PRODUCT AND AVAILABILITY GUIDE

Low Relaxation (LR) Strand

Effective from: February 2019
Applicable for: Australia
Liberty Steel is Australia’s leading manufacturer of wire products. Liberty Steel produces a range of 7-wire strand for use in the construction & mining industries.

Strand is a number of wires in one or more layers, laid around a centre wire, with a uniform length of lay in each layer. Wires are laid helically and may be round or shaped or a combination of both.

Strand is used in post tensioning and pre-stressing of concrete where large spans are desirable for the construction of bridge beams, shopping centres, car parks and commercial buildings. Strand is also used in the manufacture of cable bolts for underground mining applications.

The 9.5, 12.7, 15.2 and 15.7mm strand manufactured by Liberty Steel complies with Australian Standard AS/NZS 4672 “Steel Prestressing Materials” and is Proudly Australian Made.

1.0 INTRODUCTION

This guide details the product specifications for the core range of Australian Made LR Strand supplied by Liberty Steel.

1.1 Terms of Payment

Liberty Steel standard Payment Terms are nett 30 days from end of month of invoice. Liberty Steel’s Standard Terms and Conditions of Sale, as amended from time to time, apply to the sale of goods and services by Liberty Steel. Liberty Steel’s Standard Terms and Conditions of Sale are available at www.libertygfg.com/tandc.asp.

Liberty Steel may amend the Standard Terms and Conditions of Sale at any time. Please check Liberty Steel’s website or contact the Liberty Steel business for a copy of the current Standard Terms and Conditions of Sale prior to placement of an order. The placing of an order constitutes an acknowledgement that you have read, and agreed to be bound by, Liberty Steel’s Standard Terms and Conditions of Sale.

Liberty Steel reserves the right to change the details of an order in the case of circumstances or events not foreseen by Liberty Steel at the time of order placement. Liberty Steel will endeavour to minimise the extent of any changes to an order and will notify you in writing of any such changes. You will have no claim against Liberty Steel in respect of any changes to an order.
2.0 PRODUCT AVAILABILITY / STRAND SPECIFICATIONS

Liberty Steel Australian Made LR Strand is typically available ex-stock, however requested forward orders are appreciated to ensure quantities and delivery dates are able to be met.

Table 1. Strand Specifications

<table>
<thead>
<tr>
<th>Name / Size</th>
<th>9.5mm Strand</th>
<th>12.7mm Strand</th>
<th>15.2mm EHT Strand</th>
<th>15.7mm Strand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Number</td>
<td>300519</td>
<td>206199</td>
<td>206281</td>
<td>266420</td>
</tr>
<tr>
<td>Tolerance on Strand Diameter</td>
<td>+/- 0.4</td>
<td>+/- 0.4</td>
<td>+/- 0.4</td>
<td>+/- 0.4</td>
</tr>
<tr>
<td>Minimum Breaking Force (kN)</td>
<td>102</td>
<td>184</td>
<td>261</td>
<td>279</td>
</tr>
<tr>
<td>Minimum 0.2% Proof Lead (kN)</td>
<td>83.6</td>
<td>151</td>
<td>214</td>
<td>249</td>
</tr>
<tr>
<td>Minimum Elongation 600mm GL (%)</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Nominal Area (mm²)</td>
<td>55</td>
<td>98.6</td>
<td>143</td>
<td>150</td>
</tr>
<tr>
<td>Nominal Mass (kg/1000m)</td>
<td>432</td>
<td>774</td>
<td>1122</td>
<td>1170</td>
</tr>
<tr>
<td>Nominal Length (m/1000kg)</td>
<td>2315</td>
<td>1292</td>
<td>891</td>
<td>855</td>
</tr>
<tr>
<td>Approx Modulus of Elasticity (Gpa)</td>
<td>195 (+/- 10Gpa)</td>
<td>195 (+/- 10Gpa)</td>
<td>195 (+/- 10Gpa)</td>
<td>195 (+/- 10Gpa)</td>
</tr>
<tr>
<td>Coil Weight</td>
<td>3.0 Tonne coils ex stock</td>
<td></td>
<td></td>
<td>(Other coil weights may be available by enquiry)</td>
</tr>
<tr>
<td>Lay (or Helix)</td>
<td>Right Hand Lay</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: LR Strand is manufactured and stocked in Newcastle, New South Wales.

3.0 PACKAGING

LR Stand is supplied as reel-less coils and in a wrapped condition.

- Coil Inside Diameter: 900mm nominal
- Coil Outside Diameter: 1420mm (Max.)
- Coil Width: 820mm nominal
4.0 MINIMUM ORDER QUANTITY (MOQ)

The Minimum Order Quantity is 24 tonnes. Quantities less than the Minimum Order Quantity may be agreed to however, additional surcharges for freight and other costs may apply.

5.0 CERTIFICATION AND COMPLIANCE

A test certificate will be supplied with each coil. All Liberty Steel mills are certified to ISO9001 and all testing is done in NATA certified laboratories. Low Relaxation Strand is made in accordance with AS 4672.

5.1 Mill Quality Certification

Our Newcastle Wire Mill has a quality system in place which conforms to and is accredited by SAI Global to AS/NZS ISO 9001:2000 - Quality Management Systems - Requirements. Our Certification Number is QEC0087.

All products manufactured are tested for conformance to appropriate Product Standards in our NATA registered laboratories. Our laboratories operate in accordance to ISO/IEC 17025 (1999). Our accreditation number is 821. Product testing is accredited by the Australian Certification Authority for Reinforcing Steels Ltd (ACRS). Our Certification Number is 71001.

