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LP ARMAWRAP

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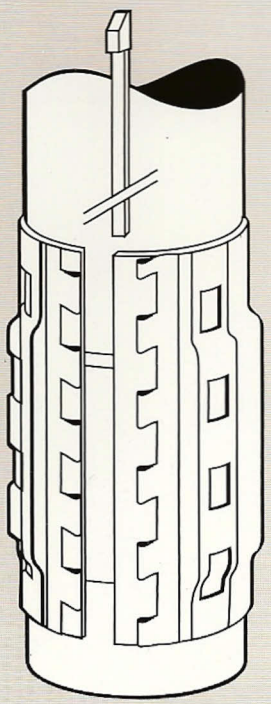

INTRODUCTION

Low-Profile Armawrap has been specifically designed to facilitate passage through the conductor guide tubes during drilling operations. It is a wraparound corrosion protection and anti-foulant system which provides an easily installed retrofit encapsulation system under "cold-work" conditions for the cladding of subsea pipelines, vertical risers and piles in the splash-zone.

Low-Profile Armawrap's elastomeric properties and closure system provides the unique facility of removal and subsequent replacement to facilitate routine inspection of the substrate.

Hoop tension imposed in the tough resilient outer skin acts to force the inner layer against the surface of the substrate, thereby causing the carrier gel and its corrosion inhibitor to form a close association with the substrate. The thixotropic nature of the carrier gel allows it to be exuded into any surface irregularities, thereby providing a seal and thus terminating the supply of oxygenated water to the riser, pipe or pile surface.

The Low-Profile Armawrap also has the facility to act as a carrier for the Intersleek anti fouling system which is cold bonded to the outer skin and specifically formulated to prevent the build up of marine growth throughout the operational life of the system.

The system is modular and therefore a multiplicity of units may be deployed to encapsulate virtually any length of circular and flanged section pipe.

DESIGN CRITERIA

In preparing our technology package we have based our design around a combination of materials with proven performance within a variety of operational environments. The components which combine to form the Low-Profile Armawrap system are resistant to long term immersion in both seawater and fresh water and to the attendant biological and chemical attack. In addition the system will withstand attack from environmental forces, U.V., ozone and temperature variations whilst providing permanent protection in service, by resisting wave action and impact damage. Armawrap systems are available which will perform in application where the substrate temperature is artificially high (e.g. on some live risers).

The materials in the system are stressed below their operational limits ensuring a high safety factor in all parameters whilst in service. If accidentally punctured, the hoop tension will cause the gel impregnated within the inner layer carrier to be exuded from the damaged area and "self-seal". The inhibitor within the gel will neutralise any oxygenated water which has permeated through the damaged wrap at the time of impact. The design of the laminar membrane and the hoop tensions involved combine to ensure that in the extremely unlikely event of a tear being introduced to the Low Profile- Armawrap, the tear will not propagate.

The basic objective was to design a system that, whilst fulfilling all of the requirements once in service, should be "operator friendly" with key features of safety and ease of application.

No labour intensive ancillary materials such as tapes, primers or adhesives are used in order to reduce the possibility of human error and/or non-compatibility of components in the installation of the system to a minimum.

CONSTRUCTION

Low-Profile Armawrap is of a monocoque construction comprising a polymeric textile reinforcement encapsulated within the neoprene outer layer, bonded to a polypropylene penetration resistant felt impregnated with a corrosion inhibitor or biocide contained within a water resistant thixotropic gel, as dictated by the application for which the system will be supplied.

The Outer Skin

In designing the system we considered multiple operational parameters in addition to those necessary for the material to retain hoop tension throughout the projected operational life of the fabric.

Various polymers were considered, however, neoprene is chosen for the criteria indicated alongside.

The Low-Profile Armawrap material is fabricated from textile reinforced neoprene sheet formulated to provide the proven advantages of a flexible material resistant to the marine environment. The material has been specifically fabricated in response to the demand created by large hovercraft for heavy duty skirt material which now has supportive data resulting from 20 year operations in the marine environment.

