Certification of construction products

Certification rule 072 (CR 072)

Relining methods for pipes and pipe components for waste water and run-off rain water in properties:

- Polymer spray lining
- Cured-in-place pipe lining with flexible tube impregnated with thermosetting polymer
Contents

0 Foreword 3
1 Introduction 4
2 Scope 5
3 Requirements 5
4 Technical requirements 5
  4.1 Functional requirements 5
  4.2 Material and product requirements 7
  4.3 Additional requirements 8
5 Requirements concerning descriptions in instructions 8
  5.1 Product description 8
  5.2 Associated documents 8
  5.3 Marking 9
6 Production inspections 10
  6.1 Manufacturer’s internal inspections 10
  6.2 Supervisory testing and inspection 11

Appendix 1 Requirements
  Applicable requirements under the Swedish Planning and Building Act (2010:900), section 8 (4)
  Applicable requirements under Boverket Regulations
  Requirements in certification rules covered by Construction Regulations of Boverket (BBR rules)

Appendix 2 Technical details

Appendix 3 Flow diagram showing the relationships between the system owner, contractors and producing units.
0 Foreword

Certification rules describe the conditions under which construction products are SP-certified. They consist of product-specific rules as well as general rules (certification rule CR000).

The certification rules state which characteristics are assessed (according to the BBR rules) during certification and also how they are assessed.

The certification rules are based on applicable standards but may be revised in future, for example in order to harmonise them with European or international standards. They may also be revised if new regulations are introduced or in light of the experience gained from application of the certification rules.

The certification rules for pipes and pipe components for waste water and run-off rain water are established by the SP Certifiering unit manager.

02/06/2016

Johan Åkesson
SP Certifiering unit manager
1 Introduction

This certification rule contains technical information concerning self-supporting relining systems with spray lining or cured-in-place pipe lining, intended for internal renovation of run-off rain water and waste water systems in normal domestic environments in buildings. The certification rule is not applicable to relining of pipe systems for drinking water.

Definitions:
- Self-supporting relining system: spray lining and CIPP lining are self-supporting systems
- Spray lining: sprayed thermosetting resin
- CIPP (Cured In Place Pipe) lining: tube impregnated/filled/inverted with thermosetting polymer
- System owner, see also appendix 3: the owner of a type of relining system is usually the certificate holder
- The system owner can also be the "contractor/service provider" for its own system
- Contractor/service provider, see also appendix 3: has a contract with the system owner to use the system owner's relining system
- Producing unit, see also appendix 3: one of the contractor's units where handling of finished projects and incoming materials takes place and where installers are based.
- Method: a relining method such as CIPP lining or spray lining
- T25 is a manual setting out how to document drain pipe video inspections in properties and how to describe and classify observations. The manual is a collaborative venture involving members of the STVF (the Swedish video inspection association), BRiF (the Swedish industry body for relining in properties), Fastighetsägarna (body representing Swedish property owners), SABO (Swedish Association of Public Housing Companies) and VVS Företagen (Swedish body representing HVAC companies). The manual is only available in digital form and is free for everyone to use.

If the intended use of the product is not as described in this certification rule, a more detailed analysis will be carried out. In that case, the product will be assessed on the basis of applicable parts of this certification rule and also laws, government orders, regulations, rules, etc.

The certification rule will be updated with applicable rules for the new intended use.
Certification rule CR000 contains general information.
2 Scope

The rules apply to the relining of waste water systems and run-off rain water systems in buildings, with spray lining or CIPP lining intended for the relining of pipe systems made of cast iron, PE, PP, PVC, cement and glazed clay, etc. The customer (certificate applicant) specifies the types of pipe, material and dimensions to be included in the certificate and on the basis of which the system is tested.

*Type tests will be performed by the system owner and contractors/service providers but certain material tests are only performed by the system owner, see section 4.*

The certificate must indicate that the scope of the test covers the different pipe types by stating the pipe types for which the relining system has been tested and approved.

If the product includes joins between CIPP lining and spray lining, these must also be included in the certificate. Joins between different methods are only permissible at a branch.

