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OPERATING AND MAINTANANCE MANUAL
PETROVAP ATEX VAPOR SENSORS

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Tax No. (NIP): PL6770021314 Reg No. (KRS): 0000108413 Stat. No. (REGON): 003914150

1. DEVICE DESCRIPTION AND OPERATING PRINCIPLE:

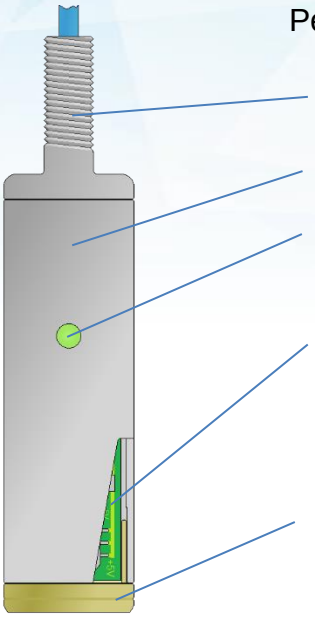
PetroVAP ATEX sensors (manufactured by PETROSTER Sp.J.) are vapor sensors designed to detect leaks of liquid substances or gases using a dry detection method in category III and V systems, in accordance with EN 13160-1. They are primarily intended for the detection of hydrocarbon vapors, including gasoline, diesel fuel, LPG, alcohols, hydrogen, and carbon monoxide, as well as other media depending on their physicochemical properties and volatility. These are catalytic combustion sensors with high sensitivity and short response time, utilizing the phenomenon of resistance change in response to the concentration of vapor particles in the sensor's vicinity. The sensor's output voltage increases proportionally with the detected vapor concentration, ranging from 0.2V in a neutral state to 5.5V when reaching the maximum detection threshold.

The sensor housing includes a built-in LED that signals active power supply and excitation level, changing color proportionally to the detected vapor concentration—from green in a neutral state to red when the upper detection threshold is reached. These sensors are dedicated for use with PETROSTER control units but are also compatible with most control panels available on the market. They feature a continuous cable monitoring system, in compliance with PN-EN 13160-1 requirements, which allows distinguishing between an alarm triggered by vapor level changes or leak detection and cable damage.

Depending on the application, they can also be used as process sensors. They are designed to be as simple as possible, utilizing a highly accurate measurement element manufactured using industrial technology, ensuring high reliability and fault tolerance. The sensors are designed with minimal hysteresis, ensuring very high measurement accuracy. The housing is made of acid-resistant steel, the measurement element is manufactured using industrial technology, and the IB-class cable allows the use of PetroVAP ATEX sensors with a wide range of media.

These sensors comply with intrinsic safety requirements and can be used in explosion-hazardous zones, including Zone "0" environments of gases, dust, and mists of explosive groups up to IIC. They have been certified under ATEX number JSHP 20 ATEX 0005X. They meet the requirements of ATEX Directive 2014/34/EU and are manufactured in accordance with PN-EN 60079-0:2013-03 (EN 60079-0:2012) and PN-EN 60079-11:2012 (EN 60079-11:2012) standards. They are designed for operation in gas, vapor, and mist environments with temperatures ranging from -30°C to +80°C, featuring temperature class T6 for applications up to 75°C and T5 for applications up to 80°C. The measurement element is enclosed in a head that prevents flame propagation.

2. SENSOR CONSTRUCTION:



PetroVAP ATEX sensor structure:

1 – mounting thread with two nuts

2 – acid-resistant stainless steel sensor body

3 – status LED indicator (green – no vapors, red – full saturation; gradual change)

4 – intrinsically safe electronic module with measurement element, encapsulated in the body below the measurement element, with an IB-class intrinsically safe cable extending outside

5 – sensor measurement head

Inside the sensor, there is a sealed electronic module connected to an oil-resistant, shielded cable designed for intrinsically safe systems. The cable has three numbered black wires: 1 – PWR, 2 – SIG, 3 – GND. The sensor housing and measurement head are permanently connected during production, forming an integral, non-dismantlable unit. The nuts on the thread are used for mounting.

