Certification rules
regarding
Fire detection systems in engine compartments of heavy vehicles
SPCR 197

2017-03-10

Preface

Products can be certified for P-marking by RISE Research Institutes of Sweden. Issue of a certificate is subject to establishment that the product meets the requirements of relevant standards, regulations etc., and that the manufacturer operates an approved inspection regime and quality control system.

This document sets out the rules for certification of fire detection systems in engine compartments of heavy vehicles.

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 are based on SP Method 5320 and internationally accepted standards. 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. 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 future 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. If clarification or complementation of the rules becomes necessary, an appropriate PM document will be issued, and will also be incorporated in future issues of the rules.

For buses and coaches, complementary certification rules – SPCR 183 – enable certification of a combined fire detection and suppression system or certification of a separate fire suppression system installed in the engine compartment.

Disclaimer

The test results relate to the performance of the fire detection system against a variety of tests based on some of the operating conditions and fire hazards associated with engine compartments. The test method is designed to provide some information about the detection performance of the product. This information should be used as input to a risk assessment for real applications but is not intended to be the sole criterion for assessing the protection against potential fire hazards. It is the responsibility of the fire protection system provider, in collaboration with the vehicle supplier or owner, to carry out a full risk assessment for each vehicle application and accept full responsibility for the overall performance of the installed system. RISE takes no responsibility for how a tested system performs in a real engine compartment fire.

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Certification

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1. Introduction

1.1 General

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, a department that is separate from the testing and inspection departments. It answers to a certification board, whose members are drawn from across the range of industry areas involved. The board can appoint expert groups for various product areas, e.g. as technical working parties. Certification of products by RISE is performed in accordance with SS-EN ISO/IEC 17065.

Products which, after an initial evaluation - which includes testing and other aspects - show that they fulfil specified requirements can be certified by RISE. This certification is confirmed by issue of a certificate, one of the rights of which is usually permission (under licence) to use a certification symbol. Ongoing inspection/surveillance, consisting of the manufacturer's FPC procedures and RISE surveillance inspection, ensures that the requirements relating to the product continue to be fulfilled during the validity period of the certificate.

1.2 Scope

These certification rules apply for fire detection systems intended for engine compartments of heavy vehicles, including but not limited to buses, coaches, trucks, wheel loaders, tractors, mining machines and forestry machines.

This certification consists of the following moments

- Evaluation of the product(s).
- Initial assessment of the manufacturers FPC followed by yearly audits of the FPC.

2. Conditions for certification of fire detection systems in engine compartments of heavy vehicles

2.1 The certification process

2.1.1 General

The certification consists of an evaluation of the products performances and of its manufacturer's FPC procedures. When the requirements are fulfilled, and a written agreement between the manufacturer and RISE about the extent of the surveillance inspection is signed, a certificate can be issued. The certificate is valid provided that the products continue to fulfil the requirements and that the ongoing inspection continues to operate correctly. Certified products may be marked with RISE P-mark.

- Technical requirements, requirement for the continuous inspection and marking requirements are described in chapter 3
- Requirements regarding the manufacturer´s FPC and the surveillance inspection is described in chapters 4 and 5.
- Other terms and conditions are set out in chapter 6.

2.1.2 Application

Application for certification shall be submitted in writing, and shall be accompanied by:

- technical data (test reports, product description),
- a description of the manufacturer's FPC procedures as specified in chapter 4
- proposal for marking, as set out in section 3.4

2.1.3 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 mean that the RISE cannot accept the assignment, which is then communicated to the customer with a justification.
If the application is adopted, this is communicated to the customer through an order confirmation being sent to the customer. An evaluation plan is prepared, if it does not already exist. When a standard is followed, this largely represents the evaluation plan. If a subcontractor must be engaged, this is communicated to the customer. The customer is entitled to object to the selected subcontractor.

2.1.4 Test samples

The customer is encouraged to send test samples to the extent that the evaluation plan requires. The number of samples are normally stated in the applied standard. When the certification shall cover a range of sizes, testing of samples in different sizes can be necessary.

2.1.5 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 that the standard or specification requires. The evaluation process includes tests and examinations that are carried out to the extent that the specification requirements and/or evaluation plan 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 labelling and information to the user etc. In cases where the product and/or documentation shows deficiencies, i.e. does not meet the requirements, the evaluation may be cancelled.

The evaluation process also includes an initial assessment of the manufacturers FPC.

If the results of the evaluation show that the product and documentation meet the requirements of the specification, the process proceeds to review and decision.

2.1.6 Review and decision

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 and delivered to the customer.

2.1.7 Period of validity

The validity of the certificate is normally five years. 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.

