Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-22/6559 of 23/02/2023
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	Hilti Powder-actuated fastener X-U16 S12
Product family to which the construction product belongs:	Powder actuated fastener
Manufacturer:	Hilti AG Feldkircherstraße 100 9494 Schaan LIECHTENSTEIN
Manufacturing plant(s):	Hilti Plant 1 Feldkircherstraße 100 9494 Schaan LIECHTENSTEIN
This UK Technical Assessment contains:	12 pages including 3 Annexes which form an integral part of this assessment
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	UKAD 330153-00-0602 “Cartridge fired pin for connections of thin gauge steel members and sheeting”

1. Technical description of the product

The powder-actuated fastener[1] X-U16 S12, made of carbon steel, is driven through the structural steel component to be fastened (sheeting) in the steel base material by using the powder actuated fastening tool DX 462, and a cartridge 6.8/11M Black as propellant charge. The anchorage of the fastener in the base material is carried out by cold welding, clamping and mechanical interlock.

The product description is given in Annexes A1 and A2.

[1] Both terms (cartridge fired pin and powder-actuated fastener) are commonly used

2. Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

The performances given in Section 3 are only valid if the fastener is used in compliance with the specifications and conditions given in Annexes B1 to B4.

The verifications and assessment methods on which this UK Technical Assessment is based lead to the assumption of a working life of the fastener of at least 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3. Performance of the product and references to the methods used for its assessment

3.1. Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Tension resistance of connection	See Annex C1
Shear resistance of connection	See Annex C1
Design resistance in case of combined tension and shear forces (interaction)	No performance assessed
Check of deformation capacity in case of constraining forces due to temperature	See Annex B1
Determination and check of application limits	See Annex B3

3.2. Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	No performance assessed
Resistance to fire	See Annex C1

3.3. Health, hygiene and the environment (BWR 3)

Essential characteristic	Performance
Content and/or release of dangerous substances	No performance assessed

3.4. Safety and accessibility in use (BWR 4)

Please refer to BWR 1

3.5. Protection against noise (BWR 5)

Not relevant.

3.6. Energy economy and heat retention (BWR 6)

Not relevant.

3.7. Sustainable use of natural resources (BWR 7)

Essential characteristic	Performance
Durability	No performance assessed

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied

4.1. System of assessment and verification of constancy of performance

According to UKAD No. 330153-00-0602 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011) as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 2+ applies.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable UKAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1. UKCA marking for the product/ system must contain the following information:

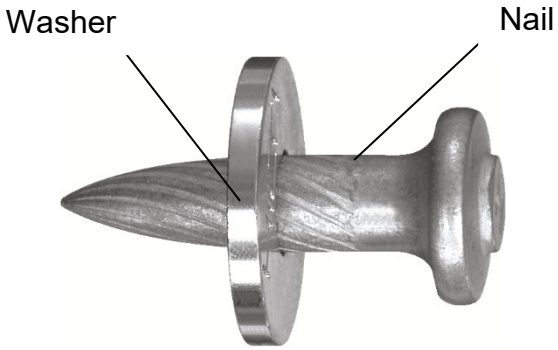
- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of certificate of constancy of performance (where applicable)
- UKTA number.

On behalf of the British Board of Agrément 	
Date of Issue: 23 February 2023	**Hardy Giesler** Chief Executive Officer

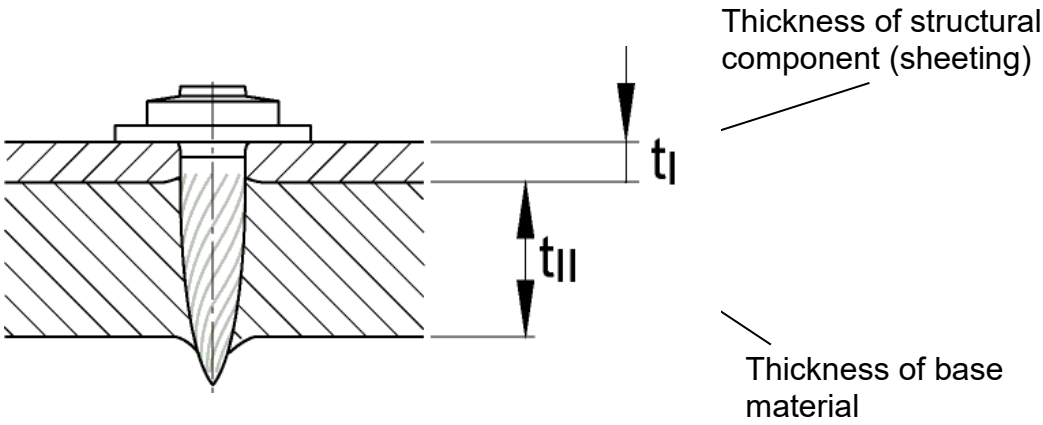
British Board of Agrément,
1st Floor Building 3,
Hatters Lane,
Croxley Park
Watford
WD18 8YG

