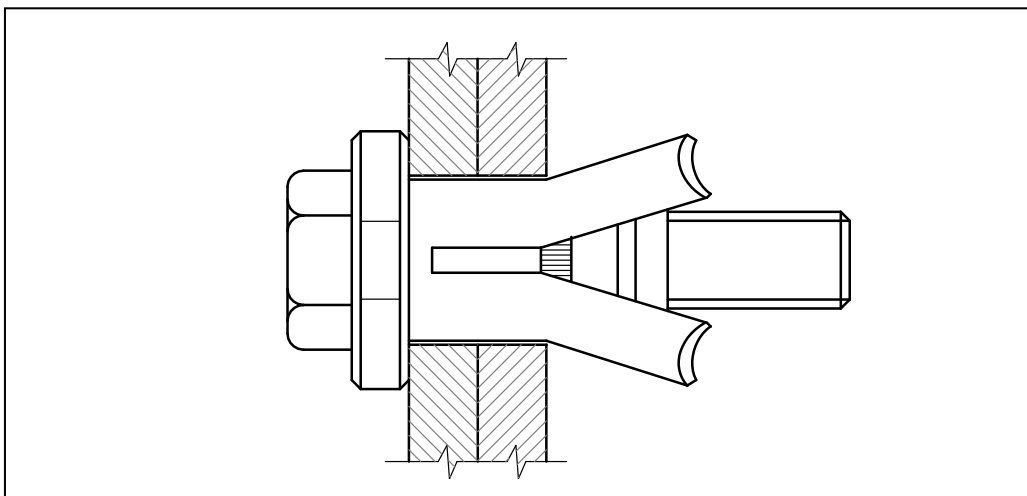
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Niresh D Somlie
Principal Technical Officer

7 Annex 1: BoxBolt Structural Bolting Assembly (3 Part Assembly)



Pre-installation



Post installation

The hexagon head setscrew assembly is used for all sizes M6, M8, M10, M12, M16 and M20.

8 Annex 2: Dimensions of Fastener Components

BoxBolt Structural Bolting Assembly (Pre-installation)

