

**Recommended Fixings Manual
for**



2500 Chamfered

Suite of Profiles



A Breakthrough in Performance

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Application illustrations are 1:1 scale



The Correct Fastener

rapierstar® the market-leading supplier of screws to the PVC-U window industry, with its unrivalled technical expertise, has worked together with your systems company to produce this recommended fixings manual. The following pages contain advice on the correct fastener for each application.



Your orders are despatched direct from our purpose-built premises near Congleton in Cheshire.

Star Performance

rapierstar® StarPVCU window screws have conformed with all relevant industry standards, guidelines and recommendations for some time and are intended to be used where mechanical resistance, stability and safety of use in the sense of the 'essential requirements' of Annex I of the Construction Products Regulation 305/2011 are to be fulfilled.

- All rapierstar® StarPVCU screws exceed the requirements of BS 7412:2007 section 5.6.
- Fast starting screws for non-reinforced applications
- High specification drill points for fast insertion without breakage for reinforced applications
- Full range of stainless steel options available

Surpassing Standards

rapierstar® branded product ranges have been certified by European approved 'Notified Bodies', confirming initial type testing and assessment & verification of constancy of performance.

CE BS EN 14351-1:2006+A1:2010, Windows and doors product standard, performance characteristics. **rapierstar®** branded screws conform with the requirements of harmonised European standard

BS EN 14351-1 and have been type tested to meet the standard of BS EN 14566:2008+A1:2009. By conforming with this standard, we are describing, with independent verification, that the head/thread/point maintain consistency of design. This also guarantees that the production of steel screws is to EU standards and that factory controls are in place during manufacture.

PAS 24:2012 Windows and doors fabricated with correct StarPVCU screws exceed PAS 24:2012 - enhanced security performance requirements for doorsets and windows in the UK. PAS 24:2012 supersedes PAS 24:2007 and BS 7950:1997, which are withdrawn.

BS EN 1670:2007 Electroplating coatings of **rapierstar®** products comply with the provisions of ISO 2081:2008 and exceed corrosion resistance testing to BS EN 1670 grade 4 for Carbon Steel screws and BS EN 1670 grade 5 for Stainless Steel screws.

ISO 9000, is a family of standards relating to quality management and are designed to help organisations ensure they meet the needs of customers. **rapierstar®** is an ISO 9001:2008 registered company and all our window screws are manufactured by ISO 9000 certificated companies. Full traceability is maintained so long as the screws remain in the box in which they were supplied.



General Hints:

For air driven tools, check that the correct air pressure is maintained.

Check airlines, couplings and tools for leakage.

Clearly mark or label separate driving tools that have been set at different torque settings to ensure that the correct torque is used in each application.

Label bench mounted fastener containers with both fastener type and applications. Keep fastener containers well separated to avoid confusion.

Check for wear of screwdriver bits and replace when worn or damaged.

You may find it useful to have a series of screw charts available at the various work stations to illustrate which fasteners must be used for specific applications. Please contact **rapierstar®** - we will be happy to provide help and support.



Clear Product Information

Branded, easy to read labels give clear product information, preventing identification errors.

Screw Tips - Best Practice

Perpendicular Insertion: Ensure that any fastener is applied at 90° to the material at all times.

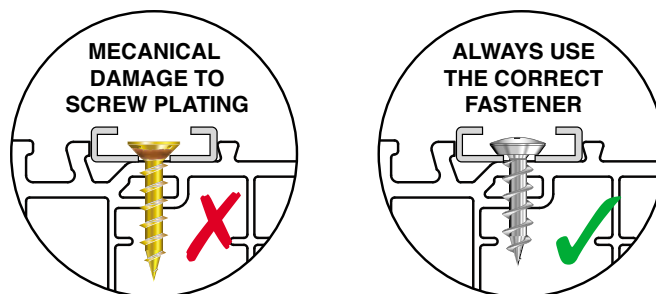
Mechanical Damage: It is important to use the correct torque setting and screwdriver bit for each application. If the screwdriver bit does not engage fully into the recess, or if the torque setting on the screwdriver is too high, damage to any corrosion protection layer of the screw may occur with the resulting likelihood of corrosion.

Torque Setting: The use of excessive torque may lead to stripping and failure of the fastener. The torque setting on the screwdriver should be the minimum required to

effect a complete fastening. At initial set-up, this should be established through trial and error on scrap material, gradually building up to the required torque level.

Screwdriver Speed: It is recommended by the Glass & Glazing Federation and the British Plastics Federation that driver speeds between 1500 rpm and 2000 rpm are used. For applications into PVCU only, a lower speed might be preferable. Also, the same piece of hardware may be used in both reinforced and unreinforced applications. In such cases it may be convenient to have two air screwdrivers set at the appropriate torque and speed.

Using the incorrect fastener may cause damage to the plating of the screw, resulting in the potential for corrosion.



Avoid Corrosive Elements

Several factors can cause screws to rust, each of which can be accelerated depending on the situation of the application.

Silicone sealants - avoid acetic acid cured high and low modulus sealants. The vapour alone is sufficient to cause corrosion. Therefore a neutral curing sealant is recommended.

Acrylic fillers - contact with any carbon steel component will cause corrosion.

Cleaners - aggressive cleaning substances, especially those containing ammonia, chlorine etc. which are commonly used by the householder, can have a very severe effect and should not be used where screws are situated.

New-build - screws should not come into contact with wet plaster or cement, as the lime content will cause corrosion. Also, the acid wash that is often used to clean brickwork is highly corrosive and should be avoided completely. **Where any of the above conditions are likely to exist, the use of stainless steel is recommended.**

100% Stainless 100% Solution

For coastal or heavily polluted regions of the country, when attaching stainless steel hardware, or where prolonged guarantees are being offered, we recommend that stainless steel screws should be used.

Enhanced Martensitic – Grade 410 100% stainless steel

Ideal for steel reinforcement:

Screws manufactured from enhanced 410 grade stainless steel, widely used in the U.K. are designed and manufactured specifically for drilling and tapping through galvanised steel reinforcement.

Enhanced Martensitic stainless steel screws are magnetisable, allowing for easier and more accurate use in the factory. On-site confirmation that stainless steel screws have been used is achieved by way of an identification mark stamped onto the head.

Enhanced Martensitic stainless steel screws provide a high performance corrosion resistant solution from a single length of 100% stainless steel wire.

Austenitic – Grade 302 – 100% stainless steel

Ideal for PVC-U only applications:

By specifying austenitic fasteners for PVC-U only applications, you ensure a high performance, corrosion resistant screw capable of out-living the window and many of its components.

Not ideal for steel reinforcement:

Austenitic stainless steel is intrinsically soft. Although ideal for PVC-U only applications, and acceptable into thin aluminium, it will not reliably self-drill or self-tap through galvanised steel reinforcement. Therefore, some austenitic screws are either treated or manufactured in such a way as to overcome this problem.

Bi-Metallic

These screws have an austenitic head and 'top' portion of thread with carbon steel drill point and partial thread. Often accepted by Councils and Housing Associations for use in the manufacture of windows and doors.

Austenitic stainless steel is non-magnetic, therefore on-site confirmation is achieved by use of a magnet. Please contact **rapierstar®** for details if Bi-Metallic screws are required for 'fully austenitic' contracts.

Identification of Stainless Window screws

Unique head design eliminates confusion between the grades of stainless steel used. Clear product marking on the head of **rapierstar®** window screws allows immediate identification of the grade of stainless steel from which the screws are manufactured. This ensures that specifications are adhered to.



Austenitic Stainless Steel - 302

Because 302 grade Austenitic stainless steel is intrinsically soft, it is unsuitable for self-drilling applications. However, it is ideal for use in PVC-U only applications, giving excellent corrosion resistance.



Enhanced Martensitic Stainless Steel - 410

410 grade Martensitic stainless steel is a harder grade which is capable of self-drilling and tapping into steel reinforcement. Screws are independently tested by UKAS accredited test bodies to beyond 3000 hours salt spray test in accordance with BS EN ISO 9227.

