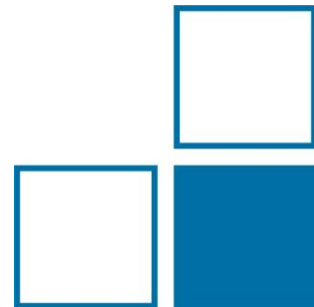
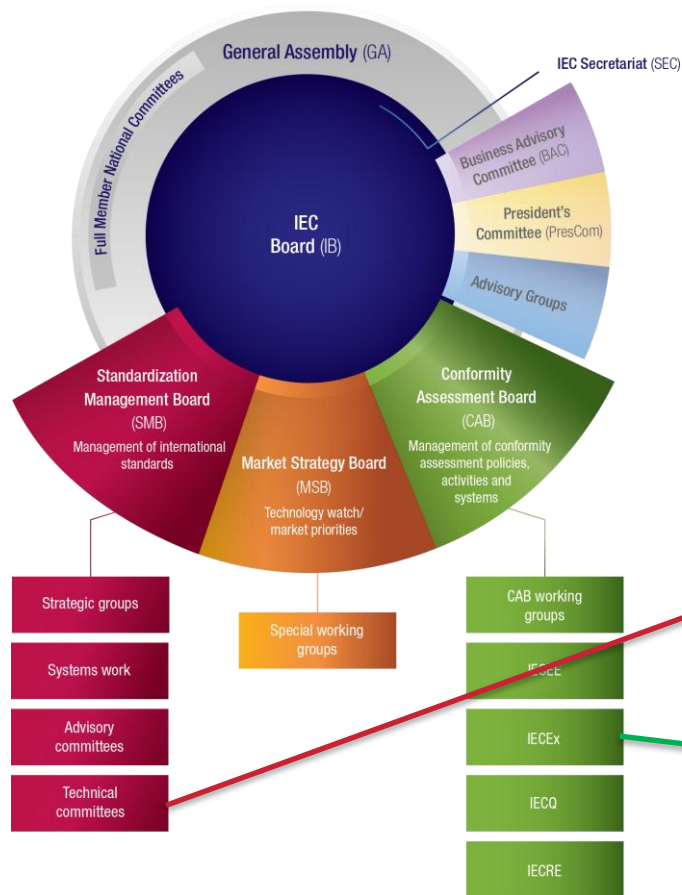


Updating of IEC Standards

Tim Krause, 16th of September 2026, Beijing
Industrial Symposium - 2026 IECEx Annual Meeting



PTB IEC - Structure



The members of IEC are National Committees which are expected to represent the electrotechnical stakeholders from their country.

They appoint experts and delegates coming from industry, government bodies, associations and academia to participate in the technical work of the IEC.

ONE member and one vote per nation

TC31 - Equipment for explosive atmospheres

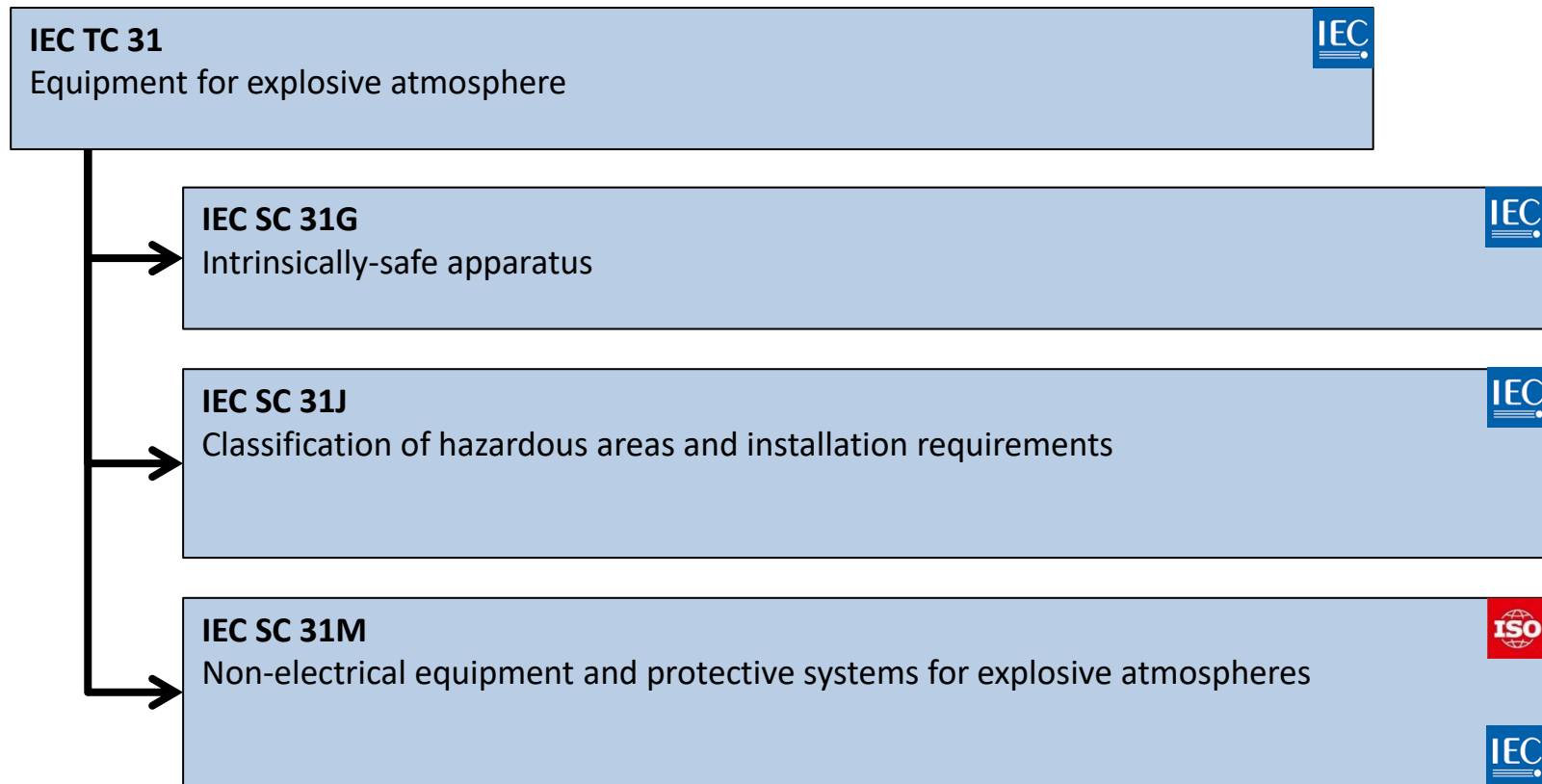
International Electrotechnical Commission System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres (IECEX System)

