

**Assessment of Caswick integrated ladder system
for manholes and access chambers - schedule**



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1. Scope

To assess the integrated ladder developed and produced by Caswick Ltd for incorporation into precast concrete manholes. The assembled product gives access and egress to and from gravity sewers and other underground chambers.

The ladder comprises polypropylene encapsulated steps to which two polypropylene side rails (stringers) are attached. The steps are installed and the stringers slid through rings on each step until they rest on the floor of the manhole. A red end cap is slid over the top end of each stringer. Brackets are available to support the stringers above the top step at the point of access.

The preferred method of installation of the steps into a pre-cast concrete manhole ring is by casting plastic inserts into the concrete at the time of manufacture. The steps are hammered into the inserts. The steps may be retrofitted to concrete manhole rings by drilling parallel holes at the correct centres and fixing the step into the holes using an epoxy or cementitious grout.

The steps are supplied with projections of either 150 or 200 mm. The stringers are supplied in nominal 25m length coils.

2. Assessment schedule

To assess the products against the performance requirements listed in Section 3 through an audit of test data.

2.1 Witness selected testing of the stringer and locating system.

2.2 Audit of installation instructions including witnessing of installation.

3. Review of properties

3.1 Encapsulated step

The structural element of the product is a plastic encapsulated step manufactured and Kitemarked to BS EN13101:2002. The step meets the requirements of a Type D Class 1 step. The Kitemark requires compliance with the standard for:

- Materials
- Design features
- Dimensions
- Plastic encapsulated thickness
- Surface condition
- Corrosion resistance
- Twist
- Vertical loading
- Resistance to impact
- Integrity of plastic
- Encapsulation
- Marking and designation

3.2 Additional tests for locating eye

The locating eyes for the stringer on the step are not covered by the Kitemark. The following additional tests are done:

Loading test: 5kN load equally distributed between the 2 eyes on adjacent steps for at least 60 seconds with no signs of failure. Test method as per Appendix A of Caswick Ltd's Document No. 50901, Issue 1.
Dimensional check: to Caswick drawing no. 1264A Issue A.



3.3 Stringer

Material properties

The stringer is manufactured from a high impact resistant polypropylene copolymer with the properties listed below.

- Tensile stress at yield: 27.0MPa to ISO 572-2
- Flexural modulus: 1300MPa at 23°C to ISO 178
- Melt mass-flow rate (MFR): 1.5g/10mins to ISO 1133.
- Thermal stability: >8minutes @ 200°C to BS EN728.
- Impact strength Charpy notched: 8.00kJ/m² @ -20°C and 50.0kJ/ m² @ 23°C to ISO 179.

3.4 Extruded section

- Dimensions: to Caswick drawing No. 1341 Issue A.
- Deflection under load: maximum deflection 2.5% of unsupported length when 0.5kN load applied for a minimum of 60 seconds. Maximum residual deflection of 0.3% of unsupported length when load is removed. Test method as per Appendix B of Caswick Ltd's Document No. 50901, Issue 1.
- Shock loading: withstand a load of 5kN for 5secs followed by a load of 1.5kN for 15secs. Test method as per Appendix C of Caswick Ltd's Document No. 50901, Issue 1.

4. Review of procedures

In addition to the performance of the component parts the following are checked:

Installation of the steps and stringers into a concrete manhole assembled

from individual pre-cast concrete rings with the inserts cast into the rings. Caswick installation instructions for the steps and the stringers.

Quality control, as it applies to:

- incoming materials;
- control of production.

5. Reference documents

BS EN 752: Part 3: Drain and sewer systems outside buildings – Planning. (1997 inc. Amendments Nos. 1 and 2).
BS EN 728: Plastics piping and ducting systems – Polyolefine pipes and fittings – Determination of oxidation induction time.
BS EN 1917: Concrete manholes and inspection chambers, unreinforced, steel fibre and reinforced. (2002 inc. corrigendum No. 1).
BS EN 5911: Part 3: Specification for unreinforced and reinforced concrete manholes and soakaways. (2002 inc. Amendment No. 1).
BS EN 13101: Steps for underground man entry chambers – Requirements, marking, testing and evaluation of conformity. (2002)
BS EN 143896: Fixed ladders for manholes. (2004)
ISO178: Plastics – Determination of flexural properties.
ISO 179: Plastics – Determination of Charpy impact properties.
ISO 527-2: Plastics – Determination of tensile properties – Part 2: Test

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conditions for moulding and extrusion
plastics.

ISO 1133: Plastics – Determination of
the melt mass-flow rate (MFR) and the
melt flow volume flow-rate (MVR) of
thermoplastics.

Caswick Ltd

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Contact: WRc plc, Frankland Rd, Blagrove, Swindon SN5 8YF
Tel: 01793 865000 Fax: 01793 865001 E-Mail: wrcapproved@wrcplc.co.uk