

HOLLO-BOLT® LINDAPTER® HEX HEAD

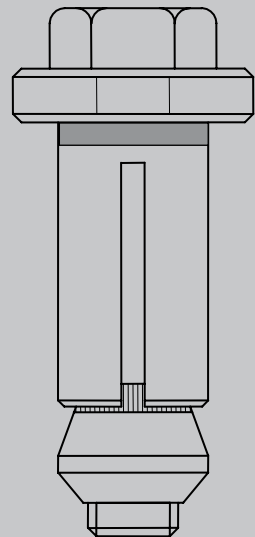
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APPROVAL DOC

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European Technical Assessment

ETA 10/0416
of 30/11/2015

I General Part

Trade Name	Hollo-Bolt®
Product Family to which the Construction Product Belongs	EC PAC 33
Manufacturer	Lindapter International Lindsay House Brackenbeck Road Bradford West Yorkshire BD7 2NF
Manufacturing Plant	As Held on File
This European Technical Assessment Contains	21 pages including 11 annexes, which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No. 305/2011, on the basis of	EAD 330001-00-0602, Edition, 1

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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 Holo-Bolt 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 sizes M8, M10 and M12, the Holo-Bolt assembly comprises three components: bolt; slotted sleeve, with integral washer; conical nut. For sizes M16 and M20, the Holo-Bolt assembly comprises five components: bolt; slotted sleeve; steel washer; compressible rubber washer; conical nut. Sizes M8, M10 and M12 are available with hexagonal head screw, hexagon socket button head screw or security button head screw, or with countersunk head screw and flared sleeve.

Size M16 is available with hexagonal head screw or countersunk head screw.

Size M20 is available with hexagonal head screw only.

For the form of installed assembly, see Annex 1 and Annex 2.

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 in this European Technical Approval are based on an intended working life of the product of 50 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	
		Shear Resistance of Assembly	
		Design Resistance for Combined Tension and Shear Forces	
		Mechanical Properties of the Carbon / Stainless Steel Components	
		Mechanical Properties of the Fastener	
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
	4.3.1	Content and Release of Dangerous	See ETA Section 4.3.1

		Substances	
4	4.4	Safety and Accessibility in Use	See ETA Section 4.4
		Tension Resistance of Assembly	
		Shear Resistance of Assembly	
		Design Resistance for Combined Tension and Shear Forces	
		Mechanical Properties of the Carbon / Stainless Steel Components	
		Mechanical Properties of the Fastener	
5	4.5	Protection against Noise	See ETA Section 4.5
6	4.6	Energy Economy & Heat Retention	See ETA Section 4.2
7	-	Sustainable Use of Natural Resources	See ETA Section 4.2
		Durability	

4 Methods of Verification

4.1 Mechanical Resistance and Stability

The following aspects of performance are relevant to this essential requirement for the fastener assemblies.

4.1.1 Tension Resistance of Assembly

The characteristic values of tension resistance given in Annex 4 to 11 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 Holo-Bolt fasteners are to be used. In cases where no value is given then $g_M = 1.33$ should be used.

4.1.2 Shear Resistance of assembly

The characteristic values of shear resistance given in Annex 4 to 11 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 Holo-Bolt fasteners are to be used. In cases where no value is given then $g_M = 1.33$ 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

The following aspects of performance are relevant to this essential requirement for the Hollo-Bolt Assemblies.

4.2.1 Reaction to Fire

The Hollo-Bolt is classified as Performance Class A1.

4.3 Hygiene, Health and the Environment

4.3.1 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 Regulation, these requirements need also to be complied with, when and where they apply.

4.4 Safety in Use

Assessed under BWR 1.

4.5 Protection against Noise

Not Relevant

4.6 Energy Economy and Heat Retention

Not Relevant

4.7 General Aspects Related to the Performance of the Product

4.7.1 Manufacturing

The Lindapter Hollo-Bolts are manufactured in the factory in accordance with the provisions of this European Technical Approval 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.

4.7.2 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.

4.7.2.1 Installation Instructions

It is the 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 Approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum information required is:

- The fastener is to be installed in pre-drilled holes.
- The steelwork and attached component is to be brought into good contact and the holes aligned before inserting the fastener.
- Illustration of the method of gripping the collar.
- Illustration of the method of attaching the torque wrench and statement of the torque to be applied.

