

## Roll-out for Test Round 2021

**Programs:** **Flameproof Joints ("FJ")**  
**Small Component Temperature ("SCT")**

### 1. Introduction

As a result of the IECEx meeting in Denver 2007, ExTAG WG10 received the mandate by ExTAG to check the possibilities of performing interlaboratory comparisons in the field of explosion protection. Interlaboratory comparisons are in general essentially required for accredited Ex laboratories which work on the basis of standard ISO/IEC 17025 and - thus - also for the IECEx test laboratories. In Melbourne 2009, the convenor of ExTAG WG10 reported that - in respect of the importance and the good resonance in the IECEx family - PTB has launched a project team in this regard. In compliance with the requirements of standard ISO/IEC 17043, this team has developed a proposal for the concept of a Proficiency Testing Scheme (PTS) within the scope of IECEx. In analogy with the internal policy of IECEx (peer assessments), it was suggested that PTB will act as a "(peer) coordinator" for this program.

The pilot phase with 44 participating laboratories was successfully completed in July 2012. The fruitful results and the positive resonance of the Ex community were the motivation to continue the PTB Ex Proficiency Testing Scheme (PTB Ex PTS). In the following eight years the eight further programs/test rounds "Temperature Classification", "Flame Transmission", "Electrostatic Charge", "Intrinsic Safety", "Pressurized Enclosures", updated "Explosion Pressure", "Tests of Enclosures" and "Battery Testing" have been successfully completed. In total 111 Ex laboratories have been participated in these programs so far.

During the IECEx meeting in The Hague in September 2014 it was decided that all accepted and applicant IECEx ExTLs and their associated laboratories are obligated to participate in a Proficiency Testing Scheme specifically designed for Ex safety protection methods (ExMC/1007/R - Report on Action Items from the Sixteenth Meeting of the ExMC held In The Hague, Netherlands 28th and 29th August 2014; Decision 2014/53). From this it follows that in accordance with IECEx 02 Rules of Procedure, participation in the PTS is mandatory for all accepted and applicant IECEx ExTLs and any Additional Testing Locations (noting that this does not include laboratories operating under the provisions of IECEx OD 024). Laboratory participation is according to their scope of acceptance in the IECEx System and is a condition for continued acceptance. PTB has been appointed by IECEx as the official provider of the IECEx Proficiency Testing Scheme (ExMC/1181/DL - The Eighteenth Meeting of the ExMC held in Umhlanga, South Africa 8th and 9th September 2016 - Confirmed List of Decisions; Decision 2016/59).

Based on the input from participating laboratories, PT workshop participants and PTB experts and the discussion at the IECEx remote meeting 2020, the members of ExTAG agreed on the two next programs/test rounds for the cycle 2021/2022. As a result, the new programs "Flameproof Joints" and "Small Component Temperature" are being launched for Test Round 2021. All IECEx test laboratories (IECEx ExTLs, IECEx Applicant ExTLs, IECEx Additional Testing Facilities (ATFs) and IECEx Applicant ATFs) and other Ex laboratories which meet the requirements of ISO/IEC 17025 are invited to participate in these programs. Additionally, manufacturers with own testing facilities are welcome as well.

## 2. Objectives and Purposes

Participation within an PTS is essential for the compliance with the requirements of ISO/IEC 17025 and IECEx laboratory assessment requirements regarding the need of the Ex laboratories to perform interlaboratory comparisons. In addition, the results of PT programs will contribute considerably to the development of the “Peer concept” within the global community of Ex laboratories. With the practical experience gained in its performance, the PTB Ex PTS shall be further developed and improved (continuous improvement process). The vision is to extend the PTS step by step to all fields of conformity assessment (not only testing) within the scope of the IEC/TC 31 standards.