Liberty Steel manufactured Strand is fully certified for Queensland Transport and Main Roads projects.

6.0 DELIVERY CAPABILITY

Liberty Steel will deliver to your manufacturing facility or construction site. Due to the variety of trailer types used for delivery, please specify if you require crane only offload at time of order placement. New sites will also need an authorised Liberty Steel site inspection form completed prior to any deliveries – this is conducted by Liberty Steel Sales and Service.

6.1 Delivery lead times

The delivery lead times for Liberty Steel LR Strand are set out in the table below. They apply to approved sites only in full truck loads. Please contact Liberty Steel Sales & Service for delivery lead times to other destinations and non-approved sites.

The delivery tolerance is +0/-5 days. All days refer to working days and public holidays during the lead time need to be added.

Delivery tolerance is to allow for scheduling, transport and production variations.

Liberty Steel has the ability to meet specific delivery dates. These must be requested in writing at the time of order placement and will be acknowledged (if they can be accommodated) at the time of order acceptance. Additional charges may be incurred. These will be advised at time of order acceptance.

<table>
<thead>
<tr>
<th>Location</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adelaide</td>
<td>5 days</td>
</tr>
<tr>
<td>Brisbane</td>
<td>5 days</td>
</tr>
<tr>
<td>Melbourne</td>
<td>5 days</td>
</tr>
<tr>
<td>Perth</td>
<td>31 days</td>
</tr>
<tr>
<td>Sydney</td>
<td>3 days</td>
</tr>
<tr>
<td>Newcastle</td>
<td>3 days</td>
</tr>
<tr>
<td>Other Locations</td>
<td>On Request</td>
</tr>
</tbody>
</table>

Example:
For a Melbourne order
Delivery Day 5
Order placed on Day 0
Order normally delivered by or before Working Day 5

Please note that published lead-time applies for orders received by 2.00pm on Day 0.
7.0 PRODUCT DETAILS

LR Strand is made up of seven wires, six outer wires twisted around a central wire (known as the “King Wire”) with a uniform length of lay in each layer. Liberty Steel gives special emphasis to quality control in the production of LR Strand, not only of the final product but throughout processing to ensure compliance with the appropriate standard or other specification nominated by the user.

8.0 RECOMMENDATIONS FOR USAGE & OTHER INFORMATION

8.1 Centre Pulling of Strand

Centre pulling of strand is the most common and convenient way of paying-off from a coil. It is important in handling strand to ensure that it is pulled from the coil in the correct manner. Since the strand acquires a twist for each loop removed from the coil, a swivel should be used to enable this twist to be relieved thus avoiding kinking and looping. The strand should pay off around the circumference of the coil so that the helix of the strand tends to tighten and not unravel. The inner end of the strand must be started so that the strand will be drawn off from the face where the inner end is secured and the loop should pay off in a clockwise direction as per the following diagram.

In order to payoff strand in this manner coils must be placed in dispensers/bripacs before removal of the straps. A typical unit is shown above. Liberty Steel does not manufacture or sell bripacs.

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8.2 Cutting of Strand

Strand can be cut using disc cutters or oxyacetylene. Abrasive disc cutters can be used without binding the strand which can be cut without splaying out. If a wire should be displaced during cutting it can easily be snapped back into place. Flame cutting is frequently used but care must be taken to ensure that molten metal is not allowed to affect other strands and the heat-affected zone of the cut must be well clear of anchorages. Always ensure that appropriate personal protective safety equipment is used.

8.3 Safety

Pre-stressing tendons are very different from steel reinforcing bars, both as a material and in their application. Certain precautions and procedures must be adopted when using them and reference should be made to Australian Standard 3600 – “Concrete Structures” for recommendations. When handling and storing it is very important to avoid abrasion damage, kinks, nicks and corrosion damage, all of which may lead to sudden and unexpected failure of the strand during or subsequent to stressing.

8.4 Mechanical Damage

- All coils should be lifted vertically from the delivery vehicle and should not be dragged across the tray of vehicle or be allowed to contact the coaming or side rails.
- Care should be taken during handling to and from storage areas to ensure coils are not damaged by such practices as dragging across concrete floors.
- Ensure that all equipment (wedge grips, etc) is properly assembled, clean and in good condition. Sand or dirt on equipment can cause tendon slippage and failure.
- Coils should be placed on rubber matting, dry untreated timber or similar material to prevent abrasion damage.
- Where slings are used for lifting coils of strand, they should be inspected for damage prior to lifting coils (ref AS 2759-1985 Section 12).

8.5 Corrosion

Several forms of corrosion exist which are particularly harmful to PC tendons:

- Severe electrochemical attack when tendons are permitted to lie partially immersed in water even for short periods of time. This particularly abrasive form of corrosion causes severe localised pitting.
- “Crevice Corrosion”, whereby pitting occurs within crannies, fissures and other similarly restricted areas, can occur with strand which has ready made crannies that can hold water.

The following precautions should always be observed:

- Strand (coils or tendons) should be stored above ground, preferably in an enclosed building away from moisture and other corrosive influences.
- During design of pre-stressed members ensure that adequate concrete cover is provided for the embedded tendons (ref AS 3600).
- Avoid all chlorides (ref AS 3600).
LIBERTY STEEL

For further information contact:
Sales & Service Team
T: 1800 787 263
E: lrstrand@libertygfg.com
F: 1800 062 977

www.libertygfg.com