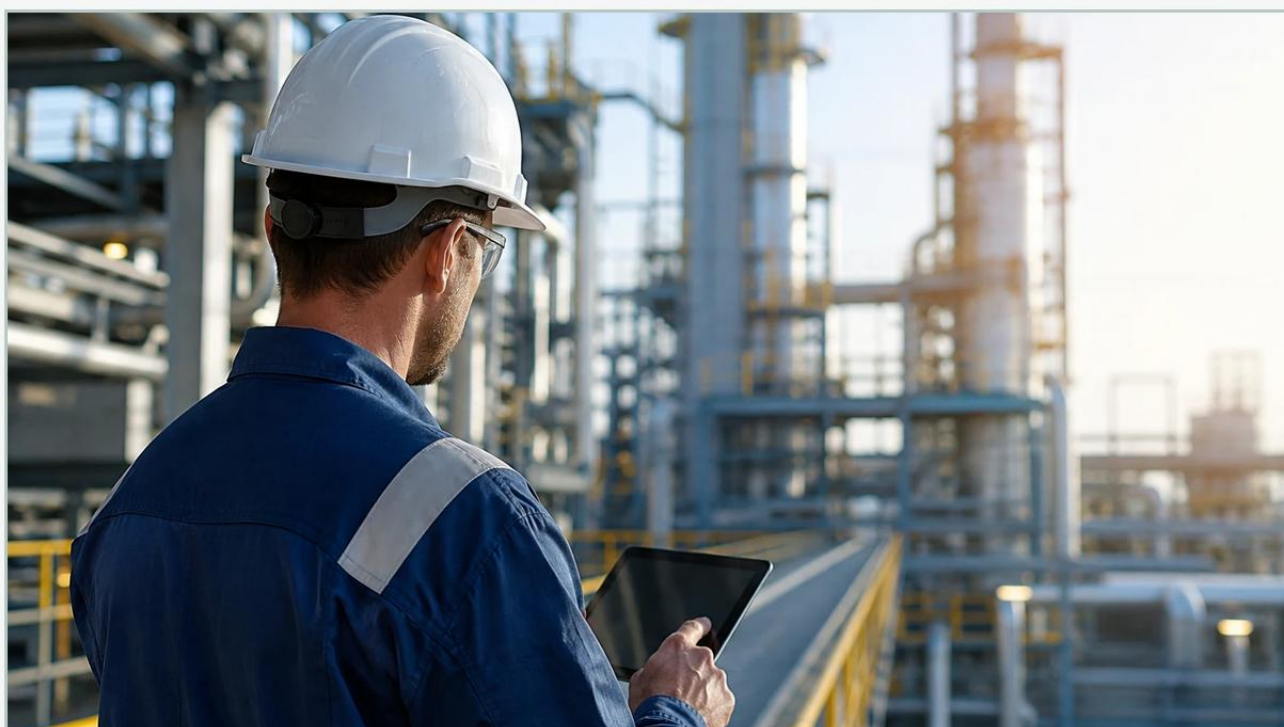


Atex Ptb

A practical guide to atex ptb, covering the reader intent, the relationship to atex ptb, key evaluation criteria, common risks, and the information the intended project audience should confirm before taking the next step.



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In the landscape of industrial automation, particularly within the chemical, oil and gas, and pharmaceutical sectors, safety is not merely a regulatory requirement but a fundamental engineering pillar. When dealing with level measurement in environments where flammable gases, mists, or dusts are present, the risk of explosion is a constant variable. To mitigate these risks, equipment must adhere to the ATEX (Appareils destinés à être utilisés en ATmosphères EXplosibles) directives. Central to the enforcement and verification of these standards in Europe—and recognized globally—is the Physikalisch-Technische Bundesanstalt (PTB).

For engineers and procurement specialists, understanding the intersection of ATEX directives and PTB certification is essential for selecting reliable instrumentation. This guide explores the technical framework of ATEX PTB certification, the measurement principles used in hazardous areas, and the practical considerations for implementing these technologies in the field.

| Understanding the Role of PTB in ATEX Certification

The Physikalisch-Technische Bundesanstalt (PTB) is Germany's national metrology institute, providing scientific and technical services for the benefit of society and the economy. In the context of explosion protection, PTB acts as a "Notified Body" (identified by the number 0102). Under the European Directive 2014/34/EU, manufacturers of equipment intended for use in potentially explosive atmospheres must often involve a Notified Body to verify that their products meet the Essential Health and Safety Requirements (EHSRs).

