

PROCESS SAFETY IS OUR MUTUAL GOAL

Risk Analysis

Inspection Body 4089

Explosion protection testing laboratory

Combustible dust testing laboratory

Flammability testing laboratory

Notified Body 1019 (ATEX)



VVUU

RISK ANALYSIS
TESTING
CERTIFICATION

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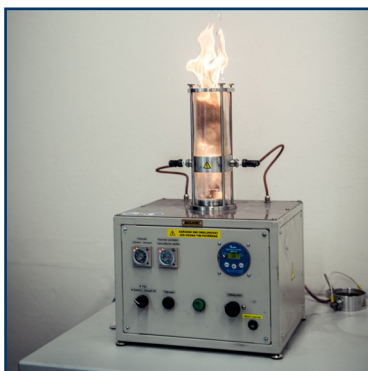
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About us

The current company VVUÚ was established in 1952 as a Scientific and Research Coal Institute dealing with testing and risk analysis in mining with a focus on the Ostrava-Karvina coalfield. Over the course of seven decades, the company has undergone significant change. During this period, we have transformed from a research institute specializing in mining safety to a modern, dynamic company offering an extensive portfolio of services in the areas of testing, risk analysis and product certification.

This challenging process has tested our capabilities, strength and allowed us to realign our focus to best match global requirements in risk analysis, testing and product certification.

Today, the company VVUÚ, a.s. clearly defined direction - **safety in industry**. Our customers are not only mining companies, but all companies in which there is a risk of an industrial accident associated with a dust explosion or fire.



Risk analysis

Legislation



ATEX 153 - Social directive

Directive ATEX 153 (1999/92/ES) specifies the health and safety requirements for working in potentially explosive atmospheres.



ATEX 114 - Product directive

Directive ATEX 114 (2014/34/EU) specifies the requirements for equipment and protective systems in potentially explosive atmospheres.

Our team of experts is ready to consult and address your needs and requirements. Based on our know-how and experience, we can help you find the optimal safety solutions for your projects, plants and facilities.

Our services



DHA – Dust Hazard Analysis

Identification of specific scenarios, hazards and risks, including the documentation of existing protective measures that are in place to reduce these risks and an assessment of the need for additional measures. The DHA analysis is thus a useful basis for the preparation of the Explosion Protection Document according to ATEX 153 (1999/92/EC).

HAZOP – Hazard and Operability Study

HAZOP is the systematic identification of the hazardous and emergency conditions of complex processing equipment.

It is applicable to all types of processes and equipment. It can also be applied to different phases of the project or in the life cycle of any equipment or technology.

Risk analysis of electrical and non-electrical equipment

This is an assessment of the selection of the installed and operated electrical or non-electrical equipment in areas with a risk of explosion. The output is a report on the suitability of placing certain equipment in a hazardous area.

Technical assistance and advice on the equipment certification process

Consultations and advice on the certification process for equipment intended for use in potentially explosive atmospheres in accordance with ATEX 114 (2014/34/EU) and the compilation of declarations of conformity. Preparation of the risk analysis and risk assessment of machinery - the basic material for the certification of equipment.

Explosion protection document 1999/92/EC

In plants where flammable substances (gases, vapors or dusts) are used, it is necessary to assess the risk of explosion in the interior of the equipment or in its surroundings. Based on this analysis, adequate measures must be taken to reduce the risk of explosion.

SIL – Safety Integrity Level

SIL (Safety Integrity Level) builds on the HAZOP method. The aim is to provide classification for all SIF (Safety Instrumented Function) within the scope of work.

SIL is defined as the reduction in relative risk provided by a particular function.

External influences identification protocols

External influences are all the factors combined that affect the installed electrical equipment in a certain place / technology.

The Protocol on the Identification of External Influences thus classifies and specifies the conditions that determine the selection and design of the electrical equipment installed.

Structural explosion prevention projects

The design and implementation of structural blast prevention systems is carried out on the basis of a project that ensures that the optimal technical solution for the application is selected according to the applicable legislation.

