

# European Technical Assessment

# ETA-20/1174 of 15/12/2020

## General Part

<b>Technical Assessment Body Issuing the European Technical Assessment:</b>	Element Materials Technology Rotterdam B.V.
<b>Trade Name of the Construction Product:</b>	BoxBolt®
<b>Product Family to Which the Construction Product Belongs:</b>	EC PAC 33
<b>Manufacturer:</b>	Access Technologies Limited Unit A2 Cradley Business Park Overend Road Cradley Heath West Midlands B64 7DW
<b>Manufacturing Plant(s):</b>	Details Held on File by Element
<b>This European Technical Assessment Contains:</b>	12 Pages including 4 Annexes which form an integral part of this Assessment
<b>This European Technical Assessment is Issued in Accordance with Regulation (EU) No 305/2011, on the Basis of:</b>	EAD 330001-00-0602 – “Expanding Structural Bolting Assemblies for Blind Fastening”
<b>This Version Replaces:</b>	ETA 15/0768, Issued on 30/11/2015

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## 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.

## 2 Specification of the Intended Use(s) in Accordance with the Applicable European Assessment Document (hereinafter 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	Characteristic	Assessment of Characteristic
<b>1</b>	<b>Mechanical Resistance and Stability</b>	<b>See ETA Section 3.1.1</b>
	Tension Resistance of Assembly	See ETA Section 3.1.1.1
	Shear Resistance of Assembly	See ETA Section 3.1.1.2
	Design Resistance for Combined Tension and Shear Forces	See ETA Section 3.1.1.3
	Mechanical Properties of the Carbon/Stainless Steel Components	See ETA Section 3.1.1.4
	Mechanical Properties of the Fastener	See ETA Section 3.1.1.5
<b>2</b>	<b>Safety in Case of Fire</b>	<b>See ETA Section 3.1.2</b>
	Reaction to Fire	See ETA Section 3.1.2.1
<b>3</b>	<b>Hygiene, Health &amp; the Environment</b>	<b>See ETA Section 3.1.3</b>
	Content and Release of Dangerous Substances	See ETA Section 3.1.3.1
<b>7</b>	<b>Sustainable Use of Natural Resources</b>	<b>See ETA Section 3.1.4</b>
	Durability	See ETA Section 3.1.4.1

## **3.1 Methods of Verification**

### **3.1.1 Mechanical Resistance and Stability**

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

#### **3.1.1.1 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  $g_M$  given in national regulations of the Member State where the BoxBolt fasteners are to be used. In cases where no value is given then  $g_M = 1.33$  should be used.

#### **3.1.1.2 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  $g_M$  given in national regulations of the Member State where the BoxBolt fasteners are to be used. In cases where no value is given then  $g_M = 1.33$  should be used.

#### **3.1.1.3 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.

#### **3.1.1.4 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.

#### **3.1.1.5 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.

### **3.1.2 Safety in Case of Fire**

#### **3.1.2.1 Reaction to Fire**

BoxBolt is classified as Performance Class A1.

### **3.1.3 Hygiene, Health and the Environment**

#### **3.1.3.1 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 Assessment, 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.

### 3.1.4 Sustainable Use of Natural Resources

#### 3.1.4.1 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:**

<b>Corrosivity Class</b>	<b>Galvanized Steel</b>	<b>Stainless Steel</b>
<b>C1</b>	more than 50 years	more than 50 years
<b>C2</b>	more than 50 years	more than 50 years
<b>C3</b>	more than 20 years	more than 20 years

### 3.2 General Aspects Related to the Performance of the Product

#### 3.2.1 Manufacturing

The Boxbolts are manufactured in the factory in accordance with the provisions of this European Technical Assessment.

Changes to the product or production process, which could result in this deposited data/information being incorrect, should be communicated to Element Materials Technology Rotterdam B.V. before the changes are introduced. Element Materials Technology Rotterdam B.V. 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.