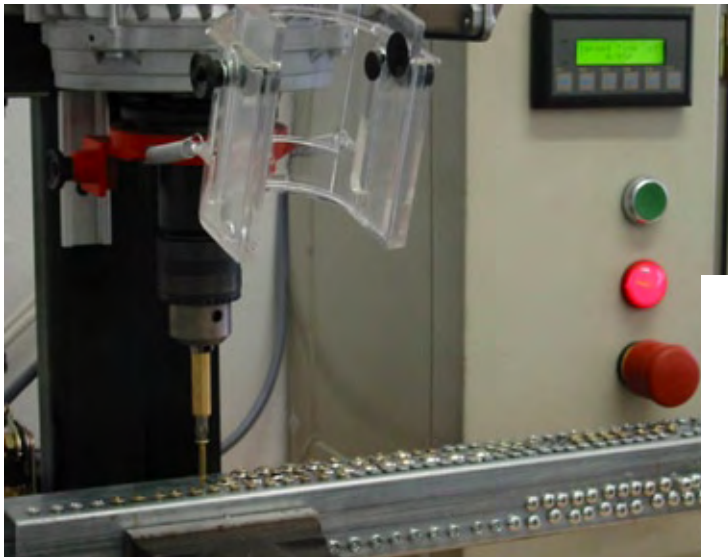
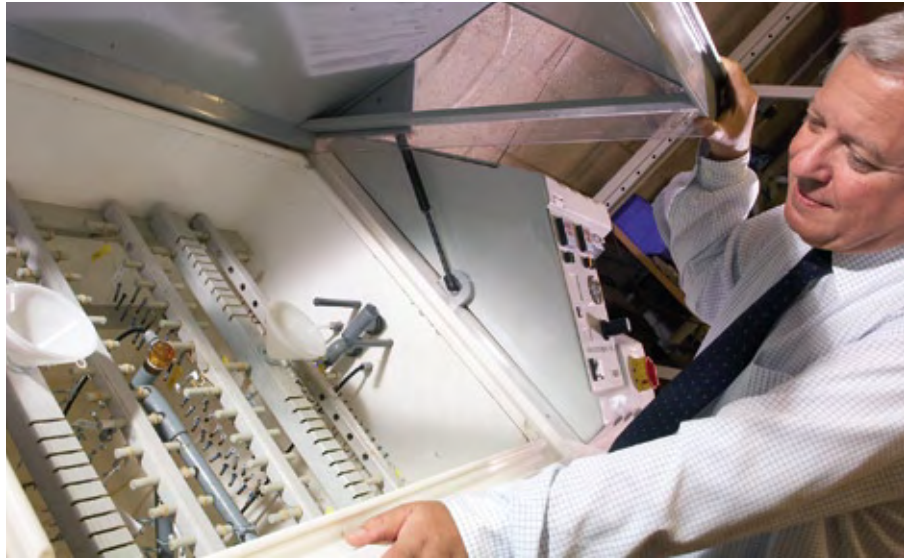


Bi-Metallic

Austenitic stainless steel fastener with a carbon steel drill tip. Suitable for reinforced applications. Combination recess with square drive giving effective 'stick-fit' onto the driver bit for ease of insertion during fabrication and common Phillips no2 recess for on-site adjustment.

Tested for Safety - Tested for Quality Durable

Screws are tested for plating depth and corrosion resistance using internationally accepted test equipment. Salt spray testing is in accordance with BS EN 1670:2007 service classes according to BS EN ISO 9227 and to UKAS requirements. Carbon steel screws are routinely tested to 300 hours and our enhanced martensitic stainless steel carries independent certification to beyond 3000 hours salt spray test.



Fast

Using custom designed and built equipment, window screws are tested for speed of insertion, ensuring that self-drilling screws provide fast and efficient fastenings into steel reinforcement and that screws for fastening into PVC-U self-start easily and safely.



Secure

Branded screws are tested for 'torque-to-start', 'torque-to-insert' and 'torque-to-spin', ensuring that screws will not shear in the correct application. Rapieststar carbon steel screws are batch tested to detect any possible Hydrogen Embrittlement (HE) which can occur when free hydrogen penetrates the structure of the steel during the plating and manufacturing process.

In any application where fasteners are required to be guaranteed free from hydrogen embrittlement or any other form of hydrogen induced cracking (HIC), Rapieststar always recommend that fasteners manufactured from a grade of stainless steel considered suitable for the end application be specified and used.



Safe

All aspects of our screws are tested and their dimensions checked to ensure that our high specifications are met. This includes depth of recess and 'wobble', using a certified Phillips No.2 driver bit. The internationally accepted standard is plus-or-minus 6°.

We specify plus-or-minus 3° to make insertion safer and easier.

Best Value

Now that Best Value has replaced Compulsory Competitive Tendering, the public sector is no longer restricted to selecting the lowest priced tender. This more business-like approach to management and accounting aims to improve the performance, quality and value for money of work on the housing stock, reducing whole life costs.

Best Value principles in action:

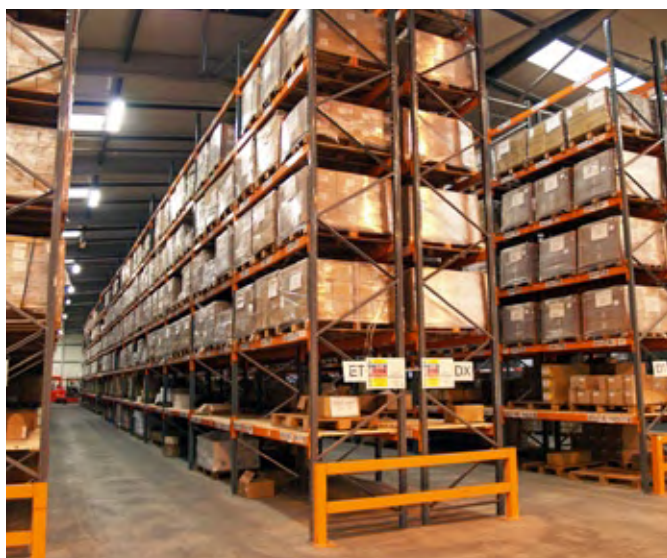
Selecting a market leading fastener supplier can be essential in Achieving Best Value Performance Targets.

rapierstar® offers quality assured products with a proven history, as well as expert technical support.



Continuity of Supply

Massive stockholding of the PVC-U window industry's most comprehensive range ensures that we are able to provide a reliable same-day despatch service.



Investors In People

rapierstar® is committed to the Investors In People standard. Continuous improvement and training within our company enables our staff to provide you with a high level of service. Our specialist teams of application engineers are available to advise window fabricators on correct fastener selection. Profile system specific fastener guides are maintained for all leading system companies.



INVESTOR IN PEOPLE

Healthy Lifestyle

In order to guarantee trouble-free installation of screws and fasteners, consideration of some general fabrication criteria should be undertaken - such as

- Securely fitting reinforcement
- Fixing operation at 90° angle
- Location of screw into flat plane of steel
- Driver speed at between 1500 and 2000 rpm
- Correct air pressure and compressor regulation
- No excessive play in power driver collar
- Suitable driver bits, regularly changed
- Unnecessary pre-drilling for stainless steel screws.

These are all potential causes of problems and are among the many areas of vital fastener performance, which we would consider during a bespoke 'Health Check' of your manufacturing fastener usage by an experienced rapierstar Technical Manager.

Contact now for more information or use your smart device to scan for more info:

Telephone: 01260 223311
email: info@rapierstar.com
www.rapierstar.com



Recommended Screw Supplier

The following manufacturers of window and door products recommend Rapiersstar only as an approved supplier of Window and Door Fabrication Screws to be used with their products.

It is important to the performance of both the locking mechanisms and keeps that they are correctly fitted using good quality, high strength screws, to the correct design for each application. manufacturers recommend that Rapiersstar screws are supplied for their range of hardware in order to achieve optimum results.

Windows fitted with their hardware and with correct StarPVCU screws exceed security tests to PAS 24:2012.



Rapier® StarFix Masonry Fixing

- ▶ **No Plug Required**
- ▶ **High Strength Fixing**
- ▶ **50% Quicker Assembly**
- ▶ **30% Less Drive-in Torque Required**

High Tech Fixing

The award winning StarFix is probably the most efficient direct masonry fixing available. The patented StarForm thread provides 30% lower drive-in torque and up to 50% quicker assembly. A cost effective and time saving installation with exceptional holding power.

Safe

The precision StarDrive recess, utilising Torx drive, provides optimum efficiency, improving grip and extending bit life.

Faster & No Wastage

No need for a plug means a quicker application. StarFix masonry fixings eliminate the wastage associated with nylon installation fixings.

Secure

High thread cuts into masonry whilst the low thread compacts loose material for maximum holding power, rapidly penetrating all kinds of brick, stone, concrete and wood.



- ▶ **No plug required – Cost effective and simple**
- ▶ **Only 6mm or 6.5mm pilot hole required through substrate**
- ▶ **8mm clearance hole through frame**
- ▶ **Universal for all common applications**
- ▶ **Long lasting and stress free stand-off fixing**

										
		LENGTH								
		62	82	102	112	122	152	152	182	202
DIAMETER	7.5mm	●	●	●	●	●	●	●	●	●
Yellow finish – 6/6.5mm pilot hole required, 8mm clearance hole										

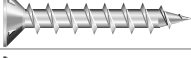
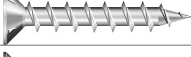


In all the following tests, the brick failed before the fastener

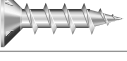
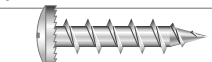
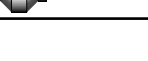
TYPICAL PULL-OUT VALUES R FFT 7.5 X 112															
1kN	2kN	3kN	4kN	5kN	6kN	7kN	8kN	9kN	10kN	11kN	12kN				
Lowest Pullout 6.34kN												Engineering Brick			
Average Pullout 8.8kN															
Highest Pullout 10.13kN															
8kN	9kN	10kN	11kN	12kN	13kN	14kN	15kN	16kN	17kN	18kN	19kN	Concrete Block			
Lowest Pullout															
Average Pullout 14.79kN															
Highest Pullout 15.48 kN															
5kN	6kN	7kN	8kN	9kN	10kN	11kN	12kN	13kN	14kN	15kN	16kN	London Brick			
Lowest Pullout															
Average Pullout 11.75kN															
Highest Pullout 13.76 kN															

The pull-out values referred to are expressed in kN (1 kN = 100Kgf).
A choice of the correct security factor is recommended.