To prepare and maintain international standards relating to equipment for use where there is a hazard due to the possible presence of explosive atmospheres of gases, vapours, mists or combustible dusts

**ESTABLISHED
1948
AGED TO
PERFECTION**

TC 31 Officers

Chair	Mr Martin Thedens Term of office : 2029-07
Vice-Chair	Mr Jason McGee Term of office : 2026-11
Vice-Chair	Mr Brad J Zimmermann Term of office : 2026-11
Secretary	Mr Tom Stack



- **3 Subcommittees:**

A TC can form one or more SCs depending on the extent of its work programme. Each SC defines its scope and reports directly to the parent TC

- **13 Working Groups & 2 Joint Working Groups:**

Develop one or a set of standards. Should be disbanded when the work is done or when inactive

- **3 Project Teams:**

Deal with the development of a single standard. Established when a project cannot be assigned to an existing WG and when the TC/SC does not want to establish a WG for a single project

- **12 Maintenance Teams & 1 Joint Maintenance Team:**

Responsible to maintain one or a set of standards. As maintenance is a never-ending job, an inactive MT will not be disbanded

- **3 Advisory Groups & 2 Joint Advisory Groups:**

Established for providing advice to the TC. These groups cannot develop standards. They may propose recommendations to be further approved

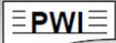
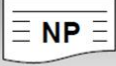
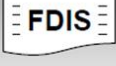
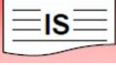
- **5 Ad-Hoc Groups:**

Short term group dealing with a specific subject

- **1 Editing Group:**

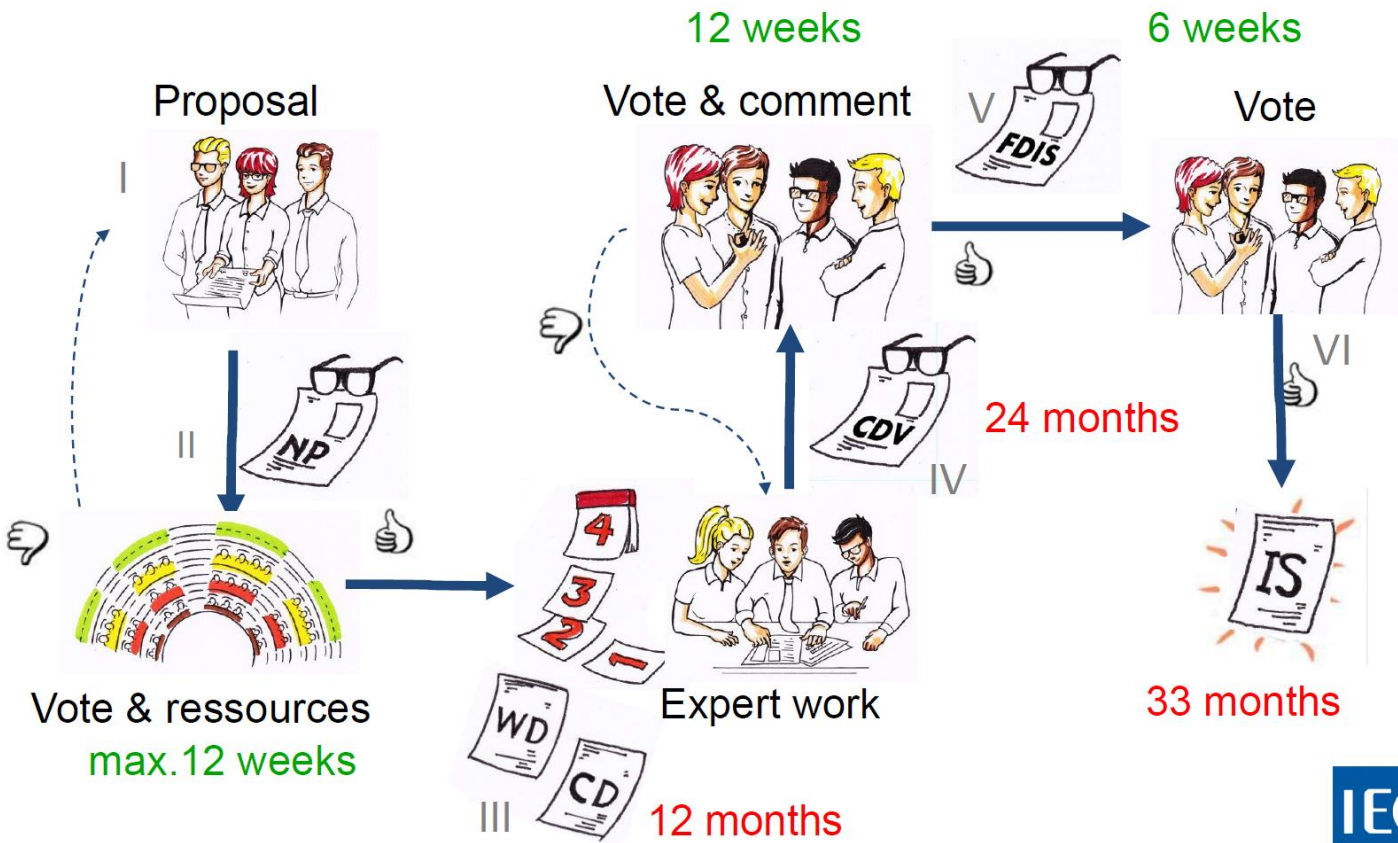
Responsible for editing draft documents (Standards, Technical Specifications, Technical reports, Amendments and Interpretation Sheets) to ensure their conformity to the ISO/IEC Directives