All information shall be presented in a clear and explicit form.

4.7.3 Design of Connections Using the Product

The characteristic values of material resistance given in Annexes 5 and 11 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

4.7.4 Durability

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

Table 1:

Corrosivity Class	Galvanized Steel	Electro-plated Steel plus JS500	Steel with Sheraplex finish	Stainless Steel
C1	more than 50 years	more than 50 years	more than 50 years	more than 50 years
C2	more than 50 years	more than 20 years	more than 50 years	more than 50 years
C3	more than 20 years	more than 10 years	more than 20 years	more than 50 years

4.7.5 Serviceability

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

4.7.6 Packaging, Transport and Storage

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

4.7.7 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 occur during the service life, fasteners 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 the Constancy of Performance (see Annex V of Regulation (EU) No. 305/2011) given in Table 2 applies.

Table 2: 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 Grip 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 Lindapter International 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 shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This production control system shall ensure that the product is in conformity with this European Technical Approval.

The manufacturer shall only use raw materials supplied with the relevant inspection documents. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of incoming materials such as nuts, washers, material for sleeves, shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimensions and determining material properties, e.g. tensile strength, hardness, surface finish.

The manufactured components of the fastener assemblies shall be subjected to the following tests, in accordance with the prescribed test plan:

Dimensions of Component Parts:

- Bolt (diameter, length, marking)
- Sleeve (length, internal and external diameters, geometry of the slots, geometry of the integral washer, where applicable)
- Rubber washer (diameter, thickness)
- Conical nut (diameters, length, geometry of surface)
- Washer (diameters, thickness, where applicable).

Material Properties:

- Bolt (ultimate tensile strength)
- Sleeve (ultimate tensile strength)
- Rubber washer (material composition, Shore hardness)
- Conical nut (proof load),
- Washer (hardness, where separate).
- Thickness of the protective coating (where applicable).
- Visual control of correct assembly and of completeness of the fastener assembly.

6.2 Tasks of Notified Body

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.

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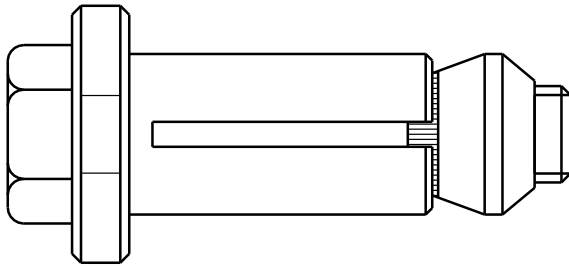


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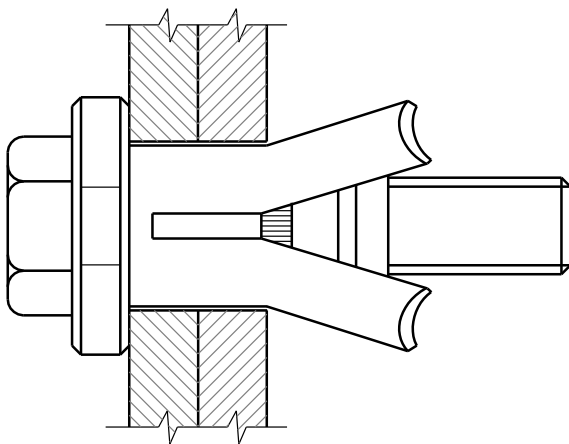
7 Annex 1: Holo-Bolt

A.1.1 Product and Intended Use (3-part assembly)

Holo-Bolt structural bolting assembly (3-part assembly)



Pre-Installation



Post Installation

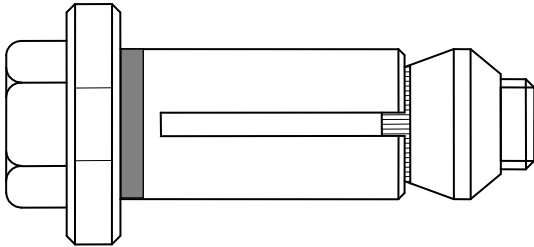
This form of the assembly is used for sizes M8, M10 and M12

Note: The fastener is illustrated with a hexagon head setscrew. A button head setscrew may alternatively be used.