The rules are not applicable to:
- Drinking water
- Underground pipes (outside buildings)
- Process piping
- Relining of floor drains

3 Requirements

The aim of the certificate is to show which requirements are met in Swedish building rules.

4 Technical requirements

The following tests must be performed for type testing as described here in section 4 and for supervisory inspections as described in section 6.2.

If the intended use of the product differs from this certification rule, a more detailed analysis must be carried out as described in section 1, potentially requiring different testing arrangements.

The testing arrangement must always be approved by SP Certifiering before type testing.

4.1 Functional requirements

The product must meet the applicable functional requirements in accordance with:
- PBL (Swedish Planning and Building Act 2010:900), see appendix 1
- BBR (Construction Regulations of Boverket – regulations and general guidance), see appendix 1
4.1.1 **Leak tightness and strength of the product**

This section describes how spray lining and CIPP lining are tested with regard to product characteristics and function.

The test is performed in accordance with EN 1055, modified as described in appendix 2 and relined under the supervision of SP. The relining must take account of whether the product is joined and whether there are different substrates, see section 4.3. Additional requirements. Appendix 2 has a schematic diagram of a pipe system for the EN 1055 compliant temperature cycling test.

All tests must be performed using the same material batch unless otherwise agreed.

The following abbreviations are used to identify the various tests.

B = Durability  
D = Dimensions  
F = Function

**Table 1**  
Functional requirements of relined systems with spray lining or CIPP lining

<table>
<thead>
<tr>
<th>To be tested</th>
<th>Test and evaluation methods</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1  Temperature cycling test,</td>
<td>EN 1055 (see appendix 2)</td>
<td>The system must be leak tight. Visual inspection with camera and note as described in T25. Reduction of cross-sectional area must not exceed 10%. If the system is not approved under T25, no further testing takes place.</td>
</tr>
<tr>
<td>leak tightness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2  Ring stiffness</td>
<td>ISO 9969</td>
<td>&gt;2 kN/m² Tested using the largest dimension for a specific thickness.</td>
</tr>
<tr>
<td>F3  FTIR/TGA (material identification)</td>
<td></td>
<td>Type tested value (TPV) = Value described with an FTIR/TGA analysis curve in order to lock the material composition for the future. This is commonly known as the fingerprint.</td>
</tr>
<tr>
<td>F4  Flushing of relined system for F1</td>
<td>Performed after the temperature cycling test</td>
<td>Visual inspection after flushing. No exposed pipe sections or cracks.</td>
</tr>
<tr>
<td>F5  Termination at floor drain</td>
<td></td>
<td>The system owner must provide SP and the customer with details of the work procedure</td>
</tr>
<tr>
<td>The joining method at the floor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>drain and the termination must be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>described. See section 5.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1  Temperature cycling test,</td>
<td>EN 1055 (see appendix 2) Cut and measured</td>
<td>The smallest measured thickness must be less than 90% of the minimum declared wall thickness.</td>
</tr>
<tr>
<td>thickness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The tests above must be performed by the system owner and also the contractors.

Certification of construction products – Certification rule 072 – Relining methods for waste water systems in buildings 2016-06-02
This is a translation from the Swedish original document. In the event of any dispute as to its content, the Swedish text shall take precedence.
4.2 Material and product requirements

Samples for durability testing are taken during the temperature cycling test. The contractor/service provider need not perform durability ageing-resistance testing in the case of P marked products purchased from the system owner.

All tests must be performed using the same material batch unless otherwise agreed.

4.2.1 Material

This section describes how spray lining and CIPP lining must be tested with regard to the durability of the material. The durability of the material is evaluated before and after accelerated ageing corresponding to 50 years.

The test method considered to be most suitable for the material is selected for the assessment, e.g. bending test or tensile test, see table 2. Aged and non-aged materials are compared with each other.