The results of this PTS will also be of direct use for all participants, among others for:

- proving the competence to
  - customers,
  - regulators and
  - end users,
- the identification and avoidance of problems in and between the Ex laboratories and the initiation of measures for improvement,
- the establishment of the effectiveness and comparability of the applied testing and measurement methods,
- the support of IEC/TC 31 by providing the outcomes and findings to the respective maintenance teams/working groups,
- the provision of additional confidence to the customer,
- the avoidance of distortions of competition between the manufacturers as the customers of the test laboratories,
- promotion of the “fair play” culture.

## 3. Programs

For performing the programs, the individual routine procedure of each test laboratory needs to be applied (used every day for achieving the test results for real projects). The general routine procedure is described by the standards of the applicable type of protection. This means that the standard of the respective type of protection must also be used as a basis when the quantities to be compared (measurands or characteristics of interest) are selected, i.e. IEC 60079-1 for program “Flameproof Joints” and IEC 60079-0 for program “Small Component Temperature”. In addition, detailed instructions in terms of a procedure instruction as well as further supporting documents (templates, data sheets, examples, etc.) are provided on how to perform the tests together with the artificial test samples.

### 3.1. Flameproof Joints (“FJ”) - Test Round 2021

For the program “Flameproof Joints (“FJ”) - Test Round 2021” the general routine procedure is described by the standard “Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures “d”” - IEC 60079-1, Edition 7.0.

In the field of the type of protection flameproof enclosures, the equipment often has joints due to the constructional design or to ensure functionality. These joints must be designed in a way that they prevent flame transmission of an internal ignition in order to fulfill the requirements of the type of protection. To ensure this, the joints must comply with certain dimensional requirements specified in the standard mentioned above. All flameproof joints, whether permanently closed or designed to be opened from time to time, shall comply, in the absence of pressure, with the appropriate requirements of clause 5. Furthermore, the determination of the test gap forms the basis for the test for non-

transmission of an internal ignition (clause 15.3). Therefore, the maximum gap of the flameproof joint has been selected as the measurand of interest which is to be compared in the program “Flameproof Joints – Test Round 2021”. In addition to this measurand of interest, the program also addresses the aspect of preparing/performing the test for non-transmission of an internal ignition (theoretical only).

### 3.1.1. Test Sample “FJ”

The Test Sample “FJ” (see Figure 1) is a simplified construction for the simulation/representation of different flameproof joints consisting of three bolts and a hole plate with various borings. The outer dimensions are 320 mm x 100 mm x 52 mm (L x W x H). The simple and robust design and homogeneity tests guarantee homogeneity and stability throughout the whole test round. In addition, the selected design of the test sample offers convenient manufacturing, preparation and transport possibilities. To ensure comparability and homogeneity, all Test Samples “FJ” are completely produced, prepared and provided by the coordinator. Detailed information and specifications regarding the test sample are described in the “Procedure Instruction of Program “Flameproof Joints - Test Round 2021”” which will be published at a later date.



Figure 1: Exemplary Test Sample “FJ”

### 3.1.2. Test method

The Test Sample “FJ” is tested in accordance with IEC 60079-1, clause 5.2 & 5.3. In addition, a theoretical preparation of the test for non-transmission of an internal ignition is performed based on documentation (clause 15.3). No experimental flame transmission testing is required for this program.

The tests for program “FJ” consist of two parts:

1. Measurement on Test Sample “FJ” according to IEC 60079-1, Clause 5.2 & 5.3,
2. (Theoretical) Description of the preparation of the test for non-transmission of an internal ignition based on documentation according to IEC 60079-1, clause 15.3.

The workload to perform this program is approximately 3 working days. Detailed information and specifications regarding the test method are described in the “Procedure Instruction of Program “Flameproof Joints - Test Round 2021”” which will be published at a later date.

### 3.2. Small Component Temperature (“SCT”) – Test Round 2021

For the program “Small Component Temperature (“SCT”) - Test Round 2021” the general routine procedure is described by the standard “Explosive atmospheres – Part 0: Equipment – General requirements” - IEC 60079-0, Edition 7.

