NON-BUOYANT LOBSTER LINE

SPECIFICATION

Prepared For

MASSACHUSETTS DIVISION OF MARINE FISHERIES

Prepared By

Tension Technology International, Inc.
35 Hubbard Road
Weston, Massachusetts 02493
Tel: (781) 235-1129
e-mail: tti@tensiontech.com

April 18, 2006

I. INTRODUCTION

A requirement exists for a non-buoyant line that can be used as a groundline to connect lobster traps in offshore waters. These lines must have the following properties in order to perform well in this application.

- Sufficient strength over time to recover a string of traps without breaking
- Resistance to ingress of sediment that can degrade the line and cause wear in the hauling sheave[1].
- Resistance to surface abrasion due to friction at the hauling sheave.
- Resistance to internal fiber wear due to repeated flexing over pulleys.

Experience by lobstermen with a variety of ropes used as groundline has demonstrated that a better line than those used to date needs to be developed in order to achieve an economic life. This specification is intended to encourage rope suppliers to offer a product for trials that are based on this specification. Evidence exits that shows good potential for superior performance.

II. MATERIALS

The lines shall be made of a combination of polyester and polypropylene fibers. The following provides the specifications for the materials:

Multifilament, high tenacity polyester. High tenacity requires a minimum strength of 7.5 grams per denier. To verify the tenacity of the fiber, the ropemaker shall do either of the following:

- Provide the name and designation of the fiber supplier with a certification of the minimum tenacity.
- Produce their own laboratory tenacity strength test certification for the fiber used in the line.

The polyester fiber must contain a marine finish. Marine finish is a non-soluble (in water) lubricant that is applied to polyester fiber by the fiber producer or ropemaker. It greatly improves resistance to damage from external abrasion and from internal fiber-to-fiber abrasion, especially when wet. In order to verify that such a finish is applied, the ropemaker shall do either of the following:

- If the fiber is procured with the marine finish applied, provide the name of the fiber supplier and the designation used for their fiber with the marine finish.
- If the rope maker applies the marine finish himself he must provide data that demonstrates that the fiber has been tested and provides improved performance compared to untreated.

[1] The hauling sheave is a Vee shaped pulley that applies tension to a line through friction developed by wedging the line in the Vee. Surface rubbing and squeezing of the line are severe.

The polypropylene fiber shall have a minimum tenacity 6.0 grams per denier. Either monofilament, multifilament, split film or Polysteel type versions are suitable.

III. Size

Two rope sizes are to be considered. These are nominal diameters and may vary by +/- 5%. The diameter is to be measured by wrapping a tape around the rope under light hand tension and dividing the circumference by 3. The sizes are:

$^{3}/_{8}$ inch (10 mm) diameter
$^{5}/_{8}$ inch (16 mm) diameter

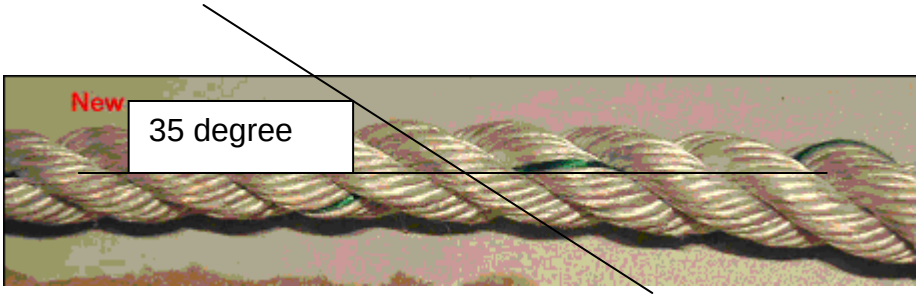
IV. Specific Gravity

The specific gravity of the rope is to be between 1.08 and 1.10.

V. Construction

The rope is to be of three strand laid construction. A hard lay is required but it must be spliceable by ordinary means. Tight strand and closing tubes are to be used to ensure a compact, hard structure to resist wear and sand penetration.

Strand lay angle shall be within 25 to 30 degrees (as measured on the outer surface). Rope lay angle shall be within 30 to 40 degrees (as measured on the outer surface, see diagram below).



The strands are to be constructed by wrapping the polyester component around a core of polypropylene. The polyester shall be prepared as rope yarns and are to be twisted tightly and then wrapped tightly around the polypropylene core. No polypropylene should be visible through the polyester outer wrapping. The purpose of this construction is to limit the ingress of sediment into the interior of the rope and to encourage sediment on the surface to fall off during trap hauling operations.