Primary Penetration Layer

Comprised of a polypropylene felt bonded to the outer membrane. The felt is impregnated to saturation with a gel of a thixotropic formulation which, dependent on specific application, has the capability to act as a carrier for corrosion inhibitors to suit a variety of substrates and/or a biocide to help in eliminating the action of sulphate reducing bacteria and the subsequent deleterious effects thereof.

Sealant Gel

The thixotropic sealant layer is a water resistant gel specifically designed for the protection of subsea structures by displacement of water from the substrate upon the surface contact. This also provides an oxygen resistant barrier.

Wraparound Closure Seal

The Low-Profile Armawrap utilises a mortice and tenon closure where, after circumferential tension has been induced into the material, the tenon fingers are aligned within the mortice, thus allowing a central one piece locking bar to be inserted. Upon releasing circumferential tension from tensioning unit, the load is then transferred to the closure assembly resulting in a maximum stand off height of 16mm compared to 56mm of the standard Armawrap closure.

Low-Profile Armawrap is easy and quick to install, requiring no particular product training on the part of the divers or topside installation personnel. It is rugged and tolerant of site conditions. It is tolerant both of the variation likely in subsea pipework and of the abuses likely during site storage and handling. Low-Profile Armawrap can equally withstand the hostile environment of the North Sea or the Arabian Gulf and, in the event of later inspection, can be removed and refitted in individual modules to allow examination of the pile surface below.

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WHY NEOPRENE?

Toughness

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Abrasion resistance

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Good U.V. resistance

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Good ozone resistance

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Resistance to high climatic temperature

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Good adhesion to fabrics

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Proven long life under sea-water

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Resistance to hydrocarbon oil contamination

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Is not degraded by any form of marine life

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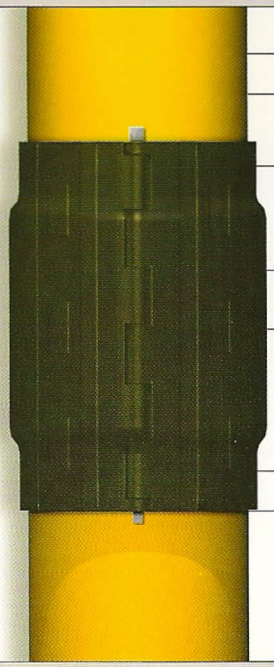
Oxidisation resistance

LP ARMAWRAP Physical Data Outer Layer



Type:	Polychloroprene coated Polyamide Hovercraft Skirt Quality		
Grade:	HSM-C11748		
Weight:	BS 4 F100		
	95 ± 5oz/sq.yd.	3220 ± 140 gms/M^2	
Breaking Strength:	BS 4 F100		
Warp	900 lbs/in.	4000N/25mm	
Weft	850 lbs/in.	3800N/25mm	
Tear Strength Across: Bird Wing Method	Warp	500lbf	2200N
	Weft	450lbf	2000N
Adhesion Peel:			
Adhesion Peel with water soak for 48 hours at 70°C	50 lbf/in	222N/25mm	
Adhesion Change %	-25% max		
Impact Test:	No damage Armawrap impact test procedure		
Ozone Resistance:	BS 903		
96 hours/40°C/50 pphm/5%	NO CRACKS		
(Hardness irrelevant/immeasurable)			

INSTALLATION

The system is very quickly installed at topside and as an example drilldeck application of the wrap system is averaging between 3-5 minutes during conductor running operations. Prior preparation is minimal requiring only loose impediment removal. No primers are required since the gell components provide this function and act in unison resulting in a fully 'active' protection system.

NICC will tailor the materials to your project Requirements
The company reserves the right to change specification without notice.

CONCLUSION

Low-Profile Armawrap provides an easily installed method of corrosion or environmental protection of piles, vertical risers and pipes.

The installation of the Low-Profile Armawrap unit has a unique "Cold Work Permit" status which fully complies with the Oil and Gas Offshore Industry's "Codes of Practice".

To facilitate complete post installation visual/NDT inspection surveys and/or maintenance at intervals indicated by the client, the facility exists to remove and refit Low-Profile Armawrap units without detriment to the long term performance of the material.

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