An important aspect for the testing and assessment of the explosion protection is the test for small components, for example transistors or resistors, whose temperature exceeds that permitted for the temperature classification, described in clause 5.3.3. In the program the test sample (small component for T4 temperature classification) should be tested with flammable mixture in accordance with clause 26.5.3, to investigate if it causes temperature ignition of the flammable mixture. Therefore, the number of ignitions has been selected as the characteristic of interest which is to be compared in the program “Small Component Temperature - Test Round 2021”.

#### 3.2.1. Test Sample “SCT”

The test sample is an all-ceramic heating element made of silicon nitride and aluminium nitride (see Figure 2).

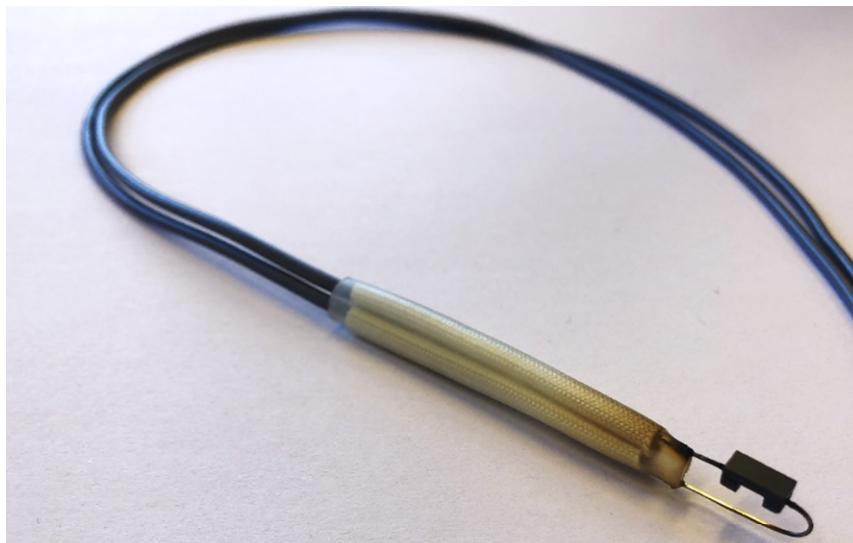


Figure 2: Exemplary Test Sample “SCT”

The size of the test sample is 7 mm x 3 mm x 1.5 mm (L x W x H). Due to the properties of the ceramic and the low mass, the test sample can be heated up and cooled down quickly. Furthermore, a homogeneous temperature distribution can be provided. Two samples (one of the samples serves as reserve) will be provided by the coordinator at the beginning of the program. To ensure comparability and homogeneity, all Test Samples “SCT” are completely selected, prepared and provided by the coordinator. Detailed information and specifications regarding the test sample are described in the “Procedure Instruction of Program Small Component Temperature” which will be published at a later date.

#### 3.2.2. Test method

In the program, the Test Sample “SCT” is tested with three different electrical power levels which should be set via own controllable power supply, and a defined gas-air mixture selected according to IEC 60079-0, clause 26.5.3, to observe if it causes temperature ignition of the flammable mixture or not.

The tests for program “SCT” consist of two parts for each electrical power level:

1. Tests with a flammable mixture according to 26.5.3 to investigate if it causes temperature ignition of the flammable mixture. During the tests the safety margin required by 5.3.4 shall be achieved
  - a. by raising the ambient temperature at which the test is carried out,
  - b. or by raising the temperature of the test sample.

To increase the statistical significance, ten tests shall be made for each electrical power level.

2. (Optional) Tests with a flammable mixture according to 26.5.3 to determine
  - a. the ignition temperature when an ignition occurs,
  - b. or the maximum surface temperature when no ignition occurs.

At least one test should be performed for each electrical power level.

The time required to complete the mandatory part of the program (Part 1) is approximately 3 working days. Detailed information and specifications regarding the test method are described in the “Procedure Instruction of Program “Small Component Temperature - Test Round 2021”” which will be published at a later date.

