

**PT/292/1109 – AS (November 2009)**  
**Assessment of the Aqualiner Lining System for**  
**Wastewater Applications**



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### **1. Scope**

1.1 This schedule sets down the requirements for assessing the Aqualiner lining system for use in 150 mm to 300 mm nominal diameter wastewater pipes.

1.2 Aqualiner is a no-dig solution for the renovation of wastewater pipes using three layers of a fabric liner containing glass and polypropylene rovings. This fabric is stitched to form a cylindrical liner, an umbilical is pulled through the liner and a nylon protective cover is slid over the liner. The liner and umbilical are then dragged through the prepared pipe and a heating head attached to the end of the umbilical.

1.3 The umbilical conveys electricity and compressed air to the heating head which produces hot air, heating the liner as it traverses the pipe. An inversion bag made from silicone rubber pushes the pig along, expands the melted liner to fit the inner diameter of the host pipe and holds it there while it cools and consolidates.

1.4 The Aqualiner system may be used to renovate a range of pipe materials that are in common use including clayware and concrete.

1.5 The Aqualiner system installs a 'stand-alone' reinforced thermoplastic lining which can be used as a fully structural lining.

1.6 The ends of the lining are sealed against the host pipe by a technique acceptable to the client.

1.7 The specification for the Aqualiner system is provided in the document: Instructions for use: Sewer Pipe Lining Version 4<sup>(1)</sup>. Key items include:

- i. Umbilical, pig components and control system manufactured by Aqualiner Limited.
- ii. Fabric liner containing 40% unfilled polypropylene fibres and 60% glass fibres by weight with a 0/90° weave.

### **2. Assessment Schedule**

2.1 This assessment covers the following:

- i. Materials quality audit.
- ii. General and mechanical properties of the lining.
- iii. Structural design of the lining.
- iv. Audit of the quality systems for the manufacture, supply, materials handling and storage of the liner.
- v. Audit of installation instructions and witnessing of installation on site.
- vi. Demonstration of the performance of the heated pig and control system.

Approval exclusions:

- i. Lining of pitch fibre pipes.
- ii. The installation or reconnection of laterals.

### **3. Materials Quality Audit**

3.1 The base material is a thermoplastic polypropylene / glass fibre fabric that is converted into a liner by Aqualiner.

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3.2 The polypropylene compound material within the liner fabric is a homopolymer as defined in BS EN ISO 15874-1<sup>(2)</sup>.

3.3 Quality management system certification for the material suppliers and liner manufacture shall be audited.

#### **4. Performance Testing**

##### *General Characteristics*

4.1 Appearance – the internal surface of the lining shall be smooth, clean and free from scoring, cavities, wrinkling and other surface defects that would prevent the Aqualiner from meeting the general fitness for purpose requirement.

##### *Mechanical Characteristics Testing*

4.2 Short-term flexural modulus testing shall be carried out in accordance with BS EN 13566-4:2002<sup>(3)</sup>.

4.3 Long-term flexural modulus testing shall be carried out in accordance with BS EN 13566-4:2002<sup>(3)</sup>.

4.4 The Aqualiner material shall conform to the requirement specified in Table 6 of BS EN 13566-4:2002<sup>(3)</sup> for 10,000 hour strain corrosion resistance testing.

4.5 Jetting-resistance testing shall be carried out in accordance with the Sewer Jetting Code of Practice<sup>(4)</sup>.

#### **5. Lining structural design**

5.1 The Aqualiner system is structurally designed in accordance with ASTM F1216<sup>(5)</sup>.

#### **6. Review of Installation Procedures**

6.1 Audit the installation instructions in the document: Instructions for use: Sewer Pipe Lining Version 4<sup>(1)</sup>.

6.2 Witness two on-site installations to check for compliance with instructions.

#### **7. Reference Documents**

1. Instructions for use: Sewer Pipe Lining Version 4, 13 August 2009.

2. BS EN ISO 15874-1:2003. Plastics piping systems for hot and cold water installations. Polypropylene (PP). General.

3. BS EN 13566-4:2002. Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Lining with cured-in-place pipes.

4. Sewer Jetting Code of Practice, Second Edition, WRc, 2005.

5. ASTM F1216-07b, Standard practice for rehabilitation of existing pipelines and conduits by the inversion and curing of a resin-impregnated tube.