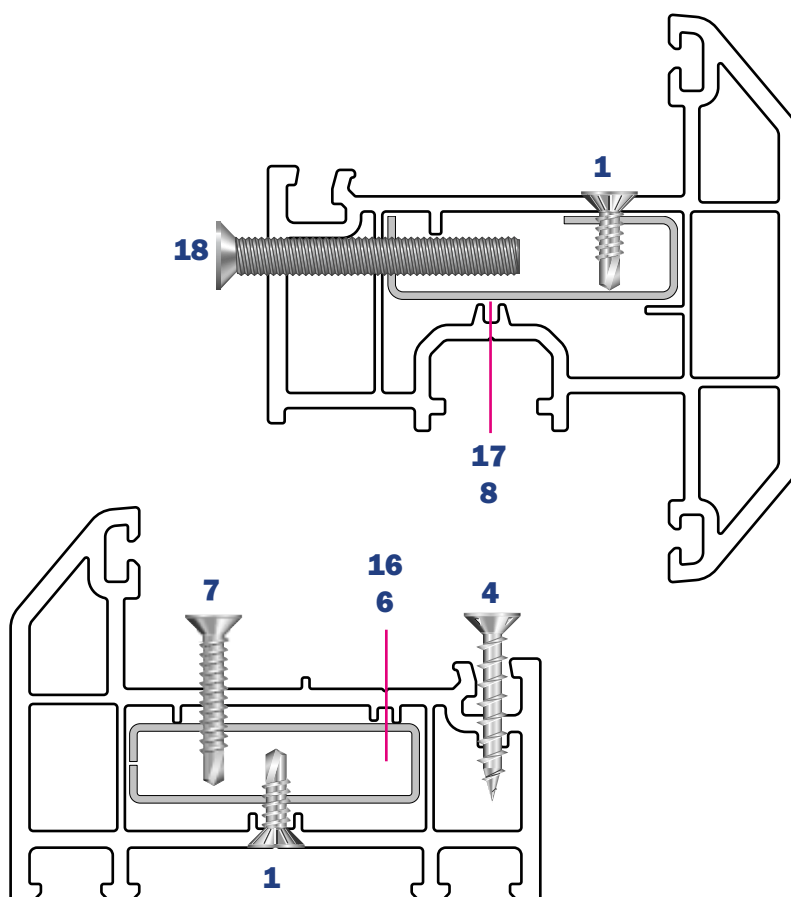
Carbon Steel

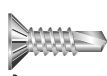
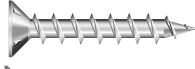
	Code	Item	Application
	RSR 3.9 x 13 Z	1	Reinforcement retention
	RSR 3.9 x 16 Z	2	Reinforcement retention
	CFG 4.3 x 16 Z	3	Thermal chamber insulator (TCI) Retention
	CFG 4.3 x 16 Z	3	Hinge to unreinforced section of door sash
	CFG 4.3 x 25 Z	4	Gearing to unreinforced sash
	CFG 4.3 x 25 Z	4	Keep to unreinforced frame
	CFG 4.3 x 25 Z	4	Run-up block to unreinforced frame
	CFG 4.3 x 40 Z	5	Hinge to door sash
	CSR 3.9 x 19 Z	6	Keep to reinforced frame
	CSR 3.9 x 22 Z	7	Run-up block to reinforced frame
	CSR 3.9 x 25 Z	8	Gearing to reinforced sash
	CSR 3.9 x 25 Z	8	Keep to reinforced frame
	CSR 3.9 x 32 Z	9	Hinge to door sash
	CSR 3.9 x 38 Z	10	Hinge to tilt & turn frame
	CSR 3.9 x 38 Z	10	Hinge to door frame
	SFG 4.3 x 16 Z	11	Friction stay to unreinforced frame
	SFG 4.3 x 20 Z	12	Friction stay to frame with TCI
	SFG 4.3 x 25 Z	13	Friction stay to unreinforced sash
	SFG 4.8 x 20 Z	14	Claw lock to frame
	SFG 4.8 x 25 Z	15	Claw lock to sash
	SSR 3.9 x 16 Z	16	Friction stay to reinforced frame
	SSR 3.9 x 25 Z	17	Friction stay to reinforced sash
	MS M5 x 40 Z	17	Handle retention
	NSR 4.0 x 13 Z	19	Weatherbar

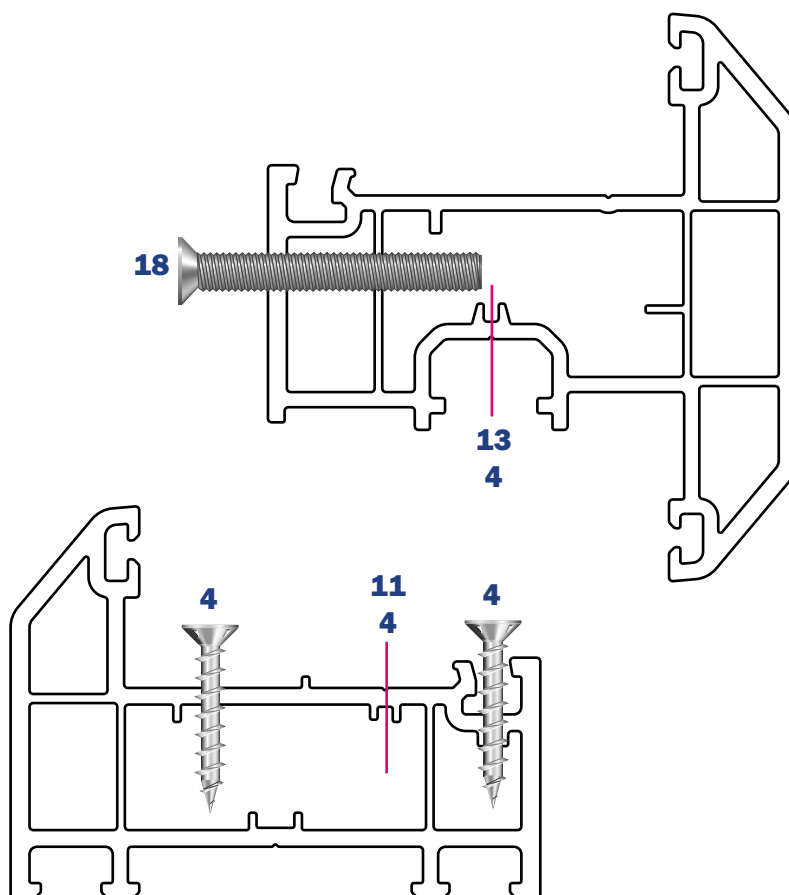
Stainless Steel

	Code	Item	Application
	RSR 3.9 x 13 S	1	Reinforcement retention
	RSR 3.9 x 16 S	2	Reinforcement retention
	CFG 4.3 x 16 S	3	Thermal chamber insulator (TCI) Retention
	CFG 4.3 x 16 S	3	Hinge to unreinforced section of door sash
	CFG 4.3 x 25 S	4	Gearing to unreinforced sash
	CFG 4.3 x 25 S	4	Keep to unreinforced frame
	CFG 4.3 x 25 S	4	Run-up block to unreinforced frame
	CFG 4.3 x 40 S	5	Hinge to door sash
	CSR 3.9 x 19 S	6	Keep to reinforced frame
	CSR 3.9 x 22 S	7	Run-up block to reinforced frame
	CSR 3.9 x 25 S	8	Gearing to reinforced sash
	CSR 3.9 x 25 S	8	Keep to reinforced frame
	CSR 3.9 x 32 S	9	Hinge to door sash
	CSR 3.9 x 38 S	10	Hinge to tilt & turn frame
	CSR 3.9 x 38 S	10	Hinge to door frame
	SFG 4.3 x 16 S	11	Friction stay to unreinforced frame
	SFG 4.3 x 20 S	12	Friction stay to frame with TCI
	SFG 4.3 x 25 S	13	Friction stay to unreinforced sash
	SFG 4.8 x 20 S	14	Claw lock to frame
	SFG 4.8 x 25 S	15	Claw lock to sash
	SSR 3.9 x 16 S	16	Friction stay to reinforced frame
	SSR 3.9 x 25 S	17	Friction stay to reinforced sash
	MS M5 x 40 Z	17	Handle retention
	NSR 4.0 x 13 Z	19	Weatherbar