When a level meter carries an ATEX PTB certificate, it signifies that the device has undergone rigorous testing by PTB's experts. This testing includes evaluating the device's electrical circuits, housing integrity, and thermal characteristics to ensure it cannot become an ignition source. For a manufacturer like Welk, achieving such certification is a testament to the engineering precision of their Main Page offerings, which include radar, ultrasonic, and hydrostatic level transmitters designed for volatile environments.

| The Two Pillars of ATEX

It is important to distinguish between the two directives that govern hazardous areas:

1. Directive 2014/34/EU (ATEX 114): This is the product directive. It applies to the manufacturer and covers the technical requirements for equipment and protective systems.
2. Directive 1999/92/EC (ATEX 153): This is the workplace directive. It applies to the end-user (the plant operator) and covers the minimum requirements for improving the safety and health protection of workers.

PTB's primary role is associated with Directive 2014/34/EU, ensuring that the hardware entering the market is inherently safe for its designated zone.

| Measurement Principles for Hazardous Areas

Before selecting a level meter, it is critical to understand the physics behind the measurement and how those principles interact with hazardous environments. Different technologies offer varying levels of inherent safety and performance.

| Radar Level Measurement (Non-Contact and Guided)

Radar technology is widely considered the gold standard for hazardous area level measurement. It operates on the Time-of-Flight (ToF) principle, where microwave pulses (often at 26 GHz or 80 GHz) are emitted toward the medium and reflected back.

Intrinsic Safety: Radar meters are frequently designed with "Ex i" (Intrinsic Safety) protection. This means the electrical energy within the device is limited to a level that cannot trigger an explosion, even in the event of a component failure.

Suitability: Because radar is non-contact, it is ideal for corrosive or volatile liquids where mechanical contact could lead to seal failure or static buildup.

| Ultrasonic Level Measurement

Ultrasonic sensors emit high-frequency sound waves. The time taken for the echo to return determines the distance to the surface.

Limitations in ATEX Zones: While ultrasonic sensors can be ATEX certified, they face challenges in pressurized tanks or environments with heavy vapors (like fuel storage). Vapors can change the speed of sound, leading to inaccuracies. Furthermore, the transducer face must be carefully engineered to prevent electrostatic discharge.

| Hydrostatic Level Measurement

Hydrostatic transmitters measure the pressure exerted by a liquid column. This pressure is directly proportional to the height of the liquid.

Protection Types: These devices often use "Ex d" (Flameproof enclosure) or "Ex ia" (Intrinsic Safety). In an Ex d setup, the transmitter is housed in a robust casing that can contain an internal explosion and prevent it from igniting the surrounding atmosphere.

Application: These are highly effective for deep wells or large storage tanks, reaching depths of up to 200 meters (approx. 656 feet).

| ATEX Zones and Equipment Categories

The PTB certification process classifies equipment based on the environment it can safely inhabit. These environments are divided into zones based on the frequency and duration of the occurrence of an explosive atmosphere.

Zone (Gas/Dust)	Frequency of Explosive Atmosphere	Required Equipment Category
Zone 0 / 20	Present continuously or for long periods	Category 1 (Very High Protection)
Zone 1 / 21	Likely to occur in normal operation	Category 2 (High Protection)
Zone 2 / 22	Not likely to occur; if it does, only for a short time	Category 3 (Normal Protection)

For instance, a level meter installed inside a fuel tank (Zone 0) must meet Category 1 requirements. PTB testing for Category 1 is the most stringent, involving multiple safety redundancies.

Technical Evaluation Criteria for ATEX PTB Equipment

When reviewing a PTB-issued ATEX certificate, engineers should focus on several specific parameters that define the device's operational boundaries.

1. Temperature Classes (T-Codes)

Explosive gases are categorized by their ignition temperature. The equipment's maximum surface temperature must remain below the ignition temperature of the gas present.

T1: < 450°C

T6: < 85°C (Most stringent)

If a radar level meter is certified as T6, it can be used in environments with gases that ignite at temperatures above 85°C, provided the ambient and process temperatures are within the specified limits.

| 2. Gas Groups

Gases are grouped by their volatility and the energy required to ignite them.

