SPCR 199

Certification rules for Fire suppression systems intended for use in engine compartments with combustion engines
Foreword

Product certification involves confirmation by an independent third party that a product fulfils requirements set out in standards or some other form of specification. Certification by RISE is performed by RISE Certification. Certification of products by RISE is performed in accordance with SS-EN ISO/IEC 17065.

This document sets out the rules for certification, product requirements and requirements in respect of ongoing surveillance of fire suppression systems intended for use in engine compartments with combustion engines.

The requirements concerning surveillance as set out in sections 4 and 5, have been drawn up by RISE. The technical requirements as set out in section 3 is described in test method SP Method 4912 with reference to actual standards where applicable. The products are divided into different fire technical classes as specified in SP Method 4912. Certification, as described in section 2, is performed by RISE Certification.

Continuous inspection involves inspection by the manufacturer and surveillance inspection by RISE. Surveillance inspection is carried out through visits to the manufacturer, and involves assessment of the manufacturer's FPC including system for risk assessment of engine compartment with following design and installation of suppression systems. In addition, samples of the finished products may be taken for testing in order to verify that the manufacturer's FPC is operating as intended.

The certification rules are based on current standards, but may be revised in future, e.g. to harmonise them with European or international standards. Revision may also be necessary if new regulations are introduced or if a need for such revision is shown by the results of experience of application of the rules.

This version of the rules replaces the previous version dated April 2021.

Disclaimer

It is up to the fire suppression system provider in collaboration with the vehicle/mobile machine supplier or owner to carry out a full risk assessment for and of each application. RISE takes no responsibility for how a certified system performs in a real engine compartment fire.

Borås, June 2023

RISE Research Institutes of Sweden AB
Certification

[Signature]
Martin Tillander
Director Product Certification
1. **Introduction**

1.1 **Scope**
These certification rules apply for fire suppression systems for installation in engine compartments with combustion engines.

1.2 **Certification scheme**
The certification scheme consists of the following activities:

1. Evaluation of the product(s) by means of type testing of one or more samples representative for the production.
2. Evaluation of risk assessment, design and installation procedures.
3. Initial assessment of the manufacturers quality assessment procedures including FPC and procedures for risk assessment, design and installation.
4. Issuing of a certificate
5. Annual follow up inspections of of the manufacturers FPC including procedures for risk assessment, design and installation.

2. **Conditions for certification**

2.1 **The certification process**
The certification process is described in steps 2.1.1 -2.1.5 below.
RISE General certifications rules for product certification, CR000, also applies.

2.1.1 **Application**
Application for certification shall be submitted in writing, and shall be accompanied by:
- Technical data as specified in Annex 1.
- A description of the manufacturer's FPC procedures including procedures for risk assessment, design and installation.
- Proposal for marking, as set out in section 3.4.

2.1.2 **Review of application**
When reviewing the application, RISE checks that the application is complete and that the application can be handled within RISE certification scope. The review may result in that RISE cannot accept the assignment, which is then communicated to the applicant with a justification.
If the application is adopted, this is communicated to the applicant through an order confirmation being sent. An evaluation plan is prepared. When a standard is followed, this largely represents the evaluation plan. If a subcontractor must be engaged, this is communicated to the applicant. The applicant is entitled to object to the selected subcontractor.
2.1.3 Test samples
The applicant is encouraged to deliver samples to the extent that the evaluation plan (e.g. the test method) requires. A common practice is that the applicant installs a system at site in a test mock-up, and the set-up is documented by RISE. When the certification shall cover a range of system sizes or configurations, testing of a number of set-ups can be actual. The test samples shall be representative for the production.

2.1.4 Evaluation
During the evaluation process, the product is checked to ensure it has been manufactured in accordance with the technical data, and that it meets the requirements in the method. The evaluation process includes tests and examinations that are carried out to the extent that the method specifies. In some cases, previous test results can be used for evaluation. The requirements for these tests include that they should have been carried out by an accredited independent testing laboratory.

The evaluation includes a review of procedures for risk assessment, design, installation, labelling and information to the user.

The evaluation process also includes an initial assessment of the manufacturer's quality assurance procedures. The implementation of the procedures will be audited at the manufacturer's premises. All deviations, if any, found during the audit, shall be corrected by the applicant and the corrective actions shall be approved by RISE.

An agreement on continuous quality control and inspection, as described in chapter 4 and 5 shall be entered between the manufacturer and RISE. In the case of RISE using a subcontractor, an agreement between all three parties shall be set up.

The evaluation will be summarized and go further to the review and decision.

2.1.5 Review, decision and issuing of a certificate
The evaluation work is reviewed, and following successful results, the process proceeds to the decision phase. When a decision on certification has been taken, a certificate is issued to the applicant.