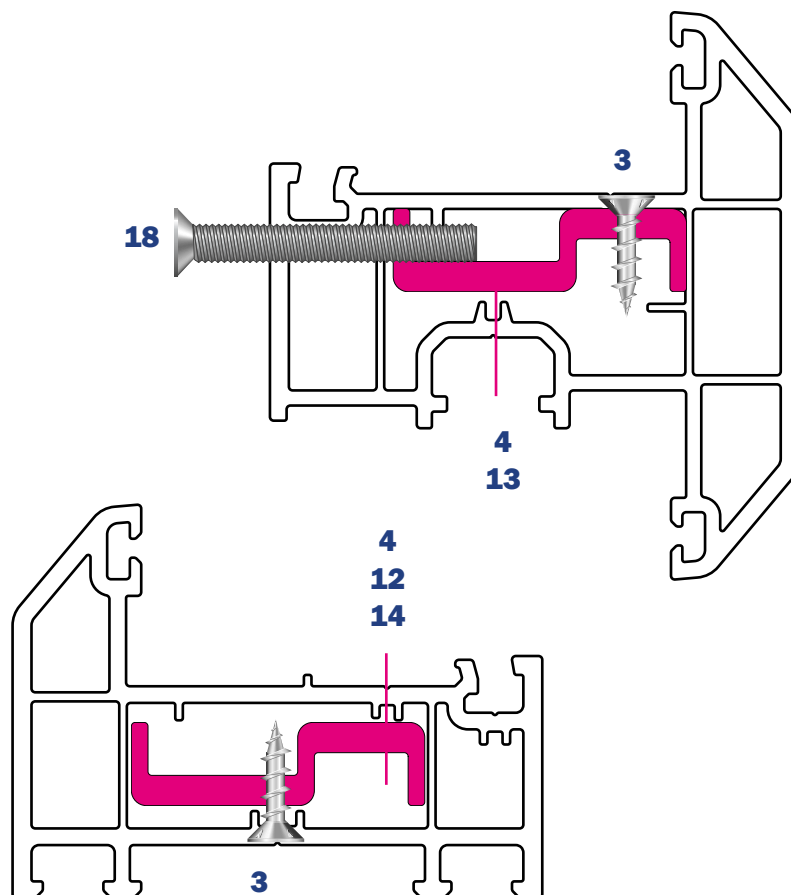
Casement Window - Reinforced
Frame 2532 with 2845 Reinforcement
Sash 2534 with 2544 Reinforcement



1		RSR 3.9 x 13 Z	Reinforcement retention
16		SSR 3.9 x 16 Z	Friction Stay (Frame)
17		SSR 3.9 x 25 Z	Friction Stay (Sash)
8		CSR 3.9 x 25 Z	Gearing
6		CSR 3.9 x 19 Z	Keep
4		CFG 4.3 x 25 Z	Keep
7		CSR 3.9 x 22 Z	Ride-Up Block
18		MS M5 x 40 Z	Handle

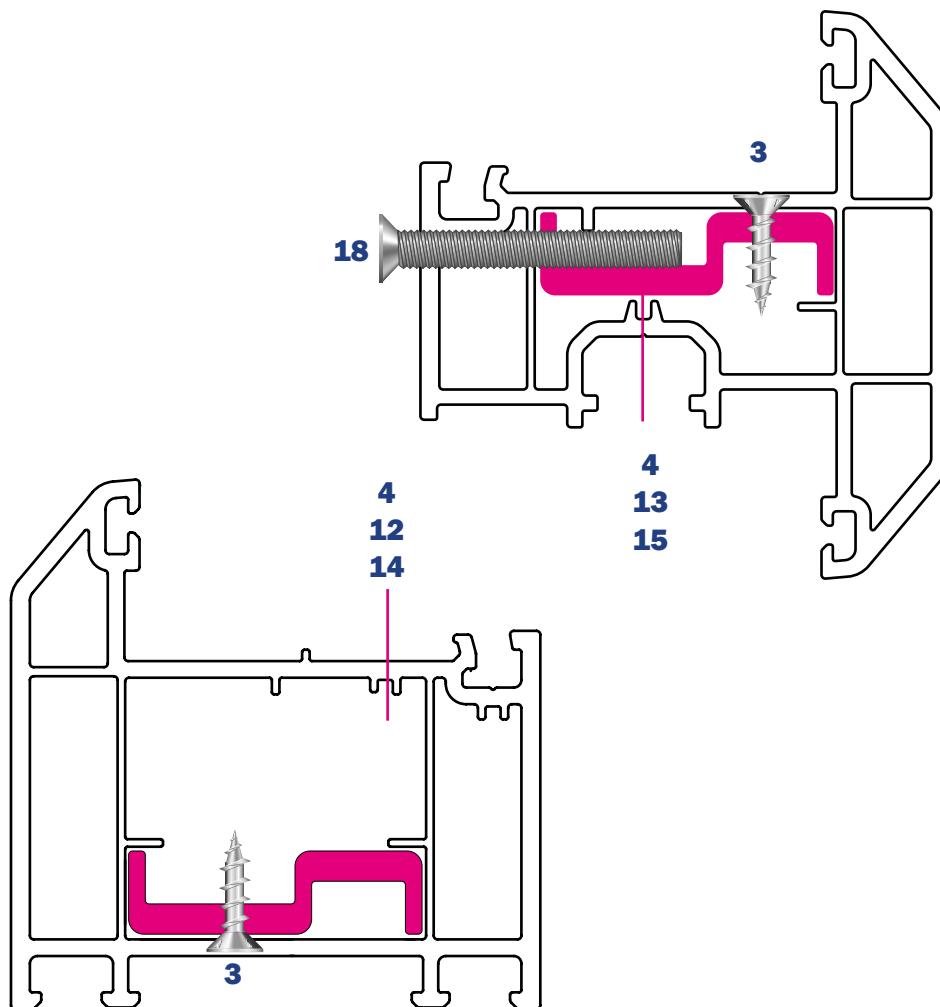


13		SFG 4.3 x 25 Z	Friction Stay (Sash)
11		SFG 4.3 x 16 Z	Friction Stay (Frame)
4		CFG 4.3 x 25 Z	Gearing
4		CFG 4.3 x 25 Z	Keep
4		CFG 4.3 x 25 Z	Run-Up Block)
18		MS M5 x40 Z	Handle

**Casement Window with Thermal Chamber Insulator
Frame 2532. Sash 2534**


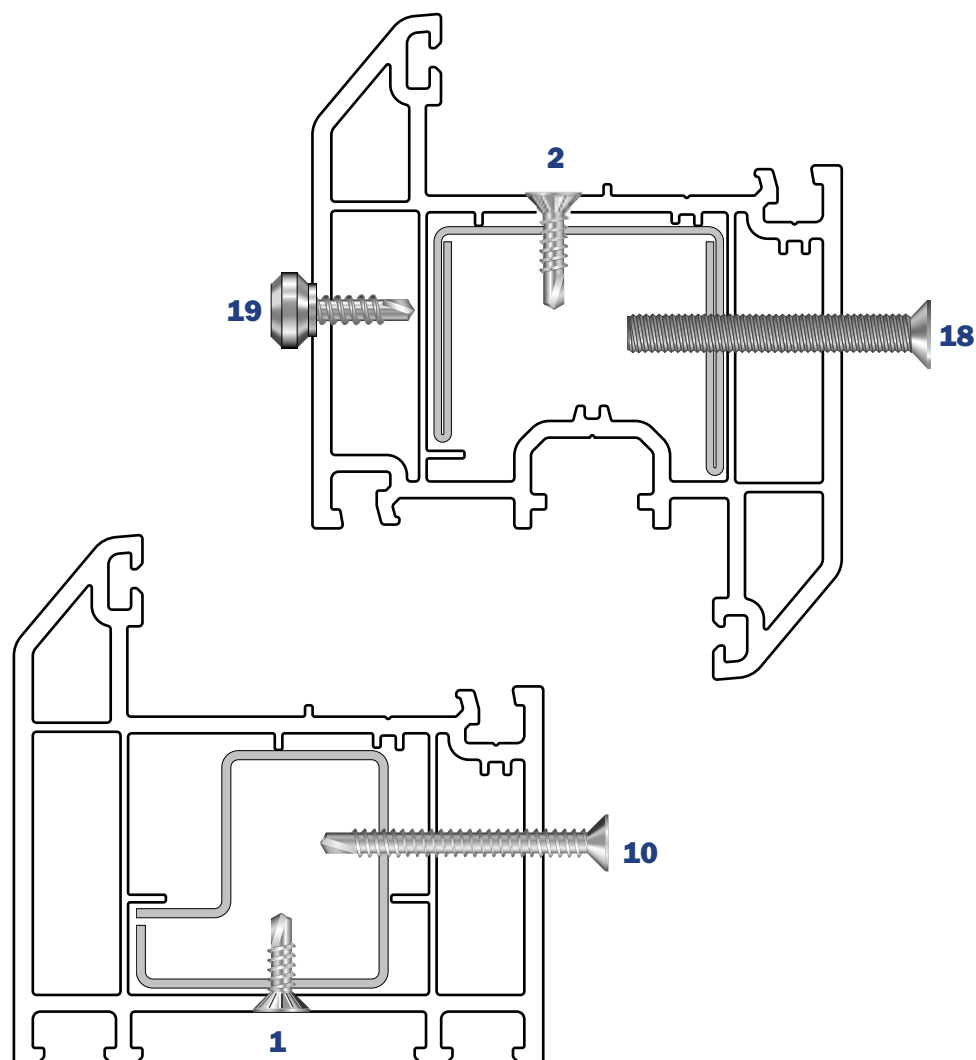
3		CFG 4.3 x 16 Z	T.C.I. retention
4		CFG 4.3 x 25 Z	Gearing
4		CFG 4.3 x 25 Z	Keep
12		SFG 4.3 x 20 Z	Friction Stay (Frame)
13		SFG 4.3 x 25 Z	Friction Stay (Sash)
14		SFG 4.8 x 20 Z	Claw Lock
18		MS M5 x 40 Z	Handle

