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To whom it may concern

Veniano 19/12/2016

Subject : Parker DMS – Minesleeve

You can find herewith enclosed in the next pages the tests carried out on the DMS- Mine-sleeve according the main International spec's .

NPD Engineering Mgr.
P.Pelanda

DMS – Minesleeve

Parker Minesleeve offers the best abrasion resistance without adding stiffness to hose assemblies and exceeds the MSHA specifications for flame resistance and flame propergation. Burst tests performed according to SAE J343 on hose assemblies coveres with Minesleeve (DMS) show an oil spill retention capability of 7 times greater than similar products. Also suitable for bundling small hose assemblies, tubing or wires.

- Abrasion resistance
  – offers the best abrasion resistance without adding stiffness to hose assemblies
- Fire & flame resistance
  – exceeds US MSHA specifications for flame resistance & flame propergation
- Electrical conductivity
  – tests performed to ISO 8031 on hose assemblies covered with minesleeve show electrical conductivity values well below the specification requirements
- Oil spill retention
  – burst tests performed according to SAE J343 on hose assemblies covered with minesleeve how an oil spill retention capability of 7 times greater than similar products, also suitable for undling small hose assemblies, tubing or wires
- Approvals: MSHA & UK COAL

Temperature Range ..... -50 °C up to +120 °C

Part Number	I.D. round		I.D. flat	
	mm	Inch	mm	Inch
DMS-23	23	0.91	39	1.54
DMS-27	27	1.06	45	1.77
DMS-31	31	1.22	52	2.05
DMS-36	36	1.42	57	2.24
DMS-47	47	1.85	77	3.03
DMS-55	55	2.17	89	3.5
DMS-66	66	2.60	107	4.21
DMS-85	85	3.35	136	5.35
DMS-93	93	3.66	149	5.87
DMS-127	127	5.00	197	7.75

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PREFACE:

The Manufacturer has developed this range of product to protect environment and prevent operators injuries against any possible hydraulic hose oil leakages or spills.

Tests have been carried out to verify sleeve reliability under some of the more frequent field conditions as:

1. **Abrasion**
2. **Leakage**
3. **Burst**
4. **Fire**
5. **Conductivity**
6. **Pin Hole**

Tests have been made together with other type of sleeves (available on the marketplace) in order to set a comparison parameter.

The Manufacturer finally declares that this protective sleeve range is also designed to suite and conform to the latest Italian, European legislation and US recommendations in terms of safety and protection and recommend its use whenever a doubt on the real field condition should take place.

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TEST PROCEDURE

1 . ABRASION TEST

The abrasion test has been carried out in accordance to the international specification ISO 6945 (UNI En 7058), by means of a special abrasion machine with pre-charged knife (50Nw – 5 Kg.)

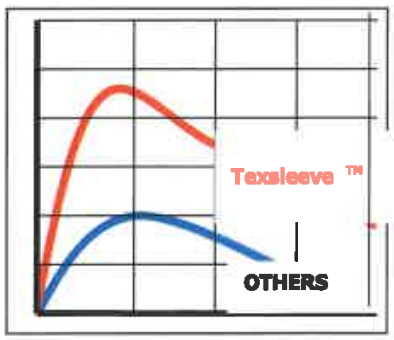
Normal sleeves showed an abrasion resistant life of 18000 cycles, while Texsleeve ™ showed an abrasion resistant life over 50000 cycles with a loss in weight (abraded material) of **0,02 grams.**

ABOVE: NORMAL SLEEVE BROKEN AFTER 18000 CYCLES

BELOW: TEXSLEEVE ™ PASSED 50000 CYCLES WITHOUT SERIOUS DAMAGES

At the end of the abrasion test, single wire strands have been taken out from both sleeves and subjected to a strength test up to the breaking point, with a constant increasing charge.

This test has shown a much better response of the Texsleeve ™ products, with a breaking value close to 3 times the one reached by other products.