## 4. Results

All test results, data and information are recorded and archived by the coordinator. PTB provides access to the database by a website which is also used for other communication, e.g. publication of the results. The system guarantees total confidentiality for the handling of all relevant data. The test results forwarded by the participants to the coordinator must always be original data (no edited curves, summarized tables, etc.). All analysed and evaluated participant-related test results are foreseen to be published within the group of participants after approval from those laboratories being involved in the programs. All results are published in an anonymous way. After accomplishment of the programs, the coordinator prepares a report in compliance with the requirements of ISO/IEC 17043, clause 4.8 for each program.

Detailed information and specifications regarding the data analysis and evaluation of the results are described in the respective “Procedure Instruction” and the reports of the programs which will be published at a later date.

## 5. PTS website

The organization, communication and coordination of all processes of the PTB Ex PTS is supported by a web-based platform. Data security and confidentiality are guaranteed by an access-protected data base. The system represents a comprehensive information base for all participants, it serves as a basis for the complete data exchange within the scope of the PTB Ex PTS. PTB is the administrator of this platform. At the beginning of the test rounds, each participant receives individual login data to get access to the PTS website. Thus, access to all detailed information, descriptions and data for the performance of the programs of the PTB Ex PTS is provided. The PTS website can be found at:

<https://www.ex-proficiency-testing.ptb.de>.

Detailed information and specifications regarding the handling instructions for the website are described in the respective “Procedure Instruction” of the program which will be published at a later date.

## 6. Information for participation

### 6.1. Time Schedule

It is intended to perform both programs “Flameproof Joints - Test Round 2021” and “Small Component Temperature - Test Round 2021” in 2021/2022. Please find enclosed the detailed time schedules (see Annex A).

### 6.2. Costs of participation

The basic costs of the PTB Ex PTS (e.g. concept development of the programs and related test samples, manufacturing of the samples, evaluation procedures of the results) are covered by PTB. Nevertheless, PTB cannot cover all expenses caused by the various programs, offered every two years. The PTB Ex PTS is not organized as by a commercial provider; it is using instead the non-profit approach in cooperating with the non-profit registered association (e.V.) “Ex Network e.V.” in order to process financial transactions. The association works under financial supervision of the local tax authority of the City of Braunschweig. PTB as governmental organization is allowed to receive financial resources from the Ex Network e.V. under the umbrella of a cooperation contract with the scope of offering and conducting Ex proficiency testing programs. The costs for the PT programs within the PTB Ex PTS are as follows:

- **Participation in both programs of the current program cycle is 6,000.00 EUR (VAT excluded),**
- **Participation in a single program of the current program cycle is 3,500.00 EUR (VAT excluded),**
- **Participation in a single program of a past program cycle is 1,500.00 EUR (VAT excluded).**

After registration for the respective program(s), the participant will receive an invoice corresponding to the program costs issued by Ex-Network e.V. Payment deadlines are announced with the invoice or in direct contact with the participant. Non-payment or late payment may result in test samples and/or reports not being distributed. Payment will be confirmed together with the “Confirmation of Participation”. The participant confirms to agree with these conditions by emailing the signed “Declaration of Participation” to the provider PTB (Ex-proficiency-testing@ptb.de).

### 6.3. How to participate

The interested IECEx test laboratories and other Ex laboratories will confirm their participation by completing the respective forms enclosed as Annex B and send them back to PTB in accordance with the schedule

**before 2021-04-15.**

The coordinator will confirm the receipt of the declaration of participation accordingly. The programs are considered as two separate programs, so it is possible to participate in both programs or in just one of them.

