

<b>TO</b>	Carlos Brito – RTA Crashlab David Upston – Water Police	<b>FAX</b>	9662 5990 9692 5411
		<b>NUMBER OF PAGES INCLUDING THIS ONE</b>	4
<b>FROM</b>	Chris Turner Construction Team <b>Mobile: 0411 108 982</b>	<b>FAX</b>	02 9370 6103
		<b>PHONE</b>	02 9370 5405
<b>E-MAIL</b>	chris.turner@workcover.nsw.gov.a	<b>DATE</b>	5 July 1999

Revised Draft *Proposal for Static Line (lanyard) Testing* for comment.

At this stage the tentative date is 19 July 1999 at 2 p.m. for tests 1 & 2 at RTA Roseberry, if you agree. If so let Carlos or Derek know.

Carlos or Derek are trying to find a lab that can do the materials testing on the threads and webbing. They will contact you direct.

I would suggest that test 4 is only worthwhile if there is concern that the safety line would not have passed the test when new, and there is any merit in checking. As the safety line is approx 13 years old and the manufacturer is no longer in business I am not sure that it is worth pursuing.

As advised earlier, I am on leave until 12 July so I will talk to you then.

Regards

Chris Turner

## **Proposal for Static Line (lanyard) Testing**

### **1. Background**

A used harness is to be tested as part of a Coronial Inquest into the 1998 Sydney to Hobart Yacht Race. A webbing safety line (lanyard) apparently failed on the *Sword of Orion* allowing the helmsman to be washed overboard. The testing is therefore to focus on another safety line taken from the yacht to investigate whether it was adequate for the purpose.

Australian Standard *AS2227 - Yachtsmen's Safety Harnesses and Lines* was first published in 1978 and has been revised 3 times, 1983, 1986 and 1992.

From information provided it appears that the harness and lanyard were manufactured approx 13 to 14 years ago with the intention of complying with the original 1978 Standard.

In general Standards for products such as webbing, which are subject to wear and degradation with age, incorporate factors of safety in their specifications to allow for some reasonable degradation to occur during the life of the product. This results in a product with a reasonable life and makes discard criteria more obvious.

It is therefore inappropriate to test a used product, of this type, to the Standard test and expect it to pass. An alternative test program needs to be developed to determine whether the harness and lanyard are in a serviceable condition at the commencement of testing.

### **2. Summary of Australian Standard Tests and Relevant Requirements for the Safety Line**

1978

- Safety line no longer than 2m.
- Webbing to Class C22 or D22 to AS 1753 (i.e.  $\geq 22$  kN dry and wet breaking force) and not less than 40 mm wide.
- Thread, similar properties to the materials being sewn. May be rot treated natural fibre or may contain natural fibre.
- Load bearing components such as hooks shall withstand 12 kN without breaking or showing signs of flaws, defects or deterioration.
- Load test: Dynamic test, tested wet.  
100 kg dummy 2m fall on 2 m lanyard or less. Amended in amendment 1 of August 1979 to include an alternative of a 136 to 147 kg dummy dropped 1.47m.
- Instructions include " The safety line and harness and line should frequently be inspected for signs of deterioration."

1983

Essentially identical to 1978. Main change was introduction of a children's harness and associated tests.

1986

Essentially identical to 1978, except:

- Safety line must be detachable at the wearer's end on adult harnesses.
- Allowed webbing that did not comply with AS 1753, so long as meets the dry break force test from AS 1753 for 22 kN.

1992

Essentially identical to 1986, except:

- Reference to natural thread no longer exists.

Summary: The webbing requirement has always been 22 kN webbing whilst the requirement for hooks and other "non-deteriorating" components has been 12 kN.

### **3. Inspection and Comments**

On 30 June 1999 I inspected the remains of the safety line reported to have failed on the Sword of Orion, the safety line already tested to the current AS 2227 drop test and an undamaged specimen. Both safety lines had failed in a similar manner, total failure of the stitching and one end and partial failure at the other end with no significant damage to the webbing itself.

From visual inspection of the stitch pattern and the stitch thread on the safety lines the following comments are made:

- The harness and safety line appeared to be in excellent condition with no visual sign of significant damage or deterioration.
- There are two coloured threads used, yellow for three stitched "bars" and red for a large rectangle with diagonals.
- The red thread appears to be the same as that used elsewhere for attaching labels and to be thinner than the yellow thread.
- The lack of damage to the webbing of the failed samples is unusual. A stitched joint, other than if to attach labels or for other decorative purposes, would be expected to cause significant damage to the webbing during failure. This lack of webbing damage would suggest that either the stitching had weakened significantly or the stitch pattern was significantly weaker than the webbing.

### **4. Proposed Testing.**

Test the safety line only.

Test 1: Webbing and Stitch Joint Test. (by RTA Crashlab)

Break test generally to AS 1753, conducted wet, but test with the safety line hook as one end and a webbing bollard as the other support. This includes the stitch joint in the test length, and allows the test to be repeated on the other end.

As all hooks, the structural anchor point and other "non deteriorating" items are to withstand 12 kN rather than the webbing load of 22 kN, reaching 12 kN without failure commencing would be deemed a pass.

#### Test 2: Webbing only Test. (by RTA Crashlab)

Break test generally to AS 1753 using the webbing from test 1. Again test wet. Purpose is to determine the strength of the webbing, and to compare with the joint strength. Again 12 kN would be considered a pass, although the webbing when new would be expected to achieve 22 kN.

As the webbing being tested in this test may have been damaged in the bollard in test 1 the result could be lower, but will give an indicative result for comparison.

#### Test 3: Material Properties. (by others as yet unknown)

Test the webbing and the 2 different stitch threads to determine the materials and denier. Of potential significance is the thread material for the presence of natural fibre, which is usually more susceptible to rot in a damp environment, or nylon, which is more susceptible to UV.

#### Test 4: (if deemed of value).

If sufficient information is provided from test 3 and similar materials are currently available then a replica safety line could be manufactured, and tested to give an indication of the as new performance.

### **5. Other suggested Actions.**

Check for available information re the testing conducted on the harness and safety line for Standards Accreditation, especially whether there is any detail on the stitch thread or stitch pattern. This would be of use in comparing to the samples in hand. Even a photograph will help if no technical specification. This may be available from QAS or the test lab that conducted the testing.

C J Turner  
Senior Engineer  
WorkCover New South Wales

5 July 1999