Inspection body

Inspection body VVUÚ, a.s. No. 4089 accredited by the Czech Accreditation Institute according to the requirements of the standard ČSN EN ISO / IEC 17020.



Inspection field

Inspection of equipment and protective systems installed in explosive atmospheres.

Type and scope of inspection

Inspection activity of a type C body to assess new and operated electrical and non-electrical equipment and protective systems in explosive atmospheres.

Why have your technology inspected by an accredited inspection body?

Accreditation ensures the professional competence of inspectors, the up-to-date methods used during the inspection and the impartiality of their results. We help to detect incorrectly selected equipment and shortcomings in the design or installation of protective systems so that your technology meets the requirements of applicable technical regulations and standards. You will ensure the safety and reliable operation of your technology in an explosive environment.

What is needed to start the inspection activity?

Classification of the environments in which the assessed equipment is installed (zoning of spaces).

Technical and drawing documentation for the assessed equipment / protective systems.

Fire-technical characteristics of the substances present / safety data sheets.

What equipment do we inspect?

Verification of newly and existing installed equipment, including documentation for all types of equipment and protective systems in areas with explosion hazards.

Inspection activities are carried out in the following areas:

- Review of the scope and completeness of technical documentation.
- Assessment of the design of electrical, non-electrical and mechanical equipment.
- Assessment of the design of protective systems.

What is the output of the inspection?

The output is an inspection report containing conclusions on the conformity of the design of equipment or protective systems with the requirements of applicable technical regulations and standards in relation to the specified zone and the characteristics of substances in the explosive atmosphere.



Explosion protection testing laboratory

VVUU is a European leader in the testing of explosion protection systems. Thanks to its extensive testing facilities, the company provides its customers with comprehensive explosion prevention services. **Testing Laboratory VVUU, a.s. No. 1025 is accredited by the Czech Accreditation Institute (ČIA) in accordance with the requirements of ČSN EN ISO/IEC 17025.**



We offer



Explosion tests

Verification of operational and mechanical safety of protective systems and equipment

Educational activities in explosion protection technologies and systems

Development and application activities in explosion protection

Wide range of high-pressure test vessels

The testing laboratory is equipped with 15 test vessels with volumes from 400 dm³ to 60 m³ on a total area of 6,000 m². They meet the design requirements according to the applicable technical regulations and they have high pressure resistance up to 16 bar.

