

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

35mm Adjustable stretcher bars

© Network Rail Limited 2014. All rights reserved.

This document is the property of Network Rail. It shall not be reproduced in whole or part nor disclosed to a third party without the written permission of Network Rail.
© Copyright 2014 Network Rail.

Uncontrolled copy once printed from its electronic source.

Published and Issued by Network Rail, Kings Place, 90 York Way, London. N1 9AG.



Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

Issue record

Issue	Date	Comments
1	March 2015	First Issue

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

Reference documentation

NR/L3/SIG/11303	Signalling installation handbook
NR/L2/SIG/10663	Signalling maintenance specifications
NR/SMS/PF01	Point fittings
NR/L2/SIG/30014	Signal works testing
NR/GN/SIG/11772	Supplementary point drives and detection
NR/WI/SIG/00111	Points general – supplementary drives – mechanical

Disclaimer

In issuing this document for its stated purpose, Network Rail makes no warranties, express or implied, that compliance with all or any documents it issues is sufficient on its own to ensure safe systems of work or operation. Users are reminded of their own duties under health and safety legislation.

Supply

Copies of documents are available electronically, within Network Rail's organisation. Hard copies of this document may be available to Network Rail people on request to the relevant controlled publication distributor. Other organisations may obtain copies of this document from an approved supplier.

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

Contents

1 Purpose	4
2 Scope	4
3 Introduction to 35mm adjustable stretcher bars	4
4 How to select the correct components	5
4.1 Brackets	5
4.2 Supplementary drive and detector connection lugs	11
4.3 M30 Lock Nuts	12
4.4 Adjustable stretcher bar tooling	16
5 Installation	18
5.1 Assembly sequence	18
5.2 Pre-building adjustable stretcher bar assemblies	19
5.3 Preparing the layout for fitting	20
5.4 Calculation of Required Free Wheel Clearance	21
5.5 Switch Openings – Nominal Free Wheel Clearance	21
5.6 Fitting the rear adjustable stretcher bar	21
5.7 Fitting the lock stretcher bar	25
5.8 Fitting the Front (First) Adjustable Stretcher Bar Assembly	25
5.9 Fitting the intermediate stretcher bars	29
5.10 Set Up Check	29
5.11 Supplementary drive and supplementary detector brackets	29
5.12 Post installation gauge checks	30
6 Maintenance	31
6.1 General	31
6.2 Examination of Components	31
6.3 Adjustable stretcher bar replacement	33
6.4 Supplementary drive/detector lugs	33
6.5 Recording of adjustable stretcher bar defects	34
6.6 Minimum Actions for Adjustable Stretcher Bar Assembly Defects	34
Appendix A Fastener ordering details	35
Appendix B MGL Pin Tooling	36
Appendix C Extracts from RE/PW Drawings	37
Appendix D Adjustable stretcher bar brackets and assemblies	40

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

1 Purpose

This module contains information to support the installation and maintenance of 35mm adjustable stretcher bars.

2 Scope

This module applies to 35mm adjustable stretcher bar assemblies, their associated fastenings and defects on all S&C point switches fitted with 35mm square section adjustable stretcher bars on the following rail sections:

- CEN56 (BS113A) full depth switches
- RT60 shallow depth switches
- CEN54 (UIC54B) shallow depth switches
- Plain leads and switch diamonds in running lines.

3 Introduction to 35mm adjustable stretcher bars

The 35mm adjustable stretcher bar assembly consists of a 35mm bar and two brackets. The assembly couples together the switch rails, transmits the drive forces and enables adjustment of the switch opening (free wheel clearance) throughout the planed length of the switch.



Figure 1 – 35mm adjustable stretcher bar assembly with type 2 brackets



Figure 2 – the 35mm bar

Rubber bushes provide some flexibility at the connection between the 35mm bar and the brackets. They also provide electrical insulation.

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015



Figure 3 – bracket

The connection between the bracket and 35mm bar is achieved with hard lock nuts which lock against each other (and not the rubber bushes). The connection can be adjusted to provide the required length of stretcher bar assembly.

