
TEST REPORT

PP-GRIP PP-SLIDER

Version 2.0

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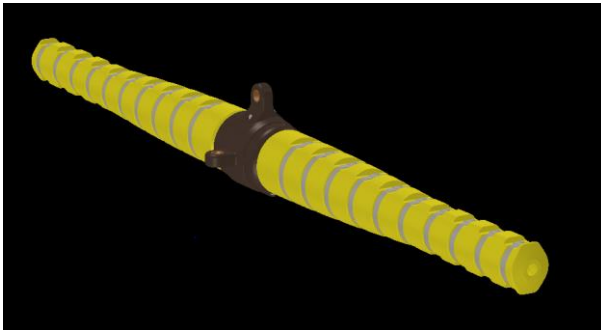
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PP Grip

Product description:

The grips is equipped with hinges for easy and fast installation and removal while giving the cable the best protection against over bend. In addition, the parts are equipped with Tongue and groove to prevent movement between the two polyurethane parts and grooves to increase friction in the contact area between the part and the cable as per the picture below. Typical use is attachment points for flotation, inner lead ins spreader ropes and for gun umbilical's as attachment to diverters or lead ins.



To achieve good friction and compression over the cable, steel bands mounted using tool with torque control.

Specifications	Lead in grip	Umbilical grip
Design load static	40 Kn	40 kN
Weight (Air)	52 kg	TBN
Weight (in water)	21 kg	TBN
Length	2400 mm	2400 mm
Grip material	Polyurethane	Polyurethane
Tow attachment point	Nickel aluminum bronze	Nickel aluminum bronze

Test 1 Normal tow test. Grip as anchoring point for Lead-In

Purpose of the test is to replicate the operational conditions when use of the grip as anchoring point for lead in flotation or as anchoring point for spreader ropes on inner streamers.



Grip and slider exposed to conditions close to conditions experienced in a normal towing operation.

Test Acceptance criteria:

Products ability to distribute the bend over a larger area and deformation of the plastic observed.

Bend radius of Lead In above 1m

Nominal force of 4 tons applied in this test.

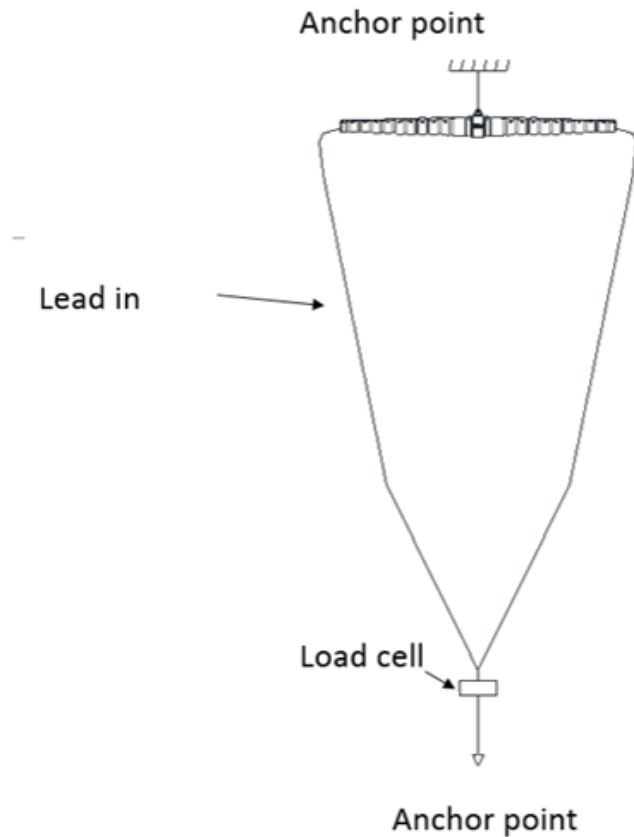
Test Results:

We applied 4100 kg of load to the tow point of the yoke forklift while both ends was anchored 20m apart. No problems were observed in this test, and the bend was distributed with a maximum bend radius (in the yoke area) above the specification of 1m. All steel bands were tight and there was no internal movement between the two plastic half's.



Test 2 Bend test

The purpose of this test is to verify that the grip, when fitted on a 47 Ton Lead In, will be able to provide sufficient “over bend” protection in extreme conditions and to observe how well the deformation / damping is distributed over the product.



