

## 1. SCOPE

This schedule specifies characteristics for the Modular ladder system produced by Caswick Ltd. to provide access into underground structures.

## 2. PRODUCT DESCRIPTION

### 2.1 Introduction

The Modular ladder system is developed for installation into underground chambers or manholes. The ladder is supplied in preassembled sections which are bolted together on site and fixed to the wall. The assembled product gives access and egress to and from gravity sewers and other underground chambers.

The ladder comprises flat stainless steel stringers and u-shaped rungs. The rungs are fixed to the stringers with clamps. In turn, the stringers are fixed to the wall, either flat or curved, by brackets which offer a variable projection from the wall. The ladder may consist of multiple sections that are jointed with fishplates to increase the length of the ladder to the specific requirement. The ladder can also be fixed to the floor using optional foot brackets. The uppermost section can be cut to length to adapt the ladder as required on site.

The ladder is supplied in sections of 0.6 m, 1.2 m and 1.5 m. Since the vertical offset of the rungs is 0.3 m the optional section lengths are chosen to reduce the likelihood of cutting off the excess length. The ladder is also available in two widths (300 mm and 400 mm) and two projections (150 mm and 200 mm).

### 2.2 Applicable Standards

The following relevant standards were identified:

- BS EN 14396:2004

- Civil Engineering Specification for the Water Industry, 7<sup>th</sup> edition
- BS EN 752:2008
- BS 4211:2005
- Sewers for adoption, 7<sup>th</sup> edition
- Sewers for Adoption Northern Ireland, 1st edition
- Sewers for Scotland, 3rd edition
- BS EN 13101:2002

### 2.3 Approval History

This is the first WRc Approved certification for the Modular ladder system.

## 3. TESTING & REQUIREMENTS

### 3.1 Type Testing

The Modular ladder system shall comply with the following requirements:

#### Materials:

Materials shall be selected to suit the service conditions at the ladder site as per BS EN 14396:2004, 4.2.

The stringers and fixings shall comply with the requirements of Civil Engineering Specification for the Water Industry, 2.70.3.

The plastic encapsulated step shall comply with the requirements of BS EN 13101:2002, 4.2.

#### Mechanical resistance:

The rungs shall comply with the following:

- Vertical imposed load test requirements of BS EN 14396:2004, 4.4.2;
- Impact test requirements of BS EN 13101:2002, 4.3.10;
- Integrity test requirements of BS EN 13101:2002, 4.3.11.

The stringers shall comply with the requirements of BS EN 14396:2004, 4.4.3.2.1.

When tested in accordance with BS EN 14396:2004, 4.4.4.2 the fixings shall support a vertical load of 3kN.

When tested in accordance with BS 4211:2005, 5.8.2 the fixings shall withstand a 0.5kN pullout.

In accordance with BS EN 14396:2004, 4.3.4 threaded joints shall be designed so that fasteners cannot work loose.

**Appearance:**

- In accordance with BS EN 14396:2004, 4.3.3 ladders shall be free from visible defects, protrusions or sharp edges.
- In accordance with BS EN 14396:2004, 4.3.6 the surface of rungs shall be profiled to prevent slipping.

**Dimensional requirements:**

- The ladder shall not exceed a height of 6 m without an intermediate platform. (BS EN 752:2008, NA. 12.6.1; BS 4211:2005, Fig 1).
- The clear space behind the ladder shall comply with the requirements of BS EN 752:2008, Table NA. 23; Sewers for Adoption Northern Ireland, Fig. 2.11 and Sewers for Adoption, Fig. B.8
- The rung stand-off distance shall comply with the requirements of BS EN 14396:2004, Table 3 without obstructing the minimum clear access distance in accordance to BS EN 752:2008, Table NA. 23; Sewers for Adoption, B3.2.6; Sewers for Adoption Northern

Ireland, Fig. 2.10 and Sewers for Scotland, Table 3.

- The distance between the top rung and the surface shall comply with the requirements of BS EN 752:2008, NA. 12.6.3.5; Sewers for Adoption, B3.2.27; Sewers for Adoption Northern Ireland, 2.12.16 and Sewers for Scotland, 2.18.7.
- The distance from the bottom rung to the benching shall comply with the requirements of BS EN 752:2008, NA. 12.6.3.4.
- The rung pitch and the width of tread shall comply with the requirements of BS EN 14396:2004, Table 3.
- The minimum width and the maximum circumferential length of the flat tread shall comply with the requirements of BS EN 14396:2004, 4.3.6.
- The encapsulation thickness of the rung shall comply with the requirements of BS EN 13101:2002, 4.3.2.2b.
- The maximum pitch of fixings shall comply with the requirements of BS EN 14396:2004, Table 3 and BS EN 752:2008, NA 12.6.3.5.
- The location of the top and bottom fixing with respect to rungs shall comply with the requirements of BS EN 14396:2004, 4.3.7.

**Other requirements:**

The first section installed shall have at least four fixings to the wall. Each subsequent section shall have at least two fixings to the wall and two fixings to the previous section. The fixings connecting individual sections shall support a 0.5kN pullout (test method as per BS 4211:2005, 5.8.2).

**Manufacture:**

To ensure the quality and performance of the Modular ladder system, the manufacturing process shall include appropriate systems for the:

- Specification of component materials;
- Verification that component materials received are to specification;
- Handling and storage of all component materials;
- Fabrication and quality of workmanship.

The manufacture of the Modular ladder system and related Quality Control procedures shall comply with requirements to ensure the stated performance of the product is reliably achieved.

The manufacture of the encapsulated rung shall comply with the factory production control requirements of BS EN 13101:2002.

The manufacture of the Modular ladder system shall comply with the factory production control requirements of BS EN 14396:2004.

**3.2 Installation**

When installed in accordance with the installation documentation, the Modular ladder system shall be reasonably expected to perform as described.

**4. APPROVAL**

The Modular ladder system has been audited and has successfully met all of the requirements stated within this assessment schedule.

Signed:

**5. REFERENCES**

1. BS EN 14396:2004 Fixed ladders for manholes
2. Civil Engineering Specification for the Water Industry, 7th edition, UKWIR, 2011
3. BS EN 752:2008 Drain and sewer systems outside buildings
4. BS 4211:2005 Specification for permanently fixed ladders
5. Sewers for adoption, 7<sup>th</sup> edition, WRc plc, 2012
6. Sewers for Adoption Northern Ireland, 1st edition, WRc plc, 2010
7. Sewers for Scotland, 3rd edition, Wrc plc., 2015
8. BS EN 13101:2002 Steps for underground entry chambers – requirements, marking, testing and evaluation of conformity