Ex standards - Stages for preparation of a new standard

	Stages	Action	Documents
1	Preliminary (optional)	Preliminary work item added to the work programme	
2	Proposal	Proposal to start a new project comes from NC, TC, SMB, liaison org.	  
3	Preparatory	Preparation of Working Draft within the working group (WD)	 Internal to WG, not circulated
4	Committee	Working draft circulated as Committee Draft (CD)	  
5	Enquiry	When mature, the CD is circulated as a Committee Draft for Vote (CDV)	  
6	Approval	Final Draft International Standard prepared from approved CDV and NCs comments (FDIS)	  
7 ⁷	Publication	IEC publishes International Standard (IS)	

Preliminary **W**ork **I**tem
New work item **P**roposal
Result of **V**oting on **N**ew work item proposal
Working **D**raft (internal to the WG)
Committee **D**raft
Compilation of **C**omments
Committee **D**raft for **V**ote
Result of **V**oting on **C**ommittee draft for vote
Final **D**raft **I**nternational **S**tandard
Report of **V**oting on final **D**raft international standard
International **S**tandard

Ex standards - Stages for preparation of a new standard



TC 31 Equipment for explosive atmospheres

Scope Structure **Projects / Publications** Documents Votes Meetings Collaboration Platform

Work programme Project Plans Publications Stability Dates Project files Projects of interest to TC 31

TC 31 Work programme (16)

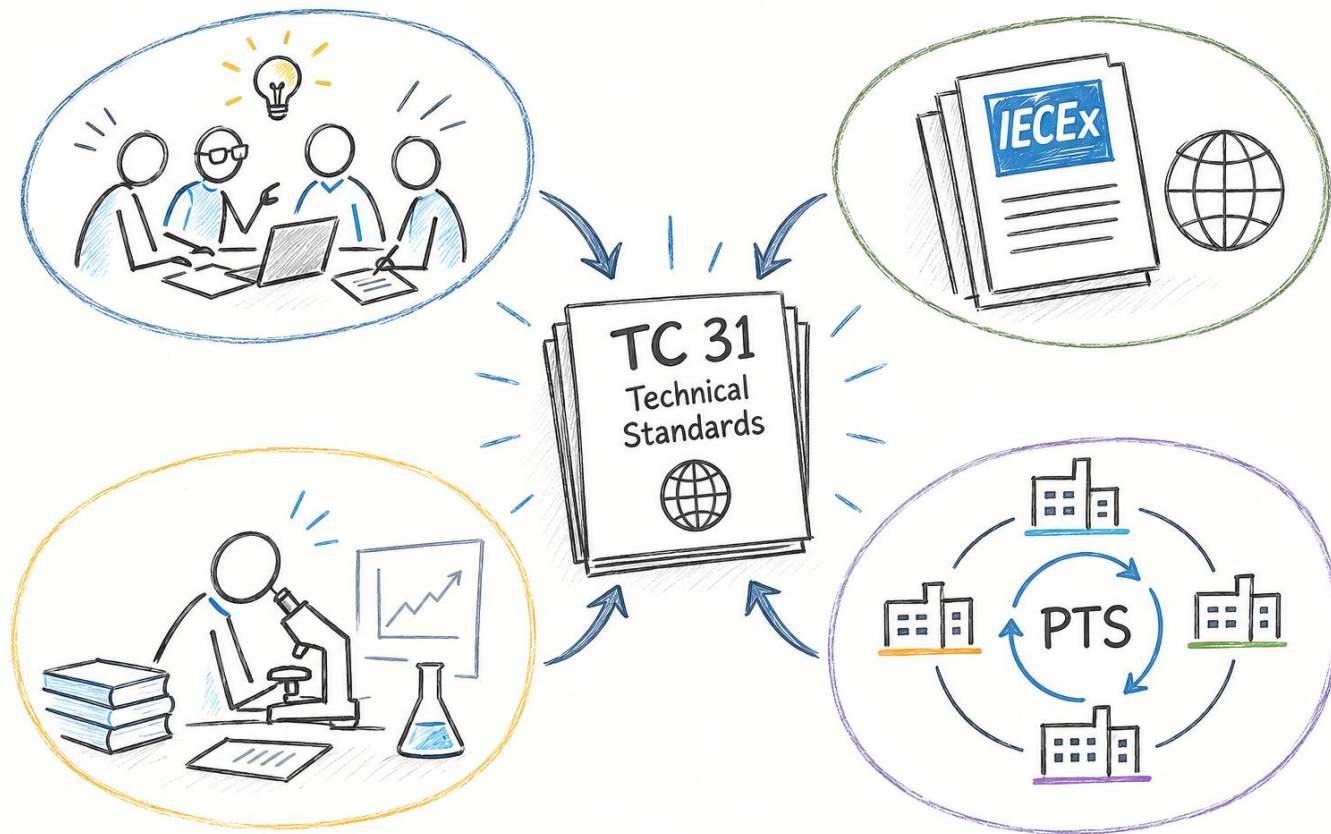
Project Reference	Online (Y/N)	Document Reference	Init. Date	Current Stage	Next Stage	Working Group	Project Leader	Fcst. Publ.
IEC 60050-426 ED4 International Electrotechnical Vocabulary (IEV) - Part 426: Explosive atmospheres	N	31/1978/RR 108 kB	2026-06	ACDV 2026-06	TCDV 2027-06	WG 22	William Lawrence	2029-06
IEC 60079-1 ED8 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"	N	31/1987/FDIS	2021-10	PRVD 2026-09	2026-09	MT 60079-1	TaiMin Kim	2026-10
IEC 60079-2 ED7 Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p"	N	31/1947/CDV 1864 kB	2023-11	PRVC 2026-03	2026-05	MT 60079-2	Ryan Brownlee	2027-06
IEC 60079-5/AMD2 ED4 Amendment 2 - Explosive atmospheres - Part 5: Equipment protection by powder filling "q"	N	31/1982/CDV 184 kB 172 kB	2026-06	CCDV 2026-08	PRVC 2026-11	WG 22	William Lawrence	2027-10
IEC 60079-7 ED6 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"	Y	31/1955/CDV 2899 kB 2467 kB	2025-10	PRVC 2026-05	2026-08	MT 60079-7	Brad Zimmermann	2027-07
IEC 60079-15 ED6 Explosive atmospheres - Part 15: Equipment protection by type of protection "n"	N	31/1961/CDV 497 kB 501 kB	2024-12	AFDIS 2026-07	DECFDIS 2026-12	MT 60079-15	Markus Zimmer	2027-06
IEC 60079-26 ED5 Explosive atmospheres - Part 26: Equipment with Separation Elements or	N	31/1950/CD 704 kB	2023-01	PCC 2026-02	2026-03	MT 60079-26	Gunter Gabriel	2027-11

