

European Technical Assessment

ETA-20/1168
 of 15/12/2020

General Part

Technical Assessment Body Issuing the European Technical Assessment:	Element Materials Technology Rotterdam B.V.
Trade Name of the Construction Product:	Powell Gee Self Drilling Screws
Product Family to Which the Construction Product Belongs:	EC PAC 33
Manufacturer:	Powell Gee & Co Ltd Rigby Street Wednesbury West Midlands WS10 0NP
Manufacturing Plant(s):	Powell Gee & Co Ltd Rigby Street Wednesbury West Midlands WS10 0NP
This European Technical Assessment Contains:	17 Pages including 1 Annex which forms 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 330046-01-0602 – “Fastening Screws for Metal Members and Sheeting”
This Version Replaces:	ETA 16/0844, Issued on 31/10/2016

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.
Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

1 Technical Description of the Product

The Powell Gee Light Section and Heavy Section fastening screws are self-drilling screws manufactured of carbon steel or stainless steel and completed with galvanised washers. The pre-hardened carbon steel screws are coated by a dip/spin bake process which gives a 500 hour salt spray test coating, giving the screws a scratch resistant coating without the Cr6 toxicity present in normal galvanising/electro plating processes.

The materials used for the fasteners are:

- Hardened SAE 1022 carbon steel with a minimum tensile strength of 14.1 kN for a 5.5 mm diameter fastener. Denoted CS in this document.
- A2 (304) austenitic stainless steel with a minimum tensile strength of 10.4 kN for a 5.5 mm diameter fastener. Stainless steel fasteners have a welded carbon steel tip. Denoted SS in this document.

Table 1: Characteristics of Self-drilling Self-tapping Fasteners

Characteristic	Values
Fastener material codes	CS: carbon steel SS: stainless steel
Fastener diameter	5.5 mm
Point-side substrate thickness codes	LS: light section 1.2 – 3.5 mm – coarse pitch thread HS: heavy section 4 – 12.5 mm – fine pitch thread
Fastener lengths	20 - 80 mm for light section substrates 32 – 115 mm for heavy section substrates
Fastener head types	All fasteners have a 5/16" (~8 mm) Hex head with a 1/2" (12.3 mm) diameter lip. They may have an additional plastic cap. Heads are not intended to be used without washers
Washer types	Conical washers of galvanised or stainless steel with an EPDM (ethylene propylene diene monomer) seal bonded to the inner face
Washer diameter codes	16, 19 or 29 (for 16, 19 or 29 mm diameter)
Washer material codes	W – galvanised steel S – stainless steel

Table 2: Codes and Nominal Sizes of Fasteners

Light Section / Carbon Steel		Light Section / Stainless Steel		Heavy Section / Carbon Steel		Heavy Section / Stainless Steel	
Code	Nominal length (mm)	Code	Nominal length (mm)	Code	Nominal length (mm)	Code	Nominal length (mm)
20.2	20			22.4	22	40.5SS	40
25.2	25	25.2SS	25	32.5	32	50.5SS	50
32.2	32	28.2SS	28	38.5	38	62.5SS	62
38.2	38	38.2SS	38	51.5	51	80.5SS	80
50.2	50	50.2SS	50	67.5	67	100.5SS	100
70.2	70	60.2SS	60	76.5	76		
82.2	82	80.2SS	80	100.5	100		

All fasteners have a nominal diameter of 5.5 mm
Code example: a 20.2 fastener has a 20 mm nominal length from flange to tip, with a type 2 drilling tip

Annex 1 provides details of the products' specifications and example of connections made with the fastening screws covered in this ETA are shown in Annex 2.

The fastening screws used to connect metal members and sheeting are subject to shear and tension forces acting on the connections.

2 Specification of the Intended Use(s) in Accordance with the Applicable European Assessment Document (hereinafter EAD)

The screws in this assessment are intended to be used for connecting steel sheeting elements to steel framing members. Examples of connections are shown in Annex 1.