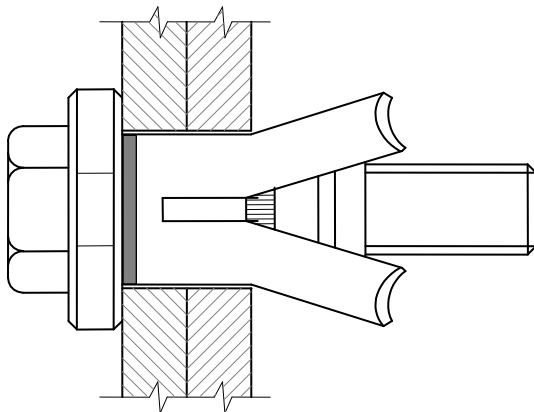
8 Annex 2: Hollo-Bolt

A.2.1 Product and Intended Use (5-part assembly)

Hollo-Bolt structural bolting assembly (5-part assembly)



Pre-installation



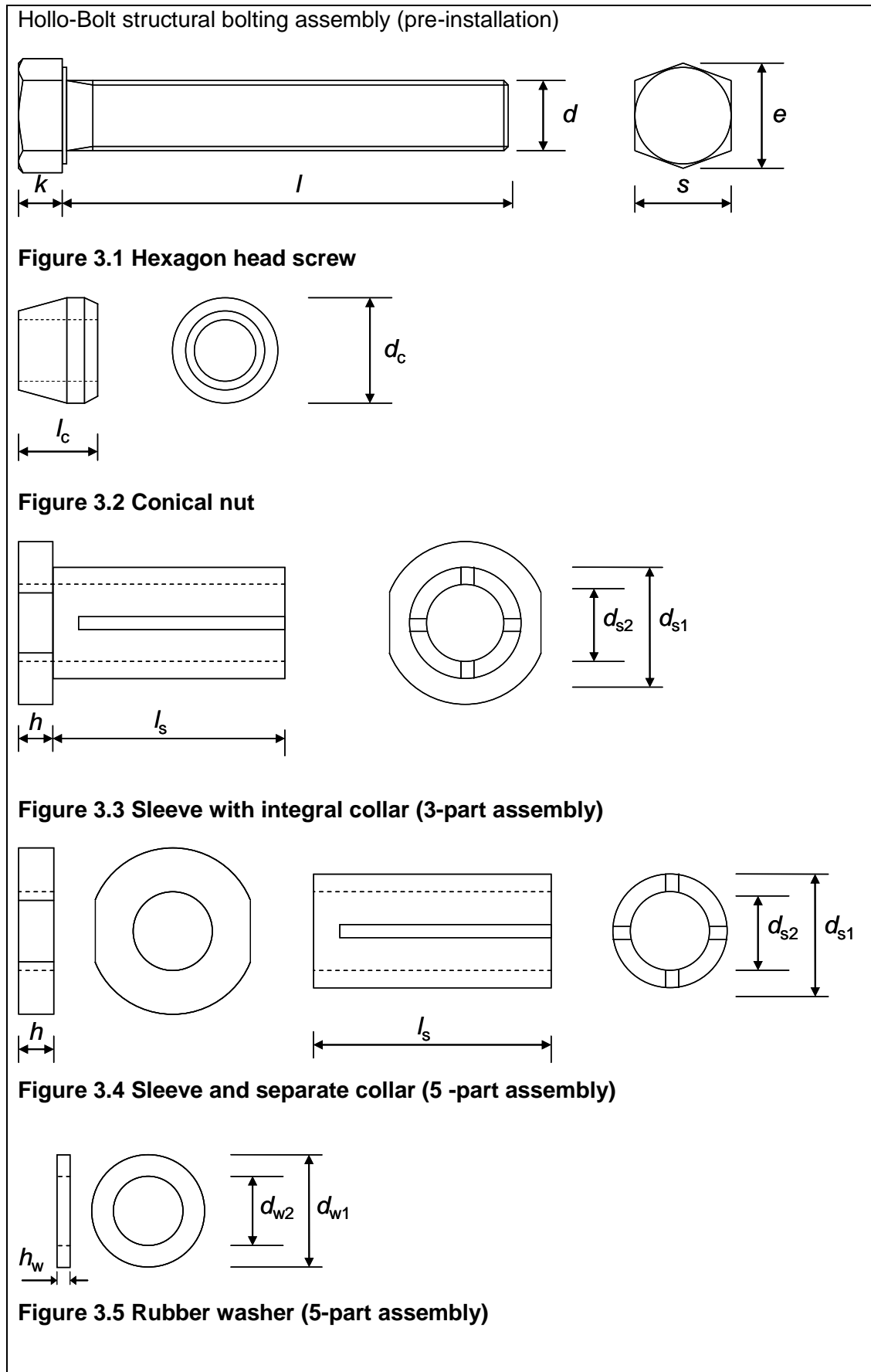
Post installation

This form of the assembly is used for sizes M16 and M20

Note: The fastener is illustrated with a hexagon head setscrew.

9 Annex 3: Holo-Bolt

A.3.1 Dimensions of Fastener Components



Annex 4: Hollo-Bolt (Hexagon head)

A.4.1 Materials and Dimensions of Fastener Components

Table 4.1 Material specification and reference standards

	Steel	Stainless steel
Designation	HB	HBST
Hexagon head screw	Property class 8.8, EN ISO 898-1	Austenitic grade A4, property class 70, EN ISO 3506
Conical nut	Free cutting carbon steel, type 11SMn30, EN 10087:1999 or 11SMnPb30, EN 10087:1999 with a minimum tensile strength of 430 N/mm ²	Austenitic stainless steel, number, 1.4404, EN 10088-3:2005 (minimum tensile strength 500 N/mm ² according to Standard)
Sleeve with integral collar, sleeve (without collar), collar (separate)	Free cutting carbon steel, type 11SMn30, EN 10087:1999 or 11SMnPb30, EN 10087:1999 with a minimum tensile strength of 430 N/mm ² (sizes up to HB16) or 390 N/mm ² (size HB20) or Cold drawn steel AISI 1021, grade C10B21 (minimum tensile strength 470 N/mm ² according to Standard)	Austenitic stainless steel, number, 1.4404, EN 10088-3:2005 (minimum tensile strength 500 N/mm ² according to Standard)
Coating (of cone, sleeve, collar and screw)	Electrodeposited coating, EN ISO 2081 + JS500 (see technical documentation) or hot dip galvanizing to EN ISO 1461:2009 or sherardizing to BS 4921:1988, class 1 + sheraplex coating	(not applicable)
Rubber washer	(see technical documentation)	(see technical documentation)