## 6.4. Contact

### 6.4.1. Coordinator:

Physikalisch-Technische Bundesanstalt (PTB)  
Bundesallee 100  
D-38116 Braunschweig

Tim Krause M. Eng.  
Convenor IECEx ExTAG WG10  
E-Mail: [tim.krause@ptb.de](mailto:tim.krause@ptb.de)  
Phone: (+49)531-592-3540

### 6.4.2. Person to be contacted for general questions and organization:

Lisa Ostermann M. Eng.  
E-Mail: [Ex-proficiency-testing@ptb.de](mailto:Ex-proficiency-testing@ptb.de); ([Lisa.Ostermann@ptb.de](mailto:Lisa.Ostermann@ptb.de))  
Phone: (+49)531-592-3554

Jia Wu M. Eng.  
E-Mail: [Ex-proficiency-testing@ptb.de](mailto:Ex-proficiency-testing@ptb.de); ([Jia.Wu@ptb.de](mailto:Jia.Wu@ptb.de))  
Phone: (+49)531-592-3548

Dipl.-Chem. Maria Brodel  
E-Mail: [Ex-proficiency-testing@ptb.de](mailto:Ex-proficiency-testing@ptb.de); ([Maria.Brodel@ptb.de](mailto:Maria.Brodel@ptb.de))  
Phone: (+49)531-592-3526

## ANNEX A

## Overview of the time schedule for program "Flameproof Joints - Test Round 2021"

No.	Task	2020				2021												2022											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	Development of program "Flameproof Joints - Test Round 2021" and preparation of the prototype test sample by the coordinator																												
2	Roll out of program "Flameproof Joints - Test Round 2021"																												
3	Registration phase for participation																												
4	Preparation and shipment of the test samples to the participants																												
5	Performance of the tests of Phase I and forwarding of the results to the coordinator																												
6	Deadline for uploading the test results of program "Flameproof Joints - Test Round 2021" Phase I																												
7	Evaluation and publication of the test results of program "Flameproof Joints - Test Round 2021" and release of the interim report																												
8	Workshop at PTB																												
9	Performance of the tests of Phase II and forwarding of the results to the coordinator																												
10	Deadline for uploading the test results of program "Flameproof Joints - Test Round 2021" Phase II																												
11	Evaluation and publication of the test results of program "Flameproof Joints - Test Round 2021" and release of the final report																												

## Overview of the time schedule for program "Small Component Temperature - Test Round 2021"

No.	Task	2020			2021												2022												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	Development of program "Small Component Temperature- Test Round 2021" and preparation of the prototype test sample by the coordinator																												
2	Roll out of program "Small Component Temperature- Test Round 2021"																												
3	Registration phase for participation																												
4	Preparation and shipment of the test samples to the participants																												
5	Performance of the tests of Phase I and forwarding of the results to the coordinator																												
6	Deadline for uploading the test results of program "Small Component Temperature- Test Round 2021" Phase I																												
7	Evaluation and publication of the test results of program "Small Component Temperature- Test Round 2021" and release of the interim report																												
8	Workshop at PTB																												
9	Performance of the tests of Phase II and forwarding of the results to the coordinator																												
10	Deadline for uploading the test results of program "Small Component Temperature- Test Round 2021" Phase II																												
11	Evaluation and publication of the test results of program "Small Component Temperature- Test Round 2021" and release of the final report																												

## ANNEX B

### Declaration of Participation

#### Program: Flameproof Joints (“FJ”)

##### Participant information

<b>Test laboratory</b>	
<b>Contact person</b>	<b>First name</b>
	<b>Surname</b>
<b>Phone</b>	
<b>E-mail</b>	
<b>Additional e-mail address for “cc” (if required)</b>	
<b>VAT-ID (if available)</b>	

##### Dispatch address for the test sample

<b>Address</b>
<b>ZIP/Postal code</b>
<b>City</b>
<b>Country</b>

##### Billing address (only to be filled in if different from dispatch address)

<b>Address</b>
<b>ZIP/Postal code</b>
<b>City</b>
<b>Country</b>

With the signature we confirm our participation in the PTB Ex Proficiency Testing Program “Flameproof Joints – Test Round 2021” of the PTB Ex Proficiency Testing Scheme and agree to the following conditions:

In the scope of the PTB Ex Proficiency Testing Scheme test samples will be shipped to the participants of the scheme in order to perform interlaboratory comparisons. The test samples were developed and prepared at PTB for the PT programs and are made available at the own risk of the participating test laboratories.

