

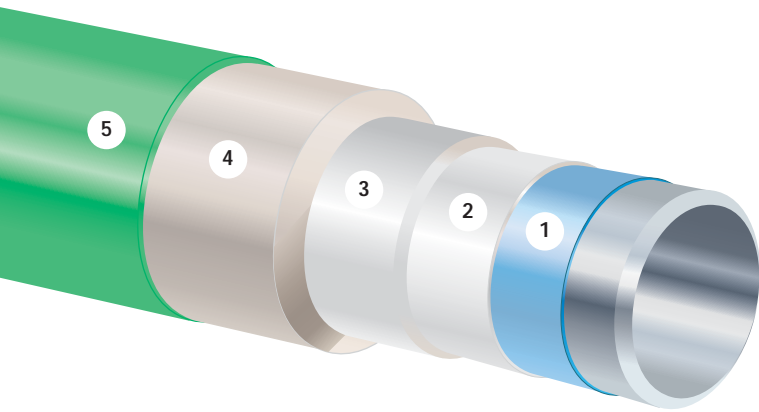
Thermotite[®] ULTRA[™]

Superior Subsea Insulation



FLOW ASSURANCE

PRODUCT DATA SHEET



1. Fusion Bonded Epoxy
2. ULTRABond Adhesive
3. ULTRA Solid
4. ULTRA Foam
5. ULTRASHield

Product Description

Thermotite[®] ULTRA[™] is an innovative subsea insulation system with unlimited water depth capability, comprising a specially engineered blend of polymeric materials having unique mechanical and thermal properties. The superior performance of Thermotite[®] ULTRA[™] assures complete system integrity during service, and reduced energy loss in steady state and transient conditions.

Applications



Oil & Gas Pipelines



Subsea Pipelines



Small Diameter Pipelines



Superior Insulation Properties

- Lower thermal conductivity of both solid and foamed systems results in lower achievable U values
- Reduced thermal diffusivity extends cool-down time
- Compatibility with direct electrical heating systems (DEH) extends system utilization

Unmatched Mechanical Performance

- Superior low temperature ductility enables lower temperature reeling and increased flexibility in installation schedule.
- Incompressibility of solid system allows unlimited water depth installation
- Higher insulation density coupled with reduced thickness improves seabed stability of flowlines and assists in optimizing hydrodynamic response of risers

Thinner Insulation

- Lower thermal conductivity translates to reduced insulation thickness and potential savings in transportation and installation costs
- Thinner insulation and reduced pipe profile results in lower lay strains and improved hydrodynamic response

No Glass Microspheres

- Zero risk of compromised thermal performance due to glass breakage or degradation during service
- Superior insulation performance without glass enables unlimited depth installation

Proven Field Joint Technology

- Compatible injection-moulded field joint material guarantees insulation integrity and system performance
- Lower field-joint application temperature facilitates cooling and reduces moulding cycle time

Application Using Conventional Equipment

- Streamlined delivery schedules, product standardisation and quality assurance practices due to simplified processing operations
- Universally and readily available project management and logistics support from multiple existing plant locations

Features & Benefits

Thermotite® ULTRA™



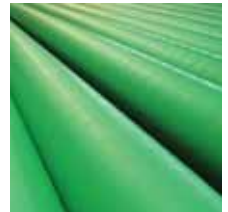
Superior Subsea Insulation

Typical Plant Capabilities and Product Properties

Capability/Property	Thermotite® ULTRA™
Diameter Range.....	4" - 30"
Maximum Water Depth.....	Unlimited as solid
Density	800 - 1040 kg/m ³
Heat Capacity (Cp).....	1220 J/kg K
Thermal Conductivity (k)	0.11 - 0.16 W/m K
Axial Shear Strength	> 10 Mpa
Simulated Service	(tested up to) 280 bar at 95°C
Outer Fiber Strain (Reel Lay)	2.6% strain at -10°C

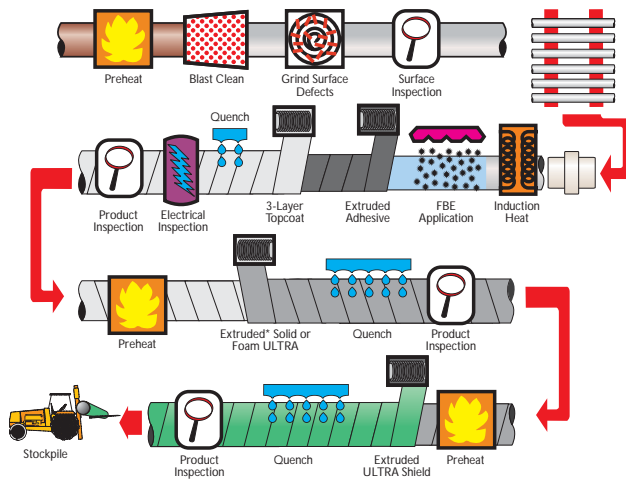
Values shown are typical and may vary from plant to plant. Consult Bredero Shaw for special requirements.

Note: As density and composition are design variables with Thermotite® ULTRA™ the above figures are given as general guidelines. Where there is a range specified, the interval is related also to the density range for the particular component. In addition, it should be noted that Thermotite® ULTRA™ has passed tests for Resonant Fatigue, Trawl Board Impact, Stinger Roller and Tensioner Clamp.



Thermotite® ULTRA™_rev021

Product Application Process



* Insulation and outer shield layers may also be extruded by the crosshead method.

Plants

North America Pearland, Texas	Latin America Veracruz, Mexico	EMAR Leith, Scotland Orkanger, Norway	Asia Pacific Kuantan, Malaysia Kabil, Batam Island, Malaysia
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About Bredero Shaw

Bredero Shaw is the global leader in pipe coating solutions. With more than 80 years of experience, the largest team of dedicated pipe coating professionals, the most extensive network of strategically located plants worldwide and with proven innovative coating technologies, the company has protected more pipelines in virtually every environment and operating condition than anyone in the industry.

Bredero Shaw offers technologically advanced solutions for anti-corrosion coatings, protective and weight coatings, thermal flow assurance coatings, internal coatings, custom coatings and field joints for both onshore and offshore applications. This broad range of products and services provides Bredero Shaw with the unique capability to service the full spectrum of pipeline protection and flow assurance requirements. Consult your Bredero Shaw representative for your unique project requirements.

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Regional Offices

The information contained herein is indicative of the types of coatings provided by Bredero Shaw, and is not intended to be a guarantee that a particular coating will be suitable for a given application. Since many unique environmental, operating, and design conditions must be considered, the user shall determine the suitability of the coating for the intended use and assume all the risks and liabilities in connection therewith. Bredero Shaw's liability is stated in our standard conditions of sale.