Maximum explosion parameters in real volumes

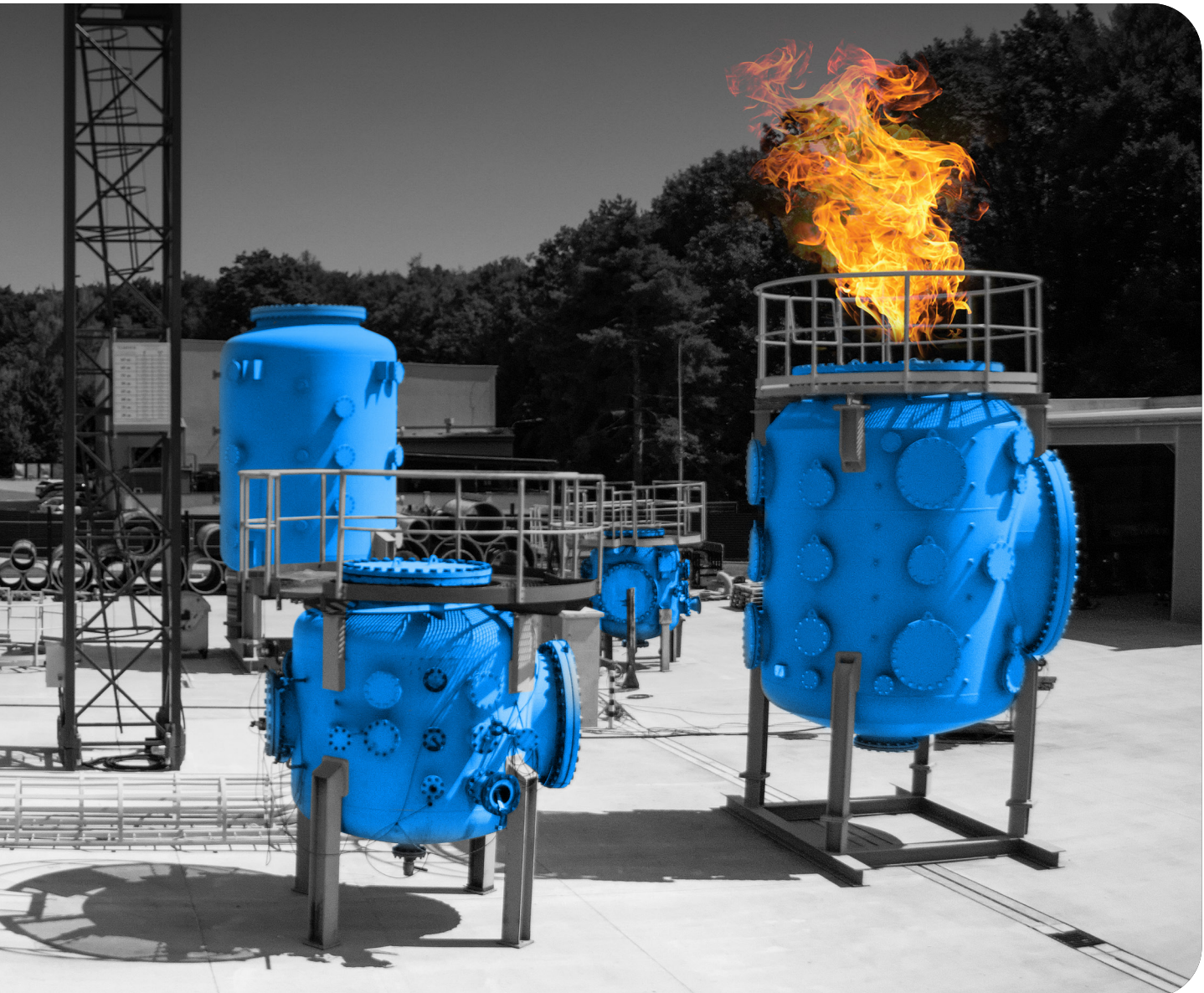
The vessels allow maximum explosion parameters to be achieved under real conditions in an enclosed volume, enabling protective systems to be tested under actual explosion conditions while maintaining the highest possible level of safety.

Accredited determination of explosion parameters in 1 m³ volume

An advantage is the possibility of determining the maximum explosion parameters of dust mixtures in a standardized 1 m³ vessel, whose accuracy and quality have been confirmed by CaRo interlaboratory comparison tests. This also makes it possible to use combustible dusts supplied directly by the customer during testing, allowing the protective system to be tested under conditions as close as possible to the actual application.

State-of-the-art recording and measuring technology

The testing laboratory has state-of-the-art technology for the recording and subsequent evaluation of the explosion tests performed.



It uses three independent measuring lines. Almost all computational designs need to be practically verified by large-scale simulation tests.

The use of three independent test lines makes it possible to test different protection systems in parallel in a given test cycle.

Large-scale tests

Large-scale tests also play an indispensable role in the development of new protective systems and equipment, where without these tests the product cannot be certified for use in hazardous areas. The output of these types of tests is an accredited report.

Test, evaluation, accredited test report, ATEX certificate

The testing laboratory offers the possibility of performing large-scale explosion tests, including their subsequent professional evaluation. Our experts provide individual approach and support in solving the issues of testing protection systems according to accredited test procedures.

Upon customer request, the explosion protection test facility will submit the accredited test report to the Notified Body for conformity assessment.

