

Tension Structures



Macalloy are global leaders in the manufacture of threaded steel tension bars and cable systems.

Based in the heart of the UK's steelmaking industry, we have a history that can be traced back 100 years.

However, we are always looking forward, and we constantly strive to innovate and improve quality to meet the needs of the modern construction industry. Our products have been central to the construction of many prestigious global landmarks including, the 7-star Burj Al-Arab Hotel in Dubai, Marina Bay Sands in Singapore and Jubilee Bridge in London.



The Renault Building, Swindon.

For further information call +44 (0)1909 519200 email sales@macalloy.com visit macalloy.com

Why work with us?

- Leading suppliers to the construction industry for over 100 years
- Exporting worldwide since the 1960s
- Industry experts in steel threaded bar and cable systems
- Innovative solutions to challenges in the construction industry
- Home of the PT Bar
- Originators of the Tension Structure System
- Technical support from our experienced design and engineering team
- Internally and externally audited for quality
- Internationally-recognised award winners
- Holders of European and worldwide technical product approvals
- Often imitated but never equalled

Our commitment to innovation and willingness to work alongside our customers to develop solutions to industry problems, are the qualities that have enabled us to maintain our position as market leaders for 100 years.

At Macalloy, we have been developing innovative new systems and technologies in Tensile Structures since the early 1980s.

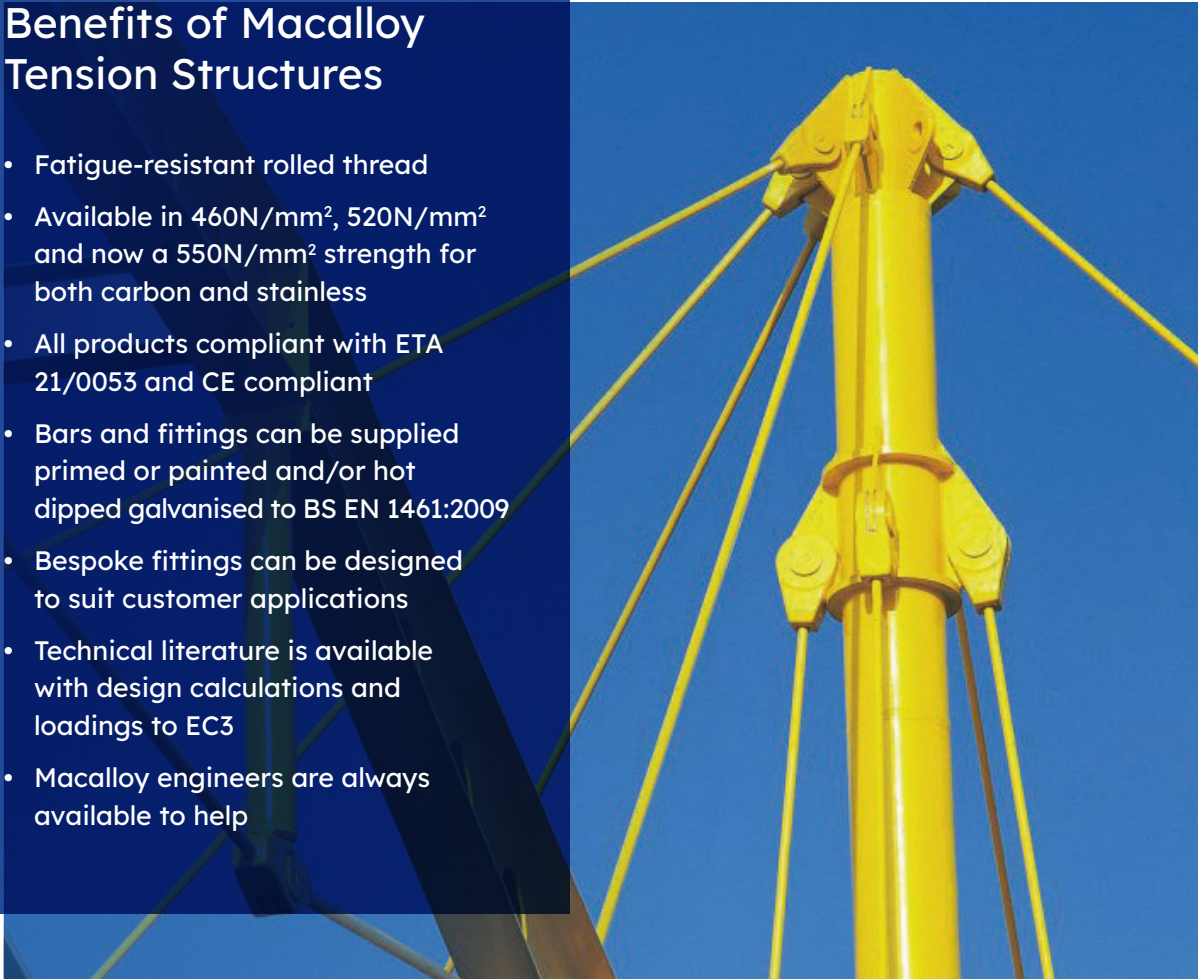
Since then, our range of architectural tension structure bars has grown in popularity, providing designers with the opportunity to create contemporary designs and custom solutions.