Table 4.2 Dimensions

				M8	M10	M12	M16	M20
Nominal diameter	d	mm		8	10	12	16	20
Max dia of cone	d_c	mm		13	17.46	19.05	25.4	31.75
Outer dia of sleeve	d_{s1}	mm		13.75	17.75	19.75	25.75	32.75
Inner dia of sleeve	d_{s2}	mm		9	12	14	17	21
height of collar	h	mm		5	6	7	8	10
Outer dia of washer	d_{w1}	mm					26	31
Inner dia of washer	d_{w2}	mm					16	20
Washer thickness	h_w	mm					5	5
Length of screw	Size 1	l	mm	50	55	60	75	90
	Size 2	l	mm	70	70	80	100	120
	Size 3	l	mm	90	90	100	120	150
Length of sleeve	Size 1	l_s	mm	30	30	35	41.5	50
	Size 2	l_s	mm	49	48	57	63	76
	Size 3	l_s	mm	68	67	79	84	102

For thread dimensions and tolerances, see EN ISO 4017 (steel assemblies) or EN ISO 3506 (stainless steel assemblies).

For other dimensions and tolerances, see technical documentation

A.5.1 Characteristic Values and Limiting Values

Table 5.1 Characteristic values of tensile and shear resistances

Designation	Nominal size	Tensile resistance $F_{t,Rk}$ (kN)	Shear resistance $F_{v,Rk}$ (kN)	Material strength of sleeve (N/mm ²)
HB08	M8	23.1	32.9	430
HB10	M10	39.6	54.2	430
HB12	M12	45.8	71.0	430
HB16	M16	84.3	139	430
HB20	M20	124	211	390
HBST08	M8	26.8	30.7	500
HBST10	M10	46.0	51.0	500
HBST12	M12	53.3	65.0	500
HBST16	M16	98.0	128	500
HBST20	M20	154	205	500

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 5.2 Limiting values of hole size and grip

Designation	Nominal size	Hole diameter (mm)		Clamped length (mm)					
		min	max	Size 1		Size 2		Size 3	
HB08	M8	13.8	15.0	3	22	22	41	41	60
HB10	M10	17.8	19.0	3	22	22	41	41	60
HB12	M12	19.8	21.0	3	25	25	47	47	69
HB16	M16	25.8	28.0	12	29	29	50	50	71
HB20	M20	32.8	35.0	12	34	34	60	60	86

In addition, the outer ply (i.e. the ply directly under the collar) must be at least 8 mm thick for sizes HB16 and HB20.