<https://certification.vvu.cz/en>

VVÚÚ is the Notified Body 1019 according to the legislation 2014/34/EU for the certification of protective systems intended for use in potentially explosive atmospheres.

Accredited testing at TTC Ostrava

EN 14373	explosion suppression systems (automatic high rate discharge suppressor or HRD systems)
EN 14797	explosion venting devices (bursting panel device, explosion doors or flaps, relief valves)
EN 16009	flameless explosion venting devices (mesh, ceramic, ribbon devices for flameless venting)
EN 14460	explosion resistant equipment (filters, cyclones, redler conveyors, elevators, dryers and other explosion-proof equipment)
EN 16447	explosion isolation flap valves
EN 15089	explosion isolation systems (rotary valve, float valves, quick-closing gate valves, fire extinguishing barriers)
EN 14034-1	determination of the maximum explosion pressure $p_{\max}$ in a 1 m ³ vessel
EN 14034-2	determination of the maximum rate of explosion pressure rise $(dp/dt)_{\max}$ in a 1m ³ vessel
EN 16020	test of explosion diverters

Testing explosion suppression systems in accordance with EN 14373

This test determines the effectiveness of the explosion suppression system in different volumes of closed test vessels.

The result of the testing is the value of the maximum reduced explosion pressure for different unit volumes depending on the value of the explosion constant K_{st} .

Testing explosion resistant equipment in accordance with EN 14460

This test assesses the ability of the structure to withstand internal explosion pressure without loss of integrity and to prevent hazardous effects of the explosion from reaching the surroundings.

Testing explosion venting devices in accordance with EN 14797

The venting device is subjected to type testing to achieve maximum vent efficiency, functionality and mechanical strength.

Testing explosion isolation flap valves in accordance with EN 16447

This test assesses the functionality and mechanical integrity of explosion isolation flap valves.

Testing flameless explosion venting devices in accordance with EN 16009

The flameless explosion venting device is subjected to type testing to achieve maximum efficiency, prevention of flame transmission, mechanical integrity and the external effects of the flameless explosion vent device.

Testing the efficiency of explosion isolation systems in accordance with EN 15089

This test assesses the resistance of the tested equipment to explosion, flame transmission, and the functionality of individual types of explosion isolation devices (active and passive isolation valves, extinguishing barriers, and rotary feeders).

The determination of the maximum explosion pressure $p_{\max}$ and the maximum rate of explosion pressure rise $(dp/dt)_{\max}$ in a 1 m³ vessel in accordance with EN 14034-1 and EN 14034-2.

The values of these parameters are necessary for testing of explosion protection systems, for the qualified calculation and design of explosion protection elements.

Explosion protection remote test site Štramberk

The explosion protection testing laboratory includes a unique complex of three explosion galleries in Štramberk, up to 300 metres long, where explosions with real parameters corresponding to conditions in mines, as well as in other technologies involving flammable substances, can be simulated.

Testing the effectiveness of explosion-proof enclosures in accordance with EN 14591-2

The test of water and explosion-proof dust enclosures preventing the transmission of explosions in mines complies with the requirements of the Czech Mining Bureau, Decree No. 10/1994 Coll., as amended, as well as with the requirements of the EN 14591-2 standard, where for a defined explosion pressure there must be no burst of explosive flame at a specified distance.

Pressure resistance test

Testing the pressure resistance of gates, doors, fire doors, windows and covered passages of buildings, stressed by explosion pressure up to 450 kPa, extremely from 0.5 to 1.0 MPa.