Group IIA: Propane, Gasoline (Least volatile)

Group IIB: Ethylene, Town gas

Group IIC: Hydrogen, Acetylene (Most volatile)

Equipment certified for Group IIC is also suitable for IIB and IIA, but not vice versa.

| 3. Protection Concepts

PTB evaluates various protection methods, including:

Ex ia/ib (Intrinsic Safety): Limits energy to prevent sparks.

Ex d (Flameproof): Contains an internal explosion.

Ex e (Increased Safety): Prevents arcs, sparks, or hot surfaces through high-quality components.

Ex m (Encapsulation): Potting components in resin to isolate them from the atmosphere.

| Practical Selection Table for Level Measurement

Technology	Typical ATEX Protection	Best For	Limitations
80 GHz Radar	Ex ia IIC T6 Ga	High precision, small nozzles, volatile liquids	Higher initial cost
Guided Wave Radar	Ex ia/db IIC T6 Ga/Gb	Low dielectric liquids, foaming surfaces	Contact with medium required
Hydrostatic	Ex ia IIC T4 Ga	Deep tanks, water treatment, sumps	Density changes affect accuracy
Ultrasonic	Ex mb/ia IIC T5 Gb	Open channels, non-volatile liquids	Vapors, pressure, and vacuum

| Installation and Maintenance Considerations

An ATEX PTB certified device is only safe if it is installed and maintained correctly. Failure to follow the manufacturer's "Instructions for Use" (which are part of the certification) can void the safety rating.

| Proper Earthing and Bonding

Electrostatic discharge is a major risk in hazardous areas. Level meters must be properly grounded to the plant's potential equalization system. For non-contact radar or ultrasonic meters, the flange or mounting hardware must ensure a low-resistance path to earth.

| Cable Glands and Wiring

Only ATEX-certified cable glands should be used. If the device is "Ex d," the glands must also be flameproof. The wiring must be kept separate; intrinsic safety (Ex i) circuits must not be bundled with non-intrinsically safe power lines to prevent induction or accidental contact.

| Routine Inspections

Under Directive 1999/92/EC, regular inspections are mandatory. This includes checking for:

Corrosion on flameproof paths (Ex d).

Integrity of seals and gaskets.

Tightness of electrical connections.

Accumulation of dust on the housing (which can lead to overheating).

| Common Risks and Pitfalls

1. **Zone Misclassification:** Installing Category 2 equipment in a Zone 0 environment. This is a critical safety breach.
2. **Incompatible Materials:** Choosing a stainless steel housing for an environment where aluminum is required, or vice versa, without considering the potential for thermite reactions or chemical corrosion.
3. **Ignoring Ambient Temperature:** Most ATEX PTB certificates specify an ambient temperature range (e.g., -40°C to +80°C). Operating outside this range can compromise the protection method (e.g., making seals brittle or electronics prone to overheating).
4. **Unauthorized Modifications:** Any repair or modification to an ATEX-certified device must be done by the manufacturer or a certified repair facility. Opening an Ex d enclosure while the circuit is live is a common and dangerous error.

| FAQ: ATEX PTB Certification

Q: Does an ATEX PTB certificate expire?

A: The certificate itself does not typically have an expiration date as long as the product design remains unchanged and the underlying directive (2014/34/EU) is current. However, if the standards are updated, manufacturers may need to re-evaluate their products.

Q: Can I use a PTB-certified device in North America?

A: While PTB is a European Notified Body, many of its test reports can be used as part of the IECEx scheme, which is recognized globally. However, for North America, you usually need specific UL, CSA, or FM approvals (Class/Division system), although the Zone system (NEC 505) is increasingly accepted.

Q: What is the difference between ATEX and IECEx?

A: ATEX is a mandatory legal requirement in the European Union. IECEx is a voluntary international certification scheme. Many PTB-tested products carry both certifications to facilitate global trade.

Q: How do I verify a PTB certificate?

A: You can verify certificates through the PTB's official database or by contacting the manufacturer. Every certified device must have a nameplate showing the ATEX marking (the hexagon with the 'Ex' symbol), the certificate number (e.g., PTB 21 ATEX 1001), and the protection string.

| Conclusion

Selecting level measurement instrumentation for hazardous areas requires a balance of process accuracy and uncompromising safety. The ATEX PTB framework provides a reliable benchmark for this selection. By understanding the specific zones, gas groups, and protection types, engineers can ensure that their facilities remain productive and, most importantly, safe. For those seeking high-performance solutions that meet these rigorous standards, exploring the range of radar and hydrostatic transmitters available on the Welk Main Page is a recommended starting point for any industrial project.