Table 5.3 Nominal values of installation torque

Designation	Torque (Nm)
HB08 and HBST08	23
HB10 and HBST10	45
HB12 and HBST12	80
HB16 and HBST16	190
HB20 and HBST20	300

Annex 6: Hollo-Bolt (with button head screw)

A.6.1 Materials Dimensions and Properties of Fastener Components

Hollo-Bolt structural bolting assemblies - alternative set screws

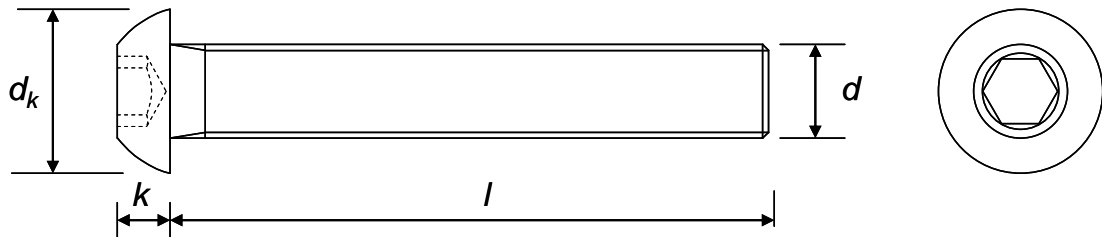


Figure 6.1 Hexagon socket button head screw

Note: In addition, 'security head' screws are produced to the same dimensions but with a different shape of socket in the head.

Table 6.1 Material specification and reference standards

	Steel	Stainless steel
Designation	HBBH (with hexagon socket) HBFT or HBPR (with security socket)	(not applicable)
Hexagon socket button head screw	Property class 10.9, EN ISO 7380:2004	
Button head security screw	Property class 10.9, EN ISO 7380:2004	
Coating of screw	Electrodeposited coating, EN ISO 2081 + JS500 (see technical documentation) or sherardizing to BS 4921:1988, class 1 + sheraplex coating	

Table 6.2 Dimensions

				M8	M10	M12
Nominal diameter		<i>d</i>	mm	8	10	12
Length of screw	Size 1	<i>l</i>	mm	50	55	60
	Size 2	<i>l</i>	mm	70	75	90
	Size 3	<i>l</i>	mm	90	90	110

