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TRIPLE A PLUS™

The ultimate protection sleeves for ropes & slings



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SCOPE: rope and sling protection

Fibre ropes used extensively for marine applications, and soft lifting slings used in almost every industry, are both highly utilized products. However, both suffer from the same weakness of low resistance to cutting and abrasion because of the nature of their predominantly textile construction.

Products made with high tenacity textile products generally cannot accommodate the negative effects of chafing, scuffing, rubbing, cutting, and scraping which are always present in almost all applications. In the majority of cases, it is the effect of severe abrasion that brings the life of the rope or sling to an early end.

Modern rope technology increasingly utilizes high performance, expensive fibres which must ideally be protected against early demise or even catastrophic failure. Cost saving is an important consideration but safety of personnel must always take priority over all technical and commercial concerns.

The quest for suitable protection sleeves for textile products used in high tensile applications has been a continuous challenge for many years and many products are available on the market. However, none of them offer a satisfactory solution to the problem, particularly in view of increasingly stringent health and safety requirements in all countries.

The vulnerability of textile slings, as regards specific safety issues, had actually resulted in many end-users maintaining the use of steel slings. The lighter, more manageable, less damaging, soft textile slings had their limitations as regards application, as there was no suitably adequate protection product available.

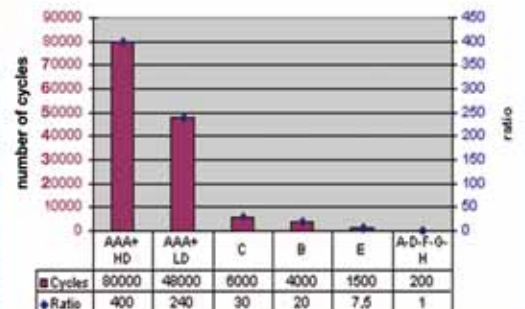
Regulations and expectations are rapidly changing and rope/sling protection must similarly advance to levels previously considered to be impossible.

Further to the two TRIPLE A PLUS™ sleeve qualities, nine alternative... The sample sleeves tested were as follows: Sample

(1): insufficient material available to conduct the "Cut" test (2): insufficient

Saw test

Over a tensioned rope, covered with the protection material, a 10mm dia. wire rope is moved back and forth under a 125° angle and at a constant speed. The test runs until complete failure of the tissue or cover (result in number of cycles).



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PARTNERS

Marathon Belting has been a major producer of specialised heavy-duty woven products for many years. They are considered to be the World's leading producer of multi-ply textile products.

Their expertise extends into many branches of industry where high performance textiles are used, often at high temperatures and in extremely hostile conditions.

One very important area of activity for Marathon is the manufacture of high temperature thick walled sleeves that are widely used to transport aluminium extrusions at 500°C. The specific method of weaving such sleeves is a 'know-how,' developed over a long period of time and has proved to be unique to Marathon.

The years of experience gained in the specialised techniques needed for sleeve weaving was the starting point of the development of protection sleeves for ropes and slings. The expertise was already in place. The most suitable textile yarns had to be found.

The search for the ultimate tough, resilient, high performance yarns quickly led to the company DSM Dyneema with their superior Dyneema® product. Using the combination of two very different proven technologies, and with the support of DSM Dyneema, an advanced protection sleeve was developed.

DSM Dyneema is the inventor and manufacturer of Dyneema®, the world's strongest fibre™. Dyneema® is a super strong polyethylene fibre that offers maximum strength combined with minimum weight. It is up to 15 times stronger than quality steel and up to 40% stronger than aramid fibres, both on weight for weight basis. Dyneema® is an important component in ropes, cables and nets in fishing, shipping and offshore industries. In addition, Dyneema® is also used in safety gloves for the glass and metalworking industry, in bullet resistant armour and in clothing for military use.

DEVELOPMENT PROCESS

A wide range of initial prototypes of protection sleeves was produced early in 2004 as a joint collaboration between DSM Dyneema and Marathon and both laboratories were used to evaluate the attributes of the different constructions.

The evaluation was conducted in such a way to simulate extreme abrasion, cutting and sawing effects on the sample sleeves. Details of these tests and the corresponding results can be seen in this brochure.

Another important consideration in the design of any protection apparatus is the tear strength of the material used. The extreme levels of pressure experienced by protective covers at high tensile loads are major causes of tearing and ultimate failure. A combination of the compact multi-ply woven structures of Marathon and the extreme strength of Dyneema® yarn resulted in new levels of tear strength not previously seen in any product.

The results of the laboratory evaluations were extremely encouraging and they confirmed that it was indeed time to conduct full-scale field tests using the best of the many sample constructions.

Over a period of two years, a complete series of tests were organised. For rope protection, tugboat operators were worked with and for sling protection focus was based on harbour handling of steel coils and very heavy natural stone blocks. Simultaneously, severe evaluation tests were running within the automotive industry.