2.1.6 Validity of the certificate
The validity of the certificate is normally five years. The certificate is valid provided that the products continue to fulfil the requirements and that the ongoing inspection continues to operate correctly. Depending on the content of reports from surveillance inspection, and other factors, the validity time may be extended after application from the holder of the certificate, see under 2.3.

Certified products may be marked with RISE P-mark.

2.2 Changes to certified products
Note that no changes of components that may affect the performance of the suppression system is allowed to be made to the certified product, without this being assessed and approved by RISE. The manufacturer must therefore notify RISE of any planned change to the certified product. Along with this notification, a description of the changes along with the addition of the technical data is attached.

RISE will then assess what measures need to be made in order for the certificate to
remain in force after such changes have been made. The assessment may result in additional tests having to be performed. If the result of the change means that the certificate is still valid, the certificate is revised with the new data.

2.3 Extension of validity period for the certificate issued.

At the end of the validity period, the period may be extended for a maximum of five years at a time. Application for renewal are to be made in writing, at least 6 months before the end of the validity period. For the application, an assessment is made of the measures required for the extension. If no changes are made to the regulations, specifications, etc. the certificate can be extended without any further action, provided that the product is unchanged relative to the original certification or the latest revision. The applicant must certify that no changes have been made. Another requirement is that the surveillance inspections has been performed as scheduled and with approved results.

If after all changes are made to the product, or are planned, the application must be supplemented with details about this. This may result in additional assessments and/or tests needing to be performed. In this case, the manufacturer must be notified thereof and may then also be given a price quotation for this.

3. Requirements

3.1 Type testing and performance requirements

3.1.1 Suppression system durability

The durability of the suppression system is tested for ability to withstand vibration at varying temperatures and resistance to corrosion. If the system has electric parts which is intended to be installed in the engine compartment these parts are tested for IP classification.

Test methods and requirements for these tests are specified in SP Method 4912 chapter 2.

If the system is intended for installation in off-road vehicles it shall be subjected to an additional 5000 shocks with acceleration 10 g and duration 20-25 ms. In this test the system shall be mounted in its intended orientation with half-sinusoidal pulse impacts in vertical direction (2500 upwards and 2500 downwards).

3.1.2 Suppression performance

Testing and classification of suppression performance is made according to SP Method 4912, chapter 3.

In order to obtain the P-mark, a minimum classification level according to Table 1 as well as requirement for re-ignition protection according to Table 2 must be achieved.
Table 1: Minimum requirements

<table>
<thead>
<tr>
<th>Test scenario rating</th>
<th>Level of openness</th>
<th>Class A fire</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>3</td>
<td>A</td>
</tr>
</tbody>
</table>

Table 2: Requirement for re-ignition protection.

<table>
<thead>
<tr>
<th>Re-ignition delay (s)</th>
<th>No re-ignition</th>
</tr>
</thead>
</table>

More information about the requirements is found in SP Method 4912. The results of the fire tests will be part of the information in the P-mark certificate.

3.2 Risk assessment

A risk assessment shall be made prior to equipment being placed into service. The identified fire hazards of the specific engine compartment shall be taken into account when designing an installation. Recommendations and specifications found in Annex 1 shall be used.

In the risk assessment, fire hazards and dangers related to efficient use of the extinguishment system shall be identified and documented together with a description on how each particular hazard is handled. The fire risk management process shall be fully documented.

The risk assessment shall be made by personnel having documented training for the task. The suppression system manufacturer shall either be directly involved in the risk assessment or indirectly through an organization appointed to the task by the suppression system manufacturer.

A risk assessment shall further be made when variations in design, use condition and environment, could change the fire risk potential or system performance.

3.3 Installation

The manufacturer shall provide the installer a design manual in compliance with section 1.1 in Annex 1. The installer shall be approved/licensed by the manufacturer.

3.4 Marking

Products entitled to display RISE certification symbol shall have a marking designed as the figure below, in black colour. The marking shall be legible and durable, and shall be applied in conjunction to the engine compartment. A template is available from RISE.

Minimum information to be found on RISE P mark label:
- Name of manufacturer and/ or Company logo
- SPCR 199
- Certificate number
- Product name
- Fire technical classification (according to SP Method 4912)
Information to be found on the product itself:

- Product name
- Serial number

Marking label

4. **Manufacturer's quality assurance procedures**

4.1 **General requirements**

The manufacturer shall operate FPC (Factory Production Control) procedures to ensure that products displaying the P symbol fulfil the requirements in these certification rules. These inspection procedures shall be described in a quality manual or corresponding document, and shall fulfil the requirements set out in this section.

The manufacturers FPC shall conform to the general requirements in TKR 000 "RISE General rules for product inspection", as well to the additional requirements, specified below.

4.2 **Additional requirements**

- The manufacturer shall have a documented process for product development that includes risk assessment of changes to certified products, considering how changes may influence the performance of the certified product. See section 2.2. Any design changes to components shall be notified to, and approved by, RISE before they can be introduced.

