PIPA
PLASTICS INDUSTRY PIPE ASSOCIATION OF AUSTRALIA LIMITED

INDUSTRY GUIDELINES
POP017

Material Requirements for White PE Jacket Compounds Suitable for Long Term UV Exposure

ISSUE 1.0 / APRIL 2017

Material Requirement for White Pe Jacket Compounds Suitable for Long Term UV Exposure

Polyethylene (PE) materials (and most plastics) can be susceptible to degradation upon long term exposure to sunlight. This degradation is brought about by physical changes which occur in the PE as a result of exposure to the ultraviolet (UV) wavelengths of sunlight.

The PE compounds used for pipe products have additives to improve the resistance to UV to varying degrees depending on the intended application of the products.

BLACK PE PIPES ABOVE GROUND

Polyethylene pipes that comply with AS/NZS4130 and are manufactured from black polyethylene compounds that comply with AS/NZS 4131 can be used in above ground applications and are suitable for long term exposure to sunlight. The best resistance to long term UV exposure is achieved by using black pre-compounded PE materials with even dispersion of fine grade carbon black as specified in AS/NZS4131. The long-term resistance to UV exposure achieved by the addition of carbon black cannot be applied to coloured PE compounds.

COLOUR IDENTIFICATION OF PE PIPES USED IN BURIED APPLICATIONS

Coloured PE jackets or stripes are commonly used to identify the contents of pipes. For example, blue striped pipe is commonly used for the transport of potable water. White is commonly used for communications conduits. For buried applications, coloured compounds are not required to resist long term exposure to UV radiation. In buried applications resistance to UV is required for only a few years – essentially to withstand the storage period prior to installation below ground.

WHITE PE PIPES SPECIFICALLY FOR ABOVE GROUND APPLICATIONS

There are applications where white jacketed pipe is installed above ground and exposed to sunlight for long periods. The white jacket material is extruded concurrently with the black pipe wall, forming an integral part of the pipe. The white jacket is effective in reducing the energy absorbed through radiation and hence the temperature of the pipe in exposed conditions is reduced. Reducing the temperature of the pipe has many advantages including reducing the temperature of the pipeline contents, reducing the derating due to temperature effects and reducing thermal expansion and contraction.

The extent to which the temperature of the pipe is reduced is dependent on many environmental factors including site location, pipeline position, prevailing weather and infra-red radiation, the extent to which the surface is covered in dust and the type of dust, the nature of the fluid inside the pipeline and the level and flow rate of that fluid. Specific design data is required to assess the potential temperature reduction for any given project.

MATERIAL REQUIREMENTS FOR THE WHITE JACKET COMPOUND IN ABOVE GROUND APPLICATIONS

In order to achieve the long-term resistance to UV exposure the composition of the white jacket material must include elements additional to those specified for stripe and jacket materials in

AS/NZS4130 that are intended for buried applications. Extensive long-term experience with coloured PE above ground tanks has been incorporated in the establishment of the additional material requirements of white jackets for above ground applications. The pipe must still comply with the requirements of AS/NZS4130.

The requirements of the white jacket compound necessary to achieve long term resistance to UV exposure for periods exceeding 15 years are defined in Table 1 below.

PIPA publishes a list of assessed stripe and jacket compounds in POP004 Polyethylene Pipe and Fittings Compounds. Those white compounds suitable for long term UV exposure conforming to the requirements outlined in this document are identified in the POP004 listing. This document is freely available from the PIPA website www.pipa.com.au.

Table 1
Material Requirements for White PE Jacket Compounds suitable for long term UV exposure

ATTRIBUTE	REQUIREMENT
Base Resin	Base resin used to produce compound conforming to AS/NZS 4131
Melt Flow Rate	≤30 % shift from parent material when measured at 190ºC/5 kg in accordance with ISO 1133.
Thermal Stability	Oxidation induction time ≥40 min. @ 200ºC when determined in accordance with ISO 11357-6.
Dispersion	When tested in accordance with AS/NZS 1462.28, the rating of appearance shall be not worse than Micrograph B in Annex B of AS/NZS 1462.28, and the arithmetic average of the maximum sizes of pigment agglomerations or foreign bodies shall not exceed 60 μm (corresponding to Grade 3 of AS/NZS 1462.28)
Weathering Resistance	Minimum 0.3% Hindered Amine Light Stabiliser (HALS) as TINUVIN783 and a minimum of 3% Rutile TiO_2 (see note below)
Colour	White

Note: The default specification for HALS is 0.3% minimum as Tinuvin 783. Other HALS compounds, HALS compounds from alternative suppliers or alternative concentrations of HALS may be used if it can be demonstrated that the outcome is equivalent or superior to that achieved with the default specification.

PIPA
PLASTICS INDUSTRY PIPE ASSOCIATION OF AUSTRALIA LIMITED

PO Box 957 North Lakes Q 4509
E plasticspipe@pipa.com.au
P +61 (0) 459 919 437
pipa.com.au

Disclaimer

In formulating this guideline PIPA has relied upon the advice of its members and, where appropriate, independent testing.

Notwithstanding, users of the guidelines are advised to seek their own independent advice and, where appropriate, to conduct their own testing and assessment of matters contained in the guidelines, and to not rely solely on the guidelines in relation to any matter that may risk loss or damage.

PIPA gives no warranty concerning the correctness or accuracy of the information, opinions and recommendations contained in the guidelines. Users of the guidelines are advised that their reliance on any matter contained in the guidelines is at their own risk.