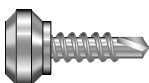
**Casement Window
2533 Frame with Thermal Chamber Insulator
Not approved to BS7950**



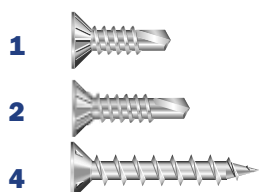
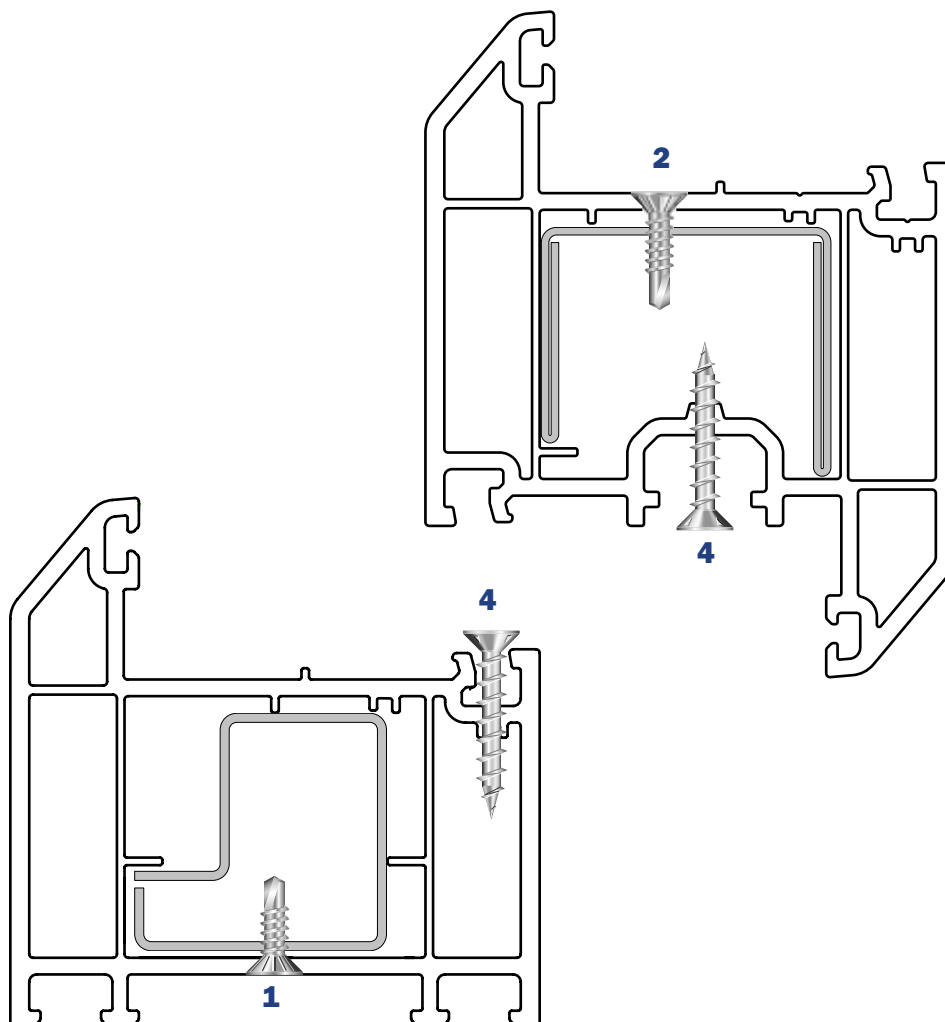
3		CFG 4.3 x 16 Z	T.C.I Retention
4		CFG 4.3 x 25 Z	Gearing
4		CFG 4.3 x 25 Z	Keep
12		SFG 4.3 x 20 Z	Friction Stay (Frame)
13		SFG 4.3 x 25 Z	Friction Stay (Sash)
14		SFG 4.8 x 20 Z	Claw Lock (Frame)
15		SFG 4.8 x 25 Z	Claw Lock (Sash)
18		MS M5 x 40 Z	Handle

Tilt & Turn Window - Reinforced - Hinge Side
Sash P2537 with 2846 Reinforcement
Frame P2533 with 2887 Reinforcement

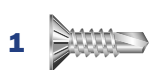
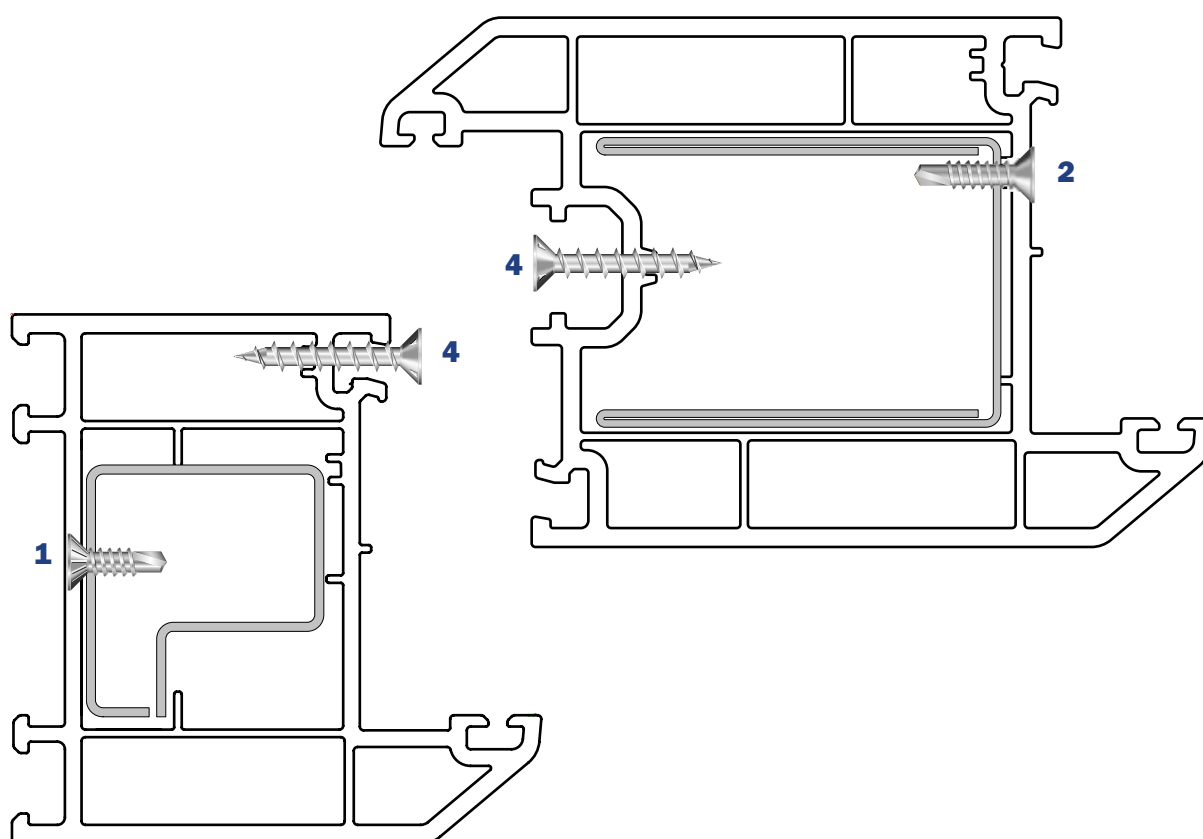


1		RSR 3.9 x 13 Z	Reinforcement Retention (Frame)
2		RSR 3.9 x 16 Z	Reinforcement Retention (Sash)
10		CSR 3.9 x 38 Z	Hinge
19		NSR 4.0 x 13 Z	Weatherbar
18		MS M5 x 40 Z	Handle

Tilt & Turn Window - Reinforced - Non Hinge Side
Sash P2537 with 2846 Reinforcement
Frame P2533 with 2887 Reinforcement



1	RSR 3.9 x 13 Z	Reinforcement Retention (Frame)
2	RSR 3.9 x 16 Z	Reinforcement Retention (Sash)
4	CFG 4.3 x 25 Z	Gearing

Tilt & Slide Patio - Reinforced - Vertical Section
Sash P2530 with 2843 Reinforcement
Frame P2533 with 2887 Reinforcement

1

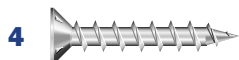
RSR 3.9 x 13 Z

Reinforcement Retention (Frame)