<table>
<thead>
<tr>
<th>Type test of materials used</th>
<th>Test and evaluation methods</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>F6 Bending test/tensile test*</td>
<td>SS-EN ISO178-1/SS-EN ISO527</td>
<td>&lt;50% reduction in tested property compared to non-aged material.</td>
</tr>
<tr>
<td>F7 FTIR/TGA relining (material identification of cured product)</td>
<td></td>
<td>Type tested value (TPV)</td>
</tr>
<tr>
<td>F8 FTIR/TGA sleeves to repair holes before relining (material identification)</td>
<td></td>
<td>Type tested value (TPV)</td>
</tr>
<tr>
<td>F9 FTIR/TGA lining (material identification)</td>
<td></td>
<td>Type tested value (TPV)</td>
</tr>
<tr>
<td>B1 Ageing-resistant material (assessed before, half way through and after)*</td>
<td>Ageing with heat in air and in water</td>
<td>Simulated service life of 50 years. Time in heating chamber determined according to the material</td>
</tr>
</tbody>
</table>

*Only carried out for the system owner in type testing or audit testing every five years, and samples are taken during the temperature cycling test. Other tests must be performed by the system owner and the contractors.
4.3 Additional requirements

Certificates with the P mark are normally obtained for a specific system with spray lining or CIPP lining. The additional requirements concern combinations of the methods described above and/or relining with different substrates (types of pipe).

To obtain a certificate for a combination of the two methods, the systems must be tested together in a temperature cycling test. At the upper branch in appendix 2, a join must be executed between the CIPP lining and spray lining.

To obtain a certificate for relining with different substrates (types of pipe), it must be tested together in a temperature cycling test. At different points labelled "PP" and "GJ" in appendix 2, pipes made of polypropylene and cast iron are inserted in order to show relining with different substrates/pipes. Adhesion to PP pipe (polypropylene) is considered to be very difficult compared to the cast iron pipes which are normally used.

5 Requirements concerning descriptions in instructions

5.1 Product description

- Name of product owner, or Contractor/service provider
- Name of product
- Description of materials
- Applications
- Dimensions (thickness and diameter)
- The joining method at the floor drain and the termination. See additional requirements section 4.3
- A work instruction must be defined and available for review, and must be included with the certificate application. It must also be included in the inspection instructions in the production inspection agreement.

5.2 Associated documents

Associated documents must contain the information necessary for correct design, installation and handling of the product. This includes an action plan describing how left-over materials are to be handled.
5.3 Marking

The following information must be evident from the marking for each completed project. The certification mark appears on a plate/label on each relined main pipe, clearly visible to an inspector or property owner, for example in inspection hatches. The marking must contain the following information:

**P mark:**
1. Name or registered trade mark of the company responsible for the products/system(s) (system owner or equivalent)
2. Project manager or equivalent
3. SP Certifiering quality mark (P)
4. Certification body (SP Certifiering)
5. Products/system(s), type designation
6. SP Certifiering certificate number, SCXXXX-XX
7. Serial number, date or other marking that can be cross-referenced to the inspection log of the system owner or contractor
8. Name or registered trade mark of the appointed inspection body if the manufacturer's internal inspections are to be monitored by an accredited body.
6 Production inspections

The following section is provided to supplement or clarify the requirements specified for internal inspections and supervisory inspections under certification rule CR000.

Inspections are carried out annually on the premises of:
- the system owner, contractors and all their producing units, and also one work site where relining of waste water systems is taking place.

6.1 Manufacturer’s internal inspections

6.1.1 Inbound inspections

Inbound inspections must be carried out by the system owner, contractors and all their producing units and all work sites where relining of waste water systems is taking place, to the extent considered necessary in order to verify that inbound materials and products comply with the specifications and material certificates.

Points to be verified:
- Incoming inspection routines and logging of raw materials used in relining. The incoming inspection must ensure that the declared raw materials are used.
- The inspection must include the batch numbers and expiry dates of the materials used.
- Safety data sheets and other relevant information/instructions from the raw material/material manufacturer must be available at the workplace.

6.1.2 Inspections during production

During the production process/relining, ongoing inspections must take place in accordance with the documentation on the premises of the system owner, contractors and all their producing units and all work sites where relining of waste water systems is taking place, based on the internal inspections reviewed for certification. Production must take place under controlled and planned conditions, for example they must be performed according to documented work instructions and monitored and controlled appropriately. Approval criteria must be defined and the production and inspection personnel must be familiar with them. The personnel must meet the training and qualification requirements of the company providing the service.

