

**GLIDING NEW ZEALAND
INCORPORATED**

***ADVISORY
CIRCULAR***

AEROTOW ROPES

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1. Introduction.

This Advisory Circular provides guidance on **Glider Aerotow Ropes**, in support of the requirements in the MOAP Appendix 3-B. In particular:

- The specifications for GNZ supplied rope.
- The requirements to be met for each towrope.
- The requirements for splicing the rings on.
- The requirements for inline splices.
- Care of ropes.

2. Approved Ropes.

- 2.1 The rope supplied by GNZ (see 3 below) is the **only** rope recommended for glider aerotowing. Notwithstanding paragraphs 1.1 and 1.2 of the MOAP Appendix 3B, service experience has shown that this rope does not require a weak link. No other rope should be used unless it has been evaluated and approved by the GNZ Airworthiness Committee.
- 2.2 The GNZ Airworthiness Committee welcomes feedback on rope performance. Comments should be directed to the NAO.

3. Rope Supplied by GNZ.

3.1 Specifications

(a)	Supplier	Donaghy's Industries Ltd.
(b)	Product	6 mm Polyester, heat set.
(c)	Colour	White.
(d)	Identification	One blue polyester marker thread.
(e)	Construction	Three-strand hawser.
(f)	Rope Diameter	6.6 mm.
(g)	Coil Weight	8.1 kg/250m roll.
(h)	Design breaking load	565 kg _f .
(i)	Actual break Load*	990 kg _f . (Ave over three tests.)
(j)	Length	250m roll.

3.2. Properties.

This rope has excellent properties, such as high strength, and resistance to stretch, abrasion, sunlight and chemicals. It is also "heat set" on manufacture, meaning that it is less likely to unravel, and has better wear properties.

*The actual strength of the GNZ rope when new is greater than that actually required. However, all rope loses strength over time due to UV light, abrasion and general wear. This has to be balanced against time of usage. GNZ Airworthiness Committee research led to the conclusion that this rope, as supplied by GNZ is suitable as a glider towrope without the need for a weak-link for its total useful life.

Percentage strength loss from splicing –	
In line splice	11%
Eye over thimble	20%
Simple eye (on to rings)	20%

Percentage strength loss from knots –	
Reef knot	47%
Sheetbend	47%
Bowline	32%
Clovehitch	39%

Specific gravity	1.38
Melting point	260 deg. C

3.3 Identification

This rope has a single blue identifying marker thread woven into the rope. Note that the rolls are supplied in 250m in lengths.

4. **Making up Towropes from Bulk Roll.**

4.1 The minimum length for a GNZ aerotow rope is 50 metres ring to ring. When new, rope lengths should be at least 55 meters from ring to ring, allowing for re-splicing several times without being reduced to less than 50 meters. By the time this has been carried out a number of times, and the rope is down to its minimum approved length, the whole rope is well weather beaten and showing distinct signs of retirement. This is typically about 12 months for a Club doing around 1600 tows a year, on a grassed airfield.

4.2 Under no circumstances should it be attempted to get five rope lengths out of one roll as some or all of them will all end up too short. As about 200 mm is used for each splice at the rings, nearly half a metre is used in the splices, so 55.5 metres is required per rope. Four ropes equal 222 metres. The remaining 28 metres can be used for ground towing ropes or tie-downs, or the ropes could be made up to 60 metres long.

5. **Splicing to Rings.**

5.1 Ropes are to be spliced at each end for the attachment of towing rings. Splices should have a minimum of five full tucks. Splices are not to be whipped and must remain open for inspection. It is a requirement that the towrope be passed twice around the ring in order to reduce wear at this point. The splice should also be as tight as possible against the ring to prevent the double loop from separating. See MOAP Appendix 3-A for tow ring specifications.

5.2 Tapering tucks in the splice.

5.2.1 The rope manufacturer recommends that the end of splices be tapered by using several tapering tucks at the end of the splice. This makes a very neat job and eases the abrupt ending of the splice. But experience

shows it is almost always the wear at the rings which prompts the resplicing of the rope, so tapering is merely a recommendation.