The component to be fastened (head-side) is referred to as substrate I, while the framing member (point-side) is referred to as substrate II. The screws may be used for indoor and outdoor applications with a corrosion category class C1 up to C3 in accordance with EN ISO 12944-2. The use of stainless-steel screws is advised for class C3.

The fastening screws are intended to be used with connections under predominantly static loads, such as wind and dead loads.

Under the provisions of this ETA and the assessment methods carried out in the corresponding evaluation report, the fastening screws may have an assumed intended working life of 25 years when installed in accordance with the manufacturer's instructions.

The indications given in this document cannot be interpreted as a guarantee given by the manufacturer, but are regarded as means for choosing the appropriate 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

BWR	Characteristic	Assessment of Characteristic
1	Mechanical Resistance and Stability	See ETA Section 3.1.1
2	Safety in Case of Fire	See ETA Section 3.1.2
	Reaction to Fire	See ETA Section 3.1.2.1
	Fire Resistance	See ETA Section 3.1.2.2

3.1 Methods of Verification

3.1.1 Mechanical Resistance and Stability

The mechanical resistance and stability has been determined as the characteristic shear and axial resistance of the fastening screws covered by this ETA. Values are given in Annex 1.

The axial resistance $N_{R,k}$ is taken as the minimum of the pull through and pull out resistances for the connection.

$$N_{R,k} = \min \begin{cases} N_{R,k, \text{Pull through}} \\ N_{R,k, \text{Pull out}} \end{cases}$$

Derivation of design resistance values to be used when designing in accordance with Eurocode 3 shall be taken as described in 3.2.2.

3.1.2 Safety in case of Fire

3.1.2.1 Reaction to Fire

The product is considered to satisfy the requirements of Class A1 with regards to classification for reaction to fire, in accordance with the provisions of the EC Decision 96/603/EC (as amended) without the need for further testing.

3.1.2.2 Fire Resistance

The assessment of the fastening screws with regards to resistance to fire performance is relevant to the systems as assembled (as fastening screws, steel members and substructures) and not the screws in their own right. Therefore, there is no performance determined for this aspect.

3.2 General Aspects Related to the Performance of the Product

3.2.1 Manufacturing

The Powell Gee Light Section and Heavy Section fastening screws are manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing process assessed and detailed in the technical documentation.

The European Technical Assessment is issued for the products covered on the basis of agreed data/information that has been deposited with Element Materials Technology Rotterdam B.V. and which identifies the products that have been assessed and judged.

Changes to the products or the manufacturing process, that may result in the information submitted and held on file being incorrect, should be confirmed with

Element Materials Technology Rotterdam B.V. before any modifications are implemented.

Element Materials Technology Rotterdam B.V. will decide on that basis whether or not such changes may affect the performance characteristics detailed in the ETAs and consequently the validity of the CE-marking. In that case additional assessment or modifications to the ETA and the corresponding evaluation report may be necessary.

3.2.2 Design of Connections Using the Product

The Light Section and Heavy section fastening screws are designed for use in service class 2 or 3 of EC5, thus being partly or fully exposed to external weather. They can be used in environmental conditions that fall under category C3 in accordance with EN ISO12944-2. The use of stainless-steel screws is advised for class C3.

For connections made with steel members and as described in the Annexes of this ETA it is not required to consider and evaluate the limitations of the connections with regards to temperature effects. For other types of connections, the effect of temperature shall be considered for design purposes as long as the effect on the connections is not significant. Other types of connections affected by temperature are not covered by this ETA.

The characteristic capacities declared in this ETA are based on the dimensions, material properties, minimum effective length (minimum screw-in length in substrates) and nominal substrates thicknesses provided by the manufacturer and as stated in the ETA and its corresponding Annexes.

In order to verify the design of connections made with the fastening screws listed in this ETA, the method given in EN 1990 is used to derive the design capacities based on the characteristic performance capacities stated the Annexes of this document.

Therefore, the design capacities to be used when designing in accordance with EN 1993-1-3 shall be derived using the following formulas:

Design shear resistance

$$V_{R,d} = \frac{V_{R,k}}{\gamma_M}$$

Design axial resistance

$$N_{R,d} = \frac{N_{R,k}}{\gamma_M}$$

Where $\gamma_M = 1.33$ where no other values are given in national regulations.