As market leaders in the design, manufacture and supply of threaded bar systems, Macalloy products have been integral to the construction of many pioneering, landmark structures across the globe.



Benefits of Macalloy Tension Structures

- Fatigue-resistant rolled thread
- Available in 460N/mm², 520N/mm² and now a 550N/mm² strength for both carbon and stainless
- All products compliant with ETA 21/0053 and CE compliant
- Bars and fittings can be supplied primed or painted and/or hot dipped galvanised to BS EN 1461:2009
- Bespoke fittings can be designed to suit customer applications
- Technical literature is available with design calculations and loadings to EC3
- Macalloy engineers are always available to help



The Renault Building, Swindon.

Tension Bars

The Macalloy tension structures range includes a 460N/mm², 520N/mm² and the new 550N/mm², available in carbon and stainless steel. For more details, please refer to the data sheet.

All systems are ISO 9001 accredited and meet European technical approval document ETA 21/0053, which is available on request.

Carbon bars can be supplied primed and ready for paint, painted, powder-coated or hot-dipped/galvanised to BS EN 1461:2009.

Fittings are designed to give the maximum amount of flexibility and adjustment, and special fittings can be designed to suit customer requirements.

All fittings (forks, pins, turnbuckles, couplers and lock covers) are supplied with a galvanised coating.

Cast fittings are UT and MPI tested in accordance with European technical approval - ETA21/0053.

FINAL ASSEMBLY EXAMPLE

Turnbuckle
(for additional adjustment and to induce tension)

Coupler
(for straightforward joining of two rods with no adjustment/ tensioning)



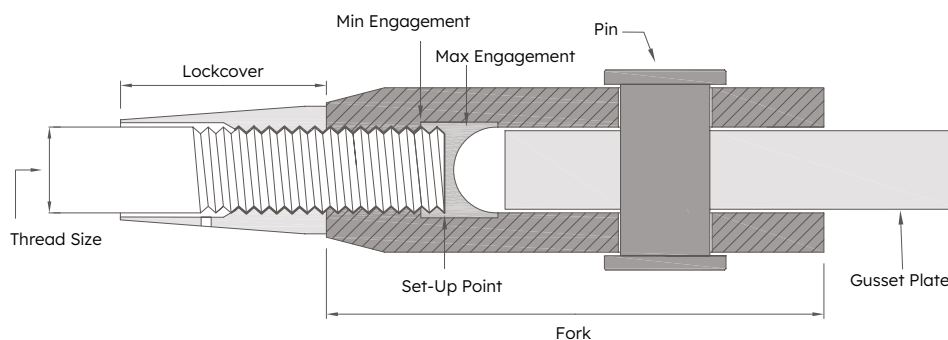
FORK ADJUSTMENT AND SET UP POINTS

Fork Adjustment - M10 to M56: +/- 1/2 thread diameter in each fork end.