- 5.2.2 Tapering tucks are not hard to do – just take a little more time. With the splice finished, and a little length left over, simply cut the three major twists down from 5 strands to 3 strands for the first tapering tuck, and down to 2 strands for the second tuck. Then cut all loose strands off at the edge of the rope, and flame this part of the splice to burn off (melt) the loose bits remaining.

6. Inline Splicing.

- 6.1 Splices anywhere along the length of the rope are permissible, providing the rope is in good condition. The inline splice should be made with at least FOUR tucks in EACH direction.
- 6.2 Each splice makes the rope a little heavier and stiffer, so no more than two in-line splices are recommended.

7. Towrope – Standard Single Tow

- 7.1 The standard towrope consists of rope, spliced at both ends to the large ring of a standard tow ring assembly. The standard towrope is to be not less than 50 metres between rings.
- 7.2 It is recommended that towropes be manufactured to a length of 55 metres in order to allow for shortening in use.

8. Towropes - Dual Tow

- 8.1 Two separate ropes are to be used. These are to consist of a “short rope” of not less than 50 metres between rings, and a “long rope” of not less than 80 metres between rings.

Note: A "long rope" of about 50m longer than the "short rope" is recommended to provide increased separation between the gliders.

- 8.2 The “short rope” consists of rope, spliced at one end to the large ring of a standard tow ring assembly, and at the other end spliced to the large ring of a multiple tow triple ring assembly.
- 8.3 The “long rope” consists of rope, spliced at one end to the large ring of a standard tow ring assembly, and at the other end spliced to the small ring of a multiple tow double ring assembly.
- 8.4 The two ropes are coupled together at the tow plane hook via the multiple rings in such a manner that if jettisoned by the tow pilot, they will automatically separate. This is accomplished by fitting the multiple tow double ring assembly over the multiple tow triple ring assembly, and then offering the last ring of the triple assembly up to the towplane release in the

normal manner. The double ring assembly will be captured on the triple ring assembly until released.

9. Towropes - Triple Tow

- 9.1 Three separate ropes are to be used. These are to consist of a “short rope” of not less than 50 metres between end rings, a “long rope” not less than 30 metres longer than the “short rope”, and a “triple long” rope not less than 30 metres longer than the “long rope”.

Note: In all cases, each rope must be AT LEAST 30m longer than the preceding rope. This is to be checked by measurement before the tow can proceed.

- 9.2 The “short rope” is to be as described above in para 8.2.
- 9.3 The “long” rope is to be as described above in para 8.3.
- 9.4 The “triple long” rope is to be as described above in para 8.3 as for the “long rope”, but with a minimum length of 110m.
- 9.5 The three ropes are coupled together at the tow plane end in such a manner that if jettisoned by the tow pilot, they will automatically separate. This is accomplished by fitting the multiple tow double ring assembly of both the “long rope” and the “triple long” rope over the multiple tow triple ring assembly of the short rope. The last ring of the triple assembly is then offered up to the towplane release in the normal manner. The double ring assemblies will be captured on the triple ring assembly until released.

10. Plastic Funnels.

Plastic funnels are not to be used on towropes.

11. Thimbles.

Thimbles should not be incorporated, particularly when the rope is to be used over hard ground or sealed surfaces.

12. Attachment to Tow Release.

- 12.1 In all cases, it is the standard small 35mm ring only, which engages with the tow release mechanism.
- 12.2 Tow release mechanisms on gliders and towplanes must be compatible with these standard rings.

13. Caring for Towropes.

- (a) Uncoil and coil correctly. Always coil clockwise.
- (b) Watch for kinks that will distort the rope.
- (c) Avoid sharp objects that will severely abrade the surface.

- (d) Ensure that splices are correctly made.
- (e) Avoid very hot surfaces.
- (f) Try to distribute wear evenly. (Don't always use the same end on the tow-plane.)
- (g) Avoid overloading that produces permanent set.
- (h) Inspect full length of rope each morning before using, for possible damage, wear, fraying etc.
- (i) Check well worn ropes to see if they should be replaced.
- (j) If continuously in a dusty environment, wash the rope periodically.

GNZ Airworthiness Committee.