www.iec.ch/tc31

All website lists are dynamic information

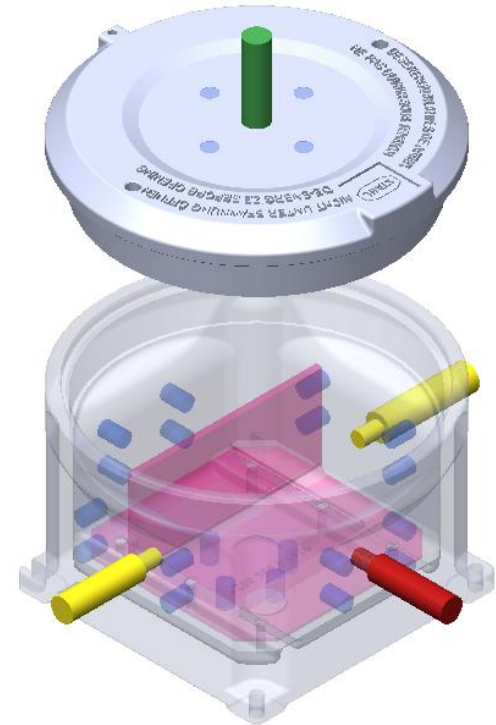
Number	Ed.	Date	Title
IEC/IEEE 60079-30-1:2025	2	2025-09	Explosive atmospheres - Part 30-1: Electrical resistance trace heating - General and testing requirements
IEC/IEEE 60079-30-2:2025	2	2025-09	Explosive atmospheres - Part 30-2: Electrical resistance trace heating - Guidance on application for design, installation and maintenance
IEC 60079-25:2020/AMD1:2025	3	2025-09	Amendment 1 - Explosive atmospheres - Part 25: Intrinsically safe electrical systems [2-WISE; IEC TS 60079-47]
IEC 60079-11:2023/ISH4:2025	7	2025-09	Interpretation Sheet 4 - Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" [Use of diodes or Zener diodes]
IEC 60079-11:2023/ISH5:2025	7	2025-09	Interpretation Sheet 5 - Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" [Figure D.1 of Annex D "Excess transient energy test"]
IEC 60079-28:2025	3	2025-11	Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation
IEC 60079-29-0:2025	1	2025-11	Explosive atmospheres - Part 29-0: Gas detection equipment - General requirements and test methods
IEC 60079-11:2023/COR2	7	2026-05	Interpretation Sheet 6 - Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" [Annex G - G.2 Linear source]
IEC 60079-0:2026	8	2026-06	Explosive atmospheres - Part 0: Equipment - General requirements
IEC 60079-10-2:2026	3	2026-06	Explosive atmospheres - Part 10-2: Classification of areas - Explosive dust atmospheres
IEC 60079-11:2023/ISH6	7	2026-07	Interpretation Sheet 6 - Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" [Figure G.2 and Figure G.3 of Annex G "Universal output characteristics"]