Fork Adjustment - M64 to M105: +/- 25 mm in each fork end.

Set-Up Point - M10 to M56: 1 1/2 x thread diameter in each fork end.

Set-Up Point - M64 to M105: 1 x thread diameter plus 25mm in each fork end.



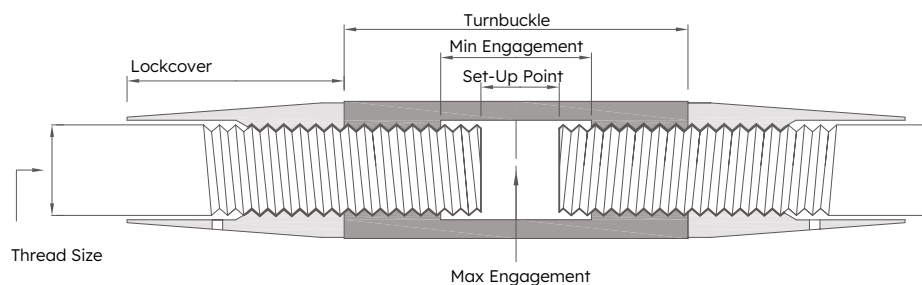
TURNBUCKLE ADJUSTMENT AND SET UP POINTS

Turnbuckle Adjustment - M10 to M24: +/- 25mm.

Turnbuckle Adjustment - M30 to M105: +/- 50mm.

Set-Up Point - M10 to M24: 1 x thread diameter +12.5mm in each end of the turnbuckle.

Set-Up Point - M30 to M105: 1 x thread diameter + 25mm in each end of the turnbuckle.



Assembly and Installation

For both pre-assembled and non-assembled tendons, please follow the assembly and installation instructions to ensure correct set-up points and thread engagement.

1. Note the thread direction of each bar end.



2. Screw tapered lockcovers on to the bar as far as the thread allows, with the taper pointing away from the fork, coupler or turnbuckle. Ensure the correct lockcover is used for fork or turnbuckle.



3. Screw forks, turnbuckles and couplers on to bars, noting set-up points on page 5. Couplers should be fully engaged.

4. Position the bar in place and secure with pins.



5. Where no turnbuckle is used, turn the bar to induce the load/adjustment required.

6. Where a turnbuckle is used, turn the turnbuckle to induce the load/adjustment required.

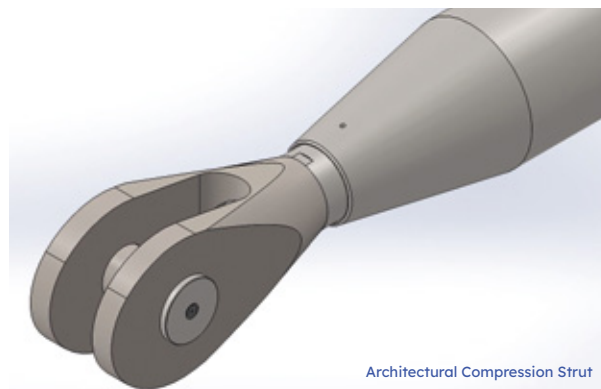
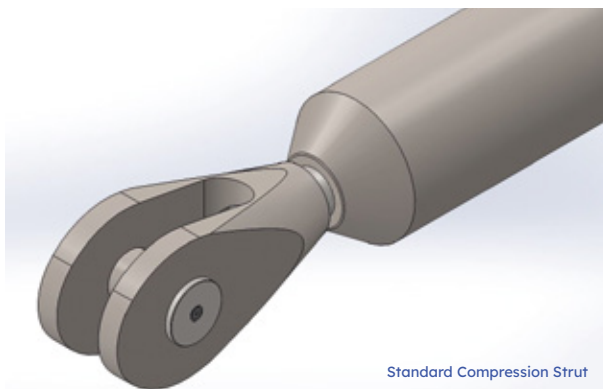
7. Screw lockcovers back against forks/couplers and turnbuckles.