3. SENSOR INPUT PARAMETERS.

U_i	=	12.5 V (DC)
I_i	=	190 mA
P_i	=	1.3 W
L_i, C_i	=	negligibly small

4. SENSOR SIG OUTPUT PARAMETERS.

U_o	=	12.5 V (DC)
I_o	=	190 mA
L_o	=	L_o of the circuit connected to power terminals
C_o	=	C_o of the circuit connected to power terminals

5. INSTALLATION INSTRUCTIONS:

The sensor should be placed in the monitored area in a way that ensures access to the expected vapor source. It should be positioned as close as possible to the anticipated leakage point. If monitoring an area where a specific leak location is not defined, such as a double-walled fuel tank space, the sensor should be placed in the expected vapor accumulation zone, considering the physical and chemical properties of the medium.

For heavier-than-air vapors, the sensor should be installed as low as possible, while for lighter-than-air vapors, it should be placed as high as possible. When selecting the installation location, the shape of the monitored space and potential vapor

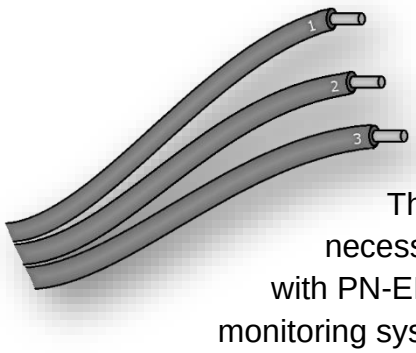
circulation should be considered. The front of the sensor head must not be obstructed, ensuring an open detection area behind the head.

The sensor is recommended to be installed in a vertical position with the head facing downward. Side mounting is also acceptable. However, upward-facing installation should be avoided due to the risk of condensation or liquid entering the head, which could interfere with the operation.

The sensor has a threaded mounting system with two nuts. The mounting bracket should allow the sensor to be secured between the nuts. Mounting the sensor in a bracket with a hole that requires threading the entire cable through is not recommended, as it complicates sensor replacement. The sensor can also be suspended freely from a cable, ensuring that the cable exits the monitored space through a properly sealed gland.

The sensor is designed for use in a clean environment and serves as an alarm device with an expected lifespan of approximately six years. Continuous exposure to vapor-saturated environments results in the gradual combustion of medium particles on the heating element, reducing its lifespan. To ensure proper functionality, the sensor should be placed in as dry an environment as possible. Submerging the sensor in liquid may cause damage.

The sensor is powered via a three-wire cable. The wire ends should be connected to the appropriate terminals on the intrinsic safety barrier:



1 – power (PWR)

2 – signal (SIG)

3 – ground (GND)

The sensor circuit must not be grounded. If grounding is necessary, galvanic isolation must be ensured in accordance with PN-EN 60079-11. All connections must be made with the monitoring system powered off.

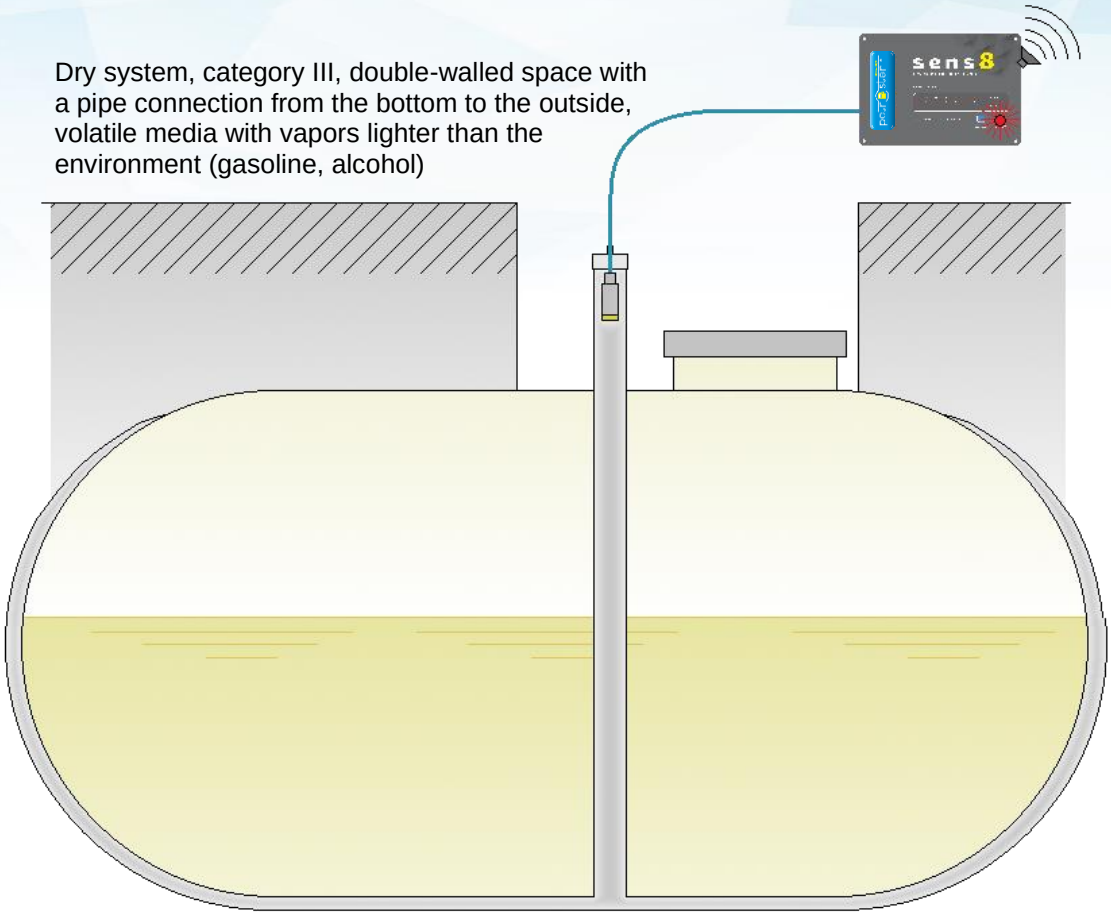
Depending on the type of control unit, after connecting the sensor, the alarm threshold must be set to ensure activation under expected leakage conditions. If connected to the PETROSTER Sens8 control unit, it is recommended to use the "sensor auto-calibration" function. If the parameter is set manually, the threshold should be selected to avoid triggering under normal conditions. It is suggested to set the threshold at approximately 30% above the normal background level of the monitored environment.