Where combined tension and shear forces occur within the connection, the interaction equation of EN1993-1-3, section 8.3 (8) must be verified, as follows:

$$\frac{N_{Sd}}{N_{Rd}} + \frac{V_{Sd}}{V_{Rd}} \leq 1.0$$

Where $N_{S,d}$ and $V_{S,d}$ are the engineering design values for normal and shear forces respectively and $N_{R,d}$ and $V_{R,d}$ are the design resistance values in the connections for normal and shear forces respectively.

3.2.3 Installation

The fitness of the fastener assembly for the intended use is given under the conditions that installation complies with the manufacturer's instructions which shall be made available to the installers.

In particular the faces of the components to be fastened together shall be brought into contact before the assembly is tightened and the tightening torque shall be sufficient to slightly compress the EPDM bonded seal.

When the installation instructions are followed, no bi-metallic corrosion should occur.

For connections where only shear forces occur, the substrates I and II are directly connected to each other and so the fasteners do not incur additional bending forces. The fastening screws are connected perpendicular to the surface of the connection elements which provides an accurate load-bearing of the connection.

The installer shall fix the fastening screws Light Section and Heavy Section in accordance with the provisions of this ETA.

3.2.3.1 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 Assessment.

In addition all data for installation and intended use shall be shown clearly on the package and/or on an enclosed instruction sheet. Design of Connections Using the Product

3.2.4 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.

3.2.5 Use, Maintenance and 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 repair of the installation prove necessary, fasteners 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 1998/214/EC of the European Commission, as amended, 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 Provided for 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 Powell Gee and Co. Ltd 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 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. 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

A handwritten signature in black ink, appearing to read 'Niresh D Somlie', with a horizontal line underneath.