2

RSR 3.9 x 16 Z

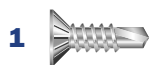
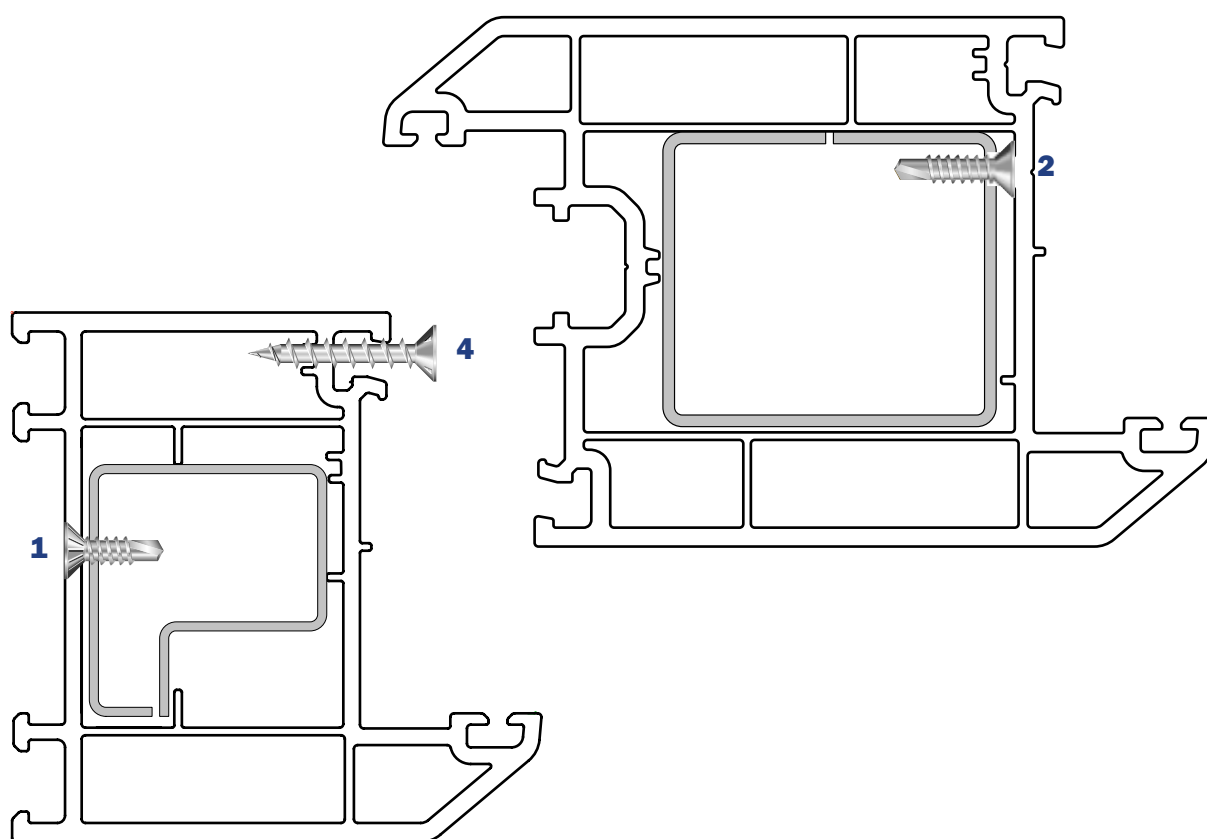
Reinforcement Retention (Sash)


4

CFG 4.3 x 25 Z

Gearing to Sash, Keep to Frame

Tilt & Slide Patio - Reinforced - Horizontal Section
Sash P2530 with 2959 Reinforcement
Frame P2533 with 2887 Reinforcement


1

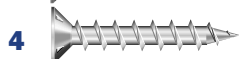
RSR 3.9 x 13 Z

Reinforcement Retention (Frame)


2

RSR 3.9 x 16 Z

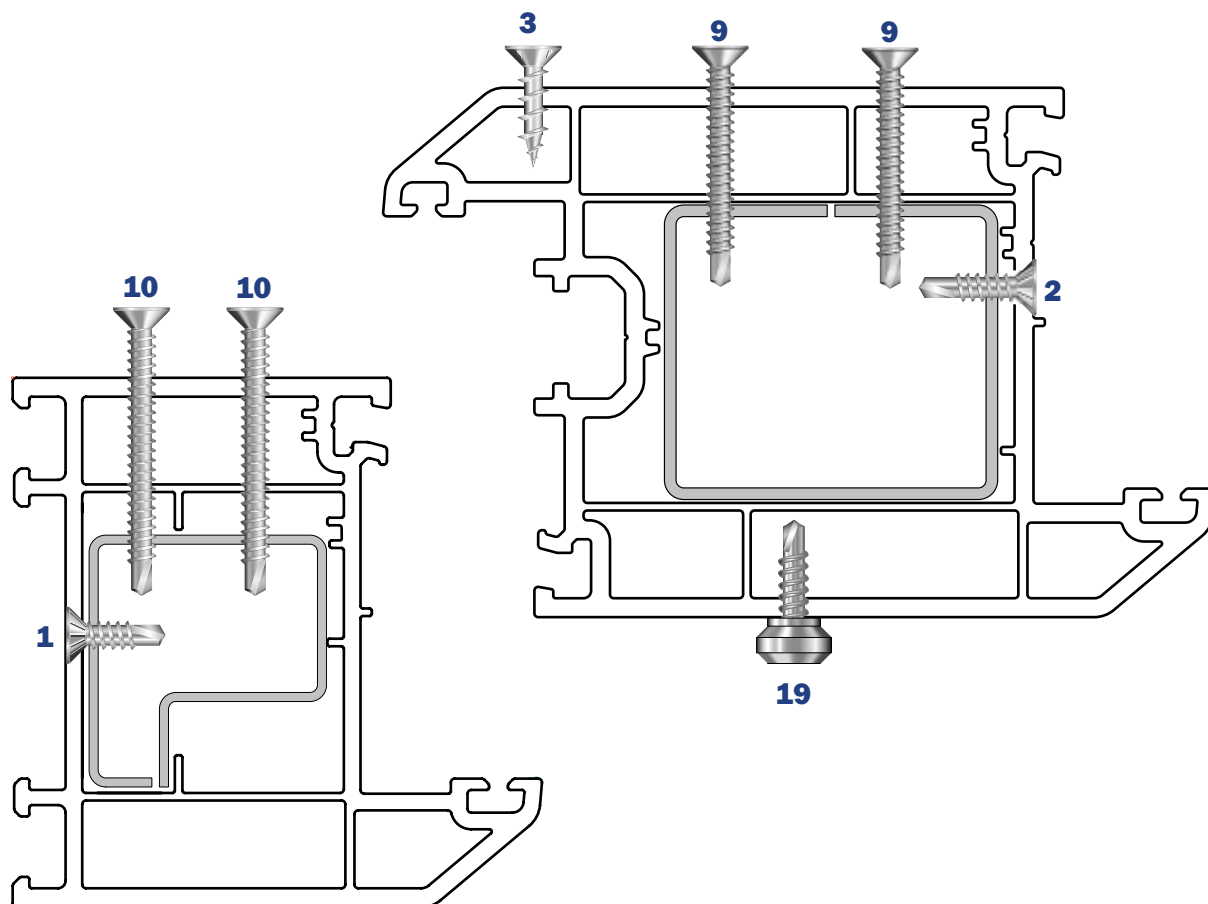
Reinforcement Retention (Sash)

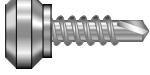

4

CFG 4.3 x 25 Z

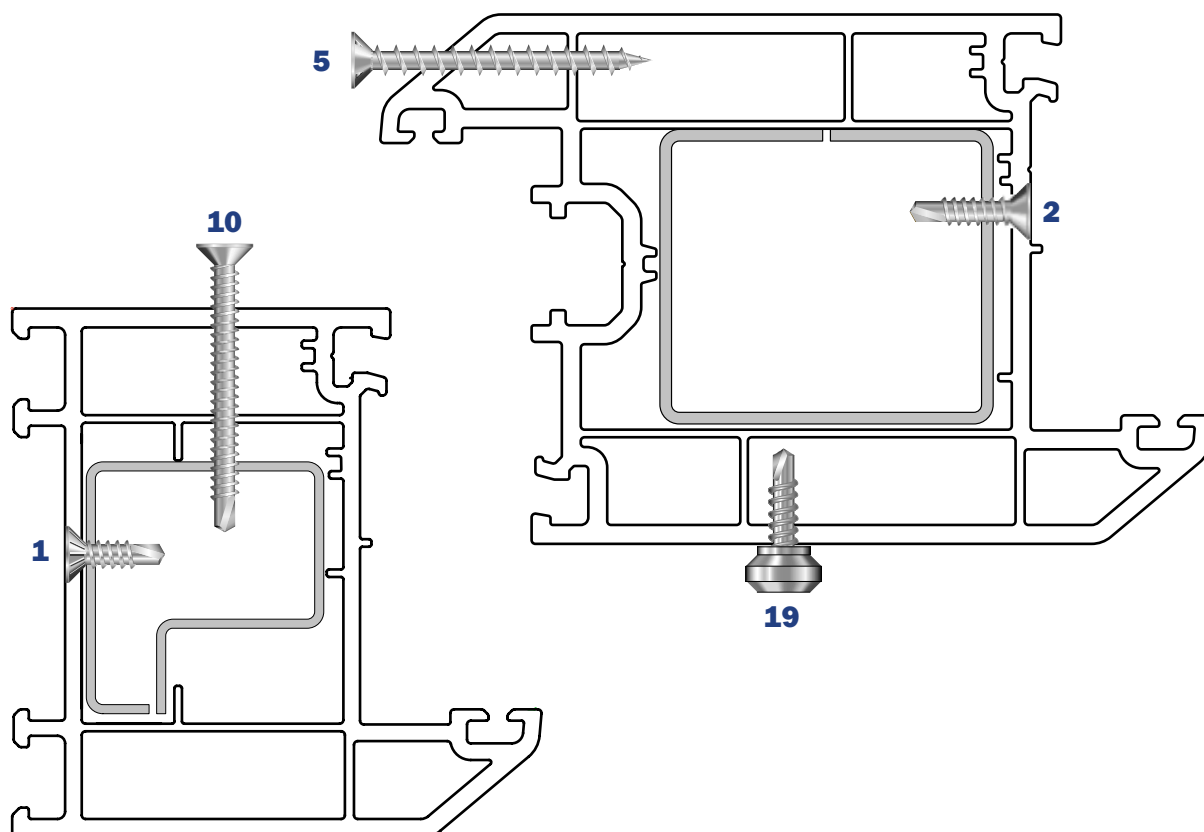
Keep

Open-In Door, Hinge Side, Flag Hinges
Sash P2530 with 2859 Reinforcement
Frame P2533 with 2887 Reinforcement