Work instructions must be defined. They must contain:
- Description of workflow and methods
- Description of material handling (safety data sheet, freshness of material)
- References to manuals, equipment descriptions, etc.
- Information about necessary maintenance of machinery and equipment
- Descriptions of the necessary control and monitoring
- Approval criteria
- Description of powers and reporting paths if nonconforming products are identified
- Routines for waste handling
6.1.3 Inspection of completed relining in existing waste water systems

Inspection of finished relining must be carried out to the extent considered necessary to ensure that the relining meets the specified requirements in T25:2012 and pages 28-33.

- Permissible nonconformities, installation with CIPP lining:
  - Level 2
  - Inspection to verify that the lining selected for a particular pipe dimension matches the specified work instruction.

- Permissible nonconformities, installation with polymer spray lining:
  - Level 2
  - Inspection of the number of layers sprayed for a particular dimension. Must match the number of layers specified in the certificate.

The sampling plan must specify sample taking, applicable test methods and the steps to take if the inspection fails.

Inspection of the finished pipe system must be carried out with a camera in both directions as described in T25.

6.2 Supervisory testing and inspection

Functional requirements and additional requirements must be verified through testing of the finished products in the inspection visit. The scope will be specified by SP.

The contract between the system owner, contractors and the inspection body must state

- Production inspection with a frequency of visits of once per year per producing unit or equivalent
- Samples are taken annually during the production inspection. The scope of sample taking is described in section 6.2.3 Tests below.

As an alternative to specifying the details in the contract, it is possible to refer to "CR 072" which contains large parts of this section 6.2. However, it is preferable to include everything in the contract without references in order to reduce the risk of incorrect interpretations.
6.2.1 Initial inspection

The initial inspection is carried out on the premises of the system owner, contractors and all their producing units. The initial inspection verifies compliance with the company's description of the internal inspection, as reviewed by SP Certifiering. In particular, it verifies that routines exist and have been implemented and that the rules are universally understood. The requirements are set out below.

Requirement

Manufacturer’s internal inspections

- 6.1.1 Inbound inspection
- 6.1.2 Inspection during production
- 6.1.3 Inspection of finished product

The following points may also be included in inspection instructions

- 4.1 Organisation
- 4.3 Document management
- 4.5 Equipment
- 4.6 Treatment of nonconforming products
- 4.7 Corrective measures
- 4.8 Waste handling
- 4.9 Traceability
- 4.10 Complaints

The initial inspection report must state that the system owner, contractors and all their producing units are capable of meeting the relevant requirements above.

6.2.2 Supervisory inspection of system owner or contractor/service provider

The annual supervisory inspection uses random samples to verify that the company performs its obligations as described in 6.2.1. The supervisory inspection of the product is carried out as described in 6.2.3.

The inspection report must state that the company meets the relevant requirements above. If the inspection reveals major nonconformities, additional follow-up inspections may be necessary on the manufacturer's premises.

Where a company is working on a project involving another company's P marked products, the supervisory inspection must be carried out on the premises of the contractor/service provider.

6.2.3 Testing

In addition to site visits, suitable test pieces are relined in forms which the inspection engineer collects and takes to the SP laboratory. Each certified product must be prepared for testing. The five year temperature cycling and ring stiffness tests are carried out on the premises of SP.