Niresh D Somlie

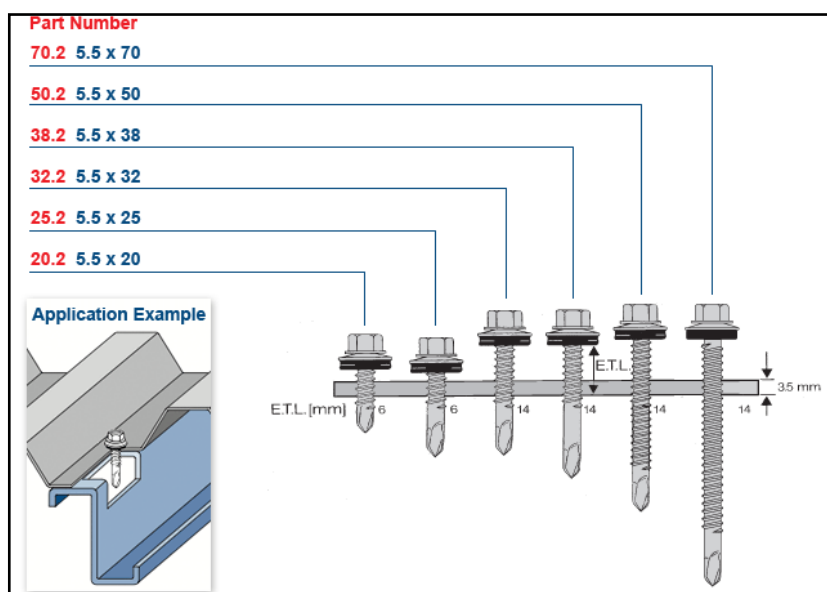
Technical Assessment Body Manager

Annex 1: Product Description and Application

A.1.1: Carbon Steel Fastening Screws for Light Section Framing

Table A1.1.1: Product Description

Characteristic	Values
Intended use	For fastening lightweight steel sheeting as roofing or cladding to light steel framing members, typically of cold rolled profile.
Fastener type	Self drilling, self tapping fastener for permanent installations
Fastener material	Hardened SAE 1022 carbon steel with a minimum tensile strength of 14.1 kN for a 5.5 mm diameter fastener.
Fastener diameter	5.5 mm
Fastener thread	Coarse pitch thread. Pitch of 1.81 mm
Point-side substrate thickness	Suitable for light section framing of 1.2 – 3.5 mm
Fastener lengths	20 - 70 mm from head flange to tip
Fastener head types	All fasteners have a 5/16" (~8 mm) Hex head with a 1/2" (12.3 mm) diameter flange. They may have an additional plastic cap. Heads are not intended to be used without washers
Washer type	Conical washer of galvanised steel with an EPDM (ethylene propylene diene monomer) seal bonded to the inner face
Washer diameters	16, 19 or 29 (for 16, 19 or 29 mm diameter)
Head side substrate I specification	Cold Rolled Profile (CRP) for roofing. Minimum steel specification S250GD with Z45 galvanized coating.
Point side substrate II specification	Cold Rolled Profile (CRP) for framing. Minimum steel specification S250GD with Z45 galvanized coating.



ETL: Effective threaded length

Code example – 20.2 means 20 mm length from flange to tip with point type 2.

Table A1.1.2: Characteristic Values for Shear $V_{R,k}$ and Axial $N_{R,k}$ Resistance of Connections

	Minimum sheeting thickness $t_{N,I}$ (mm)	Washer type and diameter	Framing member thickness $t_{N,II}$ (mm)			
			≥ 1.20	≥ 1.50	≥ 1.90	≥ 2.40
$V_{R,k}$	0.5	WS ≥ 16 mm	-	-	-	-
	0.7	WS ≥ 16 mm	1.96	2.21	2.21	2.21
$N_{R,k}$	0.5	WS ≥ 16 mm	1.71	1.98	1.98	1.98
	0.5	WS ≥ 19 mm	1.71	2.08	2.08	2.08
	0.7	WS ≥ 16 mm	1.71	2.86	3.05	3.05
	0.7	WS ≥ 19 mm	1.71	2.86	3.05	3.05

WS = galvanised conical washer with EPDM seal

Design values for shear and axial resistance have been derived from the characteristic values above as follows:

$$V_{R,d} = V_{R,k} / \gamma_M \text{ for shear resistance}$$

$$N_{R,d} = N_{R,k} / \gamma_M \text{ for axial resistance}$$

Where:

γ_M is the material specific partial factor. γ_M has been taken as 1.33. Other values may be applied by national regulation.

Table A1.1.3: Design Values for Shear $V_{R,d}$ and Axial $N_{R,d}$ Resistance of Connections

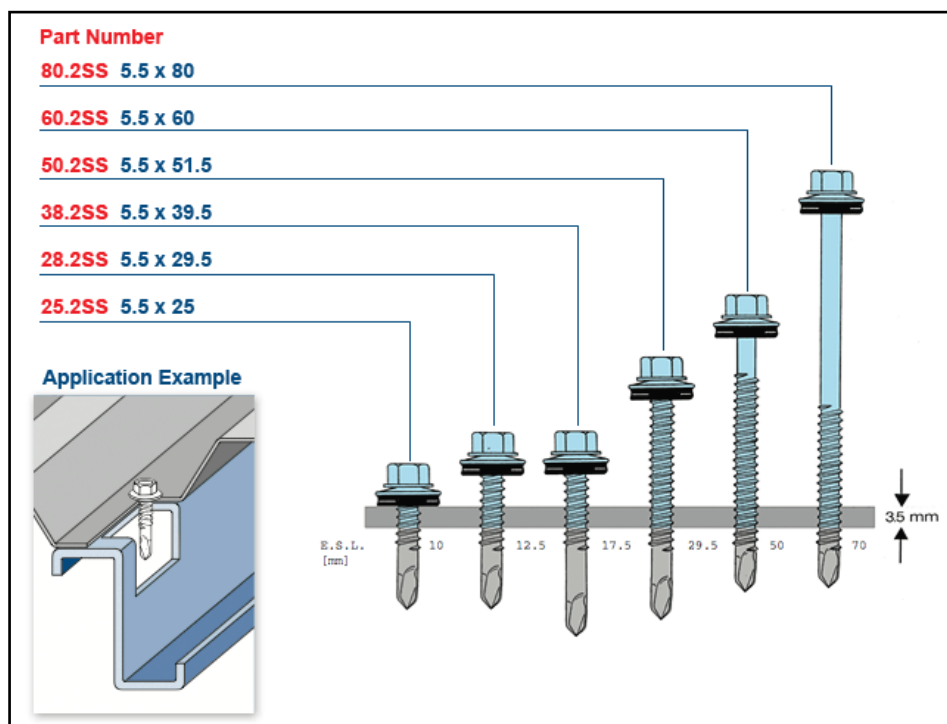
	Minimum sheeting thickness $t_{N,I}$ (mm)	Washer type and diameter	Framing member thickness $t_{N,II}$ (mm)			
			≥ 1.20	≥ 1.50	≥ 1.90	≥ 2.40
$V_{R,d}$	0.5	WS ≥ 16 mm	-	-	-	-
	0.7	WS ≥ 16 mm	1.47	1.66	1.66	1.66
$N_{R,d}$	0.5	WS ≥ 16 mm	1.29	1.49	1.49	1.49
	0.5	WS ≥ 19 mm	1.29	1.56	1.56	1.56
	0.7	WS ≥ 16 mm	1.29	2.15	2.30	2.30
	0.7	WS ≥ 19 mm	1.29	2.15	2.30	2.30