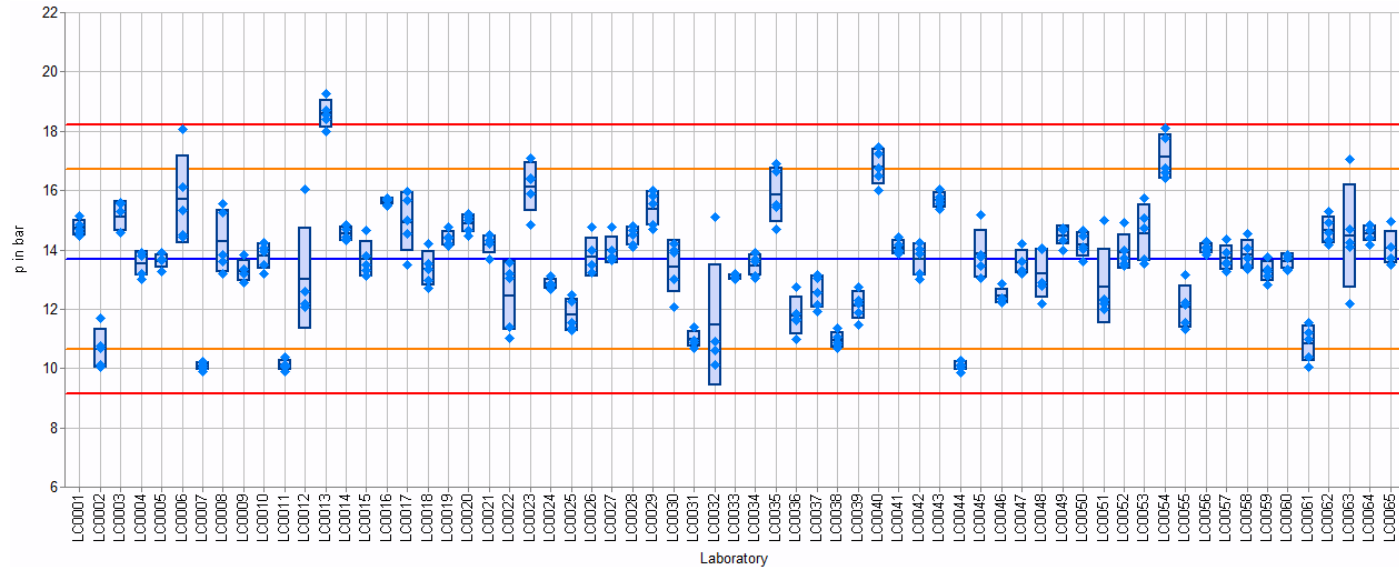
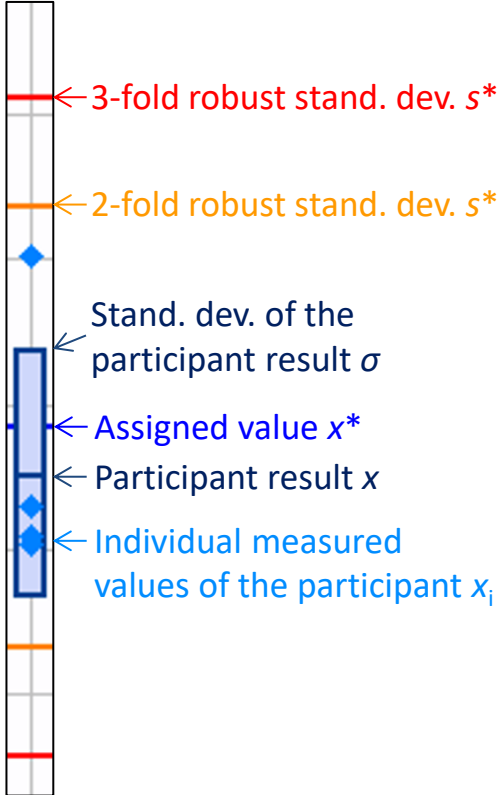
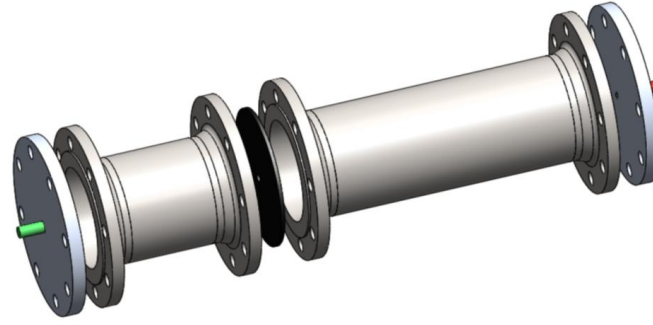
Document Number of IEC	Date of IEC circulation	Title
31J/396/CDV	2025-09-26	IEC 60079-10-1 ED4 Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres
31/1941/CDV	2025-12-26	IEC 60079-29-3 ED2 Explosive atmospheres – Part 29-3: Gas detectors – Guidance on functional safety of fixed gas detection systems
31/1947/CDV	2026-01-09	IEC 60079-2 ED7 Explosive atmospheres – Part 2: Equipment protection by pressurized enclosure "p"
31/1955/CDV	2026-06-03	IEC 60079-7 ED6: Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
31/1961/CDV	2026-04-03	IEC 60079-15 ED6: Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
31/1979/FDIS	2026-06-12	IEC 60079-42 ED1: Explosive atmospheres - Part 42: Electrical safety devices for the control of potential ignition sources for Ex-Equipment, Type of protection "f"
31J/416/CDV	2026-06-12	IEC 60079-13 ED3: Explosive atmospheres - Part 13: Equipment protection by pressurized room "p" and artificially ventilated room "v"
31/1987/FDIS	2026-07-24	IEC 60079-1 ED8: Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
31/1981/CDV	2026-08-14	IEC 62990-1 ED2: Workplace atmospheres - Part 1: Gas detection equipment - Performance requirements of detectors for toxic gases
31/1982/CDV	2026-08-14	IEC 60079-5/AMD2 ED4: Amendment 2 - Explosive atmospheres - Part 5: Equipment protection by powder filling "q"
31/1983/CDV	2026-08-14	IEC 60079-101 ED1: Explosive atmospheres - Part 101: Principles of explosion protection
31M/305/CDV	2026-08-21	ISO/IEC 80079-20-1 ED2: Explosive atmospheres - Part 20-1: Material characteristics for gas and vapour classification - Test methods and data
31M/317/FDIS	2026-08-21	ISO/IEC 80079-41 ED1: Explosive atmospheres – Part 41: Reciprocating internal combustion engines
31G/445/CDV	2026-08-28	IEC 60079-11/AMD1 ED7: Amendment 1 - Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

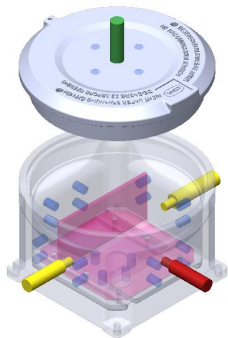


... using IEC 60079-1 (Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d") as an example

