

**CRP GROUP INC.**

A CRP Group Company

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ATTENTION	Andrew Hamilton	DATE	23-Oct-03	PAGE 1 OF	18
COMPANY ADDRESS	MBARI	FROM	Doug Marti		
		INT COPY	File		
		FAX REF	13166		
FAX NO	831 775 1646	YOUR REF			

Andrew,

Further to our on going discussion regarding the MOOS mooring project, we are pleased to provide you the attached quotation for the supply of Buoyancy & bend protection.

In order to generate the 500 lbs uplift specified, we have had to specify 2 x 15 meters coverage of Linksyn either side of the mid-water clamp. If the length of coverage becomes an issue and you would like to minimise this length further, the only option is to reduce the Linksyn length to a minimum (i.e. 2 x 3 meters, 180 degrees either side) and add a single large buoyancy module around the central mid-water clamp. We would be happy to look at this but you let me know how you would like us to proceed.

I am away next week at an exhibition in Dallas with Frank Tyson from Orcina Cable Protection who is involved with the bend stiffener designs. If you have any question or need clarification please contact on my mobile.

Best Regards,



Doug Marti
Sales Manager
Cell 281 830 1133

dmarti@crpgroupinc.com



Quotation Number S11550

1 INTRODUCTION

Monterey Bay Aquarium Research Institute (MBARI) currently has a requirement for Riser Cable Buoyancy and Bending Relief as part of the MOOS Mooring Project. An existing solution (supplied by others) did not perform satisfactorily and a new system of flotation and bend relief is required.

CRP Marine has developed a new combined continuous flotation and bend restriction system described as Linksyn™ for continuous umbilical flotation.

This quotation provides a description, specification, price and delivery of the Linksyn™ Buoyancy System (complete with associated bend stiffeners) that CRP propose to supply to the client in order to meet their requirements.

2 CLIENT SPECIFICATION

The client requirements are as outlined in the email message dated 16th September 2003. Further reference information was provided in the following documents :-

Document	Ref. No.
Riser Flotation - Specification	Revision 2.0
Riser Flotation - Arrangement Drawing	100XXXDWG

The client requires a minimum length of coverage to suit a 23 to 28 mm diameter riser cable and generate a nett buoyancy of 500 lbs at a maximum operating depth of 4,000 MSW.

The system needs to be suitable for long term use in a subsea environment.



Quotation Number S11550

3 PRODUCT DESCRIPTION

To meet the client requirements CRP propose to supply Linksyn™ Cable Flotation suitable for attachment to riser cables with outside diameters upto 52 mm.

Each Linksyn™ buoyancy module comprises a pair of identical half shells banded together with highly corrosion resistant Alloy 625 banding and seals. The Linksyn™ will provide both support to the umbilical by acting as a lock-out bend restrictor, and acting as a continuous, smooth outer profile, flexible buoyancy collar.

The Linksyn™ has been developed as a permanently installed buoyancy collar which can be located onto the cable at a 'mid water' location by means of a reaction clamp. The final interface arrangement will be agreed specifically for each individual cable (client to supply details).

Each 'free' end (leading/trailing) of the Linksyn assembly terminates via a split transition bend stiffener. This transition bend stiffener ensures a smooth transition from the lockout radius of the Linksyn™ to the free umbilical whilst deploying/recovering and also provides bend relief at the end of the Linksyn system once it is "locked-out".

When the Linksyn™ is installed as a 'mid water' buoyancy system, the cable also requires support by means of a bend stiffener at the topside and subsea connection points.

It should be noted that a bend stiffener provides an infinitely variable bend resistance, which could in extreme conditions exceed the MBR of the umbilical. The Linksyn™ system has a predetermined lock-out radius and will provide a higher level of cable protection.

CRP have developed the Linksyn™ system over recent years and it is fast becoming the industry standard.

Please refer to the Attachment for our Track Record.