Other activities of our testing laboratory

Assessing the resistance of buildings and protection systems to pressure and thermal exposure to dust-air or gaseous mixtures, including experimental verification - evaluation of explosion dynamics

Verifying the causes and consequences of an explosion of coal dust or methane-air mixtures

Monitoring explosion dynamics – the development and decline of the explosion processes in space of 1D and 2D propagation

Active involvement in R&D projects, experimental and development activities in areas dealing with explosions and fires in enclosed spaces

Rental of explosion galleries in Štramberk



Combustible dust testing laboratory

VVUU, a.s. is a European leader in the explosion testing of combustible dusts. The testing laboratory is comprehensively equipped for testing combustible dusts. **Testing Laboratory VVUU, a.s. No. 1025 is accredited by the Czech Accreditation Institute (ČIA) in accordance with the requirements of ČSN EN ISO/IEC 17025.**



Our offer



Determination of the fire-technical characteristics according Directive 2014/34/ EU of the European Parliament and of the Council (ATEX). Furthermore, the testing facility offers tests in accordance with international ASTM standards.

Accredited testing

EN 933-1	determination of granularity by sieve analysis (medium grain size)
ISO 562 ISO 1171 ISO 579	basic chemical analysis (determining the content of water, ash and volatile combustibles)
EN ISO/IEC 80079-20-2, Cl. 7. ASTM E1226	determination of flammability of dust or combustible flyings (screening test; GO/No Go test)
EN ISO/IEC 80079-20-2, Cl. 8.2. ASTM E2021	determination of the minimum ignition temperature of settled dust.
EN ISO/IEC 80079-20-2, Cl. 8.1.2. ASTM E1491	determination of the minimum ignition temperature of dust clouds.
EN 14034-3+A1 ASTM E1515	determination of the lower explosive limit of dust clouds
EN 14034-1+A1 EN 14034-2+A1 ASTM E1226	determination of the explosion characteristics of dust clouds (p_{max} , $(dp/dt)_{max}$ VA-20L
EN 14034-4+A1 ASTM E2931	determination of the oxygen content limit
EN ISO/IEC 80079-20-2, Cl. 8.3. ASTM E2019	determination of the minimum initiation energy of ignition of dust clouds
ISO 567 ISO 1013	determination of bulk density gravimetrically
EN 1237	determination of powder density gravimetrically
EN 15188	determination of susceptibility to spontaneous ignition by the isothermal method
EN 17077	classification of dust layers into flammability classes according to their combustion behavior
EN ISO/IEC 80079-20-2, Cl. 8.4.	determination of the volumetric resistance of dust
UN Test N.4	self-heating and classification of substances according to ADR/RID transport requirements – Class 4.2, substances liable to spontaneous combustion

Fire and explosion characteristics

Technical measurements and safety parameters are obtained. These parameters provide input information for safety data sheets for assessing risks in technologies.

The testing standards used are harmonised according to Directive 2014/34/EU of the European Parliament and of the Council (ATEX).

The following test equipment, among others, is used to determine fire and explosion characteristics:

VA-20L explosion autoclave (manufacturer Kühner AG)

The testing laboratory has two VA-20L explosion autoclaves, which are fully compliant with the European standards of the EN 14034+A1 series, and ASTM E1226, ASTM E2931 and ASTM E1515.

MIKE 3 (manufacturer Kühner AG)

As an additional test equipment, a modified Hartmann tube with a volume of 1.2 l, designated MIKE 3, is used. It fully complies with EN ISO/IEC 80079-20-2 and ASTM E2019.



Other activities of our testing laboratory

Expert opinions on explosiveness

Conducting risk analysis tests

Conducting research on explosive materials

Accredited test report

The laboratory provides expert opinion and interpretation of test results. The measurement results are documented in an accredited test report and a summary of fire and explosion characteristics.

Flammability testing laboratory

VVUU, a.s. is a European leader in the flammability testing of materials, components and products for the mineral extraction, plastics processing, liquid and solid materials, chemical, electrical engineering, automotive and textile industries. **Testing Laboratory VVUU, a.s. No. 1025 is accredited by the Czech Accreditation Institute (ČIA) in accordance with the requirements of ČSN EN ISO/IEC 17025.**



Our offer



Flammability tests using fire simulation are used to assess the resistance of materials to flame exposure. The laboratory is also equipped with a special fire testing gallery for large-scale fire simulations.