Programs Explosion
Pressure
2010/2017/2023





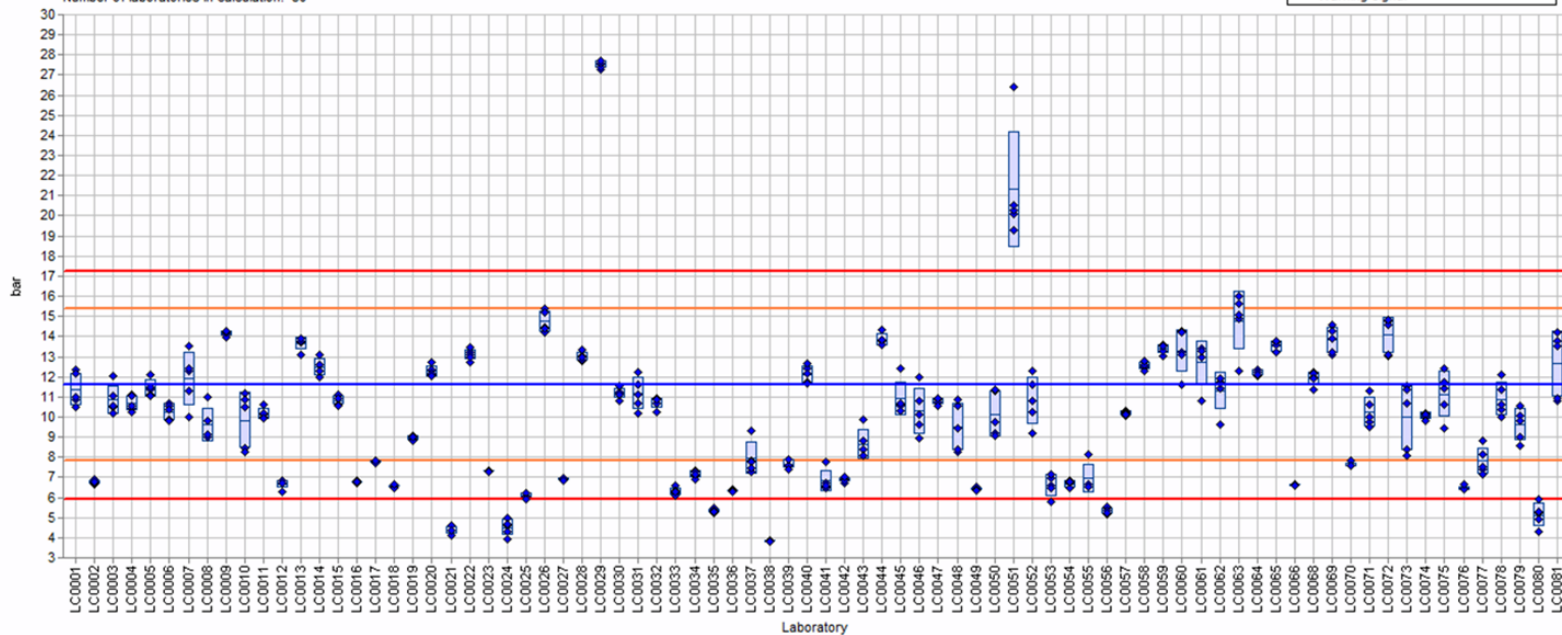


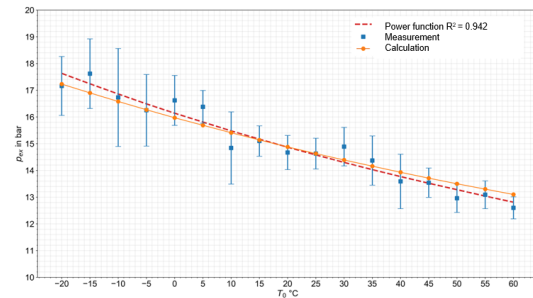
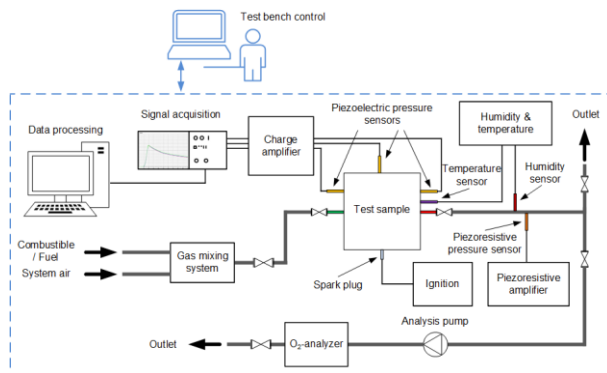
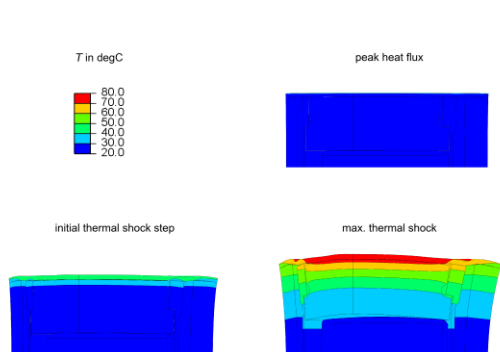
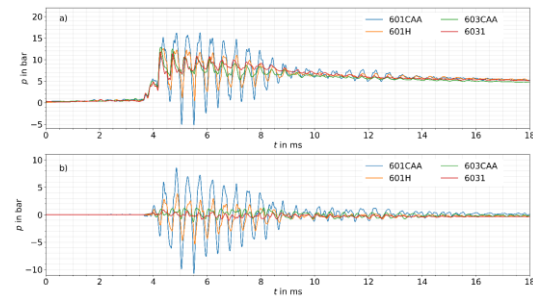
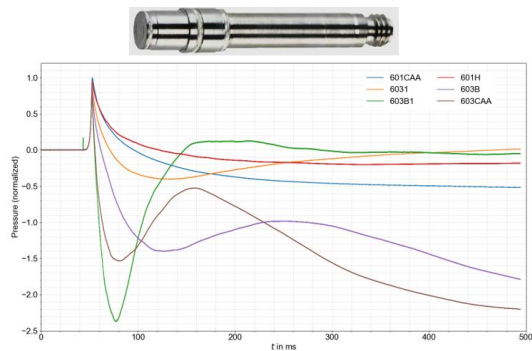
Ring test:
Sample:
Measurand:
Number of laboratories in calculation: 80

