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Filling Compounds for Fibre Optic Cables with Extended Temperature Range

Bogdány Petrol
Producer, Supplier and Commercial Ltd.

PARAFLUID
MINERALOELGESELLSCHAFT M. B. H.

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- Tube Filling compounds
  - Properties/Consistency (Rheology and Softness/Hardness)
  - Products
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General Functionality - 1

Why are filling compunds being used in telecommunication cables ?

Ensure longitudinal water blocking properties

In case of damage / leakage water can migrate through the holes / voids / interstices of the cable construction

Measures need to be taken in order to avoid further damages by water, such as filling all the remaining interstices / voids

General Functionality - 2

In fibre optic cables we have two applications / locations for filling compounds:

- inside the tubes / modules
    - tube filling with thixotropic / pseudoplastic gels

- between / outside the tubes
    - interstice filling compounds with different properties

Today we only want to consider inside tube / module filling !

Tube Filling -- Properties - 01

Consistency

The consistency needs to ensure the following requirements
- keeps the fibre in position when stationairy
- allows the fibre to move, when over a certain limit of external forces

This properties are provdided by gels; they can perform both as solids and liquids, depending on the level of external forces they are exposed to.

Tube Filling -- Properties - 02

Consistency

As parts of gel consistency there are 2 major properties:

Rheology = science about flow property or viscosity behaviour

→ Pseudoplasticity

→ Thixotropy

→ Yield Point

Softness / Hardness = stiffness of the gel

→ Cone Penetration

→ Temperature Relation

Tube Filling -- Properties - 03

Consistency – Rheology - Pseudoplasticity

Definition: viscosity is decreasing with increasing stress

Consistency – Rheology - Thixtropy

Definition: viscosity is decreasing with time at even stress

Tube Filling -- Properties - 04

Consistency – Rheology – Yield Point

Definition: stress at which the gel turns from solid into liquid
also critical yield stress, flow point

Attention: the results of measuring the yield point very much depends on the test method. When comparing figures, make sure same method is being used.

Tube Filling -- Properties - 05

Consistency – Softness / Hardness -01

The softness / hardness is described with the standard test method Cone Penetration; DIN ISO 2137

A defined standard cone is falling for 5 sec into the material; the penetration depth is given in mm/10

Tube Filling -- Properties - 06

Cone Penetration Apparatus

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Tube Filling -- Properties - 06

Consistency – Softness / Hardness - 02

Softness / Hardness depends very much on temperature, so you may correlate the low temperature working limits of a gel