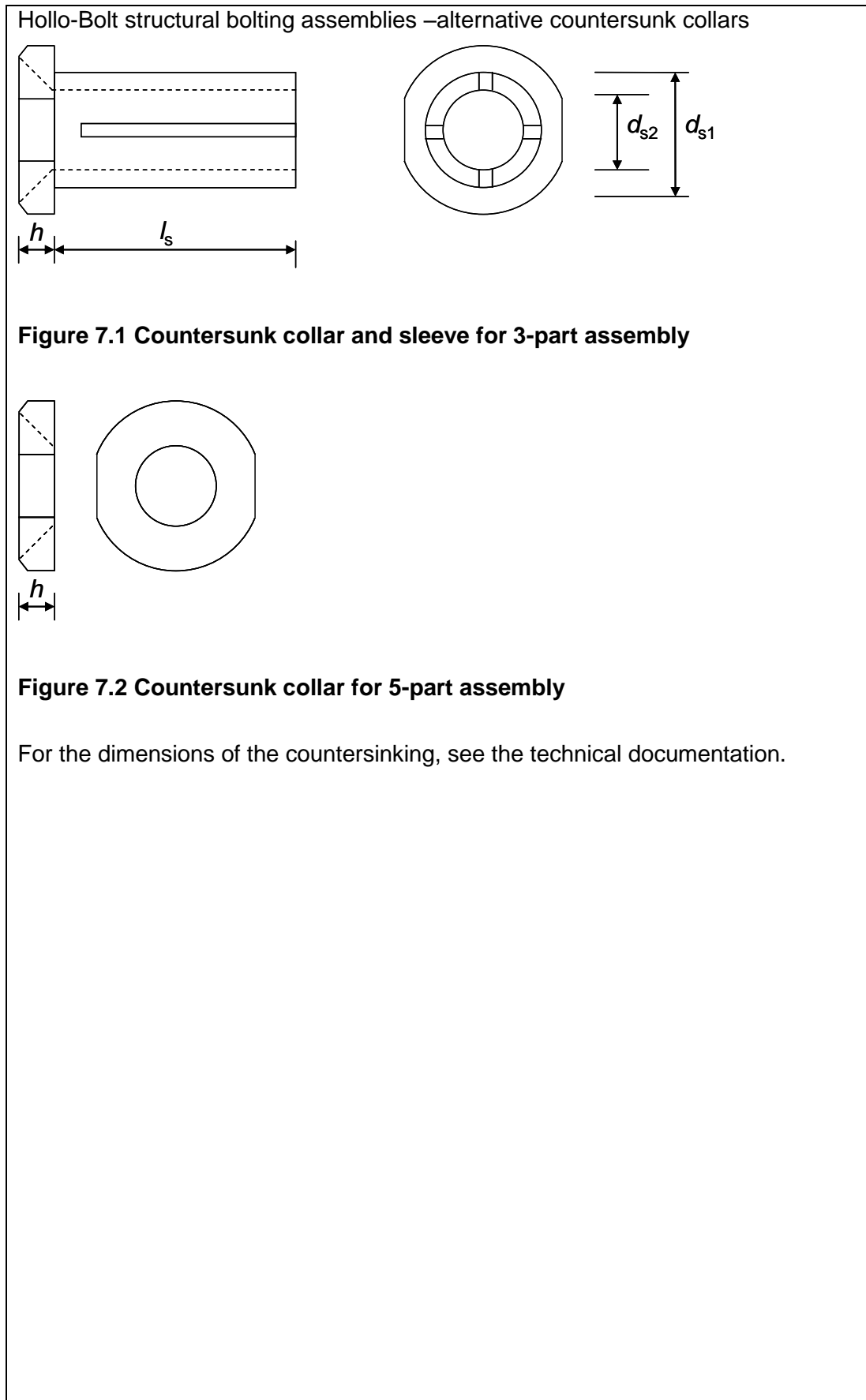
For thread dimensions and tolerances, see EN ISO 4017 (steel assemblies).

The material specifications and dimensions of the conical nut, sleeve and washer used with the button head screw are the same as those for the hexagon head assembly.

Characteristic values of assemblies with button head screws

The characteristic values, limiting hole sizes and minimum installation torque values are all the same as for the Hollo-Bolts with hexagon heads.

A.7.1 Dimensions of Sleeve and Collar



Annex 8: Hollo-Bolt (alternative countersunk collar)

A.8.1 Materials, Dimensions and Properties of Fastener Components

Hollo-Bolt structural bolting assemblies –alternative countersunk collars

Table 8.1 Material specification and reference standards

	Steel	Stainless steel
Designation	HBCSK	HBSTCSK
Sleeve with integral collar, separate collar	Free cutting carbon steel, type 11SMn30, EN 10087:1999 or 11SMnPb30, EN 10087:1999 with a minimum tensile strength of 430 N/mm ² or Cold drawn steel AISI 1012, grade C10B21 (minimum tensile strength 470 N/mm ² according to standard)	Austenitic stainless steel, number, 1.4404, EN 10088-3:2005 (minimum tensile strength 500 N/mm ² according to Standard)
Countersunk head screw	Property class 10.9, EN ISO 10642	Austenitic grade A4, property class 70, EN ISO 3506 Dimensions in accordance with EN ISO 10642
Coating (of cone, sleeve, collar and screw)	Electrodeposited coating, EN ISO 2081 + JS500 (see technical documentation) or sherardizing to BS 4921:1988, class 1 + sheraplex coating	(not applicable)

Table 8.2 Dimensions of countersunk screws

			M8	M10	M12	M16
Nominal diameter		<i>d</i> mm	8	10	12	16
Length of screw	Size 1	<i>l</i> mm	50	50	55	70
	Size 2	<i>l</i> mm	70	70	80	100
	Size 3	<i>l</i> mm	90	90	100	120

