

Assessment Schedule for the AquaSpira CSR (Composite Steel Reinforced) pipe for gravity drains, sewers and attenuation tanks as manufactured by AquaSpira Ltd



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1. SCOPE

This schedule specifies requirements for the AquaSpira CSR (Composite Steel Reinforced) pipe system as manufactured by AquaSpira Limited. It is applicable for underground gravity drains, sewers and flow attenuation in nominal diameters from 525mm to 2250mm and up to 6m in length.

Note the AquaSpira CSR pipe system refers to pipes and all fabricated CSR and stainless steel components.

The approval is not applicable to:

- Lateral Connectors (LTC).

2. PRODUCT DESCRIPTION

2.1 Introduction

The AquaSpira CSR pipe system is a structured wall pipe manufactured from polyethylene (HDPE) profile strip that has vertical external steel reinforcement ribs encapsulated within PE. The profile is helically wound and the seam is welded to form a continuous pipe. The pipes outer wall is ribbed and the internal bore is smooth.

The pipes can be manufactured in three fin height options: 20mm, 30mm and 40mm. Pipes can be supplied with stiffness ranges between 2 kN/m² (SN-2) and 8 kN/m² (SN-8).

The pipes for all diameters are spigot and socket connection and sealed by an elastomeric ring.

Pipes sections can be fabricated to include a bend or a change in nominal diameter.

Access ports and manifolds are bespoke single piece factory fabricated from

AquaSpira pipes or stainless steel. Their stiffness is equivalent to the AquaSpira CSR pipe.

2.2 Relevant Standards

At present there is no British or European standard for PE steel reinforced composite pipes.

2.3 Approval History

The AquaSpira CSR pipe system has been WRc Approved™ since 2011:

- PT/317/0211 (as Integra Pipe and Integra store).
- PT/411/0216 (as AquaSpira CSR).

3. REQUIREMENTS AND TESTING

3.1 Requirements

The AquaSpira CSR pipe system shall comply with the following requirements.

Materials: The polyethylene shall be High Density Polyethylene (HDPE) and shall meet the material requirements of Table 1 and the following performance requirements detailed in Table 2:

- Resistance to internal pressure 165 h and 1000 h.
- Melt mass-flow rate.
- Thermal stability.
- Reference density.
- Additives to the polymer.

Steel for the ribs shall meet the requirements of EN 10025-2:2019⁽¹⁾.

Elastomeric seals shall meet the requirements of BS EN 681-1:1996⁽²⁾.

Assessment Schedule for the AquaSpira CSR (Composite Steel Reinforced) pipe for gravity drains, sewers and attenuation tanks as manufactured by AquaSpira Ltd



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Steel manifolds shall be fabricated from 1.4401 stainless steel to BS EN 10088-1⁽³⁾ and shall meet the requirements of BS EN 10088-4:2009⁽⁴⁾ and BS EN 1090-2:2018⁽⁵⁾.

Appearance and colour: When viewed without magnification the following requirements apply to the AquaSpira CSR pipes and fittings:

- a) Visible surfaces shall be smooth, clean and free from grooving, blistering, visible impurities or pores and any other surface irregularity likely to prevent conformity to this assessment schedule.
- b) Ends shall be cleanly cut square to the axis of the pipe, and within any cutting zone recommended by the manufacturer, or according to the profile geometry as specified by the manufacturer.
- c) Edges on spirally formed pipes and fittings which become sharp when cut shall be rounded off.
- d) The inner and outer layer of pipes and fittings shall be coloured throughout.

Geometric Characteristics: The pipe dimensions shall conform to the requirements of Table 2 in ASTM F2562⁽⁶⁾.

3.2 Type testing

Physical Characteristics: The AquaSpira CSR pipes shall meet the resistance to heating requirement detailed in Table 1.

Mechanical resistance: The AquaSpira CSR pipe shall meet the following mechanical requirements which are detailed in Table 3:

- Ring stiffness.
- Impact strength.
- Ring flexibility.
- Creep ratio.

- Tensile strength of seam.

The AquaSpira CSR pipe shall meet the requirements of WIS-4-35-01 Issue 2⁽⁷⁾: Appendix C Longitudinal bending.

The AquaSpira CSR pipe shall meet the requirements of WIS-4-35-01 Issue 2: Appendix A Resistance to Internal Puncture.

Serviceability: The AquaSpira CSR pipe shall meet the requirements of WIS-4-35-01 Issue 2: Appendix B Resistance to Water Jetting.

Leak-tightness: The elastomeric joints of the AquaSpira CSR pipe system shall meet the leak tightness requirement detailed in Table 2.

Marking: Pipe markings shall include Manufacturer's name and/or trade mark, DN/OD, DN/ID and stiffness class.

3.3 Manufacture

To ensure the quality and performance of the AquaSpira CSR pipe/fabrications and stainless steel fabrications, the manufacturing process shall include appropriate systems for:

- Verification that component materials received are to specification.
- Handling and storage of all component materials and finished units.
- Detailed drawings for pipes and bespoke fabricated sections.
- Fabrication of profile, pipe, bespoke sections and quality of workmanship.

PT/493/0221 - AS (February 2021)

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The production of AquaSpira CSR pipe/fabrications and stainless steel fabrications and related Quality Control procedures shall comply with requirements to ensure the stated performance of the product is reliably achieved.