1		RSR 3.9 x 13 Z	Reinforcement Retention (Frame)
2		RSR 3.9 x 16 Z	Reinforcement Retention (Sash
10		CSR 3.9 x 38 Z	Hinge (Frame)
9		CSR 3.9 x 32 Z	Hinge to reinforced section of Sash
3		CFG 4.3 x 16 Z	Hinge to unreinforced section of Sash
19		NSR 4.0 x 13 Z	Weatherbar

Open-In Door, Hinge Side, Butt Hinges
Sash P2530 with 2959 Reinforcement
Frame P2533 with 2887 Reinforcement

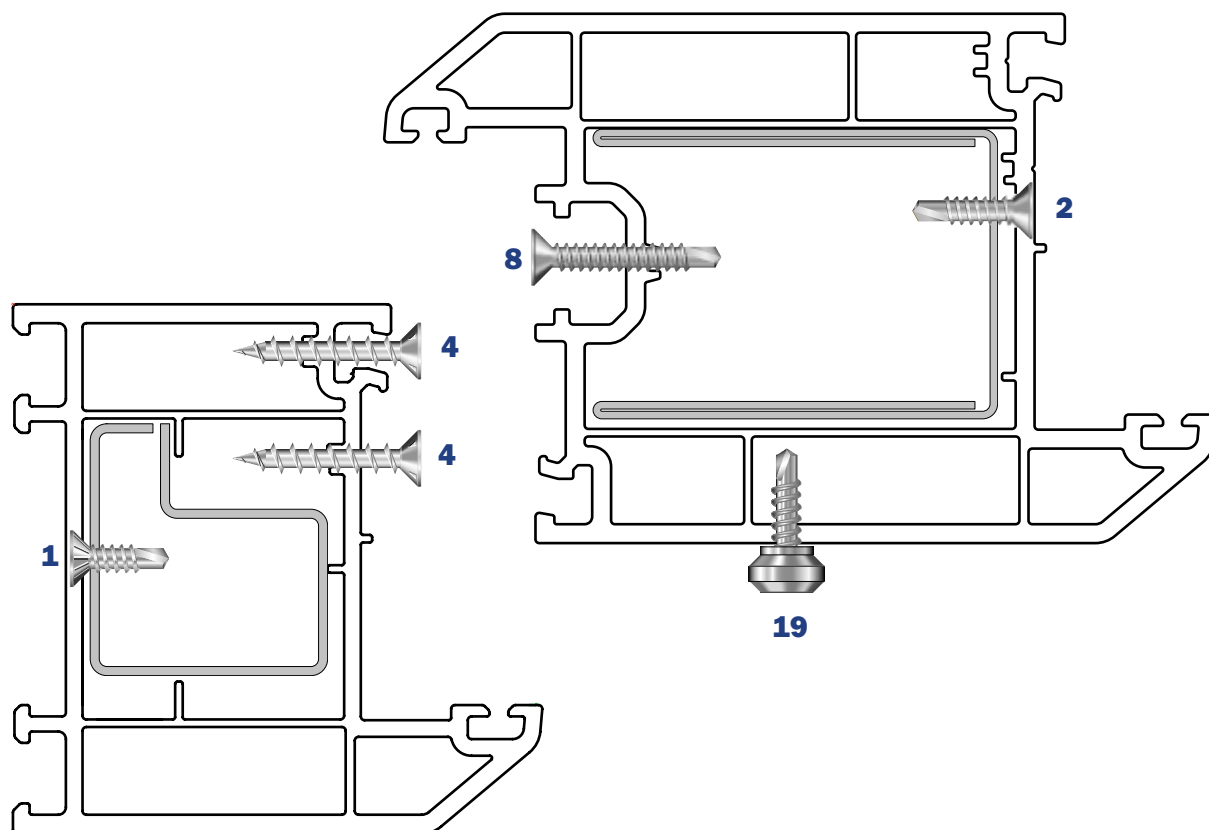


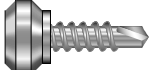
1		RSR 3.9 x 13 Z	Reinforcement Retention (Frame)
2		RSR 3.9 x 16 Z	Reinforcement Retention (Sash)
10		CSR 3.9 x 38 Z	Hinge (Frame)
5		CFG 4.3 x 40 Z	Hinge (Sash)
19		NSR 4.0 x 13 Z	Weatherbar

