

Certificat D'h

A practical guide to certificat d'h, covering the reader intent, the relationship to certificat d'h, 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 and process control, the accuracy of level measurement is not merely a matter of operational efficiency but a fundamental requirement for safety and regulatory compliance. For engineers and procurement specialists, the term "certificat d'h"—referring to the certificat d'homologation or certificate of approval—represents the bridge between a high-performance instrument and its legal, safe deployment in a specific industrial environment. Whether managing volatile chemicals, wastewater treatment facilities, or food processing lines, understanding the intersection of measurement physics and certification standards is essential for project success.

Industrial level measurement instruments, such as those provided on the Main Page of leading manufacturers like Welk, must undergo rigorous testing to receive their respective certifications. These documents verify that the equipment meets international standards for explosive atmospheres (ATEX), functional safety (SIL), or hygienic requirements. This article explores the technical principles of level measurement and the critical role that a certificat d'h plays in equipment selection and installation.

| Principles of Level Measurement Technology

Before selecting an instrument based on its certification, it is vital to understand the underlying physical principles that govern different level measurement technologies. Each method has distinct advantages and limitations depending on the medium and the environment.

| Radar Level Measurement (ToF)

Radar level meters operate on the Time-of-Flight (ToF) principle. The device emits high-frequency electromagnetic waves (typically in the 26GHz or 80GHz range) toward the product surface. These waves are reflected back to the sensor. The distance is calculated based on the time interval between emission and reception.

Non-contact Radar: Ideal for corrosive or viscous fluids as the sensor does not touch the medium.

Guided Wave Radar (GWR): Uses a probe to guide the signal, making it highly effective for low dielectric constants or turbulent surfaces.

| Ultrasonic Level Sensors

Similar to radar, ultrasonic sensors use the ToF principle but utilize sound waves instead of electromagnetic pulses. A transducer emits an ultrasonic pulse that bounces off the material surface. The duration of the echo's return allows the device to determine the distance. Because sound speed is affected by air temperature, these sensors usually include integrated temperature compensation.

| Hydrostatic Level Transmitters

This technology relies on the relationship between liquid height and pressure. The sensor measures the head pressure exerted by the liquid column. According to the formula $P = \rho \cdot g \cdot h$ (where P is pressure, ρ is density, g is gravity, and h is height), the level can be accurately determined if the liquid density remains constant. This is a common choice for deep wells and open tanks.

| Magnetic Level Gauges

Magnetic gauges use a float containing a permanent magnet that moves with the liquid level in a bypass chamber. This magnet actuates a series of external flags or a transmitter. This is a purely mechanical visual indication system that can be augmented with electronic switches for remote monitoring.

| The Role of the Certificat D'h in Industrial Compliance

A certificat d'h is more than a piece of paper; it is a technical dossier that confirms an instrument has been tested by a third-party notified body. In many jurisdictions, operating industrial equipment without the proper homologation can lead to insurance voids, legal penalties, and safety risks.

| Explosion Protection (ATEX/IECEx)

In industries like oil and gas or chemical processing, instruments are often installed in "Hazardous Areas" where explosive gases or dust are present. A certificat d'h for ATEX compliance ensures that the device's electronic circuits are either intrinsically safe (Ex i) or housed in a flameproof enclosure (Ex d), preventing the instrument from becoming an ignition source.

| Functional Safety (SIL)

The Safety Integrity Level (SIL) certification, governed by IEC 61508/61511, quantifies the reliability of a device within a Safety Instrumented System (SIS). For high-risk applications like overfill protection, a device with a SIL 2 or SIL 3 certificat d'h is often mandatory to ensure the probability of failure on demand is sufficiently low.

| Pressure Equipment Directive (PED)

For level meters installed on pressurized vessels, the PED certification ensures that the mechanical housing and process connections can withstand the specified pressure ratings without catastrophic failure.

| Selection Criteria and Technical Comparison

Choosing the right level meter requires balancing the physical properties of the medium with the necessary regulatory approvals. The following table provides a general comparison of common technologies used in industrial applications.