WS = galvanised conical washer with EPDM seal

A1.2: Stainless Steel Fastening Screws for Light Section Framing

Table A1.2.1: Product Description

Characteristic	Values
Intended use	For fastening lightweight steel sheeting as roofing or cladding to light steel framing members, typically of cold rolled profile.
Fastener type	Self drilling, self tapping fastener for permanent installations
Fastener material	A2 (304) austenitic stainless steel with a minimum tensile strength of 10.4 kN for a 5.5 mm diameter fastener. Stainless steel fasteners have a welded carbon steel tip.
Fastener diameter	5.5 mm
Fastener thread	Coarse pitch thread. Pitch of 1.80 mm
Point-side substrate thickness	Suitable for light section framing of 1.2 – 3.5 mm
Fastener lengths	25 - 80 mm from head flange to tip
Fastener head types	All fasteners have a 5/16" (~8 mm) Hex head with a 1/2" (12.3 mm) diameter flange. They may have an additional plastic cap. Heads are not intended to be used without washers
Washer type	Conical washer of stainless steel with an EPDM (ethylene propylene diene monomer) seal bonded to the inner face
Washer diameters	16, 19 or 29 (for 16, 19 or 29 mm diameter)
Head side substrate I specification	Cold Rolled Profile (CRP) for roofing. Minimum steel specification S250GD with Z45 galvanized coating.
Point side substrate II specification	Cold Rolled Profile (CRP) for framing. Minimum steel specification S250GD with Z45 galvanized coating.



ESL – effective stainless length. Hardened carbon steel tip

Code example – 25.2SS means 25 mm length from flange to tip with point type 2. SS is stainless steel.

Table A1.2.2: Characteristic Values for Shear $V_{R,k}$ and Axial $N_{R,k}$ Resistance of Connections

	Minimum sheeting thickness $t_{N,I}$ (mm)	Washer type and diameter	Framing member thickness $t_{N,II}$ (mm)			
			≥ 1.20	≥ 1.50	≥ 1.90	≥ 2.40
$V_{R,k}$	0.5	SS ≥ 16 mm	-	-	-	-
	0.7	SS ≥ 16 mm	1.96	2.21	2.21	2.21
$N_{R,k}$	0.5	SS ≥ 16 mm	1.42	1.98	1.98	1.98
	0.5	SS ≥ 19 mm	1.42	2.08	2.08	2.08
	0.7	SS ≥ 16 mm	1.42	2.59	3.05	3.05
	0.7	SS ≥ 19 mm	1.42	2.59	3.05	3.05

SS = stainless conical washer with EPDM seal

Design values for shear and axial resistance have been derived from the characteristic values above as follows:

$$V_{R,d} = V_{R,k} / \gamma_M \text{ for shear resistance}$$

$$N_{R,d} = N_{R,k} / \gamma_M \text{ for axial resistance}$$

Where:

γ_M is the material specific partial factor. γ_M has been taken as 1.33. Other values may be applied by national regulation.