When correctly installed and adjusted, the closed switch rail fits up to the stock rail. This allows facing point lock and detection tests to be carried out but the switch rail should not be excessively tight.

4 How to select the correct components

4.1 Brackets

There are a range of 35mm adjustable stretcher bar bracket designs which cater for different types of S&C. The bracket designs include both web (Type 1) and foot mounted (Type 2) variants.(see Appendix D for full details).

On shallow depth vertical CEN54 (UIC54B) S&C:

- a) Type 1 brackets attach to the rail web at front, intermediate and rear positions
 - 1) There are three different designs of type 1 brackets used in RT60 S&C; the brackets are not interchangeable between the different manufacturer's designs.
 - 2) Special type 1 brackets are fitted at the first adjustable stretcher bar position as they have integral kicking straps.
- b) Type 2 brackets attach to the rail foot at rear and intermediate stretcher bar positions

On full depth rail sections CEN56 (BS113A) S&C:

- a. All of the brackets are fixed through the web of the rail.
- b. The brackets used on this type of rail are unique to this type of rail section and cannot be fitted to shallow depth rail:

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

- c. Different types of brackets are available to cater for the different types of drive lugs that can be found on full depth rail. The type of brackets required also depends on the type of Points Operating Equipment (POE) used.

Shallow depth vertical CEN54 (UIC54B) switch-diamonds have four adjustable stretchers bars. The type of brackets used, and the position of the stretcher bar in the switch, depends on whether the switch-diamonds are point machine driven or clamp lock driven. See clause 4.4 for details.

For full details, see track engineering drawings: RE/PW/823, 'General arrangement for switch-diamonds' and RE/PW/824, 'brackets and fixings for adjustable 35mm square adjustable stretcher bars for shallow-depth switches'.

The following sections explain how the type 1 and type 2 brackets are used and the fasteners that are used to fix them to the 35mm bar and to the switch rail.

4.1.1 Web mounted type 1 brackets

Type 1 brackets are fixed to the web of the rail using an M20 X 170mm bolt and a M20 torque prevailing nut tightened to a torque of 250Nm (See Figure 4)

Although type 1 brackets all fix in the same way, they are not interchangeable. For example, a type 1 bracket for shallow depth vertical CEN54 (UIC54B) S&C cannot be used on CEN56 (BS113A) full-depth.



Adjustable Stretcher Bar

Supplementary Drive Rod

Figure 4 – Type 1 Bracket with a point drive rod secured in place with hard lock nuts.

4.1.1.1 Type 1 Brackets for RT60

All RT60 S&C uses type 1 bracket to secure adjustable stretcher bar assemblies to the switch rail. The brackets are not interchangeable between the different manufacturers' RT60 S&C designs.

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

To aid identification, three examples of different manufacturers' brackets are shown in figures 5 to 7 below:

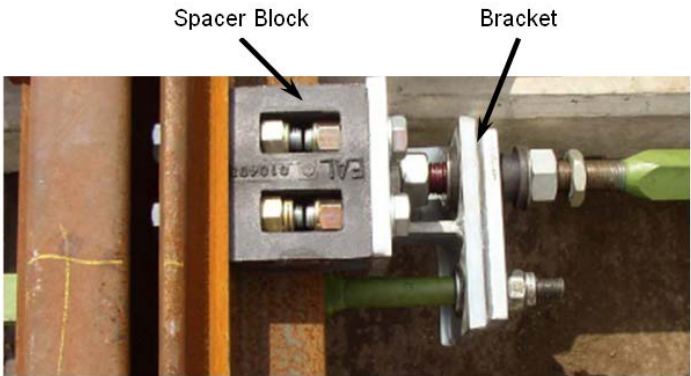


Figure 5 – Part Installed Edgar Allen (EAL) adjustable stretcher bar assembly (as originally supplied with half/full locknuts)