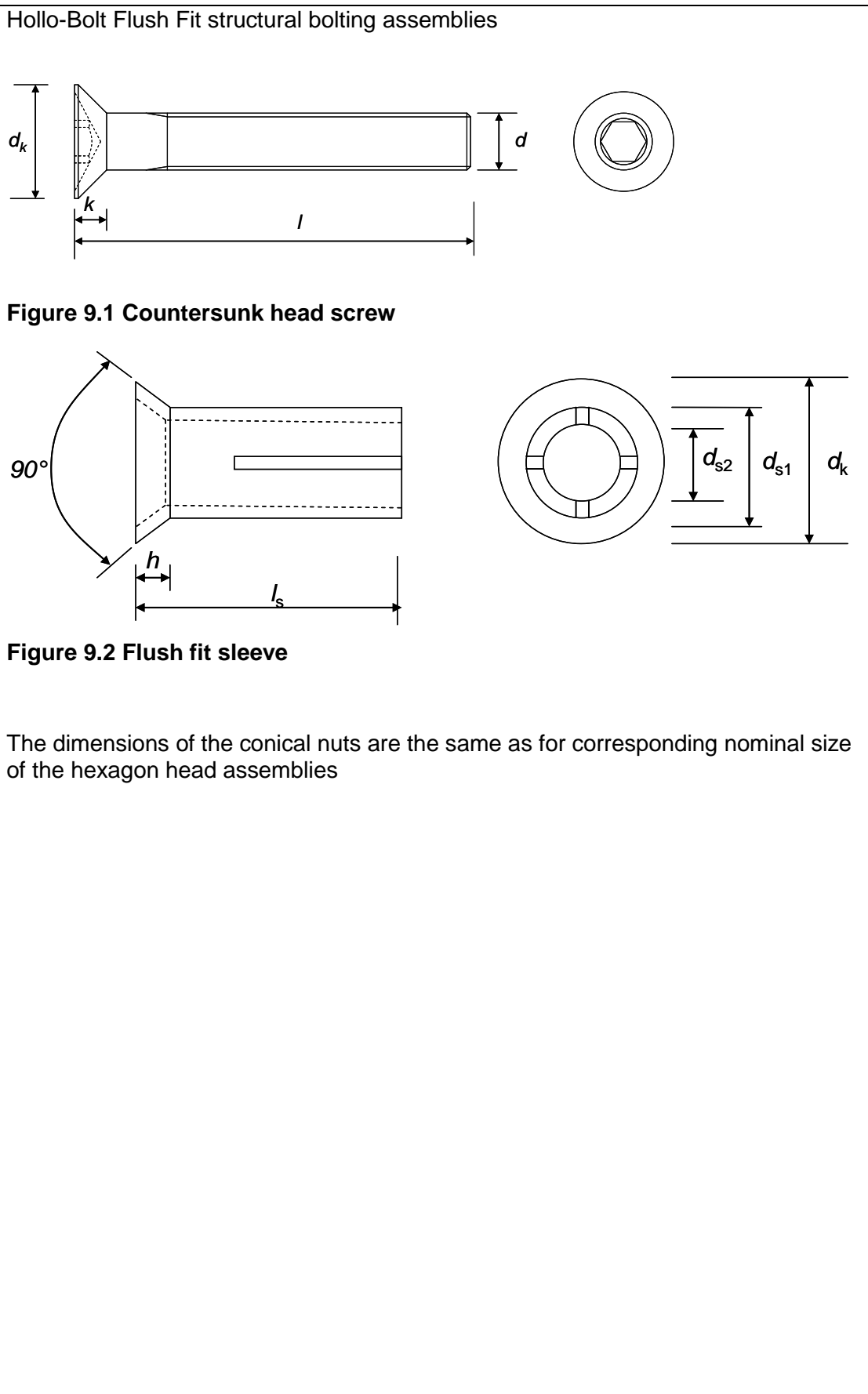
For thread dimensions and tolerances, see EN ISO 4017 (steel assemblies) or EN ISO 3506 (stainless steel assemblies).

The dimensions of the conical nut, sleeve, collar and washer (for the 5-part assembly) are the same as those for the hexagon head assembly.

