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## Quality surveillance of filling materials for security products

### ECB•S R07

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# 1 INTRODUCTION

This guideline contains recommendations for the quality surveillance of filling and barrier materials for physical security products of the safe and strongroom industry.

The requirements and recommendations described here shall apply in addition to the existing quality management system according to ISO 9001 of the production site and can be incorporated into this system.

Burglary and fire resistant products often consist of a mechanical construction, filled with a combination of materials to offer the required protection. By definition these filling materials (see 2.4) and/or barrier materials (see 2.5) have a major influence on the overall performance. This guideline focuses on the performance of these materials, and serves as the basis for monitoring the processing of raw materials into filling and/or barrier materials.

The guideline provides the production site of the applicant with a basis for checks in raw material procurement and filling procedures to ensure that a serial product actually conforms to the requirements of the appropriate standard(s). They equally apply to the procurement of barrier materials that are mixed by a supplier.

Measurement of performance parameters and/or materials samples' testing is an effective method to monitor the quality of filling and/or barrier materials in the production of a product. It is the responsibility of the production site to identify and monitor such performance parameters. The tests may be made at testing laboratories accredited according to EN ISO/IEC 17025 or by using material test facilities at the production site.

The guideline can be used for secure storage units according to the following European Standards and can be incorporated into the production site's quality management system (see chapter 3).

- EN 1143-1: Safes, ATM safes, strongroom doors and strongrooms
- EN 1143-2: Deposit systems
- EN 14450: Secure safe cabinets
- EN 1047-1: Data cabinets and diskette inserts
- EN 1047-2: Data rooms and data containers
- EN 15659: Light fire storage units

NOTE: This guideline contains obligations ("shall") and recommendations ("should").

## 2 DEFINITIONS

2.1 Applicant: legal body applying for the type test and certification

2.2 Production site: legal body that produces products providing protection against burglary and/or fire. Synonym: manufacturer

2.3 Raw material: component/ingredient of filling and/or barrier material (see 2.4 and 2.5) that contributes to the performance of these materials

2.4 Filling material: combination of different raw materials (see 2.3) normally processed at the production site in order to achieve the resistance performance against burglary or fire and whose properties:

- can be expressed by one or more performance parameters
- are not specified in the raw material description

NOTE: This is usually concrete applied as a mortar, possibly with steel fibers.

2.5 Barrier material: combination of different raw materials (see 2.3) processed by a supplier of the production site in order to achieve the resistance performance against burglary or fire and whose properties:

- can be expressed by one or more performance parameters
- are not specified in the raw material description

NOTE: Examples for this are steel grids, fire protection pads or drill protection.

2.6 Type test: Test for the determination of the resistance against burglary or fire

2.7 Testing laboratory: legal body as a rule according to EN ISO/IEC 17025 and ECB-cooperation partner performing type tests to the EN standards such as listed in the introduction.

2.8 Type test report: report describing the type test including its results

2.9 Accredited material testing laboratory: organisation having a laboratory that performs material performance tests and is accredited in accordance with EN ISO/IEC 17025

2.10 Material test facility: equipment suitable to perform material performance tests

2.11 Material test report: report describing the performance tests including the results of the material performance tests

2.12 Type test specimen: full scale model of envisaged manufactured products having all designed burglary/fire resistant properties to be verified in a performance test

- 2.13 Technical documentation: specification and drawings which describe the design of the type test specimen in accordance with the relevant standard
- 2.14 Materials sample: specimen used to measure performance parameters of the filling and/or barrier material of burglary and fire protection products (e.g. thermal conductivity, composition, structure, dry bulk density, chemical analysis)
- 2.15 Measurement inaccuracy: uncertainty of measurement due to the accuracy of the measuring equipment
- 2.16 Criteria: minimum and/or maximum value allowed for the sample measurement value.  
Synonym: threshold values
- 2.17 Performance parameter: material property of a filling or barrier material that can be measured (for production monitoring) and used for comparison (between two samples of barrier/filling material).

### **3 QUALITY MANAGEMENT SYSTEM**

The production site shall carry out internal self-inspection within the framework of a quality management system according to ISO 9001 ensuring that the serial product is in conformity with the requirements of the appropriate standard(s)' Technical Documentation.

The quality management requirements should be adhered to and implemented during serial production. This applies in particular to the procurement and the processing of security-relevant building components, raw components and filling and/or barrier materials.

### **4 PERFORMANCE PARAMETERS AND CRITERIA**

Filling and barrier materials need to be characterized in order to evaluate their performance. This requires to define for each the relevant key values. Therefore ideally, at the time of the type test the following should be agreed by the production site and the testing laboratory:

- performance parameters
- testing method
- criteria

Note: Additional R&D may prove necessary to reliably measure a performance parameter.