3.4 Installation

When installed in accordance with the installation documentation⁽⁸⁾, the installation shall be practicable and suitable for conditions that could reasonably be expected on site.

4. APPROVAL

The AquaSpira CSR pipe system has been audited and has successfully met all the requirements stated within this assessment schedule.

Signed:

A handwritten signature in black ink that reads 'A Russell'.

Valid until 8th February 2026

4. BS EN 10088-4:2009 Stainless steels. Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes.

5. BS EN 1090-2:2018 Execution of steel structures and aluminium structures. Technical requirements for steel structures.

6. ASTM F2562 / F2562M – 15 (2019) Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage.

7. WIS 4-35-01 Issue 2 October 2008: Specification for thermoplastics structured wall pipes – supplementary test requirements.

8. Installation guide for AquaSpira large diameter pipe systems, APIG V4, April 2019.

5. REFERENCES

1. BS EN 10025-2:2019 Hot rolled products of structural steels. Technical delivery conditions for non-alloy structural steels.
2. BS EN 681-1:1996 Elastomeric seals. Material requirements for pipe joint seals used in water and drainage applications. Vulcanized rubber.
3. BS EN 10088-1:2014 Stainless steels. List of stainless steels.

PT/493/0221 - AS (February 2021)

Table 1 Material Requirements

<p>The virgin material shall be HDPE to which are added additives needed to facilitate the manufacture of components conforming to the requirements of this standard. Coated calcium carbonate (CaCO₃) conforming to a) or talcum conforming to b) may be added as mineral modifiers under the following conditions. When calculated on the basis of a known formulation or, in case of dispute/not known formulation, determined in accordance with EN ISO 3451-1 the HDPE content shall be at least 75% by mass for pipes and 80% by mass for injection-moulded fittings.</p>	
Specification	Requirement
Specification for CaCO ₃	<p>1) Composition of the CaCO₃, before coating, shall conform to the following:</p> <ul style="list-style-type: none"> - Content of CaCO₃ ≥ 96% by mass; - Content of MgCO₃ ≤ 4% by mass; - Content of CaCO₃ and MgCO₃ in total ≥ 98% by mass. <p>2) Physical properties of the material shall conform to the following:</p> <ul style="list-style-type: none"> - Mean particle size, D50 ≤ 2.5 μm; - Top cut, D98 than ≤ 20 μm.
Specification for talcum	<p>3) Content of magnesiumsilicate, Mg₃Si₄O₁₀(OH)₂ shall be at least 97% by mass.</p> <p>4) Physical properties of the talcum shall conform to the following:</p> <ul style="list-style-type: none"> - Mean particle size, D50 ≤ 7 μm; - Top cut, D98 ≤ 30 μm.

PT/493/0221 - AS (February 2021)

Table 2 Performance Requirements

Test	Requirement	Test Parameters	Test Method
Resistance to internal pressure 165 h and 1000 h	No failure during the test period	End caps Type A or Type B Test temperature 80 °C Orientation Free Number of test pieces 3 Conditioning period shall conform to EN ISO 1167-1 Type of test: water-in-water 165 hour test Circumferential stress 4.0 MPa 1000 hour test Circumferential stress 2.8 MPa	EN ISO 1167-1 EN ISO 1167-2
Melt mass-flow rate	≤ 1.6 g/10 min	Temperature 190C Loading mass 5 kg	EN ISO 1133-1
Thermal stability	≥ 20 min	Temperature 200C	BS EN ISO 11357-6
Reference density	≥ 930 kg/m ³	Shall conform to EN ISO 1183-1	BS EN ISO 1183-1
Resistance to heating - oven test	The pipe shall show no delaminations, cracks or bubbles	Test temperature (110 ± 2) C Heating time for wall thickness: e ≤ 10 mm 30 min e > 10 mm 60 min	ISO 12091

PT/493/0221 - AS (February 2021)

Table 3 Mechanical Requirements

Test	Requirement	Test Parameters	Test Method
Ring stiffness	\geq relevant SN	Shall conform to EN ISO 9969	EN ISO 9969
Impact strength (round the clock method)	True Impact Rate \leq 10%	Test temperature (0 \pm 1)C Conditioning medium liquid bath or air Type of striker d90 Mass of striker 3.2 kg (\leq 1200 mm mean inside diameter) Fall height of striker 2 m	EN ISO 3127
Ring flexibility	During the test there shall be no decrease of the measured force or cracking in any part of the wall structure. After the test there shall be no wall delamination, other types of rupture in the test piece or permanent buckling in any part of the structure of the pipe wall including depressions and craters in any direction.	Deflection 30% of mean outside diameter Length of test piece as specified in EN ISO 9969 Position of test piece as specified in EN ISO 9969 Age of the test pieces (21 \pm 2) days	EN ISO 13968
Creep ratio	\leq 4 at 2 years extrapolation	Shall conform to EN ISO 9967	EN ISO 9967
Tensile strength of seam	Minimum tensile force: 400 \leq DN < 600 mm 510N 600 \leq DN < 800 mm 760N DN \geq 800 mm 1020N	Rate of movement 15 mm/min	BS EN ISO 13262
Leak-tightness	No leakage at water pressure 0.05 bar No leakage at water pressure 0.5 bar \leq -0.27 bar at air pressure -0.3 bar	Temperature (23 \pm 2) °C Joint deflection for outside diameter: 315 < de \leq 630 mm 1.5° > 630 1°	BS EN ISO 13259 Condition C