ANNEX A1
Product description / Product and installation conditions

Powder-actuated fastener X-U16 S12



Installation condition



ANNEX A2
Product description / Dimension, identification and materials

X-U16 S12

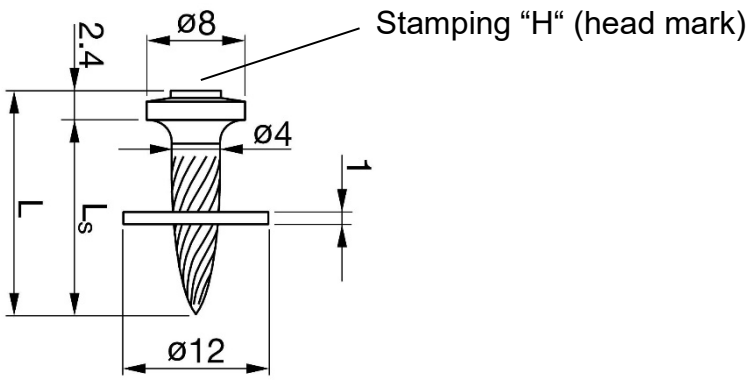


Table 1: Dimensions and materials

Powder-actuated fastener	**X-U16 S12**	
Shank length L_S	[mm]	16.0
Total length L	[mm]	18.4
Shank diameter	[mm]	4.0
Head diameter	[mm]	8.0
Washer diameter	[mm]	12.0
Washer thickness	[mm]	1.0
Material of nail	[-]	Steel C67 quenched, tempered and galvanized
Material of steel washer	[-]	Steel DC01 galvanized

ANNEX B1
Intended use / Specification of intended use

The fasteners are intended to be used for fastening of steel sheeting to steel members. The sheeting can either be used as cladding or as load bearing wall and roof element.

Anchorages subject to:

- Predominantly static and quasi-static loads.

Fixed material sheeting (flat products and therewith produced profiled products):

- Structural steel S235, S275 and S355 in qualities JR, JO, J2, K2 according to EN 10025-2.
- Steel flat products S280GD, S320GD, S350GD, S390GD and S550GD according to EN 10346.
- For thickness see Table 2.

Base materials:

- Structural steel S235, S275 and S355 in qualities JR, JO, J2, K2 according to EN 10025-2.
- For thickness see Table 2.

Use conditions (Environmental conditions):

- The intended use only comprises fasteners and connections which are not directly exposed to external weather conditions or moist atmospheres.

Design:

- The verification concept stated in EN 1990:2002 +A1:2005 + A1:2005/AC:2010 is used for the design of the connection made with the fasteners. The characteristic values (shear and tension resistance) according to Annex C1 and Annex C2 are used for the design of the entire connection.
- The partial safety factor of $\gamma_M = 1.25$ is used in order to determine the corresponding design resistance, provided no values are given in national regulations of the member state in which the fastener is used or in the respective National Annex to Eurocode 3.
- In case of combined tension and shear forces the linear interaction formula according to EN 1993-1-3:2006 + AC:2009, is taken into account.
- The possibly required reduction of the tension resistance due to the position of the fastener is taken into account in accordance with EN 1993-1-3:2006 + AC:2009, section 8.3 (7).
- For the type of connection listed in Annex B2 it is not necessary to take into account the effect of constraints due to temperature.