Figure 6 – Installed Corus Cogifer (CC) adjustable stretcher bar assembly (as originally supplied with hard lock nuts)

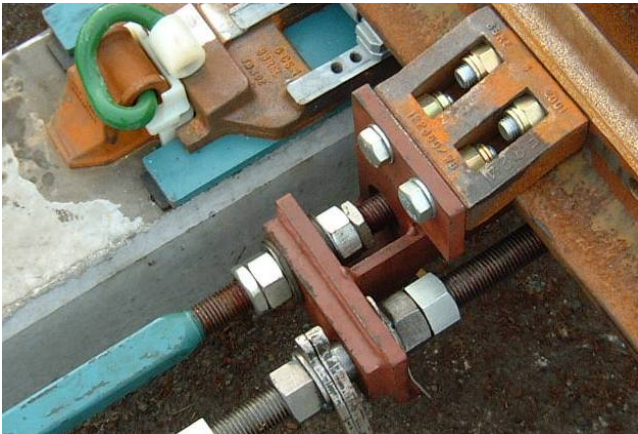


Figure 7 – Part installed Balfour Beatty (BB) adjustable stretcher bar assembly (as originally supplied with half/full locknuts)

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

4.1.2 Foot mounted type 2 brackets

Type 2 brackets are used to secure the rear and intermediate adjustable stretcher bars on shallow depth vertical (UIC54B) S&C.

These brackets are fixed to the rail foot using an M20 X 75mm bolt, 3° taper washer, Vibro-lock washer and torque prevailing nut tightened to a torque of 250Nm.

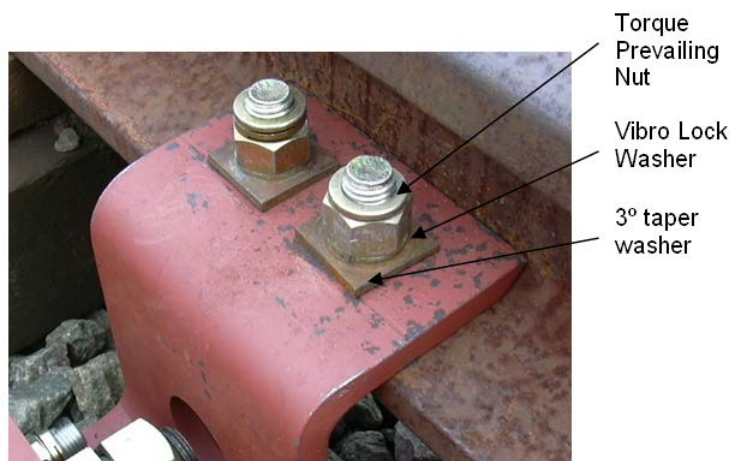


Figure 8 – A type 2 bracket secured with a 3 ° taper washer, Vibro-lock washer and Philidas style torque prevailing nut

There are two other fastener types which are obsolete but can still be found in use with type 2 brackets. The 'Kep' nut was a temporary fastener which could be left in place for up to 12 weeks and then replaced with an MGL pin, also referred to as a "Huck" pin.

If 'Kep' nuts or MGL/Huck pins are found to be loose or defective and need to be renewed, replace them with a new fastening fitted with a torque prevailing nut.