This is due to the different structure of the textile yarn utilised in the Texsleeve ™ products

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2 . LEAKAGE TEST

In order to evaluate the real anti – spilling properties of Texsleeve ™, some sleeve samples (approximate length of 330mm – 1 foot), have been clamped and submitted to an increasing pressure with a rate of rise in accordance to the SAE J 343 specification, up to the leaking pressure.

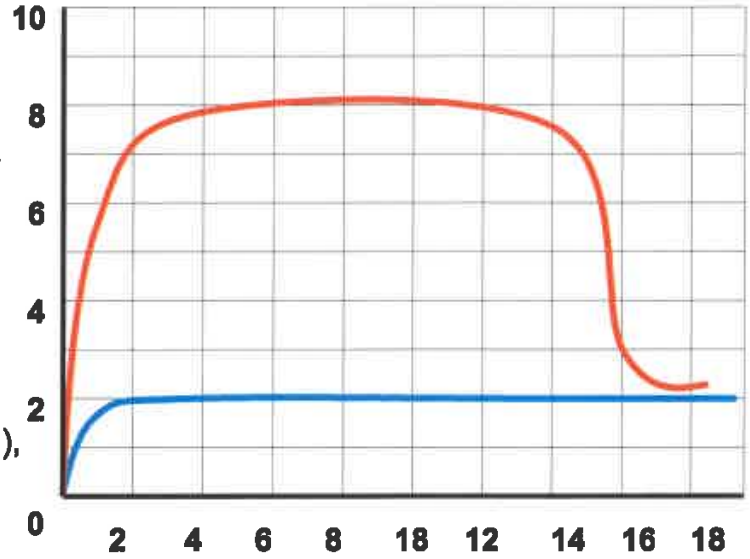
The results showed the followings:

2.1 - Normal sleeves :

impossible to pressurize the sleeve as they started to leak at less than 2 bars (28 psi) . Oil leakage shown after few seconds

2.2 – Texsleeve ™ :

The sleeve has withstood a pressure of 8 bars (100 psi), before starting to leak as the other products.
Oil leakage shown after 15 seconds from pressurization.



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3. BURST TEST

All sleeves have been assembled on multispiral wire reinforced hydraulic hoses (I.D. 20mm – ¾" – size 12), manufactured according to DIN 4 SH specification and pressurised up to the hose burst pressure (2100 bars, 30.000 psi).

The following results have been noted:

3.1 – Normal sleeves:

plain burst, sleeve completely destroyed, large oil dispersion

3.2 – Texsleeve ™:

the hose bursted, but the sleeve was only partially damaged, offering a better oil retention than the others.

Normal Sleeves

Texlseeve ™ was only slightly damaged by the bursting hose, offering an almost total oil retention.

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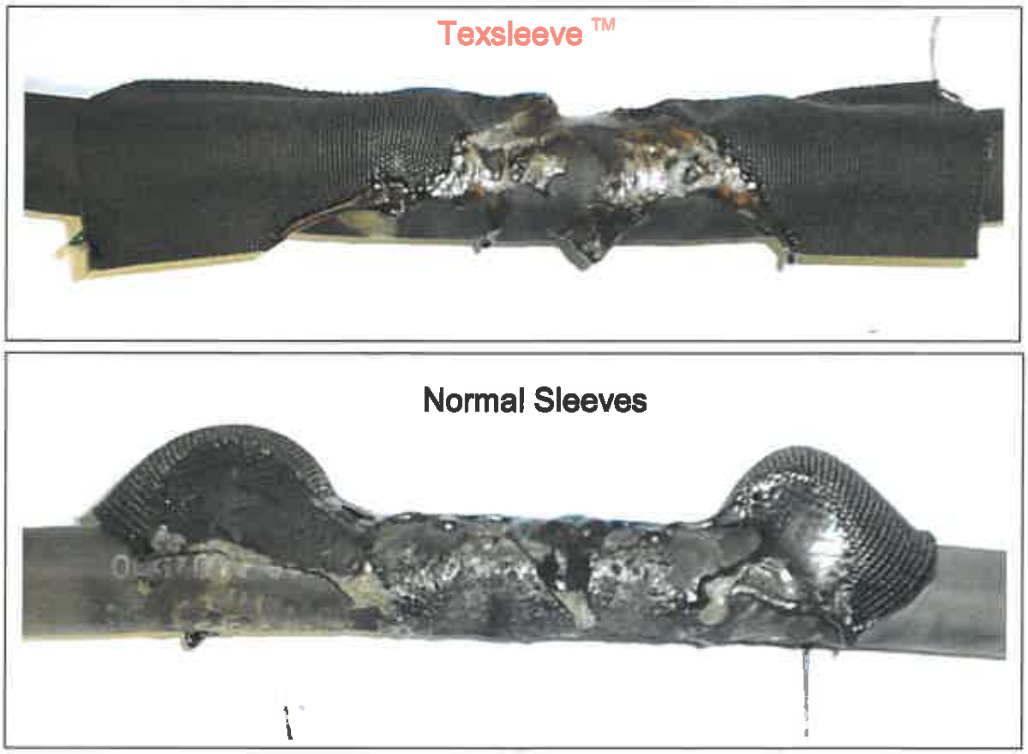
4. FIRE TEST