Installation:

- The installation is only carried out according to the manufacturer’s instructions.
- The steel sheeting is in direct contact with the steel base material in the area of the connection.
- Cartridge selection and tool energy settings in order to match the application limit diagram are taken into account, see Annex B3.
- Installation tests are carried out (e.g. check of nail head standoff h_{NVS}), provided the fitness of the recommended cartridge cannot be checked otherwise

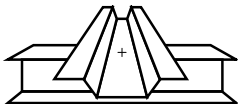
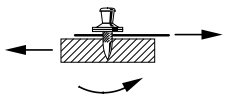
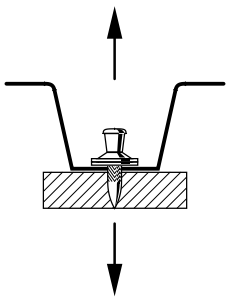
ANNEX B2
Intended use / Steel strength classes, installation parameters and types of connection

Table 2: Steel grades and installation parameters

Powder-actuated fastener		**X-U16 S12**
Minimum steel grade for sheeting	[-]	S235, S280GD
Minimum steel grade for base material	[-]	S235
Maximum steel grade for sheeting $t_I \leq$ 1.25 mm	[-]	S355, S550GD
Maximum steel grade for sheeting $t_I >$ 1.25 mm	[-]	S235, S350GD
Thickness of fastened steel sheeting t_I	[-]	0.75 mm ≤ t_I ≤ 1.50 mm
Nail head standoff h_{NVS} according to Annex C1	[mm]	4 – 5.5
Thickness of base material t_{II}*)	[mm]	t_{II} ≥ 6 mm for t_I ≤ 1.25 mm t_{II} ≥ 8 mm for 1.25 mm < t_I ≤ 1.50 mm

*) The application limits according to the Application limit diagram in Annex B3 must be taken into account additionally

Table 3: Type of connection and corresponding loading conditions

	Type of connection
	Type a
	
Type of loading	Single connection
Shear loading	
Tension loading	

ANNEX B3
Intended use / Powder-actuated fastening tool, cartridge selection and application limit

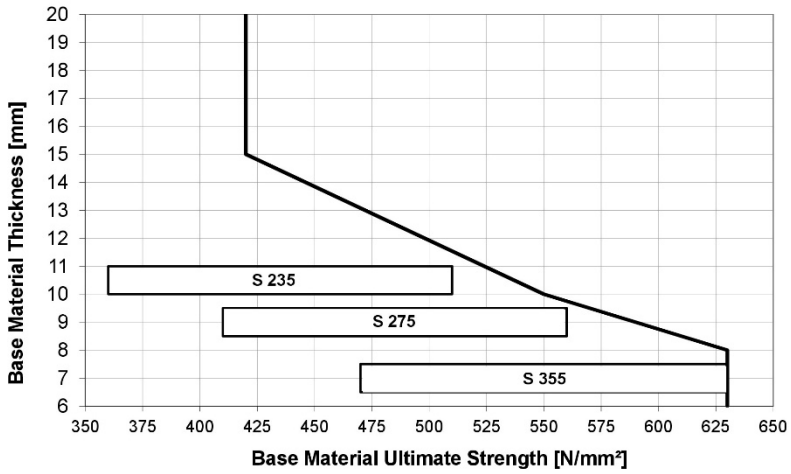
Powder-actuated fastening tool DX 462 with 12 mm fastener guide and cartridge 6.8/11M

Piston: X-462-P8, Fastener Guide: X-462-F8S12

Wheel on tool allowing regulation of the driving energy:

Setting 1: Minimum energy
Setting 4: Maximum energy

Black: Extra high load (level 7)
S235 – S355: Black

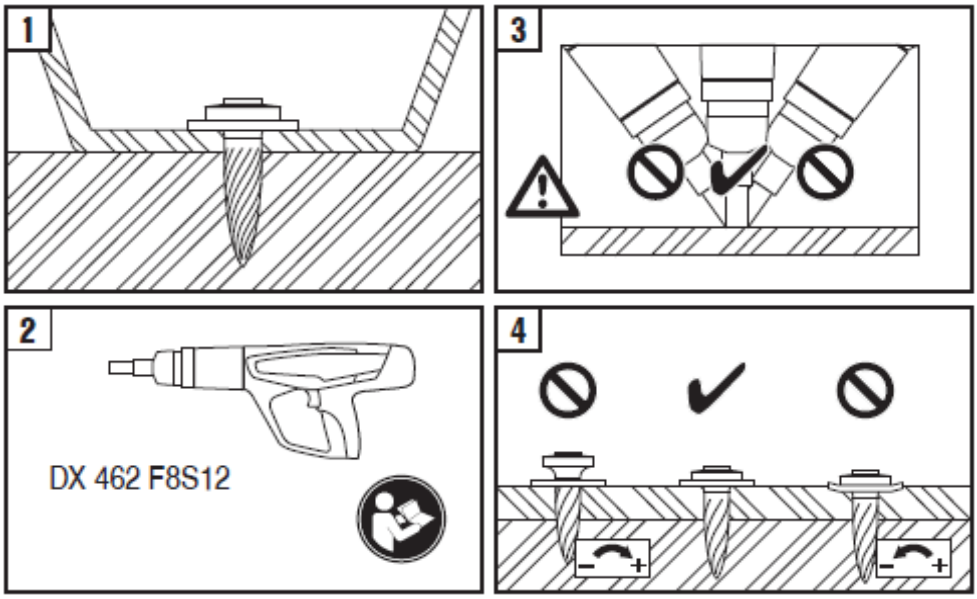
Application limit diagram:	**Tool energy setting:**
	The powder-actuated fasteners are to be driven flush. After installation the nail head standoff h_{NVS} must meet the values given in Annex C1. The driving energy is adjusted at the fastening tool by means of trial installations. 1 … for thin low strength base material 4 … along the upper application limit curve

ANNEX B4
Intended use / Powder-actuated fastener X-U16 S12

Instructions for use

- The powder-actuated fastener is driven by using the powder-actuated fastening tool DX 462 according to Annex B3 and a black cartridge 6.8/11M as propellant charge.
- The driving energy shall be determined by fine regulation at test settings according to Annex B3 – in relation to the characteristics of steel (e.g. steel strength, steel thickness). A control by measuring the fastener nail head standoff shall be done according to Annex C1.
- The powder-actuated fastener is properly set if the metal sheet tightened against the steel surface and the nail head standoff h_{NVS} is met.
- Powder-actuated fasteners which don't meet the required nail head standoff must not be loaded.

X-U16 S12



ANNEX C1
Performance / Characteristic and design values, fastener inspection, resistance to fire

Table 4: Characteristic shear resistance V_{Rk} and tension resistance N_{Rk}

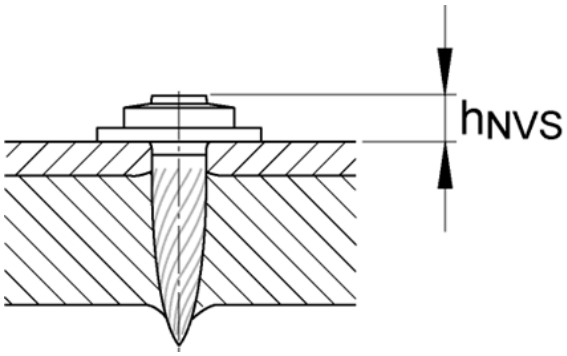
sheeting thickness t_I [mm]	Shear V_{Rk} [kN]	Tension N_{Rk} [kN]	Types of connection
0.75	2.4	2.8	a
1.00	3.6	3.6	a
1.25	5.2	4.4	a
1.50	5.2	4.4	a

Table 5: Design shear resistance V_{Rd} and tension resistance N_{Rd}

$V_{Rd} = V_{Rk} / \gamma_M$ γ_M = 1.25 in the absence of national regulations	$N_{Rd} = \alpha_{cycl} N_{Rk} / \gamma_M$ $\alpha_{cycl} = 1.0$ α_{cycl} considers the effect of repeated wind loads α_{cycl} = 1.0 for all sheeting thickness t_I γ_M = 1.25 in the absence of national regulations

Fastener inspection – nail head standoff h_{NVS}

X-U16 S12



Fastener driven flush

h_{NVS} = 4.0 to 5.5 mm

Resistance to fire

The part of the structure in which the powder-actuated fasteners X-U16 S12 are intended to be installed shall be tested, using the test method relevant for the corresponding fire resistance class, in order to be classified according to the appropriate part of EN 13501

British Board of Agrément,
1st Floor Building 3,
Hatters Lane,
Croxley Park
Watford
WD18 8YG