VI. Strength and Elongation

The strength and elongation are not specified but these properties are to be measured and recorded. The test method shall be as follows:

Test by gripping the rope on bollards of 4 to 8 inches in diameter. Alternatively, the ropes may be spliced and tested over pins at least twice the rope diameter. There should be at least 20 inches between the centers of the bollards or 20 inches between the tail ends of the splices.

Measure the elongation after determining the average break strength. Mark a 15 inch gauge length on a single rope specimen and measure the elongation that occurs between 1% of the average break strength and 50% of the average break strength.

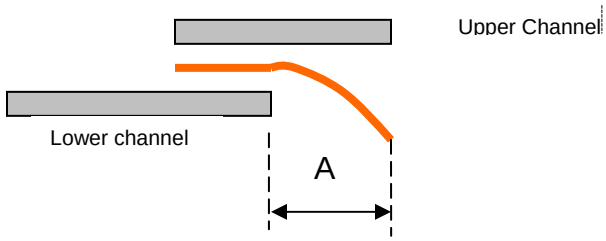
Report the results of five break tests and report the average. Report the elongation as a percentage of the break strength. Describe the break site and its location.

VII. Bending Stiffness

Rope bending stiffness plays an important role in the long-term performance and durability of ropes used in the fishing industry.

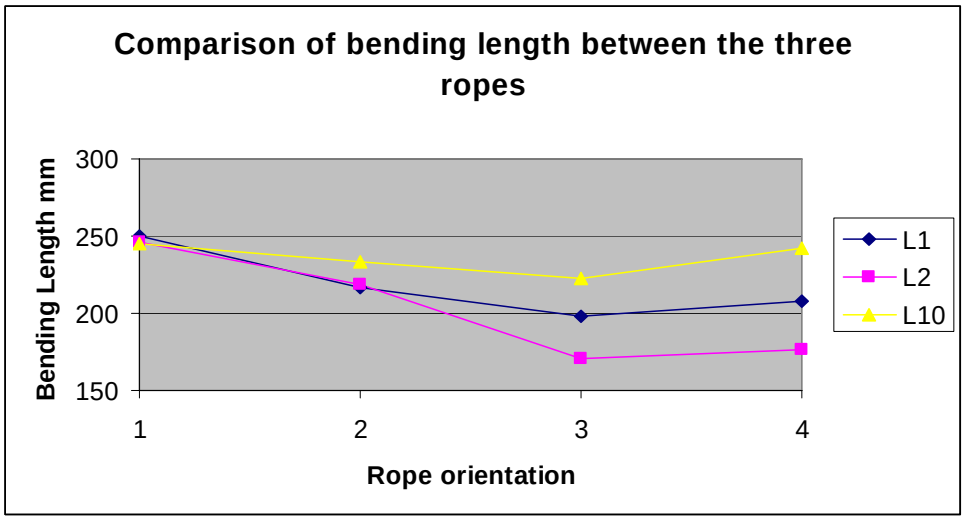
The following method is to be used to measure bending stiffness:

1. Subject a sample length of rope to the reference tension for 15 minutes
2. Place the specimen in a horizontal channel, curved as closely as possible to match the diameter of the rope.
3. An upper channel is placed over the rope sample. This is to be used to apply light and consistent pressure during the test.
4. Using the upper channel to grip the rope, the sample is slid forward by 10in, 250mm, to cantilever over the edge of the lower channel.
5. The horizontal distance A [Bending Length] from edge of the lower channel to the end of the rope sample is to be measured as shown in the diagram below



6. The rope shall then be rotated by 90 degrees and measured again, followed by two further 90 degree rotations and measurements, to make total of four measurements.
7. The entire procedure 1-6 shall be repeated for a further two times and the average deflection calculated for each 90 degree position and a graph plotted.

An example plot is shown below.



The highest value shall fall in the range 180 to 200mm.

VIII. Offer of Product for Evaluation

The requirements for offering a rope product for evaluation are as follows:

- Describe the construction and note any deviations from this specification.
- State the calculated specific gravity
- Identify the materials

Alternate products may be offered. In this case describe the product and provide information that it has the potential to meet the purpose as described herein.

All information provided in each offer will be treated as confidential and will not be revealed to persons outside DMF and TTI.