

# **THERMAPIPE®** THE UNIQUE POLYETHYLENE PE100 PIPE THAT RESISTS HEAT ABSORPTION.





Polyethylene (PE) pipelines are widely used for the conveyance of fluids overland. The ability to butt weld pipe sections to form a continuous pipeline favours their use in above-ground pipelines. Black PE also provides exceptional UV resistance, suiting the material to use by the Mining Industry in the hot and arid conditions of inland Australia.

However the black colouring of conventional PE in long pipelines contributes to significant warming of the pipe and its contents. This necessitates de-rating of the pressure capability of the pipe for temperatures above 20°C. This in effect requires the specification of higher pressure class pipes, with lower hydraulic capacity and at higher cost.

THERMAPIPE® PE pipelines have been developed to maximise performance in hot environments exposed to solar radiation.





### **PRODUCT OVERVIEW**

By the use of a highly reflective white material on the external skin, THERMAPIPE<sup>®</sup> reduces the absorption of heat. The white material is extruded concurrently with the black pipe wall, forming an integral part of the pipe. Formulation of the white compound with HALS (Hindered Amine Light Stabilisers) and titanium dioxide increases the longevity of UV resistance in the outer layer.

Extensive testing has demonstrated that solar radiation has substantial and predictably less effect on THERMAPIPE® as opposed to conventional black polyethylene pipes under the same conditions.

In all respects, THERMAPIPE<sup>®</sup> matches or exceeds the performance requirements of AS/NZS 4130 pipes for pressure applications.

By limiting the surface temperature of above ground polyethylene pipelines, a thiner walled pipe can be used than would otherwise be required in a given application.

### THERMAPIPE®'S PERFORMANCE IMPROVEMENTS RELATIVE TO BLACK PE100 PIPE:

- Thinner walled pipes providing more efficient pipe design
- Lower pipe cost
- Lower pumping cost due to greater hydraulic capacity
- Reduced thermal expansion/contraction
- Less requirement to 'snake' pipelines
- Extra purchase length reduced to +2% to accommodate snaking (Versus 4% for black)
- Reduced pipe movements on tailing dam walls and pipe racks
- Lower anchorage loads
- Reduced thermal stresses in the pipe material
- Higher pipe stiffness
- Greater resistance to collapse under vacuum effect
- Contents in THERMAPIPE® remain cooler than in equivalent black pipes

The information contained in this document should serve as a guide only and is subject to change without notice. For more information please contact Iplex Pipelines Australia Pty Ltd.



### **DESIGN FOR HIGH TEMPERATURE SERVICE**

Above ground PE pipes can absorb and shed thermal energy via a number of mechanisms. Incoming solar radiation will heat the pipe whilst re-radiation, convection and conduction to the fluid conveyed will act to cool the pipe. Variation in the incoming solar radiation intensity with time of day, cloud cover, latitude, altitude, season and pipeline orientation combine to be major determinant of pipe temperature.

Wind velocity, ambient temperature and the flow rate, temperature and nature of the conveyed fluid are also variables acting to influence pipe wall temperature.

Much of this complexity can be reduced by considering that any pipe design must accommodate the most arduous environmental conditions to be encountered. For PE, this requires the estimation of long term temperature conditions in the pipe, especially during summer.

Testing of conventional black PE pipe and the white THERMAPIPE<sup>®</sup> material by an independent laboratory has confirmed the lower radiation absorptance, resulting in substantial reductions in surface temperatures with this material.

### **RADIATION ABSOPTANCE**

POLIPlex Black PE % 96 THERMAPIPE® % 42

THERMAPIPE<sup>®</sup> is able to maintain a lower operating temperature via both the lower absorption of radiation and by maintaining free convection around the outside to optimise cooling. The mean pipe wall temperature is the key parameter, expressed as a simple average of inside and outside diameter temperatures.

### **INSTALLATION**

THERMAPIPE<sup>®</sup> PE pipes can be handled, jointed and installed in the same manner as conventional black PE pipes. However some care is required during handling to ensure the white outer surface is not damaged. Minor scratches do not reduce the performance of THERMAPIPE<sup>®</sup>.

Butt welding and electrofusion procedures are unchanged from those adopted for black polyethylene. Likewise, fittings such as long radius bends can be fabricated from THERMAPIPE<sup>®</sup>.

Field experience has shown that lower pipe temperatures prior to installation aid the handling of long lengths and minimise difficulties accommodating thermal expansion of continuously welded pipe lengths. This feature is particularly useful where multiple pipes are laid in a narrow alignment or where pipework must traverse steel structures.

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### **DE-RATING FACTORS (rt) FOR PE 100\* AT ELEVATED TEMPERATURES**



Design Basis (Years)

\*Data on PE 100 at temperatures >50°C is not available at the time of printing







### **THERMAPIPE® SIZE AND RANGE**

THERMAPIPE<sup>®</sup> is available in sizes ranging from DN100 – DN2000. Pipes can be manufactured with or without colour identification stripes.

### **STANDARDS AND APPROVALS**

In Australian pressure applications, polyethene pipe is covered by AS/NZS 4130 and material Standard AS/NZS 4131. THERMAPIPE® products are manufactured under Iplex Pipelines Quality Management System with third party certification to ISO 9001.

### **ENVIRONMENTAL CREDENTIALS**

Iplex Pipelines has published verified Environmental Product Declarations (EPD) on our range of polyethylene pipes, including Iplex THERMAPIPE<sup>®</sup>.

EPD's are third-party certified documents based on ISO 14025 and EN 15804 Standards that communicate transparent and comparable information about the life-cycle environmental impact of a product or service. Specifically, product declarations include information on the environmental impact of raw material acquisition, energy use and efficiency, composition of materials and chemical substances, emissions to air, soil and water and waste generation.

Most importantly, EPD's are of great assistance to our customers; the builders and developers seeking to construct environmentally responsible infrastructure, because EPD's present key environmental product performance data in a uniform format that facilitates comparison between alternate materials.

Access to the Iplex Polyethylene Pipe EPD<sup>®</sup> provides constructors, operators and owners with the evidence they require to claim credit points under the Green Building Council of Australia and the Infrastructure Sustainability Council of Australia's rating systems.

To view a copy of Iplex Pipelines suite of EPD's visit the Iplex website www.iplex.com.au and to learn more about the International and Australasian EPD System visit www.epd-australasia.com.



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