The relevant properties in table 5 below are tested, but the scope of the test may be adjusted following assessment.
<table>
<thead>
<tr>
<th>Test for supervisory inspection</th>
<th>Test and evaluation methods</th>
<th>Requirement</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F10</strong> Temperature cycling test, leak tightness</td>
<td>4.1.1 table 1 point F1</td>
<td>The system must be leak tight. Visual inspection with camera and note as described in T25. Reduction of cross-sectional area must not exceed 10%. If not approved under T25, no further testing takes place.</td>
<td>Every five years</td>
</tr>
<tr>
<td><strong>F11</strong> Flushing of system</td>
<td>4.1.1 table 1 point F4</td>
<td>Visual inspection after flushing. No exposed pipe sections or cracks.</td>
<td>Only in type testing</td>
</tr>
<tr>
<td><strong>F12</strong> Bending test/tensile test</td>
<td>4.2.1 table 2 point F5</td>
<td>Type tested value (TPV) ± 15%</td>
<td>Yearly</td>
</tr>
<tr>
<td><strong>F13</strong> Bending test/tensile test (with durability test)</td>
<td>4.2.1 table 2 point F6</td>
<td>&lt;50% reduction compared to non-aged material.</td>
<td>Every five years**</td>
</tr>
<tr>
<td><strong>F14</strong> FTIR/TGA relining (material identification of cured product)</td>
<td>4.2.1 table 2 point F7</td>
<td>Type tested value (TPV) (no significant difference from type test allowed)</td>
<td>Yearly</td>
</tr>
<tr>
<td><strong>F15</strong> FTIR/TGA sleeves to repair holes before relining</td>
<td>4.2.1 table 2 point F8</td>
<td>Type tested value (TPV) (no significant difference from type test allowed)</td>
<td>Yearly</td>
</tr>
<tr>
<td><strong>F16</strong> FTIR/TGA lining (material identification)</td>
<td>4.2.1 table 2 point F9</td>
<td>Type tested value (TPV) (no significant difference from type test allowed)</td>
<td>Yearly</td>
</tr>
<tr>
<td><strong>F17</strong> Ring stiffness</td>
<td>4.1.1 table 1 point F2</td>
<td>&gt;2 kN/m²</td>
<td>Every five years**</td>
</tr>
<tr>
<td><strong>B2</strong> Ageing-resistance of material</td>
<td>Ageing with heat in air and in water 4.2.1 table 1 point B1</td>
<td>Simulated service life of 50 years. Time in heating chamber determined according to the material</td>
<td>Every five years**</td>
</tr>
<tr>
<td><strong>D2</strong> Temperature cycling test, thickness</td>
<td>4.1.1 table 1 point D1</td>
<td>The smallest measured thickness must be less than 90% of the minimum wall thickness declared (by the reliner).</td>
<td>Every five years</td>
</tr>
</tbody>
</table>

**Only carried out for the system owner in type testing or audit testing every five years, and samples are taken during the temperature cycling test. Other tests must be performed by the system owner and the contractors.**
## Requirement

### Applicable requirements under the Swedish Planning and Building Act (2010:900), section 8 (4)

<table>
<thead>
<tr>
<th>Requirements under the Swedish Planning and Building Act, section 8 (4)</th>
<th>Applicable to relining systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strength, stability and durability</td>
</tr>
<tr>
<td>2</td>
<td>Safety in the event of fire</td>
</tr>
<tr>
<td>3</td>
<td>Protection regarding hygiene, health and environment</td>
</tr>
<tr>
<td>4</td>
<td>Safety in use</td>
</tr>
<tr>
<td>5</td>
<td>Protection from noise</td>
</tr>
<tr>
<td>6</td>
<td>Energy efficiency and heat insulation</td>
</tr>
<tr>
<td>7</td>
<td>Suitability for the intended purpose</td>
</tr>
<tr>
<td>8</td>
<td>Accessibility and usability for people with impaired mobility or orientation capacity</td>
</tr>
<tr>
<td>9</td>
<td>Water efficiency and waste reduction</td>
</tr>
</tbody>
</table>

### Applicable requirements under Boverket Regulations

<table>
<thead>
<tr>
<th>Requirement in PBL section 8 (4)</th>
<th>BBR (most recent version of BBR. Check the Boverket web site for changes)</th>
</tr>
</thead>
</table>
| 3 | 6:641 Installations for waste water  
| 6:642 Installations for run-off rain water in properties  
| 6:644 Design |
## Requirements in certification rules covered by Construction Regulations of Boverket (BBR rules)

