



Plastics Industry Pipe Association
of Australia Limited

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Industry Guidelines

HIGH STRESS CRACK RESISTANT PE100

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HIGH STRESS CRACK RESISTANT PE100

High Stress Crack Resistant PE100 (PE100 HSCR) is a PE100 material which offers greater resistance to slow crack growth than regular PE100. This is particularly important where the pipe is prone to damage during installation.

There are currently no established national or international standards that define high stress crack resistant PE 100 materials. As an interim measure there is a need to provide guidance to define the parameters that characterise PE100 HSCR grades. This document sets out the performance requirements that will be used to define PE100 HSCR material during this interim period.

The International Standards Organisation (ISO) is yet to define nomenclature to describe this range of PE100 materials and at the time of publication there was no established naming convention - as such the nomenclature of PE100 HSCR has been applied in this document. The nomenclature PE100 HSCR has been used as it describes the specific material property being addressed by the additional performance requirements. In Europe similar materials can often be referred to as PE100 RC – indicating enhanced resistance to cracking.

PE100 HSCR compounds must conform to both AS/NZS 4131 and the requirements listed in Table 1 below. Compounds meeting all these requirements will be identified in POP004 as PE100HSCR.

Table 1: PE100 HSCR compound performance

Test	Standard	Sample	Minimum Performance
Notched Pipe Test (NPT)	ISO 13479-2009	Solid wall SDR 11 pipe	> 5,000 hrs
Full Notch Creep Test (FNCT) see Note 1	ISO 16770-2004	Compression moulded plate	> 8,760 hrs at 80°C or by correlated accelerated testing procedure as specified in Note 1
2 Notch Creep Test (2NCT) see Note 3	EN 12814-3:2014	Solid wall pipe	> 3,300 hrs at 80°C or by correlated accelerated testing procedure as specified in Note 3
Point Load Test (PLT) see Note 2	DIN PAS 1075 2009	Solid wall 110SDR11 pipe	> 8,760 hrs at 80°C or by correlated accelerated testing procedure as specified in Note 2

Notes:

1. The FNCT can be undertaken in its long-term or accelerated (ACT) form ie:
Long-term: time to failure > 8760 hrs; 80°C; 4 N/mm² tensile stress, 2% Arkopal N-100 surfactant.
Accelerated: time to failure > 400 hrs; 90°C; 4 N/mm² tensile stress, 2 % NM 5 surfactant and 90°C.
2. Point Load test can be undertaken in its long-term or accelerated (PLT+) form ie:
Long-term: time to failure > 8760 hrs; 80°C; 4 N/mm² tensile stress, 2% Arkopal N-100 surfactant.
Accelerated: time to failure > 450 hrs; 90°C; 4N/mm² tensile stress, 2 % NM 5 surfactant.
3. The 2 Notch Creep Test can be undertaken in its long term or accelerated (2NCT+) form ie: Long-term: time to failure >3300hrs; 80°C, 4N/mm² tensile stress, 2% Arkopal N-100 surfactant.
Accelerated: time to failure >195hrs; 90°C; 4N/mm² tensile stress, 2% NM5 surfactant.
4. If visual identification of the pipe is required or a UV layer is to be used, the striping or jacketing compound used in the manufacture of the pipe must be manufactured using a base resin of a compound that qualifies as a PE100 HSCR as per Table 1.
5. Monitoring quality assessment is to be conducted in three year intervals with compulsory Notched Pipe Testing and one of the other testing procedures from Table 1 as decided by the manufacturer of the material.
6. Attention is drawn to the requirement for the PE100 HSCR manufacturer to have an established ongoing Quality Assurance procedure related to the slow crack growth resistance performance. The frequency of the sampling and testing plan and the test procedure are the responsibility of the PE100 HSCR resin manufacturer.
7. Solid wall pipe in the context of this document is defined as a single extruded layer of PE100HSCR material.

Referenced Standards

ISO 13479:2009 – Polyolefin pipes for the conveyance of fluids -- Determination of resistance to crack propagation -- Test method for slow crack growth on notched pipes

ISO 16770 – 2004 Plastics - Determination of environmental stress cracking (ESC) of polyethylene - Full-notch creep test (FNCT)

EN 12814-3:2014 Testing of welded joints in thermoplastics semi-finished products. Tensile creep test

DIN PAS 1075 (2009-04) Pipes made from polyethylene for alternative installation techniques - Dimensions, technical requirements and testing