PTB assumes no responsibility whatsoever for the use of the test samples by the participants and makes no guarantees, expressed or implied, about its quality, reliability, safety, suitability or any other characteristic. As far as legally permitted PTB refuses any liability for any direct, indirect or consequential damage arising in connection with the use of the test samples. The participants shall bear the risk of the use of test samples and of their internal work. German law shall apply.

PTB will bear the cost for the shipment of the test samples to the participants (CPT airport). The participants shall take on the responsibility for the costs for the return shipment (if necessary) and for all the processes that are involved with the shipment to and from the participant including organisation and coordination of the pre- and on-carriage as well as customs clearance.

With the signature, we give our consent to use the data provided by the participant for analysis and evaluation for publication in reports, workshops, and other publications within the framework of the program and in relation to the program in anonymous form.

The test samples are provided for the use within the PTB Ex PT Scheme. It is not intended to use the test samples for other purposes.

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**The completed “Declaration of participation” for the PTB Ex Proficiency Testing Program “Flameproof Joints – Test Round 2021” must be returned to the coordinator (E-mail: [ex-proficiency-testing@ptb.de](mailto:ex-proficiency-testing@ptb.de)) by 15<sup>th</sup> April 2021 at the latest.**

The receipt of the “Declaration of participation” will be confirmed by the coordinator.

## Declaration of Participation

### Program: Small Component Temperature ("SCT")

#### Participant Information

<b>Test laboratory</b>		
<b>Contact person</b>	<b>First name</b>	
	<b>Surname</b>	
<b>Phone</b>		
<b>E-mail</b>		
<b>Additional e-mail address for "cc" (if required)</b>		
<b>VAT-ID (if available)</b>		

#### Dispatch address for the test sample

<b>Address</b>	
<b>ZIP/Postal code</b>	
<b>City</b>	
<b>Country</b>	

#### Billing address (only to be filled in if different from dispatch address)

<b>Address</b>	
<b>ZIP/Postal code</b>	
<b>City</b>	
<b>Country</b>	

With the signature we confirm our participation in the PTB Ex Proficiency Testing Program “Small Component Temperature – Test Round 2021” of the PTB Ex Proficiency Testing Scheme and agree to the following conditions:

In the scope of the PTB Ex Proficiency Testing Scheme test samples will be shipped to the participants of the scheme in order to perform interlaboratory comparisons. The test samples were developed and prepared at PTB for the PT programs and are made available at the own risk of the participating test laboratories.

PTB assumes no responsibility whatsoever for the use of the test samples by the participants and makes no guarantees, expressed or implied, about its quality, reliability, safety, suitability or any other characteristic. As far as legally permitted PTB refuses any liability for any direct, indirect or consequential damage arising in connection with the use of the test samples. The participants shall bear the risk of the use of test samples and of their internal work. German law shall apply.

PTB will bear the cost for the shipment of the test samples to the participants (CPT airport). The participants shall take on the responsibility for the costs for the return shipment (if necessary) and for all the processes that are involved with the shipment to and from the participant including organisation and coordination of the pre- and on-carriage as well as customs clearance.

With the signature, we give our consent to use the data provided by the participant for analysis and evaluation for publication in reports, workshops, and other publications within the framework of the program and in relation to the program in anonymous form.

The test samples are provided for the use within the PTB Ex PT Scheme. It is not intended to use the test samples for other purposes.

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**The completed form “Declaration of participation” for the PTB Ex Proficiency Testing Program “Small Component Temperature – Test Round 2021” must be returned to the coordinator (E-mail: [ex-proficiency-testing@ptb.de](mailto:ex-proficiency-testing@ptb.de)) by 15<sup>th</sup> April 2021 at the latest.**

The receipt of the “Declaration of participation” will be confirmed by the coordinator.