With its focus and capabilities, the tunnel is a unique testing facility within the Czech Republic and the EU. It is 46 m long and has a cross-sectional area of 10 m². The tunnel allows the airflow velocity to be adjusted and is used for testing materials under real fire conditions, with the possibility of measuring temperatures and sampling combustion products at various locations along the tunnel.

Accredited testing

Underground materials

EN 14591 - 2, Annex B	tests efficiency of explosion barriers (trays and bags) in the conditions in a fire testing tunnel
EN ISO/IEC 80079 - 38, Article 6.2	flammability test of non-metallic materials
DIN 22 100 - 5	flammability test of plastic hoses and pipes

Conveyor belt tests according to the requirements of EN 14973, EN 12882, CSA M422 and AS 4606

EN ISO 340; Cl. 4.1, 4.2; AS 1334.10	determination of flame resistance
EN ISO 20238; CSA M422, Cl. 4.3; AS 1334.11	determination of resistance to ignition by friction
EN 12881 - 2 + A1	flammability test in a fire testing tunnel
EN 12881 - 1; CSA M422, Cl. 4.4; AS 1334.12	determination of resistance to ignition and burning on a flat gas burner in a fire testing tunnel
EN ISO 284; CSA M422, Cl. 4.5; AS 1334.9	determination of surface electrical resistance

Solids

ISO 871, ASTM D1929	determination of flash, ignition and glow temperature
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UN Test N.1 Commission Regulation (EC) No. 440/2008, Method A.10	determination of the flammability of solids – Class 4.1
UN Test N.2 Commission Regulation (EC) No. 440/2008, Method A.13	determination of the pyrophoric properties of solids – Class 4.2
Liquids	
EN ISO 9038; UN Test L.2	sustained combustibility test of liquids
EN ISO 2719; ASTM D93	determination of flash point by the Pensky-Martens closed cup method
EN ISO 13736	determination of flash point by the Abel closed cup method
EN ISO 2592; ASTM D92	determination of flash and burning points by the Cleveland open cup method
EN ISO/IEC 80079-20-1, Cl. 7	determination of ignition temperature
UN Test L.1	solvent separation test
ISO 918 Commission Regulation (EC) No. 440/2008, Method A.2	determination of boiling point
EN ISO 2431	determination of viscosity
Plastics, plastic hoses and pipes	
EN ISO 4589 - 2, UIC 564 - 2 Annex 7	determination of burning behavior by oxygen index method
UL 94, Ed.6 - art.7, EN 60695 - 11 - 10	flammability of plastic materials, horizontal burning (HB)
UL 94, Ed.6 - Article 8, EN 60695 - 11 - 10	flammability of plastic materials, vertical burning (V-0,V-1,V-2)
UL 94, Ed.6 - Article 9, EN 60695 - 11 - 20	flammability of plastic materials, vertical burning (5VA,5VB)
UL 94, Ed.6 – Article 11	flammability of plastic materials, vertical burning of thin materials (VTM-0, VTM-1, VTM-2)
UL 94, Ed.6 – Article 12	flammability of plastic materials, horizontal burning of foam materials (HBF, HF - 1, HF - 2)
Textile	
EN ISO 6940, 95/28/EC, Annex VI, UNECE No. 118, Annex 8	determination of ease of ignition
EN ISO 6941, 95/28/EC, Annex VI, UNECE No. 118, Annex 8	measurement of flame propagation speed of vertically oriented specimens
Vehicle interior materials	
95/28/EC Annex IV, UNECE No. 118 Annex 6, ISO 3795, TL1010, DBL 5307 Article 5.1, WSK - M4D556 A/A3/A4/A5, FMVSS §571.302, VW 96243, MS 300 - 08	measurement of flame propagation speed, determination of flammability
Chemical substances and chemical preparations	
Commission Regulation (EC) No. 440 / 2008 Method A.12	determination of flammability of substances and agents reacting with water
Solid alternative fuels	
EN ISO 21644, Annex B: B.7, B.8, B.9	determination of biomass content
Fuel tanks for motor vehicles	
UN/ECE No. 34 - Annex 5 (ECE R34)	fire resistance test