<table>
<thead>
<tr>
<th>BBR requirement</th>
<th>Section in certification rules covering the requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>5.1 Product description Type 7</td>
</tr>
<tr>
<td>1:1</td>
<td>5.2 Associated document Type 7</td>
</tr>
<tr>
<td>1:1</td>
<td>5:4 Marking Type 7</td>
</tr>
<tr>
<td>1:1</td>
<td>6 Production inspection Type 7</td>
</tr>
<tr>
<td>6:641</td>
<td>4.1.1 Leak tightness and strength of the product</td>
</tr>
<tr>
<td></td>
<td>6.2.3 Testing</td>
</tr>
<tr>
<td>6:642</td>
<td>4.1.1 Leak tightness and strength of the product</td>
</tr>
<tr>
<td></td>
<td>4.2.1 Material</td>
</tr>
<tr>
<td></td>
<td>4.3 Additional requirements</td>
</tr>
<tr>
<td></td>
<td>6.2.3 Testing</td>
</tr>
<tr>
<td>6.644</td>
<td>4.1.1 Leak tightness and strength of the product</td>
</tr>
<tr>
<td></td>
<td>4.2.1 Material</td>
</tr>
<tr>
<td></td>
<td>4.3 Additional requirements</td>
</tr>
<tr>
<td></td>
<td>6.2.3 Testing</td>
</tr>
</tbody>
</table>
**Technical details**

EN 1055:1996 compliant testing with relining material. The temperatures, flows and number of cycles used for testing are as set out in Program A of the standard. A branch pipe and reducer are fitted to the lower pipe. Joins against the direction of flow (see T25:2012 page 28 dated 2013-05-13) should not be permitted due to the increased risk of leaking between the lining and the existing pipe. Plastic can shrink during curing.

The client uses SP’s rig to install a pipe system, for example consisting of plastic pipes and cast iron pipes depending on the intended application. Adhesion to PP pipe (polypropylene) is considered to be very difficult compared to the cast iron pipes which are normally used. The relining process is monitored by SP personnel, who check that the relining follows the system owner’s written work instructions. If a relining is intended for both plastic and cast iron pipes, the system must be set up as illustrated below.

Three holes with a diameter of 50 mm must be drilled and repaired as illustrated, and if rubber seals are used in the plastic pipes they must be removed before relining.

![Figure 1. System to be tested on premises of independent third party.](image_url)

* Drilled hole 50 mm

1. Bend 50 - 90°
2. Join 50 mm
3. Branch pipe 110/110-90°
4. Join 110/100 mm
5. Bend in cast iron 100-90°
6. Branch pipe 110/110-90°
7. Reducer 160/110 mm

After testing, the pipe is inspected with a camera to check the condition of the relining. The material thickness (min and max) of the relining is measured

- in the upper horizontal pipe 1 metre from the branch pipe
- in the vertical pipe 1 metre from the branch pipe
- in the lower horizontal 100 mm cast iron pipe 1 metre from the bend
- in the lower horizontal 160 mm PP pipe 1 metre from the T fitting
Flow diagram showing the relationships between:

- system owner, contractors and producing units. It also shows how they are entered in the certificate. If a contractor wishes to obtain P marking but the system owner does not, the contractor will be the certificate holder and is responsible for all testing.

<table>
<thead>
<tr>
<th>Certificate holder</th>
<th>System owner flexible liner and/or internal coating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>System owner of flexible liner and/or internal coating</td>
</tr>
<tr>
<td></td>
<td>Contractors (listed on certificate)</td>
</tr>
<tr>
<td>Company A: system owner = contractor</td>
<td></td>
</tr>
<tr>
<td>Company B: contractor 1</td>
<td></td>
</tr>
<tr>
<td>Company C: contractor 2</td>
<td></td>
</tr>
<tr>
<td>Producing units (listed on certificate or in contract appendix?)</td>
<td></td>
</tr>
<tr>
<td>Producing unit: A1, etc.</td>
<td></td>
</tr>
</tbody>
</table>

Relationships between system owner, contractors and producing units, and how they are entered in the certificate or contract

Certificate holder

System owner of flexible liner and/or internal coating

Contractors (listed on certificate)

Company A: system owner = contractor

Company B: contractor 1

Company C: contractor 2

Producing units (listed on certificate or in contract appendix?)

Producing unit: A1, etc.