Open-In Door, Lock Side

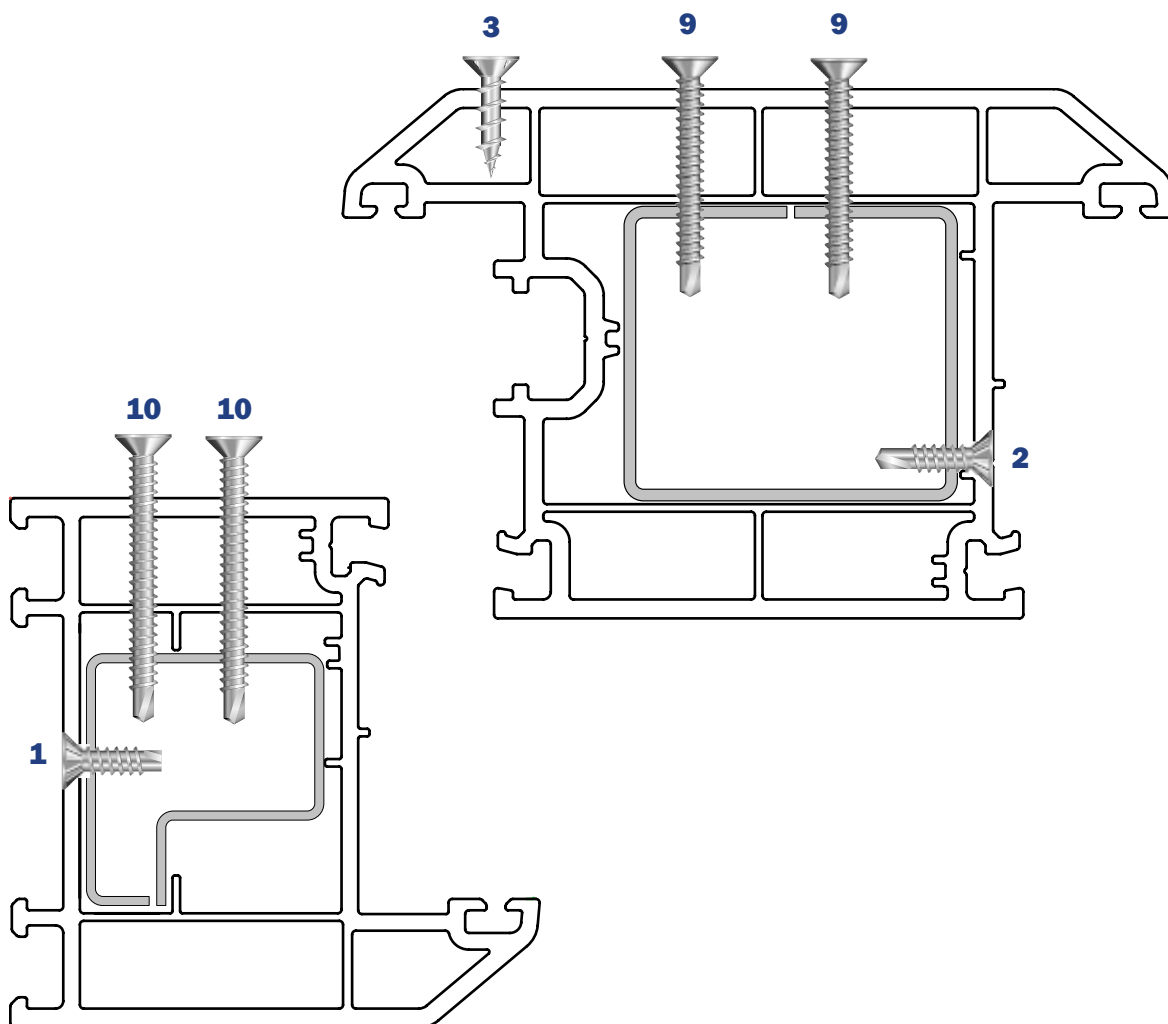
Sash P2530 with 2843 Reinforcement

Frame P2533 with 2887 Reinforcement



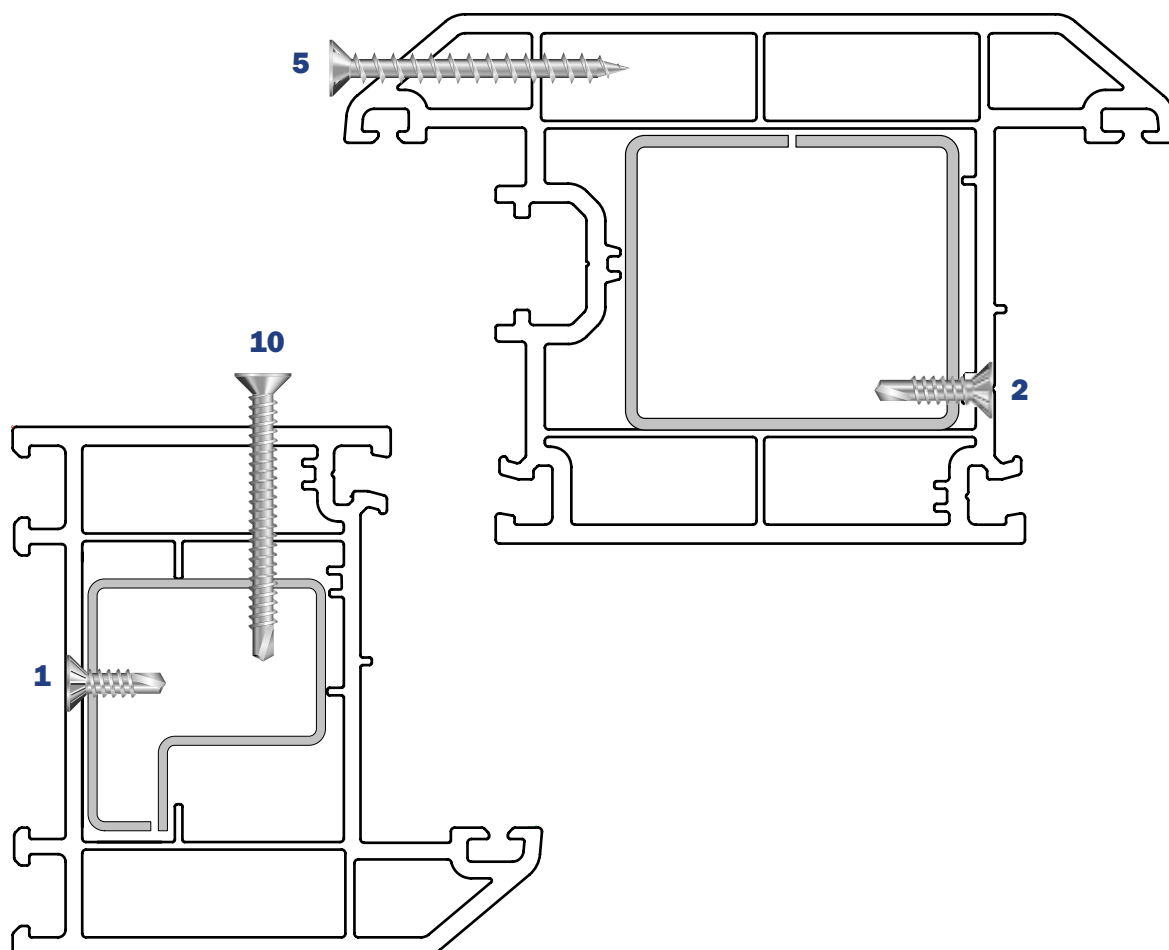
1		RSR 3.9 x 13 Z	Reinforcement Retention (Frame)
2		RSR 3.9 x 16 Z	Reinforcement Retention (Sash)
8		CSR 3.9 x 25 Z	Gearing, Keep
19		NSR 4.0 x 13 Z	Weatherbar

Open-Out Door, Hinge Side, Flag Hinges
Sash P2531 with 2859 Reinforcement
Frame P2533 with 2887 Reinforcement



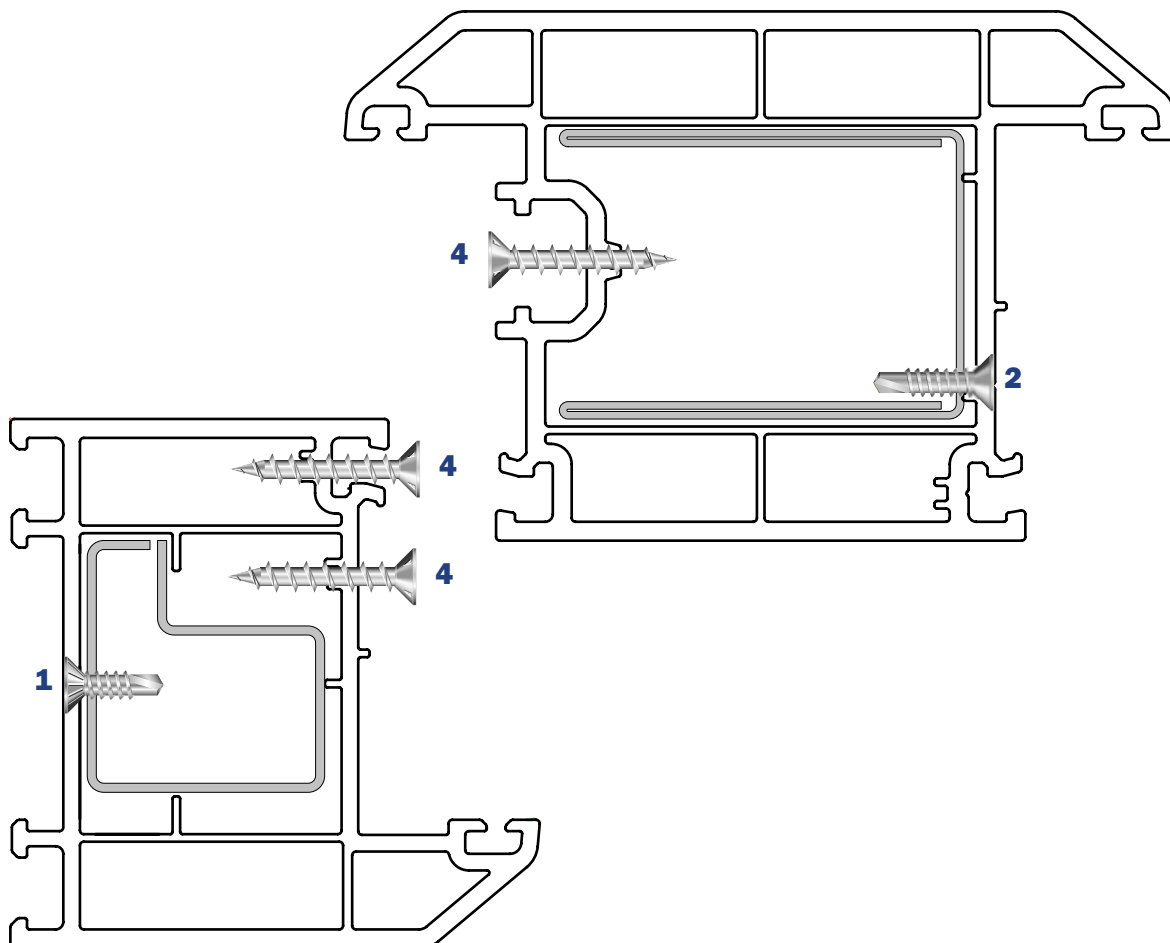
1		RSR 3.9 x 13 Z	Reinforcement Retention (Frame)
2		RSR 3.9 x 16 Z	Reinforcement Retention (Sash)
10		CSR 3.9 x 38 Z	Hinge (Frame)
9		CSR 3.9 x 32 Z	Hinge to reinforced section of Sash
3		CFG 4.3 x 16 Z	Hinge to unreinforced section of Sash

Open-Out Door, Hinge Side, Butt Hinges
Sash P2530 with 2859 Reinforcement
Frame P2533 with 2887 Reinforcement



1		RSR 3.9 x 13 Z	Reinforcement Retention (Frame)
2		RSR 3.9 x 16 Z	Reinforcement Retention (Sash)
10		CSR 3.9 x 38 Z	Hinge (Frame)
5		CFG 4.3 x 40 Z	Hinge (Sash)

Open-Out Door, Lock Side
Sash P2531 with 2843 Reinforcement
Frame P2533 with 2887 Reinforcement



RSR 3.9 x 13 Z

Reinforcement Retention (Frame)



RSR 3.9 x 16 Z

Reinforcement Retention (Sash)



CFG 4.3 x 25 Z

Gearing, Keep

Notes



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