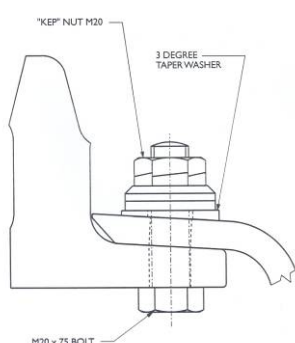


**Figure 9 –
Kep nut**

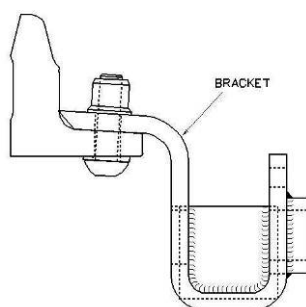


**Figure 10 –
MGL/Huck pin**

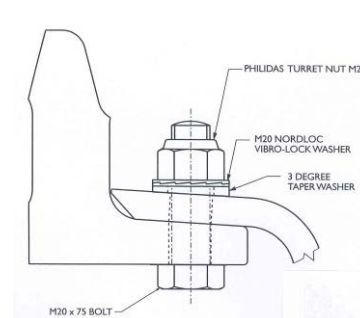


**Figure 11 –
Torque Prevailing nut**

NOTE Type 2 brackets can also be found on RT60 manufactured by S&C VAE. It is also possible to use Type 2 brackets on CEN56 (BS113A) full depth switches but these are secured through the web of the rail.

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

4.1.3 Brackets for Full Depth Switches

35mm adjustable stretcher bar designs have been developed to fit full depth rail sections. These designs are not compatible for use with shallow depth rail.

All designs of bracket for full depth rail are secured through the web of the rail. Different designs of bracket are available to cater for the different designs of drive lugs that can be found on full depth rail. The design of bracket required also depends on the type of Point Operating Equipment (POE) used.

Details of the brackets for the full depth adjustable stretcher bars can be found on RE/PW 586 to RE/PW 589 and in Appendix D.



Figure 12 – Full depth 35mm adjustable stretcher bar assembly

4.1.4 M20 nuts torque settings

M20 torque prevailing nuts are used to secure the stretcher bar brackets to the switch rail. They should be torqued to 250Nm on installation and check tightened to 200Nm.

Table 1 shows the adjustments required to the torque wrench setting to take into account their use with extension pieces.

Type of torque wrench	Required installation value: 250 Nm	Required check tightened value: 200 Nm
Norbar 200 & 300 range	250 Nm	200 Nm
Non insulated LTTK 11 (fitted with the 22mm spigot adaptor)	Indicated value to achieve 250 Nm: 245 Nm	Indicated value to achieve 200 Nm: 197 Nm
Insulated LTTK 16 (fitted with the 22mm spigot adaptor)	Indicated value to achieve 250 Nm: 135 Nm	Indicated value to achieve 200 Nm: 105 Nm

Table 1 – M20 torque prevailing nuts

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

4.1.5 Brackets for Switch Diamonds

Shallow depth vertical (UIC54B) switch-diamonds have four 35mm adjustable stretchers bars. The type of brackets used, and the position of the stretcher bar in the switch, depends on whether the switch-diamonds are point machine or clamp lock operated.

The following is an overview of switch-diamonds for shallow depth CEN54E1A1 (UIC54B) rail. For full details, see track engineering drawings: RE/PW/823, 'General arrangement for switch-diamonds' and RE/PW/824, 'brackets and fixings for adjustable 35mm square adjustable stretcher bars for shallow-depth switches'.

NOTE No design of 35mm adjustable stretcher bar is compatible with CEN56 (BS113A) full depth switch-diamonds. These use a fixed stretcher bar design and are not covered in this Standard (see Track Engineering Drawing RE/PW/92/113A 'Stretcher bars and soleplates for switch-diamonds').

4.1.5.1 Shallow Depth Switch Diamonds - Point Machine Operated

The front (first) adjustable stretcher bar has both a type 5 and a type 6 bracket. Both are fixed to the web of rail and have kicking straps. The type 6 bracket has additional holes to facilitate the fitting of a drive plate for the point drive.

Fixing centres for both brackets are identical; this is to allow the point drive to be located on either side of the switches.