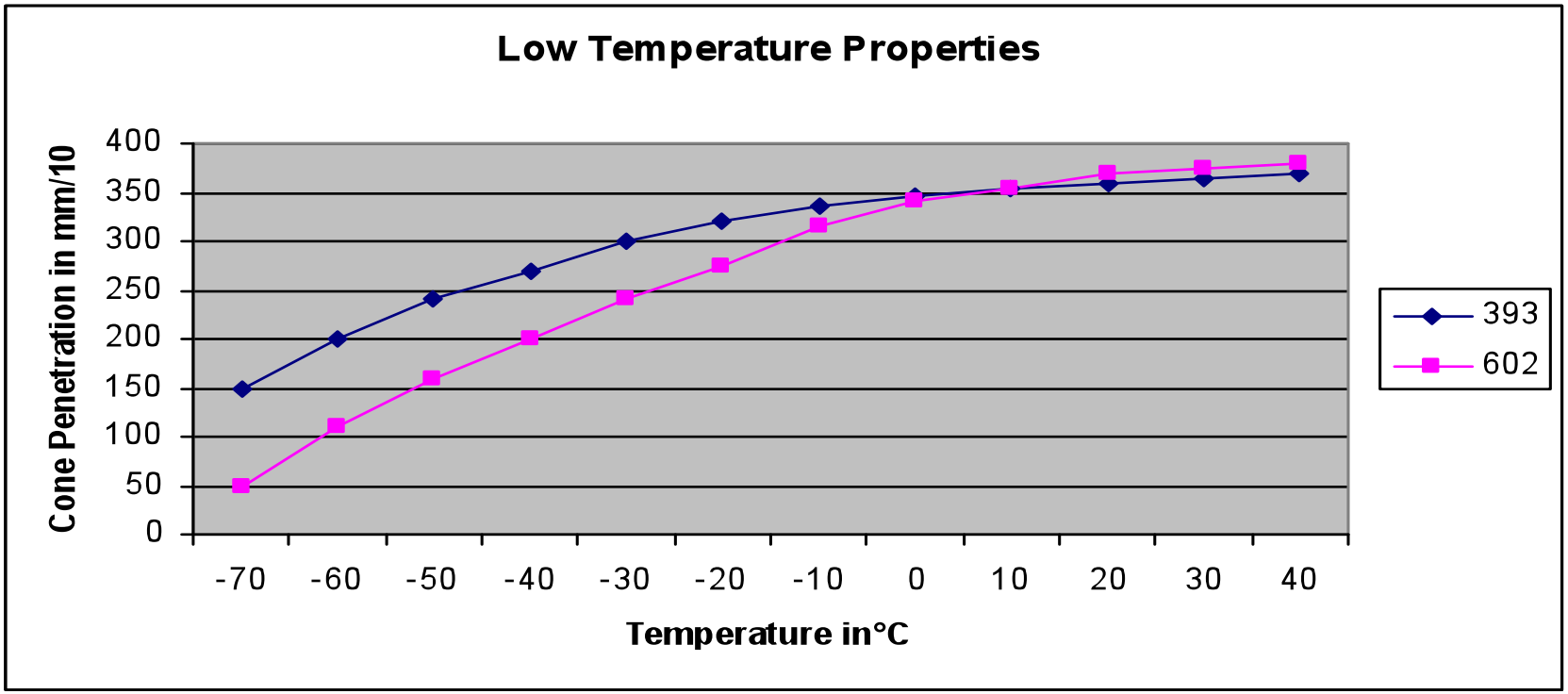
To ensure the gel is not effecting the fibre negatively it should have a minimum cone penetration of 150 mm/10

Critical to the fibres is the cristallization of paraffinic parts of the base oil; this cristallization influences the cone penetration dramatically

There is no direct correlation to the Rheology; only the dependance on temperature is similar

Tube Filling -- Properties - 06

Consistency – Softness / Hardness - 02



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Tube Filling -- Products - 01

Products – 01 „Standard Product Range“

Full working temperature range (< -60°C to +100°C) Standard Rheology Normal tube / speed	Full working temperature range (< -60°C to +100°C) Special Rheology Small tube / fast speed
Limited working temperature range -40°C to +100°C Standard Rheology Normal tube / speed	Limited working temperature range -40°C to +100°C Special Rheology Small tube / fast speed

Tube Filling -- Extended Temp Profile

Extended Temperature Profile – 01

There is a wide difference between the full and the limited working temperature range, technically and commercially.

Innovation with a product, which covers most of the cable specifications regarding low temperature requirement