Characteristic values of assemblies with countersunk collars

The characteristic values, limiting hole sizes and minimum installation torque values are all the same as for the Hollo-Bolts with hexagon heads.

A.9.1 Dimensions of Fastener Components



15.1 Annex 10: Hollo-Bolt Flush Fit

A.10.1 Materials and Dimensions of Fastener Components

Table 10.1 Material specification and reference standards

	Steel	Stainless steel
Designation	HBFF	HBSTFF
Countersunk head screw	Property class 10.9, EN ISO 10642	Austenitic grade A4, property class 70, EN ISO 3506 Dimensions in accordance with EN ISO 10642
Conical nut	Free cutting carbon steel, type 11SMn30, EN 10087:1999 or 11SMnPb30, EN 10087:1999 with a minimum tensile strength of 430 N/mm ²	Austenitic stainless steel, number, 1.4404, EN 10088-3:2005 (minimum tensile strength 500 N/mm ² according to Standard)
Flush fit sleeve	Free cutting carbon steel, type 11SMn30, EN 10087:1999 or 11SMnPb30, EN 10087:1999 with a minimum tensile strength of 430 N/mm ² or Cold drawn steel AISI C10B21 (minimum tensile strength 470 N/mm ² according to Standard)	Austenitic stainless steel, number, 1.4404, EN 10088-3:2005 (minimum tensile strength 500 N/mm ² according to Standard)
Coating (of nut, sleeve, collar and screw)	Electrodeposited coating, EN ISO 2081 + JS500 (see technical documentation) or sherardizing to BS 4921:1988, class 1 + sheraplex coating	(not applicable)

Table 10.2 Dimensions

			M8	M10	M12
Nominal diameter	<i>d</i>	mm	8	10	12
Max dia of cone	<i>d_c</i>	mm	13	17.46	19.05
Outer dia of sleeve	<i>d_{s1}</i>	mm	13.75	17.75	19.75
Inner dia of sleeve	<i>d_{s2}</i>	mm	9	12	14
Outer dia of tapered portion	<i>d_k</i>	mm	23.7	29.6	32.7
Lengths					
Length of screw – Size 1	<i>l</i>	mm	50	50	55
Length of screw – Size 2	<i>l</i>	mm	70	70	80
Length of screw – Size 3	<i>l</i>	mm	90	90	100
Length of sleeve – Size 1	<i>l_s</i>	mm	35	36	42
Length of sleeve – Size 2	<i>l_s</i>	mm	54	54	64
Length of sleeve – Size 3	<i>l_s</i>	mm	73	73	86
Length of tapered portion	<i>h</i>	mm	5	6	7

For thread dimensions and tolerances, see EN ISO 4017 (steel assemblies) or EN ISO 3506 (stainless steel assemblies).

For other dimensions and tolerances, see technical documentation

16 Annex 11: Holo-Bolt Flush Fit

A.11.1 Characteristic Values and Limiting Values

Table 11.1 Characteristic values of tensile and shear resistances

Designation	Nominal size	Tensile resistance $F_{t,Rk}$ (kN)	Shear resistance $F_{v,Rk}$ (kN)	Material strength of sleeve (N/mm ²)
HBFF08	M8	23.1	32.9	430
HBFF10	M10	39.6	54.2	430
HBFF12	M12	45.8	71.0	430
HBSTFF08	M8	26.8	30.7	500
HBSTFF10	M10	46.0	51.0	500
HBSTFF12	M12	53.3	65.0	500

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 11.2 Limiting values of hole size and grip

Designation	Nominal size	Hole diameter (mm)		Clamped length (mm)					
		min	max	Size 1		Size 2		Size 3	
HBFF08 and HBSTFF08	M8	13.8	15.0	10	27	27	45	45	64
HBFF10 and HBSTFF10	M10	17.8	19.0	12	27	27	45	45	64
HBFF12 and HBSTFF12	M12	19.8	21.0	12	30	30	52	52	74

In addition, the outer ply (i.e. the ply directly under the collar) must be at least 8 mm thick for M8 size and 10 mm for M10 and M12 sizes.

Table 11.3 Nominal values of installation torque

Designation	Torque (Nm)
HBFF08 and HBSTFF08	23
HBFF10 and HBSTFF10	45
HBFF12 and HBSTFF12	80