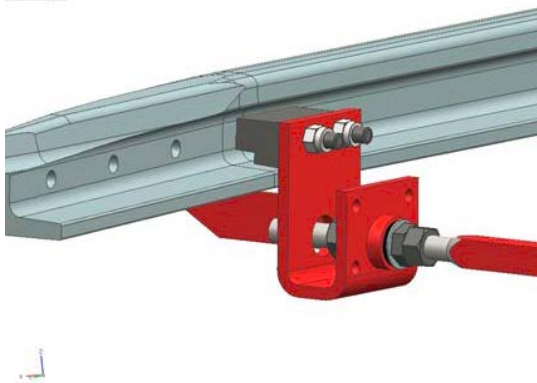


**Figure 13 – Type 6 bracket
(with additional holes)**

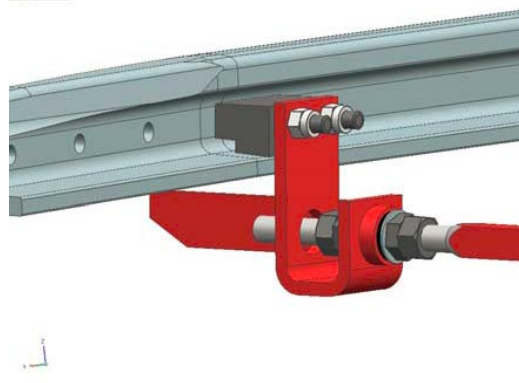


Figure 14 – Type 5 Bracket

The second adjustable stretcher bar is fixed to the rail using type 4 brackets which are handed (L and R) and come in three different types to cater for different switch diamond angles:

- 1 in $7\frac{1}{2}$ to 1 in $10\frac{1}{2}$
- 1 in $12\frac{3}{4}$ to 1 in 15
- 1 in 17 to 1 in 28.

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

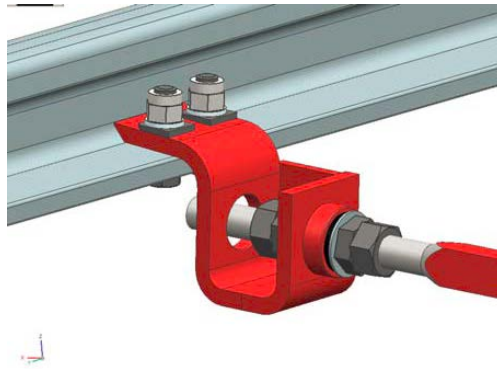


Figure 15 – Type 4L for 1 in 7½ to 1 in 10½

4.1.5.2 Shallow Depth Switch Diamonds - Clamp Lock Operated

The front (first) adjustable stretcher bar is secured with type 5 brackets on both sides. (No point drive take-up is required with clamp-lock operated switch diamonds).

On the second adjustable stretcher bar, Type 4 brackets are used in the same way as in a conventional point-machine driven design. Full details for the brackets are provided in Appendix D.

4.2 Supplementary drive and detector connection lugs

Connection lugs are fitted to adjustable stretcher bar brackets to facilitate the fitting of supplementary drives or detectors. They usually take the form of additional plates and are secured to the adjustable stretcher bar bracket using four hexagonal socket cap screws, washers and torque prevailing nuts. In some RT60 designs the plate is welded to the bracket.

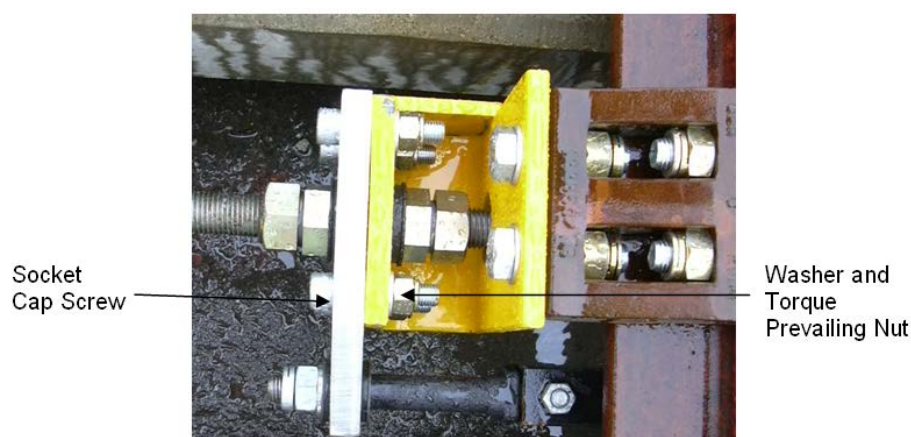


Figure 16 – Supplementary detector

Connection lugs for CEN54E1A1 (UIC54B) are secured using cap screws. For CEN56 (BS113A) the drive and detector connection lugs are part of the stretcher bar bracket.