New product with – 55°C to -60°C minimum working temperature

Tube Filling -- Extended Temp Profile

Extended Temperature Profile – 02

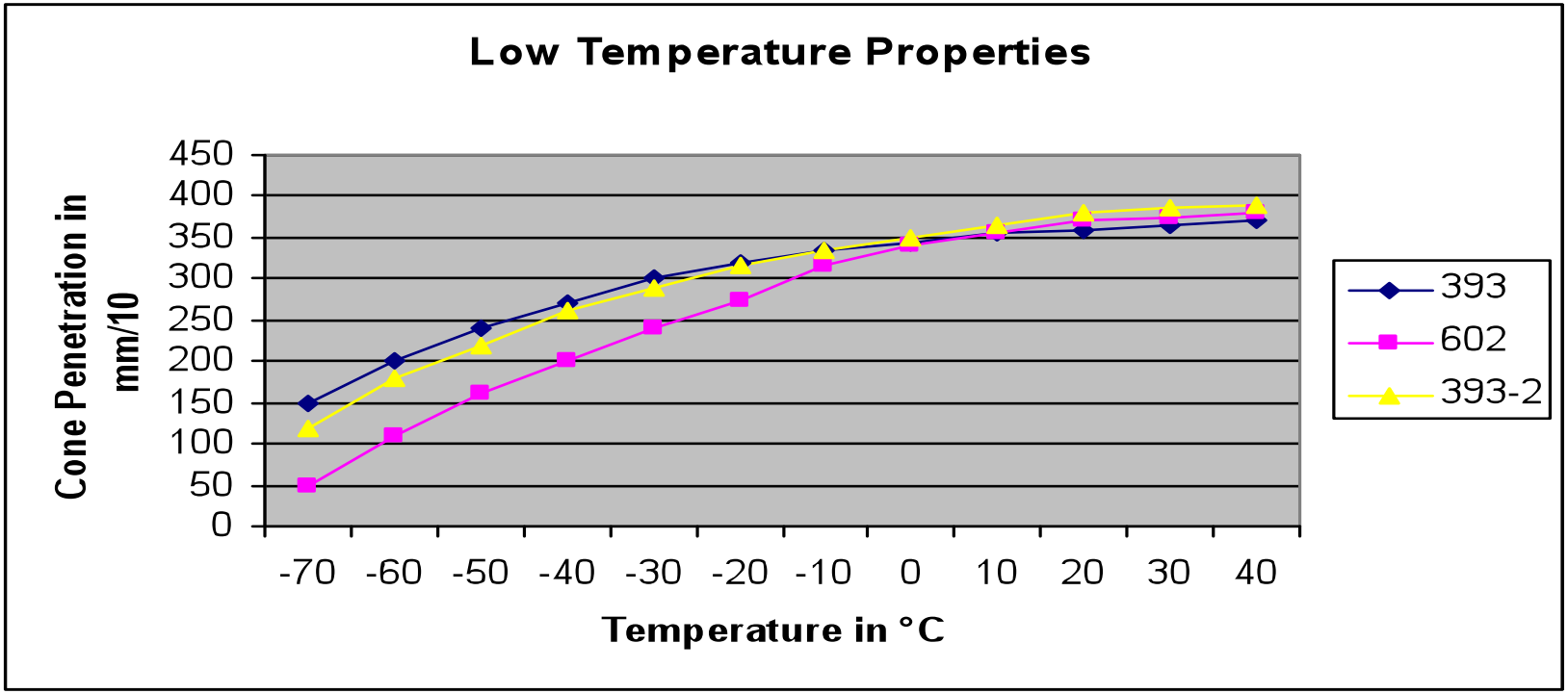
The products have almost same profile as full range product, but pricewise only a little more expensive than the -40°C types

Cone Penetration at -60°C is above 150mm/10

Rheology is at normal standard level

Tube Filling -- Extended Temp Profile

Extended Temperature Profile – 02



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Bogdany Petrol, Ltd.

- Located in Hungary
- Factory has more than 100 years of history
- The company Bogdany was established in 2000, taking over the original activity
- Todays activities:
  - Vaselines for Pharma and Cosmetics
  - Special paraffins for wood, poultry, house hold industry
  - Rust preventives
  - Heating oils
  - Cable filling compounds for copper cables
- New
  - Emulsions for wood, glass wool and stone wool industry
  - Optical cable filling compounds LUNECTRA

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Parafluid

Parafluid is a more than 100 years old specialist in the petrochemical industry. We are marketing globally:

- Petroleum Jellies for Pharma and Cosmetics
- White Oils for Pharma and Cosmetics
- Technical Jellies and Oils
- Base oils for Lubricants
- Cable Filling Compounds LUNECTRA

- Headquarter in Hamburg
- worldwide distribution network

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Conclusion

Bogdany and Parafluid are marketing cable filling compounds under the trademark

LUNECTRA

This business was taken over 3 years ago from HB Fuller, who did this business since the very beginning of the cable industry.

Today we can offer the entire range of products, from standards to specialties.

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Conclusion - 02

Lunectra OC

Full working temperature range Standard Rheology **LUNECTRA OC 393**	Extended working temperature range Standard Rheology **LUNECTRA OC 393 - 2**
Limited working temperature range Standard Rheology **LUNECTRA OC 602-2**	

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Thank a lot for your attention !!!

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