Quotation Number S11550

4 MATERIALS

4.1 FOAM CORE

Each Linksyn™ half shell consists of a Hisyn high performance, low density syntactic foam flotation core totally encapsulated within a rigid polyethylene shell. The Hisyn syntactic foam core will not absorb water even when exposed directly to sea water, i.e. the Hisyn core is of closed cell construction and does not rely on a homogenous external skin to provide a water barrier.

The nominal density of the syntactic foam is 680 kg/m³ to suit the maximum operating depth of 4,000 MSW.

4.2 EXTERNAL SHELL

The rigid shell is manufactured from a linear medium density polyethylene with a nominal shell thickness of 6 mm. - coloured yellow. Each shell provides protection for the flotation core against impact damage during deployment and recovery from the vessel.

The nominal density of the polyethylene shell is 940 kg/m³.

4.3 INSTALLATION BANDING

The banding and seals are manufactured from Alloy 625 conforming with ASTM designation B443-93 Grade 1. Alloy 625 is widely used for subsea applications, has excellent corrosion resistant properties and provides a design life of 25 years.

All banding and seals are recessed below the surface of the moulded shell to provide a low profile, no sharp edges and maximum protection.

4.4 BEND STIFFENERS

The leading/trailing transition stiffeners and topside/subsea termination stiffeners comprise a one-piece design with a single split line bolted together. The transition stiffeners are designed to interface directly with the Linksyn™ modules. The bend stiffeners are moulded in a high performance polyurethane elastomer - coloured orange, and are secured into position using stainless steel fasteners.

4.5 INTERFACE CLAMP

A mid water reaction clamp is manufactured from a four-piece segmented central cable clamp manufactured from Stainless Steel lined with polyurethane. The split outer clamp body is manufactured from a rigid polymer, typically nylon or similar. All fasteners are stainless steel.



Quotation Number S11550

5 TECHNICAL SPECIFICATION

Item	Value	Units
Product Name	Linksyn Flotation	-
Product Sales Code	C30	-
Nominal Umbilical Diameter	23 – 28 (TBC)	MM
Length of Coverage Required (per Set)	2 x 15	M
Maximum Operating Depth	4,000	MSW
Nominal Dimensions (per Float Pair)	260 OD x 317 long	MM
Nominal Syntactic Density	680	KG/M ³
Calculated Nett Buoyancy (per Float Pair)	2.0	KG
Calculated Weight in Air (per Float Pair)	8.0	KG
Calculated Nett Buoyancy (per Metre)	8.0	KG
Calculated Weight in Air (per Metre)	32.0	KG
Minimum Bend Radius	1.0	M
Maximum Bending Moment	5.0	kNm

Note : All calculations use a seawater density of 1,025 kg/m³.



Quotation Number S11550

6 QUALITY

CRP operate a full quality assurance programme in accordance with BS EN ISO 9001 - Certificate Number FM 11585. The independent certifying authority for our programme is the British Standards Institution.

CRP standard in-house testing procedures will apply. The following tests will be carried out during the manufacture of these items :-

- (i) Hydrostatic crush pressure testing of syntactic material from all mixes used during manufacture. All testing to be carried out on retained samples held in storage at CRP for a minimum period of 5 years.
- (ii) Dimensional and weight in air checks during batch manufacture.

7 SCHEDULE

In order to manufacture 30 metres coverage of Linksyn™ Cable Flotation and Bend Stiffeners as described above, CRP require a period of 10 to 12 working weeks from the receipt of an order based upon this quotation to the completion of the goods in our works, Skelmersdale.

8 PACKING & SHIPPING

Upon completion of the goods in our works, the Linksyn™ Cable Flotation and Bend Stiffeners will be packed in wooden cases suitable for air/sea freight awaiting client's instructions.

The applicable shipping term for our offer is Ex Works, Skelmersdale UK (Incoterms 2000).