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

4.3 M30 Lock Nuts

Lock-nuts secure the adjustable stretcher bar to the fixing brackets. There are two types of lock nuts used to secure adjustable stretcher bars as described below.

4.3.1 Full Nut/Half Nut Lock Nuts

The first designs of adjustable stretcher bar used an arrangement of full-nut/half-nut locking nuts to secure the adjustable stretcher bar to the rails. These are used in pairs: one pair used either side of the bracket at each end of the stretcher bar.

Note: the nuts nearest the switch rail are referred to as the 'outer pair' and the nuts furthest from the switch rail are referred to as the 'inner pair'.



Figure 17 – Full nut/half nut lock nuts

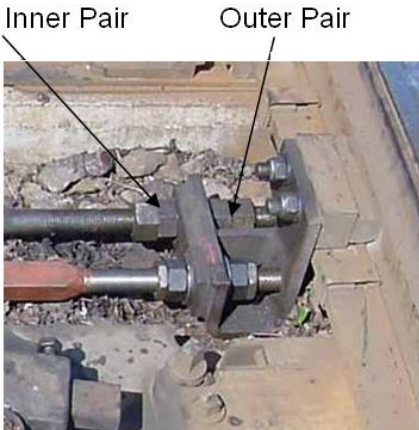


Figure 18 – Full nut/half nut lock nuts as fitted

The full nut is fitted nearest to the bush and is tightened a third-of-a-turn, sufficient to compress the bush. The half-nut is fitted against the full-nut and together they perform the lock-nut function.

M30 full/half nuts should be torqued to 300Nm on installation and check tightened to 200Nm. Table 2 shows the adjustments required to the torque setting, when using the extension piece, for all types of torque wrench.

Copyright Network Rail

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

Type of torque wrench	Required installation value: 300 Nm	Required check tightened value: 200 Nm
Non insulated LTTK 11 (fitted with the 46mm A/F long extension)	Indicated value to achieve 300Nm: 255 Nm	Indicated value to achieve 200Nm: 160 Nm
Version 1 of the Insulated LTTK 16 (fitted with the 46mm A/F long extension)	Indicated value to achieve 300Nm: 140 Nm	Indicated value to achieve 200Nm: 95 Nm
Version 2 of the Insulated LTTK 16 (fitted with the 46mm A/F long extension)	Indicated position to achieve 300Nm: Position B	Indicated position to achieve 200Nm: Position A

Table 2 – M30 full/half nut assembly values

The full/half nut arrangement is no longer used, any new installations use hard lock nuts.

4.3.2 Hard lock nuts

The current designs of adjustable stretcher bar lock the bar to the bracket using hard lock nuts. Like conventional full-nut/half-nut fixings, these are used as pairs with one pair used either side of the bracket.

As can be seen from figure 19, the pair on the inside of the bracket is known as the 'inner' pair and the pair that is on the outside of the bracket, closest to the switch rail is known as the 'outer' pair.



Figure 19 – Fitted pair of hard lock nuts

Each set of hard lock nuts has a male nut, conically shaped to fit the female nut (see figure 4). As they are slightly offset, they provide a lateral load and a locking action when the nuts are tightened. The male nut is fitted nearest the bush and is tightened by a third-of-a-turn, sufficient to compress the bush.