8. Seal fork and lockcover - please contact Macalloy for sealing method statements.

9. Assembly and installation is complete

Compression struts



Corrosion Protection

Can be supplied galvanised, painted, powder-coated or in stainless steel.

Assembly and Installation

1. Remove pins using an Allen key, position the strut and secure with pins. Tighten with an Allen key.



2. Screw the locking collar into the strut so that only a small part of the locking collar is left visible, then turn the strut to the required position.



3. Screw the locking collar back against the fork. All the thread should be covered. The forks should be sealed. Please contact Macalloy for sealing method statements.



SC460 Cable System

SC460 Swaged Adjustable Fork

FOR MINIMUM BREAK LOADS
AND CABLE TYPES, CONTACT
TECHNICAL@MACALLOY.COM



Assembly and Installation

1. Remove pins using the Allen key supplied, and screw lockcovers away from tensioners as far as the thread will allow.



2. Position the cable in place and secure with pins, tightening with the Allen key supplied. For Swaged fork tensioning, use an open-ended spanner on each adjuster and simultaneously turn each one to induce load/adjustment.



3. Swaged Tensioner and Inline Tensioner Adjustment – turn tensioner using an open-ended spanner until the correct level of adjustment tension is achieved. Then screw lockcovers back against the tensioners. Where large loads need to be induced in a cable, a version of the Macalloy TechnoTensioner can be used. For further information, please contact technical@macalloy.com.



Cable stretch

Cables undergo an initial, permanent stretch. This can be between 0.10% and 0.75%, depending on the loading and type of cable. Further elastic stretch will then be proportional to the load applied and cable used. Elastic stretch can be calculated using the following formula:

$d = \frac{\text{Load (kN)} \times \text{Length (mm)}}{E \text{ (kN/mm}^2\text{)} \times \text{Cross Sectional Area (mm}^2\text{)}}$	<p>Where E =</p> <table border="0"> <tr> <td>7 x 19 Strand</td> <td>85 kN/mm²</td> </tr> <tr> <td>1 x 19 Strand</td> <td>107 kN/mm²</td> </tr> <tr> <td>Compact Strand</td> <td>133 kN/mm²</td> </tr> </table>	7 x 19 Strand	85 kN/mm ²	1 x 19 Strand	107 kN/mm ²	Compact Strand	133 kN/mm ²
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1 x 19 Strand	107 kN/mm ²						
Compact Strand	133 kN/mm ²						

Cables are not supplied pre-stretched. If pre-stretched cables are required, please request this at the time of the enquiry or order.



Etihad Stadium, Manchester.

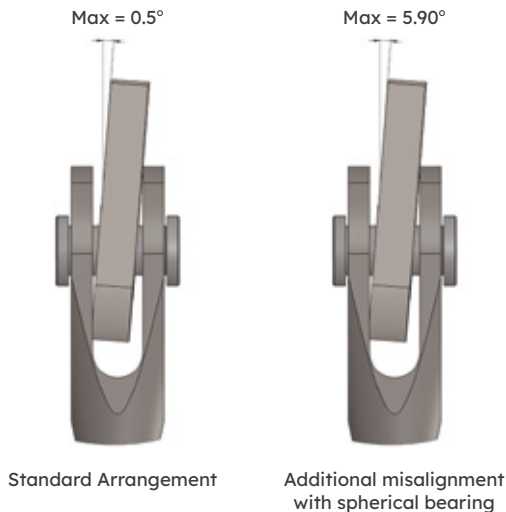
Fork / Gusset Plate Misalignment



Forks should be kept in plane and perpendicular to each other on all Macalloy Tension Structure Systems.



