

1. SCOPE

This schedule specifies characteristics for the Snap-on laser profiler and ClearLine software which provides accurate empirical data on the ovality, capacity and other conditions in new and existing pipelines.

This assessment schedule applies to the performance of the Snap-on laser profiler and the ClearLine software.

2. PRODUCT DESCRIPTION

2.1 Introduction

The laser profiler device can be retro-fitted to several makes and models of CCTV cameras and produces a ring of laser light on the inside of the pipeline.

The resulting images are analysed using the ClearLine software.

2.2 Relevant Standards

At present there are no existing standards that are relevant to the system on which to base a test schedule. WRc has drafted a test schedule based on the current needs of the UK Water Industry and to account for materials and conditions commonly encountered within the industry.

WRc identified the following documents as relevant to develop a performance test schedule.

- Manual of Sewer Condition Classification Fifth Edition 2013 (MSCC 5)⁽¹⁾
- Model Contract Document for Sewer Condition Inspection, Second Edition 2005⁽²⁾

2.3 Approval History

The Snap-on laser profiler and Clearline software system was originally awarded

WRc Approved™ certification in September 2004 (Certificate reference PT/09/2004).

The system was reassessed for WRc Approved™ certification in September 2009 (Certificate reference PT/286/0909) and September 2014 (Certificate reference PT/356/1214).

3. REQUIREMENTS AND TESTING

3.1 Type Testing

The Snap-on laser profiler and ClearLine software system shall be assessed for:

- Functionality;
- Calibration, scaling and image distortion; and
- Accuracy and repeatability.

Specific manufacturer's claims are listed below:

Reporting: The system shall provide automated reporting for ovality, hydraulic capacity, delta x/y, minimum and maximum diameter, 2D and 3D models and median diameter (for each image frame).

Output: The system shall provide data output in CSV file format.

Diameter range: The system shall provide accurate data for a pipe range of 150 mm to 450 mm.

Materials: The system shall provide accurate data for PE (including 'black' PE), GRP, clay, brick, concrete, cured-in-place pipe liners and patch repair materials.

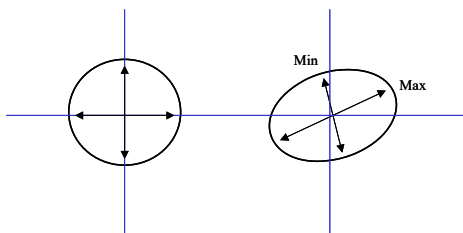
Accuracy: The system shall provide data to an accuracy of $\pm 0.5\%$ or better for linear measurements.

Repeatability: The system shall provide data with a repeatability of $\pm 0.12\%$ or better for linear measurements.

Ovality: The ASTM F1216-16⁽³⁾ standard for cured-in-place pipe liners defines a percentage ovality of the original pipe as:

$$\left\{ \frac{\text{Maximum Inside Diameter} - \text{Mean Inside Diameter}}{\text{Mean Inside Diameter}} \right\} \times 100$$

Where the maximum and minimum inside diameter is measured as follows:

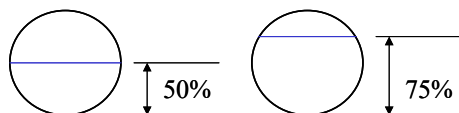


and the Mean Inside Diameter could be calculated as:

$$\frac{\text{Maximum Diameter} + \text{Minimum Diameter}}{2}$$

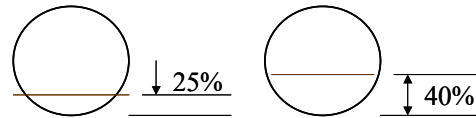
The system shall meet the specified accuracy requirements for ovalities between 0% and 15%.

Surcharge: MSCC5 defines level of surcharge by depth as a percentage of the pipe diameter.



The system shall be capable of operating between 0% and 30% surcharge and remaining fully functional.

Settled deposits: MSCC5 defines levels of percentage area reduction by settled deposits or debris.



The system shall be capable of operating between 0% and 30% area reduction and remaining fully functional.

Area reduction: MSCC5 defines percentage area reduction as follows.



The system shall provide accurate data to an accuracy of $\pm 3\%$ of the measured area.

Structural defects: Defect sizes are inferred with the aid of the light ring profiler and verified by manual measurement. Defects include:

- Fracture longitudinal;
- Crack longitudinal;
- Patch repair; and
- Hole.

3.2 Product Documentation

The product and operation documentation⁽⁴⁾ supplied by RedZone Robotics shall be complete and accurate and allow for the full benefit of the product to be achieved.

3.3 Site Audit

When used in accordance with the suppliers' instructions, the Snap-on laser profiler and ClearLine software shall be reasonably expected to perform as described.

3.4 User Requirements

Operators operating the hardware and interpreting survey results shall have

PT/455/1219 - AS (December 2019)

**Assessment Schedule for the Snap-on
Laser Profiler and ClearLine Software as
supplied by RedZone Robotics**



Independent certification of your products & services

sufficient experience, training and guidance documentation.

4. APPROVAL

The Snap-on laser profiler and Clearline software has been audited and have successfully met all the requirements stated within this assessment schedule.

Signed:

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

Valid until December 2024

5. REFERENCES

1. ISBN 9781898920700: Manual of Sewer Condition Classification Fifth Edition 2013 (MSCC 5).
2. ISBN 9781898920564: Model Contract Document for Sewer Condition Inspection, Second Edition 2005.
3. ASTM F1216-16, Standard practice for rehabilitation of existing pipelines and conduits by the inversion and curing of a resin-impregnated tube.
4. Field Handbook_Cues OZII and OZIII, Version 4.1, February 2019.