Note: The more automated and controlled the barrier preparation process, the less need for high frequently sample testing in the production.

The performance parameters (examples see annex A) shall be measurable in a reproducible manner, preferably based on a European standard.

## **5 TYPE TEST SPECIMEN**

Applicant and testing laboratory agree the preferred sample(s) made of the filling and/or barrier materials to be made in parallel with type test specimens of the relevant burglary or fire resistant product.

Manufacture of the type test specimen and agreed samples may be monitored by the testing laboratory. If applicable, the applicant enables the testing laboratory to view the manufacture of barrier materials.

The detailed formula (technical specification) and admissible tolerances as well as working and procedural instructions for the production and processing of the raw material (2.3) and filling material (2.4) shall be described by the manufacturer in the QM documentation and shall be unequivocally marked by the testing laboratory.

## **6 SERIAL PRODUCTION**

Presence of the quality management system assumes surveillance of the procurement of raw components and barrier materials. The quality management procedure shall stipulate that incoming raw components and barrier materials (2.5) received by the production site be subjected to an inspection and/or be accompanied by a confirmation of conformity issued by the supplier.

Transport and storage of raw components and barrier materials at the production site premises shall be documented in the QM documents to ensure that quality requirements are met.

By written instructions, training, etc., the production site shall ensure that the instructions for processing raw components, barrier and filling materials will be observed.

Regular maintenance and/or calibration of operational units shall be carried out to ensure the proper implementation of above instructions.

Modifications of and amendments to the working and procedural instructions for serial production with respect to the test specimen shall be communicated to ECB and the competent testing laboratory in writing.

## **7 INTERNAL QUALITY CONTROL**

The production site will determine performance parameters and where applicable also perform material tests as part of the production process control. Criteria are agreed between applicant and testing laboratory and are set in relation to the specimen performance as determined during the type test (see also chapter 4). Performance parameters and material tests shall be recorded and the results shall be checked against the criteria by the production site. In case of deviations, correction in the production process shall be made and recorded in the internal quality control documentation.

In case that material samples are used for the performance of the internal quality control further samples should be kept by the production site as reserve samples for a period of not less than two years.

## **8 EXTERNAL QUALITY SURVEILLANCE OF PRODUCTION SITE**

During the annual external ECB quality surveillance (see certification guideline ECB•C10) of the production site the following criteria shall be checked by the auditor:

- Performance of internal quality control of raw material and accordance with the criteria
- Performance of internal self-inspections of performance parameters and accordance with the criteria
- If applicable accordance of material samples with the criteria
- Compliance of the fixed filling formula and the corresponding written instructions

Wherever possible also the filling process should be monitored within the external quality surveillance.

## ANNEX A: Examples of performance parameters

Note that this overview is not limitative. In addition other performance parameters may be deemed relevant and a measurement method be agreed.

For burglary resistant materials, examples of performance parameters are

- density ( $\rho$ )
- compressive strength ( $\sigma$ )
- tensile strength ( $\sigma$ )
- flexural strength ( $\sigma$ )
- hardness (raw)
- abrasive resistance
- stability of aggregate

For burglary resistant materials, examples of measuring other parameters are

- penetration resistance test with thermal tool
- penetration resistance test with hammer
- penetration resistance test with electro hammer
- penetration resistance test with grinder
- penetration resistance test with electrical drilling machine

For fire resistant materials, examples of performance parameters are

- thermal conductivity ( $\lambda$ )
- wet and dry density ( $\rho$ )
- moisture content (%)
- conductivity/insulation ( $\lambda$  at ... K)
- heat capacity (C)
- compressive strength ( $\sigma$ )
- phase change temperature (t)

Note: it must be realised that the combined choice of design and materials determines the feasibility of criteria. It is recommended to make this combined choice such that it leads to achievable criteria in production.

## **ANNEX B: Recommendations for material samples**

If material samples are taken the following recommendations are reasonable:

### a) Marking:

- Name and address of the manufacturer of the certificate holder
- Designation of material (name of formula)
- Date when the material sample is taken
- Type or series from which the sample is taken and which filling material is used
- Name of person taking the sample
- Characteristic data, e.g. weight

### b) Work instruction for production of samples:

- Time and place of sample taking
- Ambient temperature in the hall where the mixer is located
- Filling process of the test equipment ("formwork of the sample")
- Storage of the sample after filling
- Number of samples produced per year
- Marking of the sample

### c) Dimensions:

For testing the parameters dry density and thermal conductivity with material samples the following dimensions are useful:

length x width x height = 160 x 160 x 200 mm