- A person shall be appointed to represent the manufacturer with regards to the manufacturing inspection. This person shall have the necessary authority and responsibility to ensure that the intended quality of the certified products is achieved and maintained.

- The manufacturer shall be able to confirm, by means of collecting and retaining relevant documents, that the products fulfil specified requirements.
• Documentation of inspection and testing shall be of such an extent that the necessary traceability can be assured. Records shall contain comments when results depart from those expected, together with descriptions of actions taken in response thereof.

• Archiving times shall be stated for documents relating to manufacturer’s FPC. Records of risk assessments, design, installation and test and inspections made at production/assembly shall be kept available for inspection by RISE. The records shall be retained for at least ten years after the product has been delivered.

5. RISE surveillance inspection

5.1 Execution
Surveillance inspection will be carried out at least once a year in the form of a visit, of which prior warning will not necessarily be given, by RISE to the manufacturer. The manufacturer shall provide unrestricted access to RISE representative for performance of the surveillance inspection.

On these visits, RISE will inspect to determine whether the manufacturer’s described inspection procedures are operating as intended.

Testing and inspection may be performed to a different extent, depending on the type and results of surveillance inspection. This will be set out in the agreement for surveillance inspection.

Surveillance inspection can also be carried out on a specific object where the system has been installed or at a site where installation take place.

Documents demonstrating the risk assessments, installation design and/or installations made shall be available at follow-up inspections, if applicable.

5.2 Surveillance inspection failure
If the manufacturer’s own inspection procedures fail inspection testing and/or examination, the reasons for this failure shall be investigated. The investigation may result in a new surveillance visit, retesting or failure of the manufacturer’s own inspection procedures.

5.3 Reporting
The results of surveillance inspection visits shall be reported in writing to the manufacturer and - if the holder of the certificate is some party other than the manufacturer - also to the holder of the certificate.
6. **Other terms and conditions**

See CR000 RISE General certification rules for certification of products.

7. **References**

SS-EN ISO/IEC 17065, Certification bodies - General requirements relating to certification of products.

EN ISO 9001, Quality management systems – Requirements


ISO 16750:2006, Road vehicles – Environmental conditions and testing for electrical and electronic equipment

ISO 21207:2004, Corrosion tests in artificial atmospheres – Accelerated corrosion tests involving alternate exposure to corrosion-promoting gases, neutral salt-spray and drying

EN 615:2009, Fire protection – Fire extinguishing media – Specifications for powders (other than class D powders)

SP METHOD 2580, Foam concentrates – Quality control

BS 5117: Section 1.3:1985, Testing corrosion inhibiting, engine coolant concentrate ('antifreeze'), Determination of freezing point

UN ECE R10.03:2008, Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility

UN ECE R107, June 22 2017, Annex 13

CR000, RISE General certification rules for certification of products

TKR 000, RISE General rules for product inspection
Annex 1

A1. Technical descriptions

A1.1 Risk assessment

A risk assessment of the fire hazards in the engine compartment must be made prior to equipment being placed into service. In addition for what is stated in section 3.2, the risk assessment shall also include the following information:

- Fire-risk identification within the engine compartment
- The gross volume of the engine compartment
- The protected fire risks in the engine compartment
- Installation drawings including placement of extinguisher agent container, pressure vessel, controller, piping systems, detection system, hoses, etc.
- Mass of suppression agent
- The type and number of nozzles
- Nozzle location and direction
- Estimation of the minimum temperature the suppression system may be activated at and calculated system pressure at this temperature
- Estimation of maximum temperature the suppression system may be activated at and calculated system pressure at this temperature
- Estimation of maximum air flow rate through the engine compartment

A1.2 Design and installation manual

P-marking impose that the manufacturer’s system design and installation manual as a minimum fulfills design parameters of the certified system.

- Number of nozzles (or other discharge points used)
- Nozzle type used (if the tested system utilized more than one nozzle type, it is allowable to use them in different proportions as long as the total flow rate is assured to be the same)
- Extinguishing agent
- Mass of extinguishing agent
- Maximum allowed pipe length from agent cylinder to the most remote nozzle.
- Number of fittings.
- Dimensions of pipes and fittings.
- The lowest and highest approved system pressure
- Mass of propellant gas, if applicable
- Pressure of the propellant gas (at 20°C), if applicable
- Type of propellant gas, if applicable
- System operating temperature range
The manual should include a detailed description of the installation procedure and what engine parts are to be protected, for example: turbo charger, exhaust manifold, generator including electrical wiring, air conditioner, auxiliary heaters and pressurized oil and fuel lines and distribution piping.

Optional information, when applicable:

- A technical description of the suppression system
- Placement of extinguishing agent and propellant gas containers
- Article numbers of the included components
- Pressure test procedure for the piping upon completed installation if the operating pressure exceeds 30 bar
- The maximum and minimum storage and operating temperature
- A schematic description showing the detection system, alarm and control unit
- Maintenance and service recommendations