Use of horizontal gusset plates should be avoided to prevent loads in gusset plates due to bar weight.



The standard Macalloy fork allows for misalignment between gusset plates of up to 0.5 degrees. Where greater adjustment is required or there is potential movement exceeding 0.5 degrees, larger forks can be put on the bar or strut and a spherical bearing can be inserted providing up to 5.9 degrees of misalignment / movement.

BESPOKE SYSTEMS

Macalloy can supply a range of special items, including:

- Larger diameter tension bars
- Bespoke cast and fabricated connection pieces
- Spade connections
- Oversized forks or spades on smaller diameter bars, cables or struts

ENGINEERING SUPPORT

Our experienced Engineering Team are here to answer your technical enquiries and assist in the design and development of your project.

From your first initial design, our Technical Team can help in putting your ideas into practice and help develop solutions tailored to your specific needs. Macalloy's engineering team can provide support and advice on a range of issues including:

- Fire protection
- Thermal expansion
- Installation and stressing
- Managing misalignment and movement

Macalloy Site Services

Get the most out of your Macalloy products

Have you thought about...

Pre-loading and sagging?

The need for aligning and levelling tension rods?

Checking and determining loads?

At Macalloy, we offer a comprehensive Site Services package. This includes:

1. SERVICE OPTIONS

Macalloy offer a number of service options, including complete job stressing, de-stressing or measurement of loads, all to an agreed stressing sequence. In addition, one of our representatives can supervise the assembly of the components on site.

2. TRAINING

Macalloy provide support and training on all our systems, as well as on the use of hydraulic equipment. You can also access training on jacks and Macalloy TechnoTensioner units.

3. EQUIPMENT HIRE/PURCHASE

We can arrange for the hire or purchase of calibrated torque wrenches, hydraulic jacks and TechnoTensioner Units, for any length of time required. All equipment comes with calibration and test certificates and conversion charts.

4. AFTER SALES SERVICE

As part of our system management and maintenance programme, to ensure the long-term health of the bar system, Macalloy can offer an inspection service including load checking.

MACALLOY TENSIONING SYSTEMS

MACALLOY PIN-CONNECTED BARS AND CABLES

Used in conjunction with a turnbuckle and can be used to accurately induce predetermined loads. The Macalloy TechnoTensioner can be used to avoid seizing in stainless steel threads due to cold welding.

Macalloy's Site Services team is available to provide on-site support and training on the use of the Macalloy TechnoTensioner.



PANAJI TOWN BRIDGE, GOA, INDIA. The Goa State Infrastructure Development Corporation (GSIDC) launched the Gyan Setu pedestrian bridge in September 2022, linking Mala to the Central Library. The 99m long, 3m wide bridge spans the Rua de Ourem creek. The cable-stayed bridge's single pylon makes its construction particularly unique. The bridge's main pylon features Macalloy's M48 and M64 460 stainless steel bars.



ETIHAD STADIUM, MANCHESTER. At a capacity of 53,400, Manchester City's stadium is the fifth largest in the Premier League. Its cable-stayed roof, designed and developed by Arup, utilises Macalloy architectural tension rods to suspend the roof from ground-anchored steel pylons.



SCOTTISH PARLIAMENT, EDINBURGH. The iconic Scottish Parliament building at Holyrood is home to the Scottish Parliament. This purpose-built structure houses over a thousand MSPs, staff and civil servants. Its design reflects the landscape, people and culture of Scotland and is constructed from steel, oak, and granite. MACALLOY 460 in diameters M10 to M56 and lengths of 6m for M64 and M76 were used to help support the roof within the Scottish Parliament Building, which was designed by Enric Miralles, and completed in 2004.



ETA - 21/0053 Tension Rod Systems
BSEN ISO 9001: 2015



For further information call +44 (0)1909 519200
email sales@macalloy.com or visit macalloy.com

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