#### 3.2.2 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.

##### 3.2.2.1 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

#### 3.2.1 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.

### **3.2.2 Serviceability**

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

### **3.2.3 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.

### **3.2.1 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.

## **4 Assessment and Verification of Constancy of Performance (hereinafter AVCP) System Applied, with reference to its Legal Base**

### **4.1 System of Assessment and Verification of Constancy of Performance**

According to the Decision 1999/176/EC of the European Commission, the System(s) of Assessment and Verification of Constancy of Performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

## **5 Technical Details necessary for the Implementation of the AVCP System, as foreseen in the applicable EAD**

### **5.1 Tasks for the Manufacturer**

#### **5.1.1 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.

#### **5.1.2 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

## **5.2 Tasks for the Notified Body**

### **5.2.1 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.

### **5.2.2 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. 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 Amsterdam, Netherlands on 15/12/2020

By

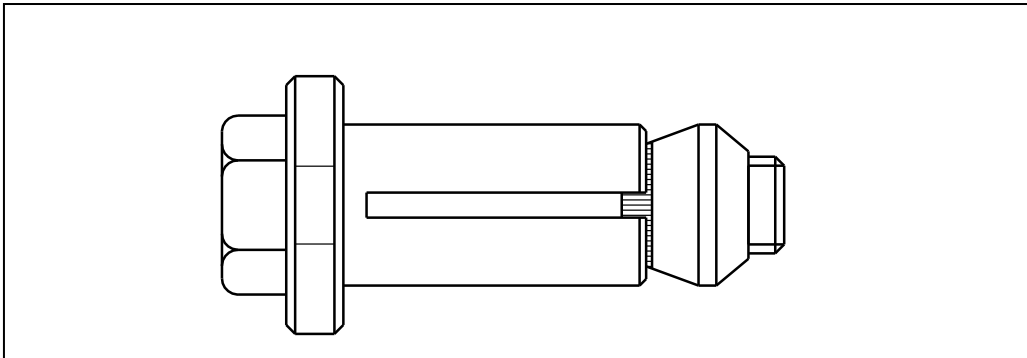
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Niresh D Somlie