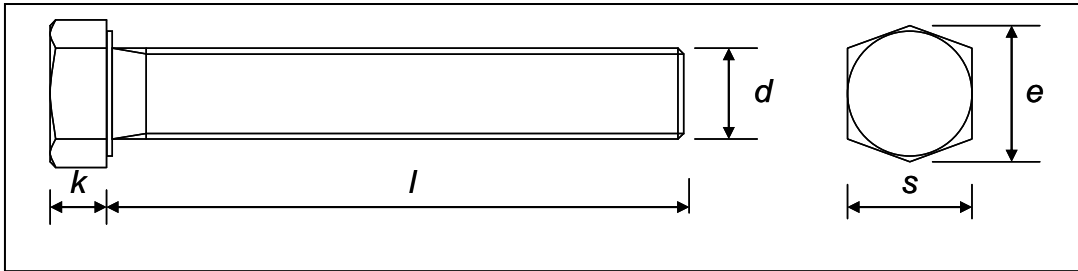


Figure 2.1: Hexagon Head Screw

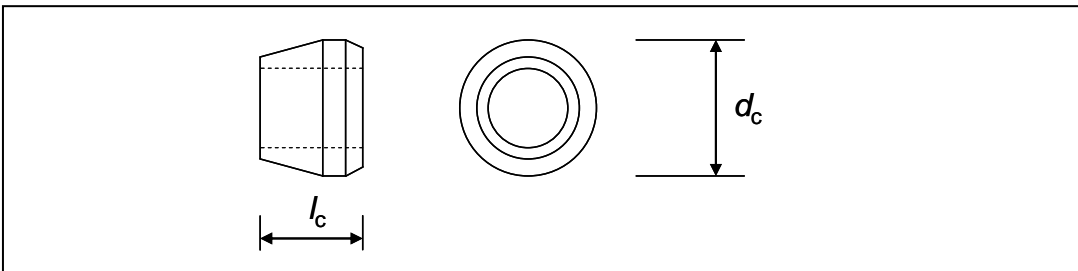


Figure 2.2: Conical Nut

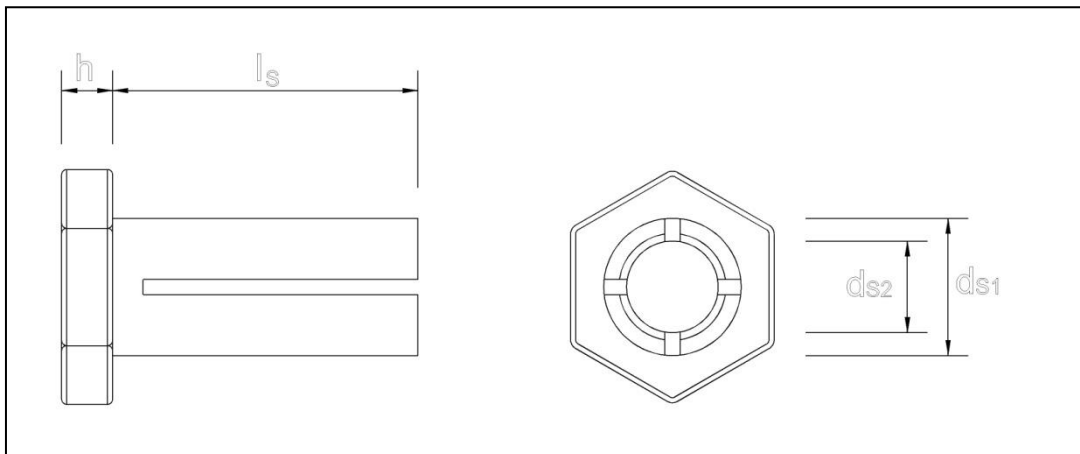


Figure 2.3: Sleeve with Integral Collar

9 Annex 3: Materials & Dimensions of Fastener Components

Table 3.1 Material specification and reference standards

	Steel	Stainless steel
Designation	BQ_Z__ or BQ_G__	BQ_S__
Hexagon head screw	Property class 8.8, EN ISO 898-1	Austenitic grade A4, property class 70, EN ISO 3506
Conical nut	Chinese specification GB699-20, EN 10083:1999 grade 1.1151, with a minimum tensile strength of 430 N/mm ²	Austenitic stainless steel, number, S31600, ASTM 276-08a (minimum tensile strength 515 N/mm ² according to Standard)
Sleeve with integral collar	Chinese specification GB699-20, EN 10083:1999 grade 1.1151, with a minimum tensile strength of 430 N/mm ²	Austenitic stainless steel, number, S31600, ASTM 276-08a (minimum tensile strength 515 N/mm ² according to Standard)
Coating (of cone, sleeve, collar and screw)	Electrodeposited coating, FE/Zn8/A (clear passivated) in accordance with EN ISO 2081 in at least 72 hours salt spray testing (in accordance with ASTM B117) or Hot dip galvanizing to EN ISO 1461:2009	(not applicable)

Table 3.2 Dimensions (Nominal)

			M6	M8	M10	M12	M16	M20
Nominal diameter	<i>d</i>	mm	6	8	10	12	16	20
Max dia of cone	<i>d_c</i>	mm	10	13	17	19	25	32
Length of cone	<i>l_c</i>	mm	10	12	13	14	18	27
Outer dia of sleeve	<i>d_{s1}</i>	mm	10.5	13.5	17.5	19.5	25.5	32.5
Inner dia of sleeve	<i>d_{s2}</i>	mm	6.9	8.9	10.9	12.9	16.9	20.9
Height of collar	<i>h</i>	mm	5.4	6.4	7.4	8.4	9.4	11.4
Length of screw	Size 1	<i>l</i>	45	50	50	55	75	100
	Size 2	<i>l</i>	n/a	70	70	80	100	130
	Size 3	<i>l</i>	n/a	90	90	100	120	150
Length of sleeve	Size 1	<i>l_s</i>	29.6	33.6	32.6	36.6	51.6	66.6
	Size 2	<i>l_s</i>	n/a	53.6	52.6	61.6	75.6	96.6
	Size 3	<i>l_s</i>	n/a	73.6	72.6	81.6	95.6	121.6

10 Annex 4: Characteristic Values of Tensile and Shear Resistance

Table 4.1

Designation	Nominal Size	Tensile Resistance $F_{t,Rk}$ (kN)	Shear Resistance $F_{v,Rk}$ (kN)	Material Strength of Sleeve (N/mm ²)
BQ_Z06 or G06	M6	13.7	18.8	430
BQ_Z08 or G08	M8	23.6	33.3	430
BQ_Z10 or G10	M10	41.8	58.5	430
BQ_Z12 or G12	M12	53.7	76.3	430
BQ_Z16 or G16	M16	96.0	139.3	430
BQ_Z20 or G20	M20	168.0	229.9	430
BQ_S06	M6	12.7	17.6	515
BQ_S08	M8	23.1	31.6	515
BQ_S10	M10	36.5	57.1	515
BQ_S12	M12	53.1	72.4	515
BQ_S16	M16	98.9	131.6	515
BQ_S20	M20	154.4	220.2	515

The characteristic values are valid when the assemblies are installed in holes in steel components within the tabulated range of hole size and when the total thickness of the components into which the assemblies are installed are within the tabulated range of thickness.

Table 4.1 Limiting values of Hole Size and Grip

Designation	Nominal Size	Hole Diameter (mm)		Clamped Length (mm)					
		Size 1		Size 2		Size 3			
		min	max	min	max	min	max	min	max
BQ_ / BQ_S 06	M6	10.8	12.0	5	29	n/a	n/a	n/a	n/a
BQ_ / BQ_S 08	M8	13.8	15.0	5	26	18	46	30	66
BQ_ / BQ_S 10	M10	17.8	19.0	5	23	18	43	35	63
BQ_ / BQ_S 12	M12	19.8	21.0	5	25	20	50	40	70
BQ_ / BQ_S 16	M16	25.8	28.0	5	35	30	60	55	80
BQ_ / BQ_S 20	M20	32.8	35.0	8	42	35	72	65	102

Table 4.2 Minimum Values of Installation Torque

Designation	Torque (Nm)
BQ_ / BQ_S 06	13
BQ_ / BQ_S 08	25
BQ_ / BQ_S 10	45
BQ_ / BQ_S 12	80
BQ_ / BQ_S 16	190
BQ_ / BQ_S 20	300