The Building Envelope Authority

Guidance Documents

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GD 32 SELF DRILLING FASTENER INSTALLATION TOOLS

As a leading association within the metal building envelope industry, MCRMA is responsible for providing a range of in-depth guidance documents and training courses for people involved in various aspects of the construction process. It is crucial that every aspect of a building envelope is considered, including the fasteners.

Precision engineered fasteners require compatible tools to optimise installation time and quality. Screw guns are an installer essential when working in roofing and cladding construction, as they ensure that the optimum mechanical performance of a self-drilling fastener is obtained, guaranteeing the integrity of the building envelope.

The majority of fastener-related problems on site are simply from using incorrect tooling. Self-drilling fasteners are designed to be installed with the constant rotational drive of a purpose-designed screw gun. Drill points do not perform well at very high speeds, so a maximum of 2000 rpm is recommended. Whilst this may appear counter-productive, the burn-out rate will be substantially less. Once an attempt at drilling holes has failed, case hardening of the steel support will make subsequent attempts even more difficult.

In today's construction higher tensile (harder) grades of steel are being increasingly used, so the correct choice of tool is essential. The typical tensile strength of light section purlins, rails and spacer bars has increased considerably in recent years. Published minimum tensile grades of 39N/mm² and 450N/mm² are now commonplace and with the allowable tolerances the maximum could be nearer to 600N/mm². This higher tensile material stretches the self-drilling performance tolerance. Therefore, it is imperative that the correct installation tools are specified to minimise the number of cases where fasteners are 'burning out'.

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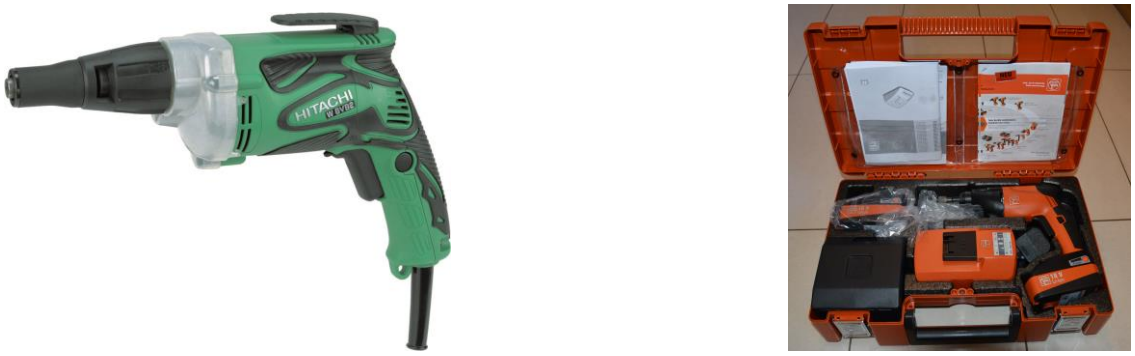
Self-drilling fasteners, the preferred type used for roofing and cladding constructions are to be installed with either a battery screw gun or a 110V screw gun, with the compatible head socket/bit and fitted with an adjustable depth locating nose piece unless the fastener design incorporates features to prevent overdriving.



Examples of typical screw guns

For external drive screws, e.g., hexagonal and bi-hexagonal (moulded) heads, the socket must be deep enough so that the drive is on the flange at the base of the head. This will give more efficient drilling of the fastener as well as preventing damage to the top of the fastener head.

This is particularly relevant to magnetic sockets where, on some designs, the magnet is very shallow and could damage the coating to the head. This is made worse as the magnet naturally attracts a build-up of swarf. The recess on sockets must be deep enough to clear the top of the fastener head.

Applying excessive end load via the screw gun whilst the fastener is drilling could also be counterproductive and increase the risk of the fastener ‘burning out’. This is, perhaps naturally, more common on thicker hot rolled/heavy section steel supports

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The exact speed of the screw gun will vary depending on the fastener type and the steel substrate, but the slower a fixing is installed, the higher the mechanical performance obtained. Below is recommended guidance from the leading fastener manufacturers:

Light section rail	Heavy section rail	Stitcher 0.7mm x 2
2000 rpm MAX	1800 rpm MAX	2000 rpm MAX

Screw guns have a slower rotational speed than impact drivers, but far more efficient in that the installer will not have to attempt to drill into the substrate more than once or try and use multiple fasteners, which in itself creates more problems.

Impact drivers should not be used. Their repetitive impact action can lead to drilling failures, reduce the fastener pull-out performance, and damage the coating or strip the moulding on the fastener head. The use of an impact driver may therefore make void any warrant provided by the fastener supplier.

Dry wall screw guns tend to run at up to 4000rpm which exceeds the recommendations above, so should not be used.

IN SUMMARY

Do

- Install roofing and cladding self-drilling fasteners using either a battery screw gun or a 110v screw gun.
- Ensure that the screw gun is fitted with a correctly adjusted depth locating nose piece (unless the fastener has features to prevent overdriving)
- Install roofing and cladding self-drilling fasteners at speeds less than 2000 rpm whether or not the fastener has features to prevent overdriving
- Always use the correct PPE to avoid personal injury
- Ensure correct sockets and drive bits are used
- Any magnet must be recessed deep enough to clear the head
- External sockets must drive on the flange at the base of the screw head

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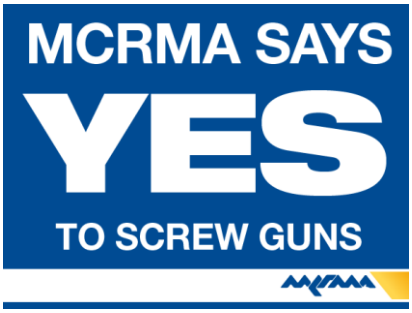
Do not

- Install roofing and cladding fasteners with either an impact driver or a dry wall screw gun.
- Apply excessive end loads (bodyweight force) via the screw gun whilst the fastener is drilling, particularly on thicker hot rolled/heavy section steel supports.



Correct specification screw guns are available for purchase from the leading fastener manufacturers who are members of the MCRMA

Adoption by industry of the guidance outlined in this document will lead to better and more consistent standards of metal roofing and cladding construction. Failure to comply with the advice contained in this document could also void any warranty provided by a fastener manufacturer.

MCRMA member companies can advise on the suitability and performance of materials, systems and assemblies. Manufacturers are best placed to offer advice about their particular products and any variation from their published data during the design or construction process could result in the component or system failing prematurely or not complying with the guarantee or warranty conditions.

In addition, design information can be obtained from any of the independent roofing and cladding inspectors featured on the MCRMA web site at www.mcrma.co.uk

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