

Aim for Superior Zonal Isolation.



PROTEUSTM
Thermal Cementing Solutions

**A New Flexible Thermal Cementing
Solution Designed Specifically for
the Oilsands Environment**

Pride *by* Performance.



Sanjel

From Sanjel,
a specialized energy
service company,
comes PROTEUS™,
a thermal cementing
solution that can adapt
to any application required
in the challenging oilsands
environment where the
cement sheath can be
exposed to extreme
temperature and pressure
fluctuations. PROTEUS™
displays a cost-efficient
balance of compressive
strength and flexibility,
providing enhanced
resilience during
temperature and pressure
cycles.

Sanjel

Cementing

A Sanjel Specialized Energy Service

Physical Properties

PROTEUS™ displays superior properties for a 1700 kg/m³ (14.2 lb/gal) weighted cement at the extreme temperatures experienced in the oilsands environment. The high compressive strength and low Young's Modulus of PROTEUS™ outlines the high performance qualities seen in Figures 1 and 2. These qualities allow for a more resilient cement sheath under the high stress environments experienced when steam is introduced in the wellbore.

PROTEUS™

Thermal Cementing Solutions

The foundation of the PROTEUS™ thermal system begins with PROTEUS™ *CORE*, a blend designed for basic applications such as surface casing, abandonment plugs, and remedial work. PROTEUS™ *CORE* is the foundation upon which new blends are created to meet specific wellbore requirements.

Environmental Benefits

A reduction of CO₂ emitted into the atmosphere is observed with every tonne of PROTEUS™ that is pumped versus common thermal cements. The amount of CO₂ emissions is noticeably larger for traditional thermal cements when compared to an equivalent volume of PROTEUS™.

CO₂ Per Tonne of Cement

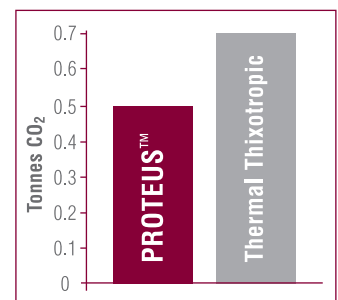


Figure 1: Compressive Strength

High temperature compressive strength data ensures thermal stability.

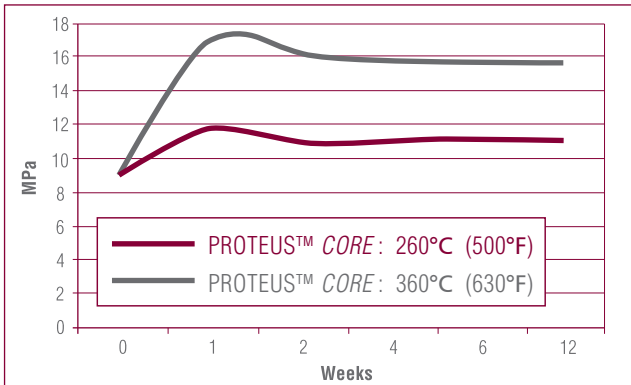
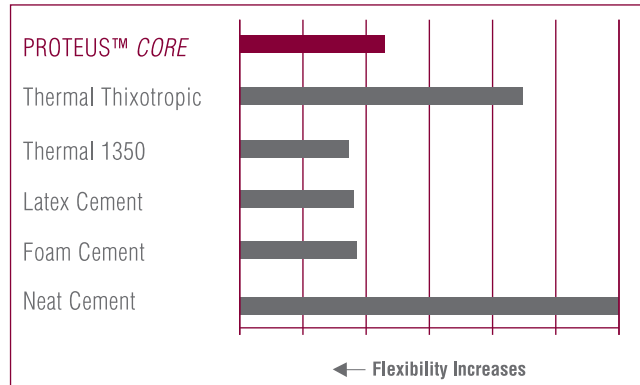


Figure 2: Compressive Young's Modulus

Young's Modulus is used to characterize a material's flexibility. A lower value reflects a more flexible material.