Table A1.2.3: Design Values for Shear $V_{R,d}$ and Axial $N_{R,d}$ Resistance of Connections

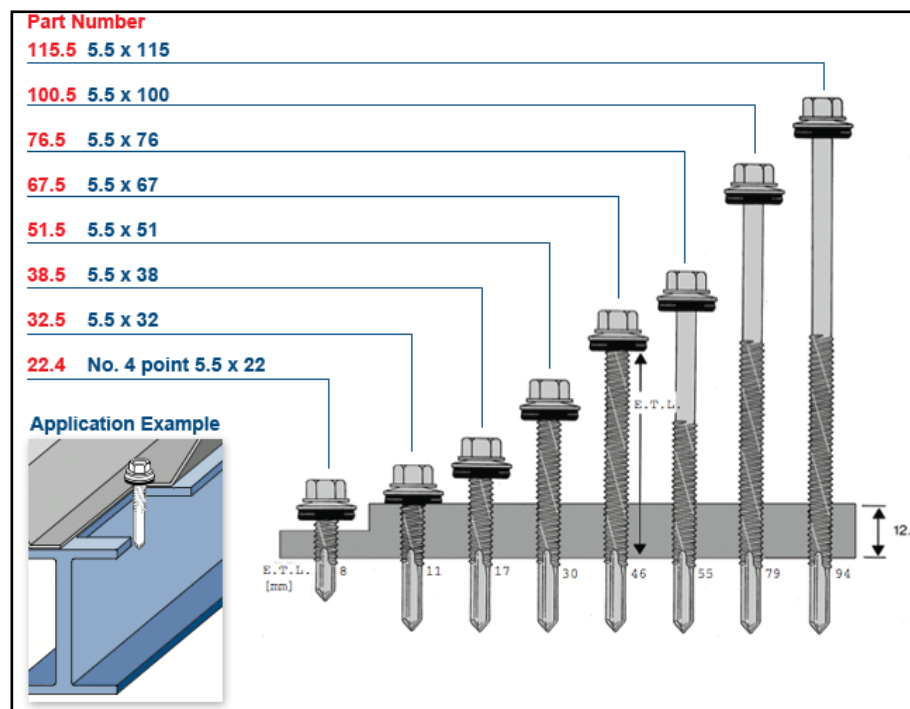
	Minimum sheeting thickness $t_{N,I}$ (mm)	Washer type and diameter	Framing member thickness $t_{N,II}$ (mm)			
			≥ 1.20	≥ 1.50	≥ 1.90	≥ 2.40
$V_{R,d}$	0.5	SS ≥ 16 mm	-	-	-	-
	0.7	SS ≥ 16 mm	1.47	1.66	1.66	1.66
$N_{R,d}$	0.5	SS ≥ 16 mm	1.07	1.49	1.49	1.49
	0.5	SS ≥ 19 mm	1.07	1.56	1.56	1.56
	0.7	SS ≥ 16 mm	1.07	1.95	2.30	2.30
	0.7	SS ≥ 19 mm	1.07	1.95	2.30	2.30