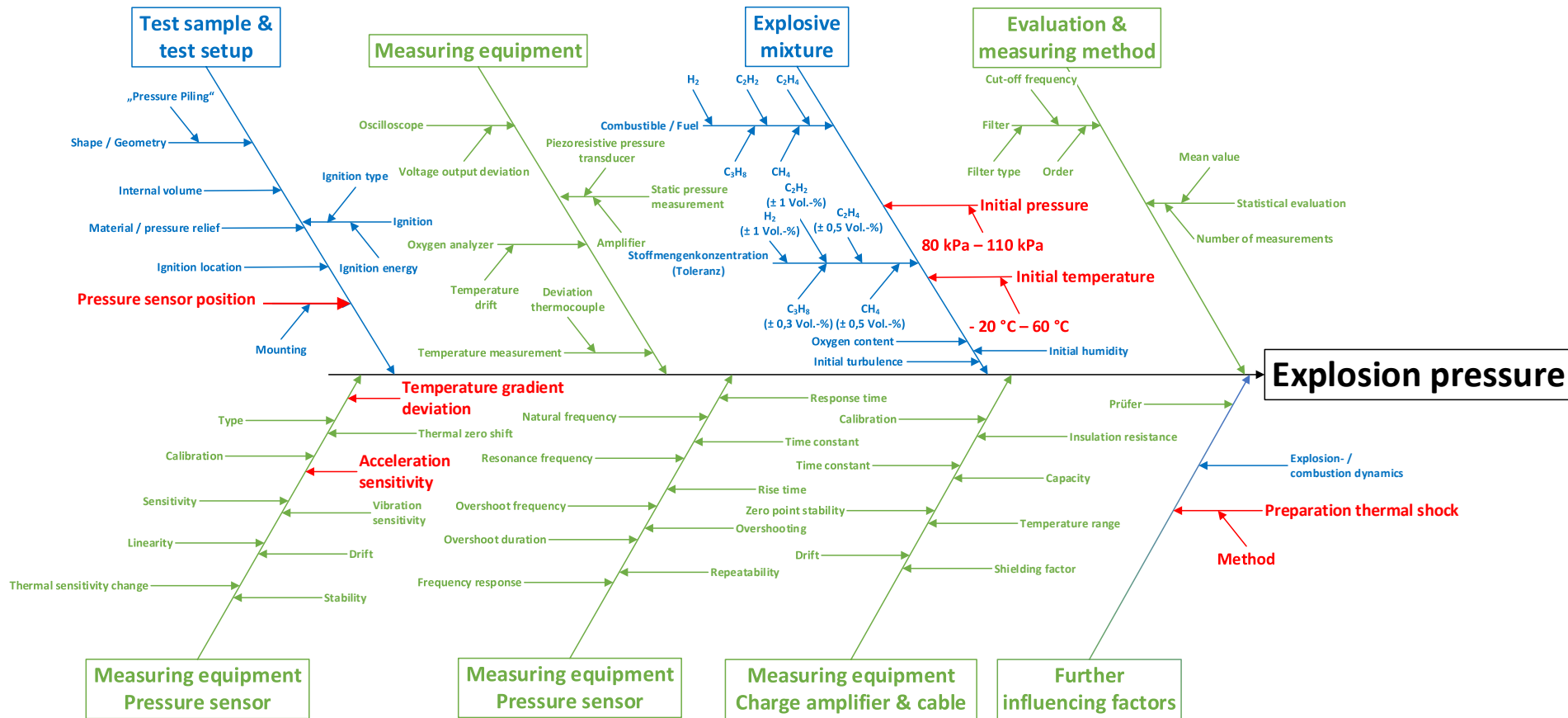
Program "Explosion Pressure - Test Round 2023" - Phase I
Tests with configuration B
Explosion pressure $PE_{x,own}$ (from the pressure sensor at the own location) with hydrogen in bar

Assigned value: 11,60 bar
SDPA: 1,89 bar
Range of tolerance: 7,82 - 15,38 bar (ID score $\leq 3,8$)

 Laboratory-specific standard deviation
 Assigned value*
 Action signal
 Warning signal







PTB IEC TC 31 - Support from IECEx / PTB Ex PTS...



- › Results of proficiency testing programs shows deviations in the determination of explosion pressures
- › In-depth analysis of the participants' results, discussion of these with the participants, and research into specific aspects of the programs form the basis for understanding the reasons behind differences in the determination of explosion pressures
- › The most influencing factors can be significantly reduced by technical measures and correction methods

- › Annex introduced for the first time („Annex I: Recommendation to improve the effectiveness of the determination of explosion pressure“) for new edition of IEC 60079-1

- › Significant contribution to:
 - › *Increasing user awareness of influencing factors when determining explosion pressures,*
 - › *Improving the global comparability of measurement data,*
 - › *Strengthening confidence for the determination of explosion pressures.*

Annex I (informative)

Recommendation to improve the effectiveness of the determination of explosion pressure

I.1 General

Proficiency testing programs have been conducted that have included explosion pressure determination in accordance with this document. An immediate and positive outcome from the program has been that it has highlighted a number of aspects that testing bodies can apply to readily improve the consistency of results.

I.2 Aspects to improve consistency

There are a number of readily applied measures that can be applied to improve the repeatability and reproducibility of testing across testing bodies that use this document. These measures include, but are not necessarily limited to the following:

- a) Most important is a critical analysis and plausibility check of all measured results (including pressure curves).
- b) To prevent pre-pressure inside of the test sample a delay time for shut off valves after purging with the gas air mixture should be used.

NOTE 1 If shut off valves close immediately after purging with the gas air mixture, the pressure inside of the sample could be higher than atmospheric pressure. Pre-pressure of the gas air mixture inside of the sample could cause higher explosion pressures than expected.

- c) Shut off valves of the test facility should be located close to the test sample.

NOTE 2 The volume of the gas connection lines could influence the volume of the test sample which causes different pressure values than expected.

- d) Pressure sensors should be tightened to torque recommended by the pressure sensor manufacturer.

NOTE 3 Wrong torque could cause side loading of the sensor membrane which results in distortions in the output signal and different pressure values than expected.

- e) Pressure sensor faces should be flush mounted with the inside wall of the enclosures in which they are mounted.

NOTE 4 Flush mounted sensor faces could avoid an acoustic oscillation and minimize turbulences.