The results, from all the test locations and applications, were considered to be absolutely outstanding and Marathon were confident that their new product, **Triple A Plus™** made with Dyneema® fibre would undoubtedly become the leader in the field of protection sleeves.



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WITH
Dyneema®

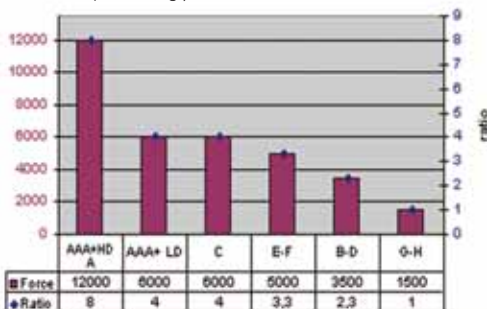


types of protection sleeves were tested. All sample sleeves were tested under identical conditions and the results can be seen from the graphs provided.
A - Nylon sleeve (1) **C** - Woven PES (Cordura) sleeve **E** - Special PES cover for roundslings **G** - Braided PES/PP sleeve (3) **I** - "Firehose" sleeve N°2
B - Braided PES sleeve **D** - Standard PES cover for roundslings **F** - Polyurethane sleeve (2) **H** - "Firehose" sleeve N°1

material available to conduct the « Abrasion » test(3): The material was not stable enough to conduct the « Abrasion » test

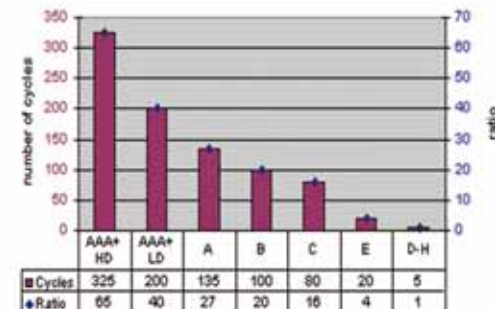
Cut test

In a vertical tensile testing machine a knife is hydraulically pushed through a tensioned rope that is covered with the respective protection material. The test continues until the knife is pushed completely through the rope and cover. After each test the knife is prepared to the same level of sharpness (result in force in N necessary for cutting)



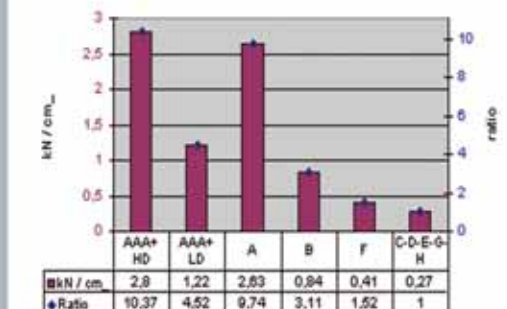
Abrasion test

A rope, covered with the respective protection material, is rotated under tension and at a constant rotation speed, over a spiked abrasion wheel. The test continues until complete failure of the protection material, or cover. (The result is recorded by the number of cycles achieved).



Indicative Tear Strength Performance

The breaking strength of the protection cover is a very important issue. Most of the existing products are known to fail on this requirement. In the graph provided, the tear strength is calculated for all tested protection products (method: specific strength of the material x efficiency factor issue = kN/cm²)





RESULT

Triple A Plus™ is now available for all lifting, towing, or mooring applications where enhanced resistance to all forms of abrasion is desirable or imperative. The advantages can be summarized as:

- Superior resistance to every form of abrasion.
- Excellent resistance to sharp edges.
- Outstanding tear resistance when under extreme pressure.
- Exceptional flexibility as expected from a textile product.
- Very significant improvement in the safety of lifting apparatus.
- Total enhancement of longevity of rope and slings.
- **Triple A Plus™** is able to consistently perform at such high levels that no other protection sleeve is currently capable of achieving.



QUALITIES

Triple A Plus™ is currently available in two qualities, both constructed from 100% Dyneema® yarn, and each with a 2 ply wall construction: -
Heavy Duty, having a nominal 5mm wall thickness
Light Duty, having a nominal 3mm wall thickness



All **Triple A Plus™** quality sleeves have integrally woven red lines on the inside face, which are recommended to be used as 'wear indicators'. At a time when the outside face of the sleeve has worn to such a degree that the red lines are visible, consideration should be given to replacement.

For ease of identification, all **Triple A Plus™** sleeves have integrally woven gold lines on the outside face denoting that they are of Marathon manufacture.

The manufacturing capabilities of Marathon are such that protection sleeves to suit all dimensions of ropes and slings can be adequately catered for.



FURTHER RESEARCH AND DEVELOPMENT

Triple A Plus™ is an innovative product that will bring enormous benefits to the various industries. Further research and development to find even better solutions are ongoing and will continue until all limiting boundaries have been overcome in the most economical and efficient manner.

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