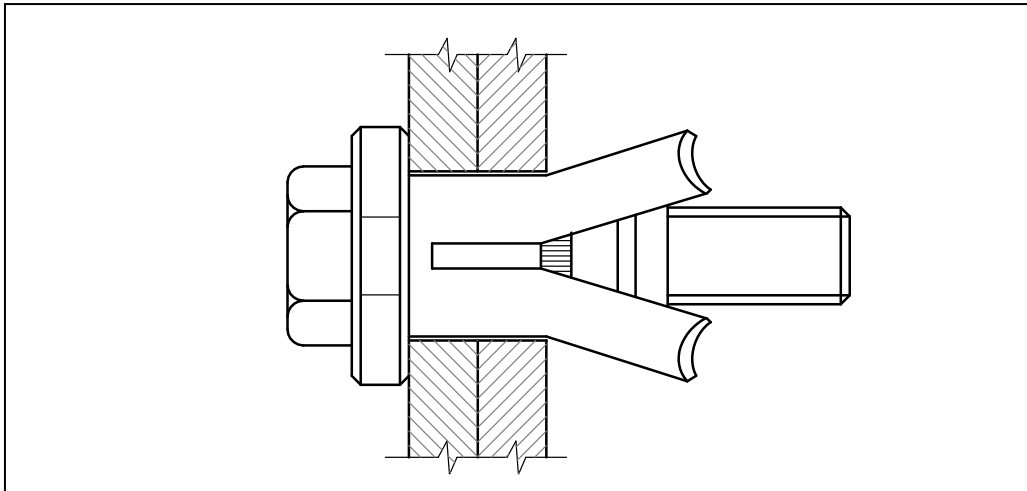
Technical Assessment Body Manager



## 6 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.

## 7 Annex 2: Dimensions of Fastener Components

### BoxBolt Structural Bolting Assembly (Pre-installation)

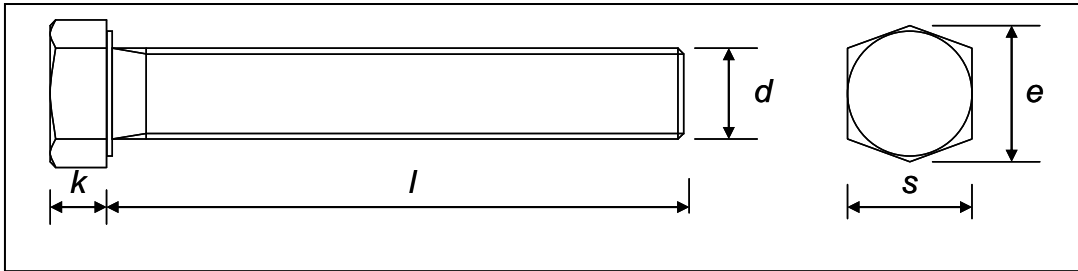


Figure 2.1: Hexagon Head Screw

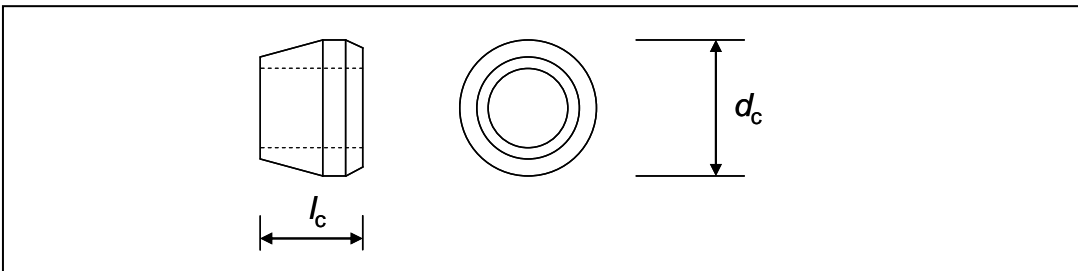


Figure 2.2: Conical Nut

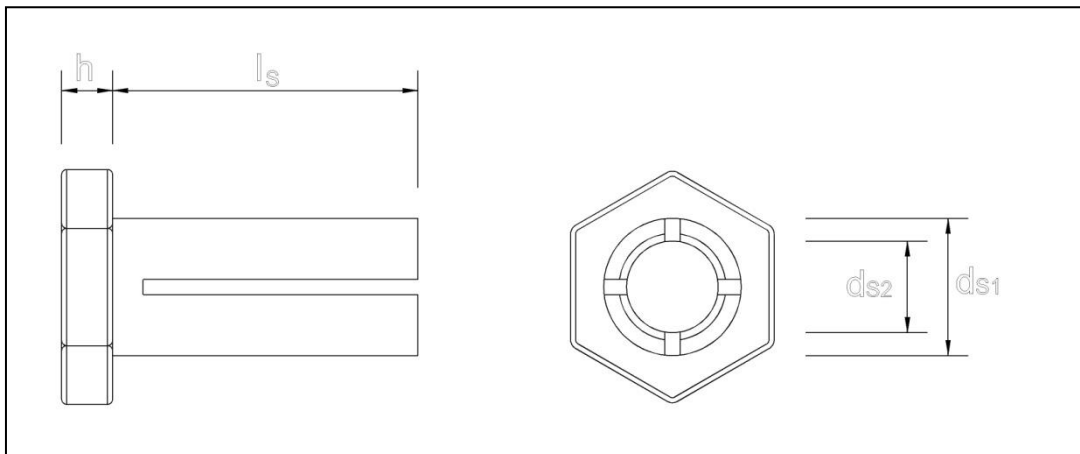


Figure 2.3: Sleeve with Integral Collar

## 8 Annex 3: Materials & Dimensions of Fastener Components

**Table 3.1 Material specification and reference standards**

	<b>Steel</b>	<b>Stainless steel</b>
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 <sup>2</sup>	Austenitic stainless steel, number, S31600, ASTM 276-08a (minimum tensile strength 515 N/mm <sup>2</sup> 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 <sup>2</sup>	Austenitic stainless steel, number, S31600, ASTM 276-08a (minimum tensile strength 515 N/mm <sup>2</sup> 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)**

			<b>M6</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>
Nominal diameter	<i>d</i>	mm	6	8	10	12	16	20
Max dia of cone	<i>d<sub>c</sub></i>	mm	10	13	17	19	25	32
Length of cone	<i>l<sub>c</sub></i>	mm	10	12	13	14	18	27
Outer dia of sleeve	<i>d<sub>s1</sub></i>	mm	10.5	13.5	17.5	19.5	25.5	32.5
Inner dia of sleeve	<i>d<sub>s2</sub></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<sub>s</sub></i>	29.6	33.6	32.6	36.6	51.6	66.6
	Size 2	<i>l<sub>s</sub></i>	n/a	53.6	52.6	61.6	75.6	96.6
	Size 3	<i>l<sub>s</sub></i>	n/a	73.6	72.6	81.6	95.6	121.6

## 9 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 <sup>2</sup> )
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)					
		min	max	Size 1		Size 2		Size 3	
				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