Ref:	NR/L2/TRK/6100/mod06
Issue:	1
Date:	07 March 2015
Compliance date:	07 March 2015

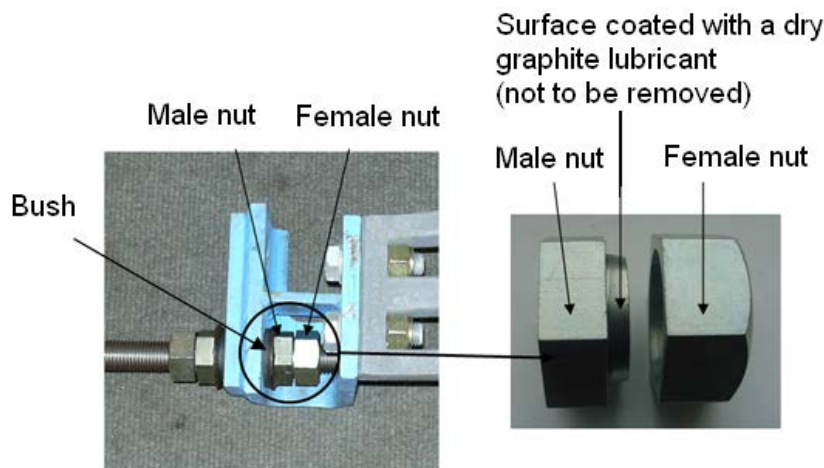


Figure 20 – Male and Female Hard Lock Nuts

IMPORTANT NOTE

There are two sizes of hard lock nuts used on S&C with 35mm adjustable stretcher bars. Although they look the same they are different sizes and are not interchangeable. The two types of nuts are:

- M30 lock nuts (catalogue no. 003/035016) used to secure the adjustable stretcher bar to its bracket (see figure 20). These can be identified as the female nut has 'M30' stamped on the top surface
- 1½" Whitworth lock nuts used to secure the drive/detector rods. These can be identified as the female nut has 'BSW 1½'" stamped on the top surface.

If you are in any doubt about the size of lock nuts, use a new set.

The M30 Hardlock nuts are now supplied with flanged female nut as shown in figure 21.

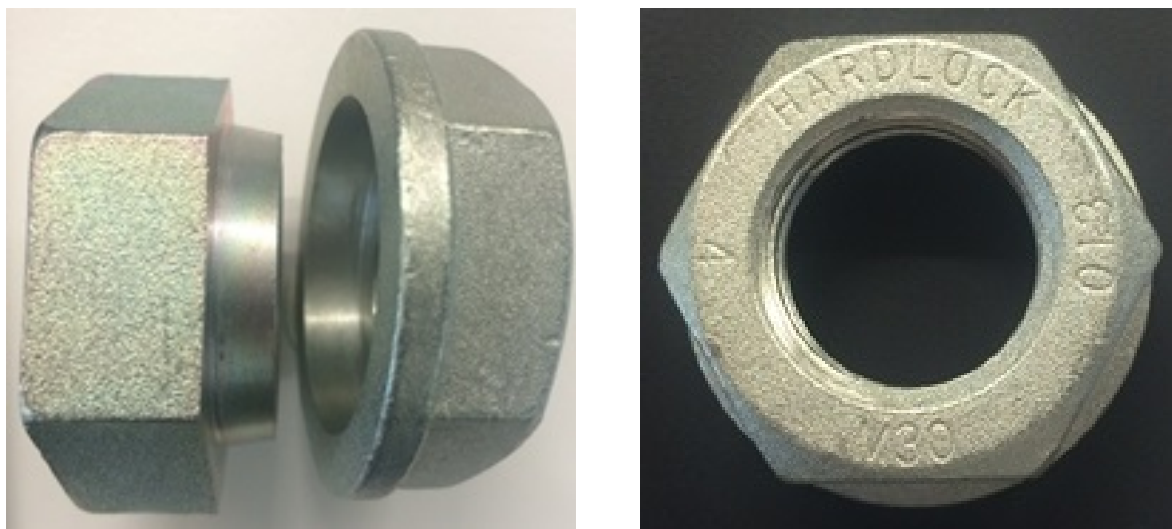


Figure 21 – M30 Hardlock Nuts – Flanged Female Nut