- f) To consider the influence of thermal shock on pressure sensors, the sensors face (membrane) must be prepared. If pressure sensors are not innately designed to consider the influence of thermal shock, the best approach is to apply a thin layer (about 1 mm) of RTV (Room-Temperature-Vulcanizing) silicon to the membrane of the sensor (but only to the membrane, not to the whole adapter). Other appropriate, but not so durable, approaches include the use of silicon grease or vinyl electrical tape. The colour of the protective coating materials has no relevant effect on the measured explosion pressure.

NOTE 5 When measuring explosion pressures with PE (piezoelectric) pressure sensors, the sudden thermal stress onto the sensor - in particular the membrane - can result in mechanical stress onto the piezo crystals, thus altering the reading from the sensor. All pressure sensors respond to this thermal shock, but in different ways depending on the housing and membrane design. The thermal deformation of the membrane and housing interferes with the pressure measurement by the sensor. In effect, incorrect pressure curves and reduced maximum pressures can be measured.

- g) To avoid charge losses and an associated influence on the explosion pressure measurement, low noise high-impedance cables should be selected when using piezoelectric pressure sensors and charge amplifiers. Furthermore, it should be ensured that the connectors and sockets are always clean in order to guarantee a good electrical connection.

- h) Measures should be taken to avoid excessive heating (significantly exceeding the ambient temperature) of the gas-air mixture inside of a test sample during an explosion test series (as a cause of the heated test sample). For example, this can be a sufficient time between ignitions or the monitoring of the gas temperature. The best location to monitor the temperature of the gas-air mixture is inside the sample. If this is not practicable another appropriate location is at the outlet of the sample. The temperature sensor should be directly in contact with the gas air mixture.

NOTE 6 The density of the gas-air mixture depends on temperature. The measured explosion pressure depends on the density of the gas-air mixture and therefore it depends on temperature. The explosion pressure decreases when the temperature of the gas-air mixture rises, for example, as a cause of the heated test sample.

- i) Individual measuring ranges (for time base and amplitude) depending on the test sample and the gas-air mixture should be used. Predefined settings are inadvisable. The focus should be on recording the rise time and the maximum amplitude.

NOTE 7 The precision of measurement depends on the sample rate, the memory depth and the measuring range of the data acquisition system. Measuring ranges which are too wide could cause less precision and low details of the measuring result. Because of this it could happen that the data acquisition system does not record the highest measuring value and important peaks could be missed.

- j) The low pass filter of a charge amplifier or IEPE (piezoelectric sensors with integrated electronics) data acquisition system should be set to about 10 to 30 % of the natural frequency of the pressure sensor. The filter should be located between the pressure sensor and the charge amplifier/data acquisition system. Post-processing filters do not work in this case.

NOTE 8 High unfiltered frequency components in combination with a low sampling rate can lead to aliasing effects, which can cause unexpected changes in the pressure curve that do not reflect the actual pressure behavior. Since the requirement of IEC 60079-1 specifies a low pass filter with a cut-off frequency of 5 kHz, this point refers to the case where the 5 kHz filter is only used digitally in post-processing and no filter is used in the actual measurement.

- k) For the data acquisition system, a minimum sampling rate of 50 k samples per second is recommended.

NOTE 9 As the frequency content of the pressure signals is limited by the requirement of IEC 60079-1 to use a 5 kHz low pass filter, this can be approximated as the highest frequency in the system. For a reasonable resolution, at least factor 10 as acquisition speed: $\leq 5 \text{ kHz signal} \approx \geq 50 \text{ k samples per second acquisition speed}$.

- l) When using IEPE sensors make sure to use an IEPE-coupler with a larger time constant than that of the IEPE sensor:

$$\tau_{\text{IEPE Coupler}} > \tau_{\text{IEPE Sensor}}$$

NOTE 10 The time constant determines the cut-off frequency of the high-pass characteristics of the piezoelectric measuring chain. The total time constant of the measuring chain is close to the smaller respective "shorter" time constant of IEPE sensor and IEPE coupler. A small respective "short" time constant has an impact on "slow" respective static parts of the pressure signal. It is basically filtering away the low frequency content of the pressure signal which can have a significant influence on the measured peak pressure.

- m) When using PE pressure sensors use time constant "long" on charge amplifier (if selectable).

NOTE 11 The time constant determines the cut-off frequency of the high-pass characteristics of the piezoelectric measuring chain which can result in a significant negative impact on the measured peak pressure (see above).

- n) When using digital oscilloscopes or other measuring devices, DC coupling should always be selected.

NOTE 12 AC coupling places a capacitor in line to the measuring input of the measuring system. This works like a high pass filter and blocks DC and low frequency AC signals which can result in lower measured explosion pressures than expected.

- o) The influence of the acceleration sensitivity of pressure sensors on the explosion pressure measurement should be considered. To check how acceleration on the type of pressure sensor used affects the pressure signal, a pressure sensor of the same type using a blind hole near the pressure sensor for the explosion pressure measurement can be used (without connection to the explosion volume). If the use of a blind hole is not possible (low wall thickness, no space, etc.), an adapter closed in front of the pressure sensor membrane can also be used. The acceleration influence can be identified from the sensor signal of the pressure sensor in the blind hole or with the adapter closed. To consider this influence an option can be the use of appropriate pressure sensors (low acceleration sensitivity). Another possibility is to eliminate the acceleration contributions applying individual filter functions that specifically filter out the acceleration components in addition to the $5 \text{ kHz} \pm 0,5 \text{ kHz}$ (3 dB point) low pass filter for smoothing the pressure curve (see 16.2.2).

NOTE 13 The explosion pressure of an explosion inside a flameproof enclosure inevitably leads to a vibration of the enclosure walls. The amplitude of the vibration depends on the explosion pressure, the pressure rise time, as well as the material and wall thickness. The movement is also transmitted to the pressure sensor mounted in the enclosure wall and leads to inertial forces acting on the piezoelectric element. Depending on the sensor design/type, this can influence the output signal of the pressure sensor during explosion pressure measurement, as an unwanted signal is superimposed on the desired pressure signal due to the acceleration of the pressure sensor.



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