

**PT/288/0909 – AS (September 2009)**  
**Assessment Schedule for the Dyno-Rod**  
**In2 polypropylene lining system for**  
**drainage pipes**



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**1. Scope**

To assess the performance and jointing of the Dyno-Rod In2 polypropylene lining system for the rehabilitation of drainage systems. The In2 system comprises nominal 0.5m lengths of injection moulded, brown, polypropylene pipe. The pipes are available in nominal sizes DN100 and DN150.

The In2 system is designed for the replacement or lining of drainage pipes between manholes without the need for any excavation. The pipes are joined in the manhole via a four start trapezoidal thread with an abrupt stop. This provides a very smooth inner surface with good hydraulic properties. The joint is sealed via an elastomeric O-ring seal located in a moulded groove. The ends of the lining are grouted into the manholes.

The WRC approval applies only to the In 2 polypropylene pipes sections as manufactured by RMWL in Worcester, the sister company TIMCO manufactures the moulds for the plastic injection and undertake the precision machining working for the In2 pipe sections.

Note: The pipes are also available manufactured from black polyethylene. Assessment Schedule PT/251/1005 – AS (October 2005) applies to these pipes.

**2. Assessment schedule**

This schedule covers the following assessment areas:

2.1 Technical audit of production facilities, including review of type and quality control testing and test results.

2.2 Review of test data and witnessing testing where necessary.

2.3 Audit of written procedures for installation of the System, including on-site witnessing of installation.

**3. Review of properties**

3.1 This Assessment Schedule has taken into account the requirements of the following national and international specifications:

BS EN 476 General requirements for components used in gravity drainage systems;

BS EN 1852-1 Plastic piping systems for non-pressure underground drainage and sewerage – Polypropylene. Part 1: Specification for pipes, fittings and the system.

3.2 Marking on pipe:  
Manufacturer's name/identification  
Nominal size 'DN100'  
Short term nominal stiffness class 'SN8'  
Material – 'PP'  
'Drain'  
Date of manufacture  
Installation direction arrow

**Material properties:**

	Specification	
Melt flow rate of base polymer	ISO 1133:1992 condition 12	0.3g/10 min
Density of	ISO 1183	≥905kg/

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base polymer	Part1,	m <sup>3</sup>
Stress rupture Circum stress 4.2Mpa, @ 80°C	BS EN 921	≥140hr

The base polymer is a polypropylene block copolymer blended with a terracotta colour masterbatch.

Colour: terracotta.

Sealing ring(s): Elastomeric O ring complying with BS EN 681-1 Type WC. Nominal hardness 60°±5° IRHD. Dimensions 84x3mm.

Grout – Proprietary quick drying cement mortar.

**Pipe properties:**

Appearance: No visible defects that will detract from the performance of the lining.

Dimensions:

Nominal size	DN100	DN150
Length	500 ± 5mm	450 ± 5mm
Outside diameter	100 ± 1.5mm	148 ± 2mm
Wall thickness	6.0 ± 0.8mm	7.6 ± 1mm

Screw thread: 4-start, abrupt start and finish in accordance with manufacturer's drawings PIP0304C (DN100) or PIP0505A (DN150).

	Specification	Pass limit
Short term ring stiffness	BS EN ISO 9969	≥16kN/m <sup>2</sup>

Long term ring stiffness (creep ratio)	BS EN ISO 9967	≤4
Resistance to combined temperature cycling and external loads	BS EN 1437 Method A	WIS 4-35-01 clause 6.5
Ring flexibility	BS EN 1446	>30% deflection
Resistance to water jetting	WRc Sewer Jetting Code of Practice	300 bar
Impact resistance	BS EN 1411 100mm pipe. Striker 15kg type d90 23°C	>2.0m drop height 100mm pipe

**Joint properties:**

Leak tightness:

Hold 0.3bar and 0.5bar vacuum; 0.05 bar and 0.5bar pressure for 15minutes.

Hold 0.5bar pressure with 5% deflection on pipe with spigot. Load applied 100mm from joint. Hold 0.3bar vacuum and 0.5bar pressure for 15minutes (based on EN1277, Method 4)

Joint strength under shear: 800N force applied 120mm from joint line without threads parting.

Joint strength, pulling resistance: 7.5kN pulling force with no parting of joint.

**4. Review of procedures**

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In addition to the performance of pipes, the following items are checked.

Quality control, as it applies to:

- incoming materials; and,
- control of production.

Installation procedures and available guidance to users.

**6. Reference documents**

1. BS EN 476 General requirements for components used in discharge pipes, drains and sewers for gravity systems.
2. BS EN 681-1: British Standard Elastomeric seals. Material requirements for pipe joint seals used in water and drainage applications. Vulcanized rubber.
3. BS EN 921 Plastics piping systems: Thermoplastic pipes: Determination of resistance to internal pressure at constant temperature.
4. BS EN 1277: British Standard for plastic piping systems - Thermoplastics piping systems for buried non-pressure applications - Test methods for leak tightness of elastomeric sealing ring type joints.
5. BS EN 1411 Determination of resistance to external blows by the staircase method
6. BS EN 1437 Method 1111B: Plastics piping systems. Piping systems for underground drainage and sewerage. Test method for resistance to combined temperature cycling and external loading
7. BS EN 1446 Determination of ring flexibility
8. BS EN 1852-1 Plastic piping systems for non-pressure underground drainage and sewerage – Polypropylene. Part 1: Specification for pipes, fittings and the system.
9. BS EN ISO 9969 Determination of ring stiffness.
10. BS EN ISO 9967 Determination of creep ratio.
11. ISO 1133:1992 Plastics – Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.
12. ISO 1183 Plastics – Methods for determining the density and relative density of non-cellular plastics.
13. Sewer jetting code of practice, 1<sup>st</sup> edition, June 1997, WRc Swindon
14. prEN 13476:2006 Plastics piping systems for non-pressure underground drainage and sewerage – Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) – Parts 1 to 3.