Test Acceptance criteria:

Bend diameter above 1 m for a force of 2 tons.

(Dynamic bend radius specified by DeRegt for Lead in, is 0.5m)

Test description:

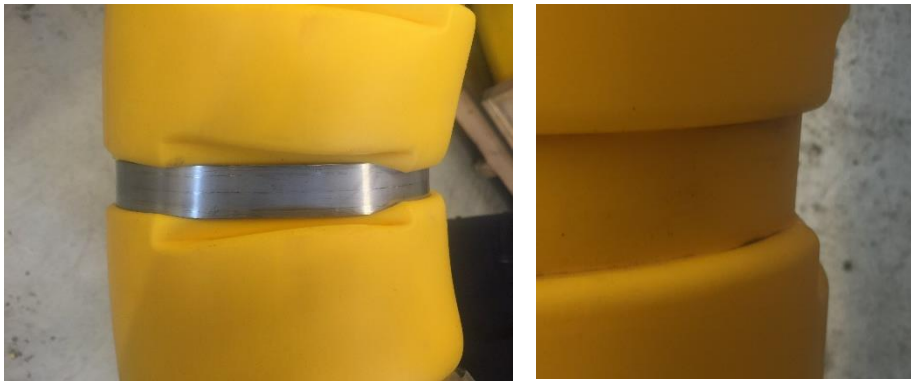
Purpose of this test was to determine if the Grip, when fitted on a 47 Ton Lead In, would give sufficient bend protection in extreme conditions. The yoke attachment point where anchored to the factory floor and both free lead in ends was attached to a 10-ton crane.



Test results:

With 1600 kg load, the bend diameter measured was 1.25 m. This is well within the lead in manufacturer's specification of 1m.

The tension was then increased up to 3000 kg. The bend diameter stayed within the specification, above 1 m. We observed some deformation in the centre and round the steel bands due to the extreme bend but the material came back to normal shape when tension was released and no permanent damage was observed after the steel band were removed for inspection. This test (3000kg) is extreme and this situation will not occur in the field under normal circumstances.



Test 3 Inline force/tow test of grip:

The purpose of this test is to determine if the product provides sufficient friction grip to a Lead-In under full load and to verify that the interface between yoke and PUR is strong enough to withstand forces that could occur if a streamer is towed directly from this point.



Test Acceptance criteria:

- No slip between Lead In and Grip
- No slip between Grip and Yoke
- Minimum deformation in area of steel band



Result: Loaded the test rig with 6000 kg. The Grip and/or Yoke did not slip and we could only observe a minor shift between the two halves close to the anchoring point (Yoke). This is due to expansion on one side and compression on the other.

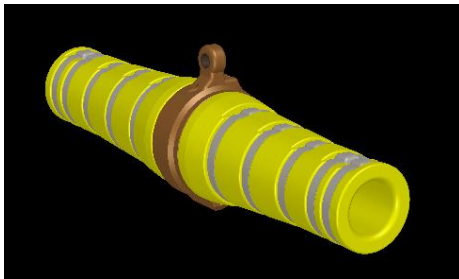
Conclusion: Test of PP GRIP

Based upon the test criteria's the product did pass all tests. A small amount of uneven deformation between inner and outer half when exposed to large bend movements where observed but expected. All energy absorbed is transferred to deformation, (elongation and compression). In order to have a product with maximum compression around the cable we decided to go with two parts philosophy and added Tongue and groove to minimize the lateral movement between the two half's. This function seems to work well.

PP Slider

Product description

The Slider is designed to slide down a lead in for attachment to flexi float system, lead in flotation or other temporarily installed equipment while protecting the lead in from over bend.



Specifications	Lead in slider
Design load static	40 kN
Weight (Air)	29
Weight (in water)	10
Length	1000 mm
Material	Polyurethane
Tow attachment point	Nickel aluminum bronze

The polyurethane parts are equipped with Tongue and groove to prevent movement between the two parts as per the picture below.



Test of slider.

Purpose of this test is to replicate normal use with normal forces to study the bend relief function.



Test load was started at 2000 kg and then gradually increased in steps up to 3600 kg. The cable bend where evenly distributed across the length of the slider and only minor deformation where observed.