SS = stainless conical washer with EPDM seal

A1.3- Carbon Steel Fastening Screws for Heavy Section Framing

Table A1.3.1: Product Description

Characteristic	Values
Intended use	For fastening lightweight steel sheeting as roofing or cladding to heavy steel framing members, typically of hot rolled profile.
Fastener type	Self drilling, self tapping fastener for permanent installations
Fastener material	Hardened SAE 1022 carbon steel with a minimum tensile strength of 14.1 kN for a 5.5 mm diameter fastener.
Fastener diameter	5.5 mm
Fastener thread	Fine pitch thread. Pitch of 1.06 mm
Point-side substrate thickness	Suitable for heavy section framing of 4.0 – 12.5 mm
Fastener lengths	22 - 115 mm from head flange to tip
Fastener head types	All fasteners have a 5/16" (~8 mm) Hex head with a 1/2" (12.3 mm) diameter flange. They may have an additional plastic cap. Heads are not intended to be used without washers
Washer type	Conical washer of galvanised steel with an EPDM (ethylene propylene diene monomer) seal bonded to the inner face
Washer diameters	16, 19 or 29 (for 16, 19 or 29 mm diameter)
Head side substrate I specification	Cold Rolled Profile (CRP) for roofing. Minimum steel specification S250GD with Z45 galvanized coating.
Point side substrate II specification	Hot Rolled Profile (HRP). Minimum Steel specification S275JR.



ETL: Effective threaded length

Code example – 32.5 means 32 mm length from flange to tip with point type 5.

Table A1.3.2: Characteristic Values for Shear $V_{R,k}$ and Axial $N_{R,k}$ Resistance of Connections

	Minimum sheeting thickness $t_{N,I}$ (mm)	Washer type and diameter	Framing member thickness $t_{N,II}$ (mm)	
			≥ 4	≥ 8
$V_{R,k}$	0.5	WS ≥ 16 mm	-	-
	0.7	WS ≥ 16 mm	2.59	2.59
$N_{R,k}$	0.5	WS ≥ 16 mm	1.98	1.98
	0.5	WS ≥ 19 mm	2.08	2.08
	0.7	WS ≥ 16 mm	3.05	3.05
	0.7	WS ≥ 19 mm	3.05	3.05

WS = galvanised conical washer with EPDM seal

Design values for shear and axial resistance have been derived from the characteristic values above as follows:

$$V_{R,d} = V_{R,k} / \gamma_M \text{ for shear resistance}$$

$$N_{R,d} = N_{R,k} / \gamma_M \text{ for axial resistance}$$

Where:

γ_M is the material specific partial factor. γ_M has been taken as 1.33. Other values may be applied by national regulation.

Table A1.3.3: Design Values for Shear $V_{R,d}$ and Axial $N_{R,d}$ Resistance of Connections

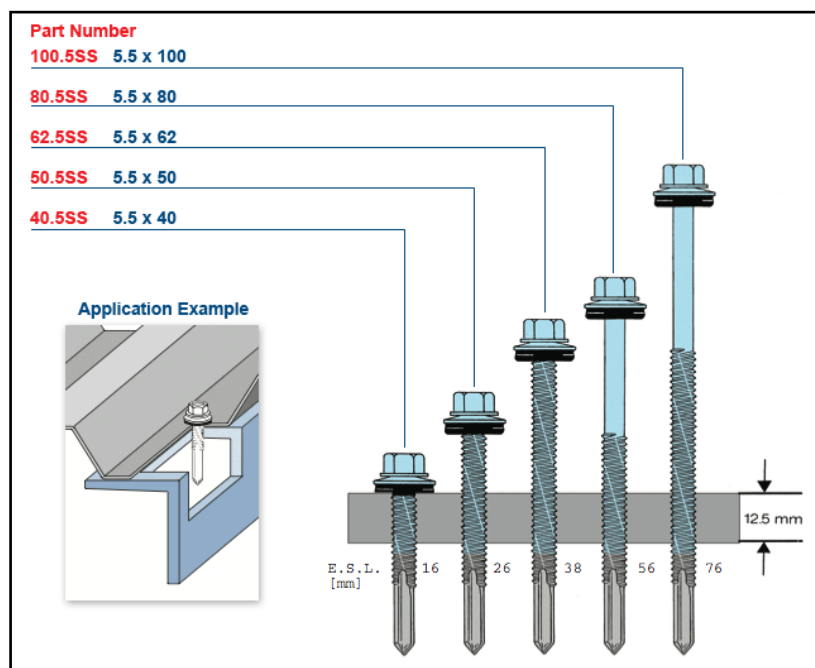
	Minimum sheeting thickness $t_{N,I}$ (mm)	Washer type and diameter	Framing member thickness $t_{N,II}$ (mm)	
			≥ 4	≥ 8
$V_{R,k}$	0.5	WS ≥ 16 mm	-	-
	0.7	WS ≥ 16 mm	1.95	1.95
$N_{R,k}$	0.5	WS ≥ 16 mm	1.49	1.49
	0.5	WS ≥ 19 mm	1.56	1.56
	0.7	WS ≥ 16 mm	2.30	2.30
	0.7	WS ≥ 19 mm	2.30	2.30