2.2 Changes to certified products

Note that no changes may 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. In this case, the manufacturer must be notified thereof and may then also be given a price quotation for this. 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. Applications 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, of course, 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. This includes that a sample test has been performed during the period. See 5.2.
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 Technical Requirements

3.1.1 Type testing and performance requirements

All requirements in SP Method 5320 shall be met. The results of the tests, including response times, ratings, etc., will be part of the information in the P-mark certificate.

For flame detectors and smoke/gas detectors, the detection system supplier shall, in addition to the requirements in SP Method 5320, meet the following requirements to avoid nuisance alarms:

- The documentation of any flame detector must demonstrate that the detector is resistant to false alarms due to radiation from hot surfaces and reflections from the sun. Furthermore, it must be stated in the specification of the detector system if the detector must be placed on a certain distance from a hot surface.
- The documentation of any smoke/gas detector must demonstrate that the detector is resistant to false alarms due to non-fire smoke typically encountered in the environment it is going to be used in, e.g. exhaust levels, possible grease on a hot surface, detergents sprayed on hot surfaces or any other steam/fumes. Field tests in typical environments are recommended.

3.1.2 Risk assessment

A risk assessment shall be made prior to equipment being placed into service. Its main purpose is to demonstrate that the system design facilitate fast detection with relation to the P-mark test reports. In particular, the identified fire hazards of the specific engine compartment shall be taken into account. Specifications found in section 1.2 in Annex 1 shall be included.

A risk assessment shall further be made when variations in design, use condition and environment, could change the fire risk potential or system performance. In practice this could mean that a risk assessment would have to be carried out for each new engine compartment configuration.

In the risk assessment, fire hazards related to a response of the detection system shall be identified and documented. The documentation shall include risk management for the complete product lifetime (e.g. maintenance requirements) and be available to the relevant parties.

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

Documents demonstrating the risk assessment made shall be available at surveillance inspections.

3.1.3 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. After each installation the installer shall sign a declaration where he declares that the system is installed and checked according to the risk assessment and the manufacturer's design manual. The declaration shall be available at surveillance inspections.

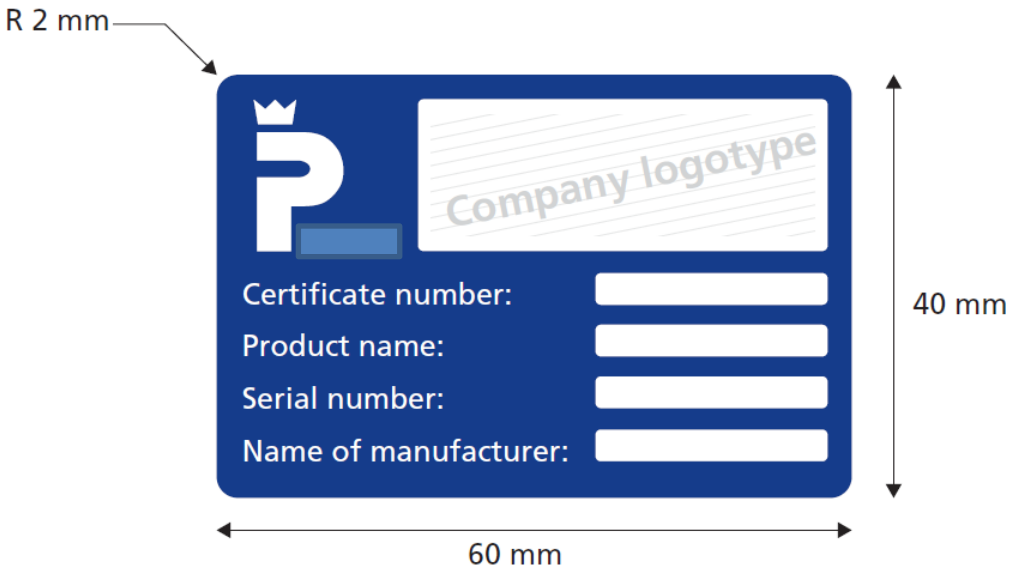
3.2 Requirement for continuous inspection

Continuous inspection shall ensure that certified products continue to fulfil the requirements in these certification rules. It shall consist of the manufacturer's FPC, as described in chapter 4, complemented by surveillance inspection, performed by RISE, as described in chapter 5.
The extent of the surveillance inspection shall be agreed and set out in an written agreement between the manufacturer/importer and RISE.