Certification of protective systems intended for use in potentially explosive atmospheres

VVUU, a.s. is the Notified Body 1019 for the conformity assessment of protective systems intended for use in potentially explosive atmospheres (ATEX). It is authorized to carry out conformity assessment activities pursuant to Government Regulation No. 116/2016 Coll., transposing Directive 2014/34/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

For manufacturers of protective systems designed for use in potentially explosive atmospheres, we offer the comprehensive certification of their products before they are placed on the EU market. The activities of the Notified Body VVUU, a.s. build on the services of an accredited testing laboratory, which offers accredited tests of protective systems in a fully equipped testing center with a wide range of test vessels ranging from 0.4 m³ to 60 m³.

Types of protection systems for conformity assessment

EN 14373	explosion suppression systems (automatic high rate discharge suppressor or HRD systems)
EN 14797	explosion venting device (bursting panel device, explosion doors or flaps, relief valves)
EN 16009	flameless explosion venting devices (mesh, ceramic, ribbon devices for flameless venting)
EN 14460	explosion resistant equipment (filters, cyclones, redler conveyors, elevators, dryers and other explosion-proof equipment)
EN 16447	explosion isolation flap valves
EN 15089	explosion isolation systems (rotary valve, float valves, quick-acting slide valves, fire extinguishing barriers)

What is needed to start the certification process?

- general description of the product
- conceptual design, manufacturing drawings and schemes of components, sub-assemblies, circuits, etc.
- descriptions and explanations necessary for understanding of those drawings and schemes and the operation of the product
- list of harmonised standards applied in full or in part
- description of the solutions chosen adopted to meet the essential health and safety requirements, including a list of other relevant technical specifications applied
- results of design calculations, examinations carried out, etc.
- test reports
- analysis and assessment of the risk(s)
- safety instructions manual (preliminary)
- design of the marking of the protective system and design of the marking label

Procedure for the certification of EU-type examination (MODULE B)

- the application for conformity assessment and the required technical documentation and its examination
- proposal for the certification process including the tests necessary for issuing the certificate, subsequent approval
- supply of samples
- conducting tests, issuing test reports
- preparation of an evaluation report
- **in the case of COMPLIANCE – issuing an EU-type examination certificate**
- **subsequent the conformity assessment according to Module D or Module F**

MODULE D - conformity to type based on the quality assurance of the production process