WS = galvanised conical washer with EPDM seal

A1.4 Stainless Steel Fastening Screws for Heavy Section Framing

Table A1.4.1: Product Description

Characteristic	Values
Intended use	For fastening lightweight steel sheeting as roofing or cladding to heavy steel framing members, typically of hot rolled profile.
Fastener type	Self drilling, self-tapping fastener for permanent installations
Fastener material	A2 (304) austenitic stainless steel with a minimum tensile strength of 10.4 kN for a 5.5 mm diameter fastener. Stainless steel fasteners have a welded carbon steel tip.
Fastener diameter	5.5 mm
Fastener thread	Fine pitch thread. Pitch of 1.06 mm
Point-side substrate thickness	Suitable for light section framing of 4.0 – 12.5 mm
Fastener lengths	40 - 100 mm from head flange to tip
Fastener head types	All fasteners have a 5/16" (~8 mm) Hex head with a 1/2" (12.3 mm) diameter flange. They may have an additional plastic cap. Heads are not intended to be used without washers
Washer type	Conical washer of stainless steel with an EPDM (ethylene propylene diene monomer) seal bonded to the inner face
Washer diameters	16, 19 or 29 (for 16, 19 or 29 mm diameter)
Head side substrate I specification	Cold Rolled Profile (CRP) for roofing. Minimum steel specification S250GD with Z45 galvanized coating.
Point side substrate II specification	Hot Rolled Profile (HRP). Minimum Steel specification S275JR.



ESL – effective stainless length. Hardened carbon steel tip

Code example – 40.5SS means 25 mm length from flange to tip with point type 5. SS is stainless steel.

Table A1.4.2: Characteristic Values for Shear $V_{R,k}$ and Axial $N_{R,k}$ Resistance of Connections

	Minimum sheeting thickness $t_{N,I}$ (mm)	Washer type and diameter	Framing member thickness $t_{N,II}$ (mm)	
			≥ 4	≥ 8
$V_{R,k}$	0.5	SS ≥ 16 mm	-	-
	0.7	SS ≥ 16 mm	2.59	2.59
$N_{R,k}$	0.5	SS ≥ 16 mm	1.98	1.98
	0.5	SS ≥ 19 mm	2.08	2.08
	0.7	SS ≥ 16 mm	3.05	3.05
	0.7	SS ≥ 19 mm	3.05	3.05
SS = stainless conical washer with EPDM seal				

Design values for shear and axial resistance have been derived from the characteristic values above as follows:

$$V_{R,d} = V_{R,k} / \gamma_M \text{ for shear resistance}$$

$$N_{R,d} = N_{R,k} / \gamma_M \text{ for axial resistance}$$

Where:

γ_M is the material specific partial factor. γ_M has been taken as 1.33. Other values may be applied by national regulation.

Table A1.4.3: Design Values for Shear $V_{R,d}$ and Axial $N_{R,d}$ Resistance of Connections

	Minimum sheeting thickness $t_{N,I}$ (mm)	Washer type and diameter	Framing member thickness $t_{N,II}$ (mm)	
			≥ 4	≥ 8
$V_{R,k}$	0.5	SS ≥ 16 mm	-	-
	0.7	SS ≥ 16 mm	1.95	1.95
$N_{R,k}$	0.5	SS ≥ 16 mm	1.49	1.49
	0.5	SS ≥ 19 mm	1.56	1.56
	0.7	SS ≥ 16 mm	2.30	2.30
	0.7	SS ≥ 19 mm	2.30	2.30
SS = stainless conical washer with EPDM seal				