Quotation Number S11550

9 PRICING

The price for manufacture and supply of the Linksyn™ Cable Flotation and Bend Stiffeners is as follows :-

- 1 Set **LS1 Linksyn™ Cable Flotation**, 4000 MSW rated
comprising the following elements :-
120 No. Linksyn™ Syntactic Filled Elements
240 No. 32mm Alloy 625 Bands and Seals

Price US \$49,950.00 Lump Sum

- 1 No. **Mid-Water Cable Clamp**,
comprising split outer clamps body c/w lined integral split clamp and all fasteners.

Price US \$6,500.00 Lump Sum

- 2 No. **Linksyn Interface Bend Stiffeners**,
comprising one-piece split design c/w all fasteners.

Price US \$5,250.00 Lump Sum

- 1 No. **Topside Connection Bend Stiffener**,
comprising one-piece split design c/w interface flange and all fasteners.

Price US \$3,650.00 Lump Sum

- 1 No. **Subsea Connection Bend Stiffener**,
comprising one-piece split design c/w interface flange and all fasteners.

Price US \$3,650.00 Lump Sum

This is equivalent to a total package price of **US \$69,000.00 Lump Sum**



Quotation Number S11550

10 TECHNICAL QUALIFICATIONS

- 10.1 The specification detailed in this quotation is based upon the information supplied at this time, any subsequent significant variation may result in changes to the specification.
- 10.2 CRP have not included for any item not specifically stated in our quotation.
- 10.3 CRP has not included for any additional load testing of the Linksyn™ system. CRP will be pleased to undertake any specific load testing trials as deemed necessary by the client but such testing together with test pieces would be at additional cost to the clients account.

11 ADMINISTRATIVE QUALIFICATIONS

- 11.1 CRP have included for the issue of a Certificate of Conformity.
- 11.2 CRP have included for all documentation to be provided in standard CRP format and this will be limited to the following – detail drawings for client approval, weekly progress reports, certificate of conformity, simple installation procedure.

12 COMMERCIAL QUALIFICATIONS

- 12.1 All prices are USD Dollars (\$).
- 12.2 The prices do not include VAT. If applicable, this will be invoiced as a separate item at the ruling rate.
- 12.3 The prices detailed in this quotation are based upon the information supplied at this time, any subsequent significant variation may result in changes to the pricing.
- 12.4 CRP can provide hand operated tensioning and double notch sealing tool suitable for applying the banding and seals to the Linksyn™ Cable Flotation. These tools can be purchased at a cost of £1,400.00 Lump Sum or alternatively hired at a rental charge of £100.00 per month per tool. This charge will be payable until the tools are returned carriage paid to our works, where they will be refurbished to purchasers account. The tools will be fully serviced and bench tested.
- 12.5 Payment terms are 30 days from date of invoice. Invoices will be raised on completion of goods in our works prior to despatch.
- 12.6 This quotation is open for acceptance for a period of 60 days and if accepted within this period the prices will remain fixed for the duration of the contract.
- 12.7 This quotation is made in accordance with CRP Group Ltd Standard Terms and Conditions of Sale – copy attached.



ITEM	QTY	DESCRIPTION	MATERIAL
1	1	TOPS OF STIFFENER	POLYURETHANE
2	1	SUBSEA STIFFENER	POLYURETHANE
3	1	WELDED CAMP	STAINLESS STEEL / WELD
4	120	LINKS ON ELEMENTS	SPRINTING FLOW
5	2	LINKS ON STIFFENER	POLYURETHANE

Section

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. THE NOMINAL NETT BULKWAVELENGTH OF THE SYSTEM IS 725 NM.
3. THE NOMINAL WEIGHT IN AIR OF THE SYSTEM IS 1010 MG.
4. THE MAXIMUM OPERATING DEPTH OF THE SYSTEM IS 4000 NM.
5. THE MAXIMUM BEND RADIUS OF THE SYSTEM IS 1.0 METERS.