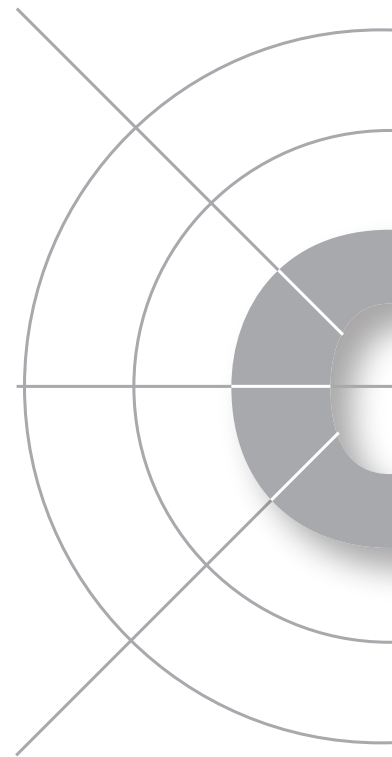


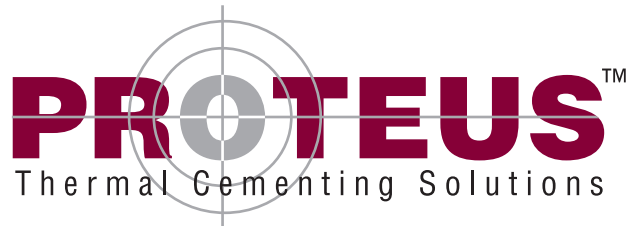
PROTEUS™ Adapts to Meet Specific Wellbore Requirements

| Blend | Density | Application |
|---------------|---|--|
| PROTEUS™ CORE | 1700 kg/m ³ (14.2 lb/gal) | The foundation of the thermal system, designed for surface casing, abandonment plugs, and remedial applications. |
| PROTEUS™ PRO | 1700 kg/m ³ (14.2 lb/gal) | Intermediate/production casing. Bulk expansion after setting ensures good cement-to-formation bonding. Thixotropic properties reduce cement fall-back. |
| PROTEUS™ LCS | 1725 kg/m ³ (14.3 lb/gal) | Lost circulation plugs. Rapid gel strength development used to effectively seal formations with extreme losses. |
| PROTEUS™ GLS | 1300 - 1500 kg/m ³ (10.8 - 12.5 lb/gal) | Sphere-based lightweight thermal cement with excellent mechanical properties for plug or casing applications. |
| PROTEUS™ FM | 1100 - 1400 kg/m ³ (9.2 - 11.7 lb/gal) | Foam-based lightweight thermal cement with good mechanical properties for plug or casing applications. |

Pumping Data

| Blend | Typical BHCT Range | Typical Thickening Time Range (hrs) | Recommended to be Used with Fluid Loss Additives | Recommended to be Used with Free Water Additives | Typical WOC Time (hrs) |
|---------------|--------------------------|-------------------------------------|--|--|------------------------|
| PROTEUS™ CORE | 10 - 35°C (50 - 95°F) | 4 - 6 | • | | 6 - 8 |
| PROTEUS™ PRO | 15 - 35°C (59 - 95°F) | 4 - 6 | • | • | 16 - 24 |
| PROTEUS™ LCS | 10 - 35°C (50 - 95°F) | 2 - 4 | | | 4 - 6 |
| PROTEUS™ GLS | 15 - 35°C (59 - 95°F) | 4 - 6 | • | • | 24 - 48 |
| PROTEUS™ FM | 15 - 35°C (59 - 95°F) | 4 - 6 | • | | 24 - 48 |





Ask your Sanjel Representative about how you can take advantage of PROTEUS™ Thermal Cementing Solutions from Sanjel, a specialized energy service company.



Sanjel

Worldwide Innovation, Commitment, Performance, and Results.

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