3.3 Marking

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

NOTE: This model will be revised during spring 2017



4. Manufacturer's Factory Production Control, FPC

4.1 General

The manufacturer shall operate FPC 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. If the manufacturer has an EN ISO 9001 quality system that has been certified by an accredited certification body, this can be regarded as fulfilling the following requirements in respect of organisation, management review, document control, control of nonconforming products, corrective actions, handling of finished products and complaints.

See CR000, General certification rules for certification of products, for details. In addition to this the following will be applied:

4.2 Installation control

If the manufacturer of the system is not the installer of the system, he shall at specified intervals perform spot checks on installed systems. Documents demonstrating the performed spot checks shall be available at follow-up inspections. See also section 3.1.3.

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 SP's 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, and will perform testing and inspection as described in section 5.2.

If the manufacturer has a quality management system that is certified by an accredited inspection body, RISE examination of the manufacturer's own inspection procedures can normally be limited to examination of records and audit reports. Testing and inspection will be carried out as described below in section 5.2.

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 on surveillance inspection.

Surveillance inspection can also be carried out on a specific object where the system has been installed.

Documents for installation will be reviewed at the time of inspection. Documented proofs of installation shall be available for inspection at any time.

5.3 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.

5.4 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 General certification rules for certification of products

7. References

- SS-EN ISO/IEC 17065, Certification bodies - General requirements relating to certification of products.
- SP Method 5320, Test method for fire detection systems installed in engine compartments of heavy vehicles
- EN ISO 9001 Quality management systems – Requirements
- CR000 SPs General certification rules for certification of products

Annex 1

1.1 Design manual

P-marking impose that the manufacturer's system design manual as a minimum fulfills design parameters of the tested system. For an engine compartment with the same gross volume as the test apparatus (4 m^3) this means that at least following variables must exactly match the tested system:

- Minimum number of sensor units
- Minimum length of linear sensors (Exact match for averaging type linear sensors, if not motivated by documentation or tests, and approved by RISE, that the sensitivity is not lowered by increasing length of the sensor)
- Number of sampling points for aspirating systems (Number of sampling points can be increased as long as the flow rate and sensitivity are not lowered at any of the sampling points. This should be motivated by documentation or tests, and approved by RISE)
- Sensor types used (If the tested system utilized more than one sensor type, it is allowable to expand the system with any of these sensor types)
- Sensitivity settings
- Flow rate of aspirating systems
- Pressure and what type of gas or liquid that is part of the sensor
- Dimensions of sensor units, including hoses, pipes, holes(inlets) and fittings

The design manual should include a detailed description of the installation procedure and what parts or volumes that are to be protected. In case the engine compartment is greater or less in volume compared to the test apparatus, section 1.3 in this annex shall apply for scaling of the system.

The design manual shall also include:

- A technical description of the detection system
- Placement of any control units and alarm indicators
- Article number of all the included components
- Labeling, identification and pressure of any pressurized components and pipes/hoses
- Settings and configurations that shall be used (If the sensitivity settings could be altered, the settings approved for P-marking must be clarified)
- Recommended minimum distance for unshielded heat sensors to any parts of the exhaust system or other hot surfaces
- The maximum and minimum storage and operating temperatures
- Clarification in case the system cannot be pressure washed (IP65)
- A schematic description showing the detection system, including control unit and alarm indicators, connected to any shut-down devices and the suppression system (if applicable)

1.2 Risk assessment

According to section 3.2 a risk assessment must be made prior to equipment being placed into service. Except for what is stated in section 3.2, the risk assessment shall also include the following information:

- Fire hazard identification within the engine compartment
- The protected fire risks in the engine compartment
- The gross volume of the engine compartment (Details of how to measure engine compartment gross volume and definition of the engine compartment are found in SP Method 5320)
- Installation drawings including placement, direction and identification of sensors, cables, hoses, pipes, fittings, control units, alarm indicators, any other connected devices (such as suppression system), etc.
- System operating temperature range
- Estimation of maximum air flow rate and flow directions through the engine compartment

In addition, the risk assessment shall include an estimation of response times for the different identified fire hazards based on the response time test in SP Method 5320 and supposed installation. Different air flow rates shall be considered as well.

1.3 Scaling of the fire detection system

The scaling model described in SP Method 5320 can be used to install the detection system in engine compartments ranging from 2 m^3 to 6 m^3 in gross volume. Details of how to measure engine compartment gross volume and definition of the engine compartment are found in SP Method 5320. In case another scaling model is to be used or if the scaling range needs to be extended, this shall be motivated separately in the risk assessment and shall be approved by RISE. For engine compartments larger than 10 m^3, typically found in large heavy duty mobile equipment, it may be necessary to perform additional measurements of environmental conditions and detector performance tests to motivate the system size and configuration.