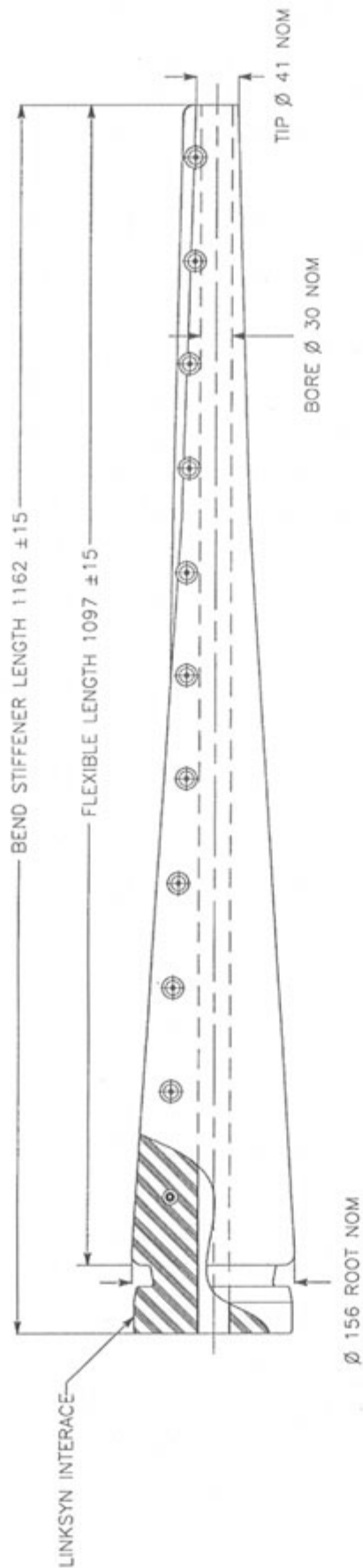
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BL OLT MONTEREY BAY AQUARIUM RESEARCH INSTITUTE
PRODUCT MOOS MOORING SYSTEM

FILE
ROSER CABLE BUOYANCY & BEND RELIEF SYSTEM
GENERAL ARRANGEMENT

SCALE 1:15	DRAWN BY LSD	SHEET DATE A1	PROJECT ON 0	
PROJECT NO QN11550	DRAWING NO C 422322		ISDUE 02	



ENLARGED SECTION THROUGH
TYPICAL FASTENER POSITION.
HEADS RECESSED TO PROTECT
ADJACENT TURNS OF CABLE
WHEN SPOOLED.

APPROX WEIGHT
IN AIR - 12 KGS
IN WATER - 3 KGS

NOTES:

FLEXIBLE COMPONENT : POLYETHER BASED POLYURETHANE, COLOUR T.B.C.

SPLIT LINE FASTENERS : STAINLESS STEEL A4-50 MIN.

NOTE: ALL DIMENSIONS ARE PROVISIONAL AND ARE SUBJECT TO CHANGE DURING DETAIL DESIGN

Orcina Cable Protection Ltd North Lonsdale Rd Ind Est, Ulverston, Cumbria, LA12 9DL, UK Tel +44 (0)1229 583914 Fax +44 (0)1229 581695 COMPANY REG. No. 2391144		SCALE 1:6 AT A4 SIZE PROJECTION	THIS DRAWING AND THE INFORMATION AND DESIGNS ON IT ARE THE COPYRIGHT AND PROPERTY OF ORCINA CABLE PROTECTION LTD, AND MUST NOT BE COPIED IN WHOLE OR IN PART OR CONNECTED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF ORCINA CABLE PROTECTION LTD	TITLE PROPOSAL LAYOUT - SPLIT BEND STIFFENER - LINKSYN INTERFACE - Ø 1.1" NOM CABLE SIZE	ENQUIRY NO. E2385-FIG-008	SHEET 1 OF 1
DRAWN <i>FGP</i>		DATE 30.9.03	RELEASED BY <i>SGP</i>			
UNITS MM		DATE 30.9.03	A CRP HOLDINGS COMPANY			