Technology	Typical Accuracy	Max Pressure	Max Temperature	Common Certifications
80GHz Radar	±1 mm	160 bar	450°C	ATEX, SIL2, CE, FCC
Ultrasonic	±0.25% of range	3 bar	80°C	CE, RoHS, ATEX (optional)
Hydrostatic	±0.1% to 0.5%	N/A (Submersible)	80°C	CE, Drinking Water (NSF)
Magnetic Gauge	±5 mm	320 bar	500°C	PED, ATEX

When reviewing a certificat d'h, engineers must ensure that the "Zone" classification on the certificate matches the hazardous area classification of the installation site. For example, an instrument certified for Zone 1 cannot be used in a Zone 0 environment without additional safety barriers.

| Installation Considerations and Best Practices

Even a device with a valid certificat d'h will fail to provide accurate data if installed incorrectly. Proper engineering starts with vessel analysis.

- 1. Avoid Obstructions:** For radar and ultrasonic sensors, the signal beam has a specific spread angle. Internal tank structures like ladders, agitators, or heating coils can cause "false echoes." Advanced software can perform "echo mapping" to ignore these fixed reflections, but physical clearance is always preferred.
- 2. Nozzle Height and Diameter:** The mounting nozzle should be as short as possible to prevent the signal from reflecting off the nozzle walls before entering the tank. This is particularly critical for ultrasonic sensors which have a "dead zone" (blocking distance) near the transducer face.
- 3. Hydrostatic Positioning:** Submersible pressure transmitters should be placed in an area with minimal turbulence. If the tank has an agitator, a stilling well (a perforated pipe) should be used to protect the sensor and ensure a stable pressure reading.

4. Environmental Shielding: While many industrial sensors are rated IP67 or IP68, extreme sun exposure can cause internal electronics to overheat. Installing a simple sunshade can extend the lifespan of the instrument and prevent thermal drift in the electronics.

| Limitations and Common Risks

Every measurement technology has its "Achilles' heel." Awareness of these limitations is crucial for maintaining the integrity of the process.

Foam: Heavy, dense foam can absorb ultrasonic and radar signals, leading to a "loss of echo" error. In these cases, Guided Wave Radar or Hydrostatic sensors are more reliable.

Vapor and Dust: High concentrations of dust or steam can attenuate ultrasonic signals because sound requires a medium (air) to travel. Radar is generally unaffected by dust and vapor because electromagnetic waves do not rely on air density.

Dielectric Constant (ϵ_r): Radar technology depends on the dielectric constant of the liquid. If the ϵ_r is too low (e.g., certain liquefied gases), the signal may pass through the liquid and reflect off the bottom of the tank instead. A certificat d'h for a radar unit will often specify the minimum dielectric constant required for accurate measurement.

| Frequently Asked Questions (FAQ)

Q: What is the difference between a calibration certificate and a certificat d'h?

A: A calibration certificate verifies the accuracy of a specific unit against a known standard at a specific point in time. A certificat d'h (homologation) is a type-approval that certifies the design and manufacturing process of the entire product line meet specific safety or regulatory standards.

Q: Can I use an ultrasonic sensor for measuring acids?

A: Yes, provided the sensor face is made of a chemically resistant material like PVDF or PTFE. You must check the chemical compatibility chart and ensure the device has the appropriate environmental certification for corrosive atmospheres.

Q: Why is 80GHz radar becoming the industry standard?

A: Higher frequency radar (80GHz) allows for a much narrower beam angle. This makes it easier to install in small nozzles and allows it to avoid internal obstructions more effectively than older 6GHz or 26GHz models.

Q: How often should a certified level meter be re-validated?

A: This depends on the industry. For SIL-rated loops, a "proof test" interval is defined in the safety manual (often every 1 to 5 years). For standard process monitoring, annual calibration is a common best practice.

| Conclusion

Navigating the complexities of industrial level measurement requires a dual focus on technical performance and regulatory compliance. The certificat d'h serves as an essential validation of an instrument's suitability for its intended environment, particularly in high-stakes industries like chemical processing and oil and gas. By understanding the principles of radar, ultrasonic, and hydrostatic measurement, and adhering to strict installation guidelines, engineers can ensure long-term reliability and safety. For those seeking standardized or customized solutions that meet these rigorous global standards, consulting professional resources and manufacturers is the most effective path toward operational excellence.