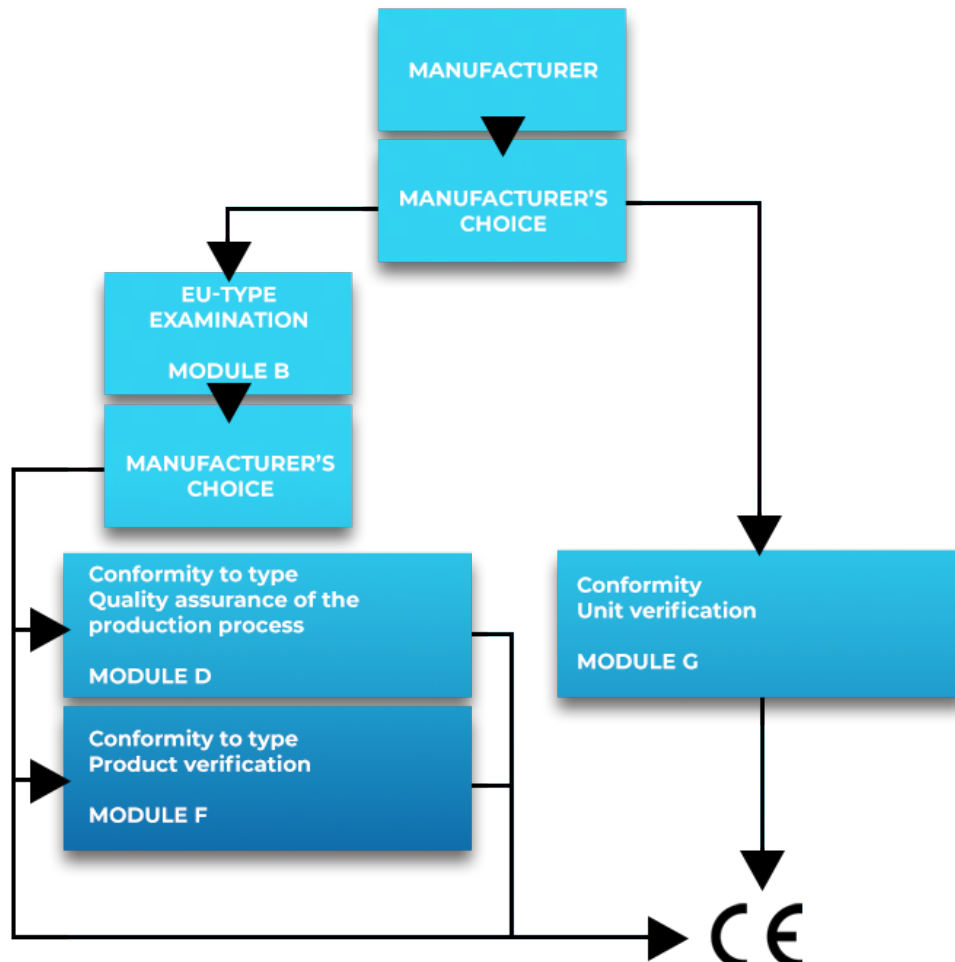
- assessment and surveillance of the quality control system used by the manufacturer to ensure the conformity of its products with the type described in the EU-type examination certificate. The audit shall include an assessment visit to the manufacturer's premises

MODULE F - conformity to type based on product verification

- examinations and tests to verify the conformity of products with the approved type described in the EU-type examination certificate and relevant legislation

Procedure for the certification of each individual product (MODULE G)

- the application for conformity assessment and the required technical documentation and its examination
- proposal for the certification process including the tests necessary for issuing the certificate, subsequent approval
- supply of samples
- conducting tests, issuing test reports
- preparation of an evaluation report
- **in the case of COMPLIANCE – issuing a certificate of conformity**



Seminars and educational activities

Our work in the field includes the organization of regular seminars that focus on the danger of explosion of flammable gases, flammable liquid vapors and combustible dust, and on eliminating the risk of explosion in industrial plants.

As part of these seminars, we conduct demonstrations of the burning and explosion of combustible dust. We are ready to offer you our professional experience and will be glad to show you what combustible dust can do.



Engineering, analysis and assessments in operational and process safety. Comprehensive services and solutions in explosion prevention and protecting industrial operations. Our team of risk analysis experts is ready to consult and address your needs and requirements in the explosion protection document, external influence identification protocols, and in undertaking a risk analysis of electrical and non-electrical equipment.



Testing Laboratory VVUU, a.s., No. 1025 is accredited by the Czech Accreditation Institute in accordance with ČSN EN ISO/IEC 17025 for testing of flammability, explosion protection, protective systems, explosives and blasting agents, explosibility, combustible dusts, personal protective equipment (PPE), and mining machinery.



VVUU is the Notified Body 1019 engaged in assessing the conformity of personal protective equipment against falls from height and slips, protective systems intended for use in potentially explosive atmospheres (ATEX), explosives for civil use, and selected types of machinery for use underground. The certification body VVUU is also accredited to certify protective and rescue equipment for working at heights, conveyor belts and flexible medium volume bags for non-hazardous materials.

VVUU has been assessing and defining fire and explosion risks for more than 70 years. VVUU, a.s. is a market leader, a company with modern and complex laboratory, testing and development facilities.

Ensuring industry safety is the clearly defined direction of the company's core activity. VVUU offers its services to all companies at risk of industrial accidents, explosions or fires.



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