Texsleeve ™ covered hose assemblies have been exposed to flame for 60 sec., according to ISO 8030.

During this time, **normal sleeves** withstood for about 8 seconds before melting and starting to propagate flame.

Texsleeve ™ started melting after 15 seconds.

Texsleeve ™ showed a much better resistance to flame propagation (see photos below)



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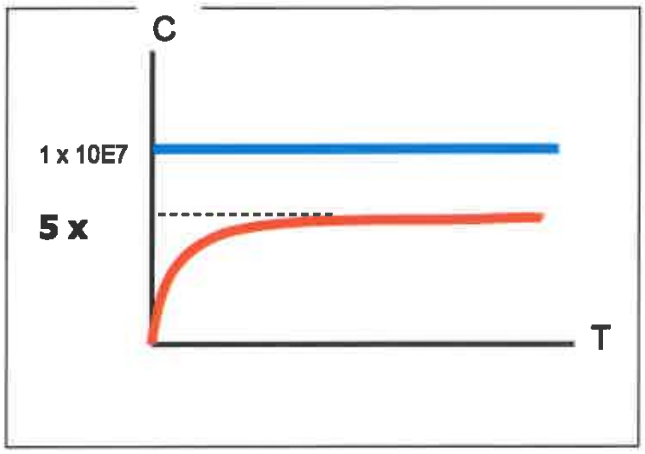
5 – CONDUCTIVITY TEST

Conductivity tests have been performed with Texsleeve ™ protective sleeves assembled on different type of flexible hoses, according to the ISO 8031 International standard.

The conductivity values have been calculated on the base of a D.C. tension of 500 Volts.



The results shown values between **3 and 5 x 10E6** ohm/meter, well below the **10E7** ohm/meter requested by the specification.

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6- PIN HOLE LEAKAGE TEST

The test has been carried out on a flexible hose according to Din 4SP (i.d. 13 mm).
In the hose it has been drilled a 1-mm. hole to accurately simulate the pin hole and a pressure of 210 bar (3000 psi) applied to evaluate the sleeve retention.

Results:

Normal sleeve: when rising and keeping the pressure at the test value (210 bar/3000psi) it was noted continuous oil spill which passes trough the sleeve in large amount (see photo 1 and 2)

Photo 1

Photo 2

Texsleeve ™: when rising and keeping the pressure at the test value (210 bar/3000 psi) it was noted an oil " mark " in correspondence to the hose pin hole.
No oil spill was left passing through the sleeve (see photo 1 and 2).

Photo 3

Photo 4

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TEST AND APPROVALS

Texsleeve protections have been tested and approved according to the most severe international Standards, specifically :

FIRE RESISTANCE	**MSHA N. IC-207/01**	**USA**
FLAMMABILITY' AN ISO 8030-1998	**RAPRA**	**UK**
ELECTRICAL RESISTANCE ISO 8031-1987	**RAPRA**	**UK**
OXIGEN INDEXUNI EN 4589.3	**CERISE**	**IT**

December 2016