To meet requirements, the leak detection system should be equipped with a non-resettable visual and audible alarm to ensure it is noticed by the operator or be integrated into the control system. Additionally, it should support continuous cable monitoring.

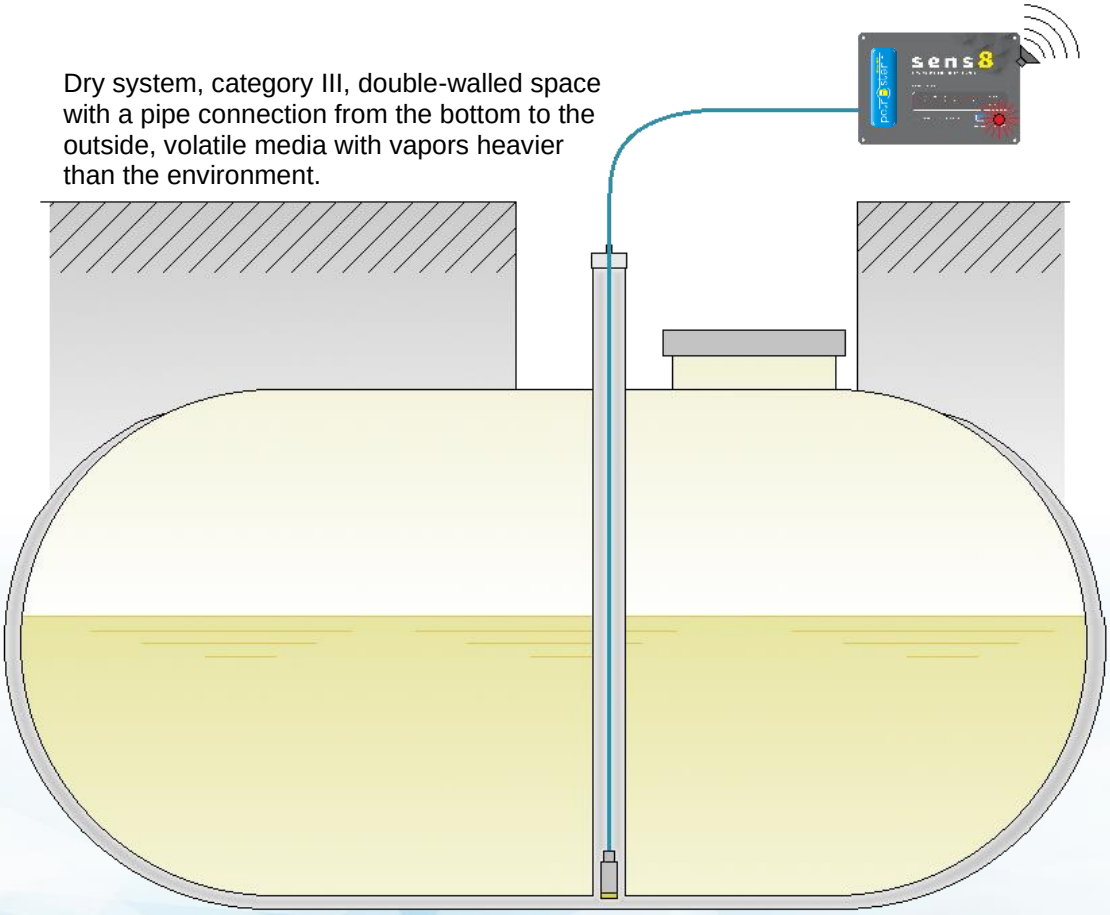
6. SENSOR APPLICATION EXAMPLES:

Applicable for various leak detection system categories in accordance with PN-EN 13160-1:

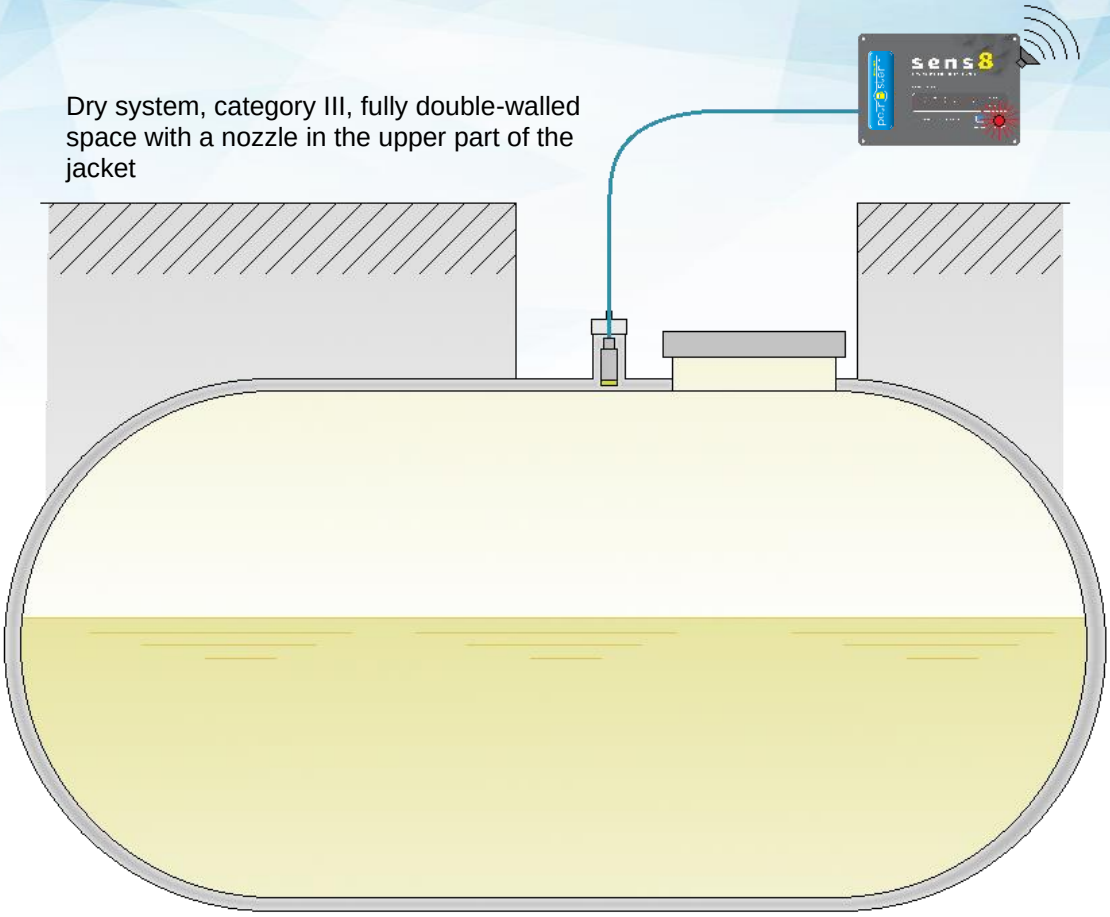
Dry system, category III, double-walled space with a pipe connection from the bottom to the outside, volatile media with vapors lighter than the environment (gasoline, alcohol)



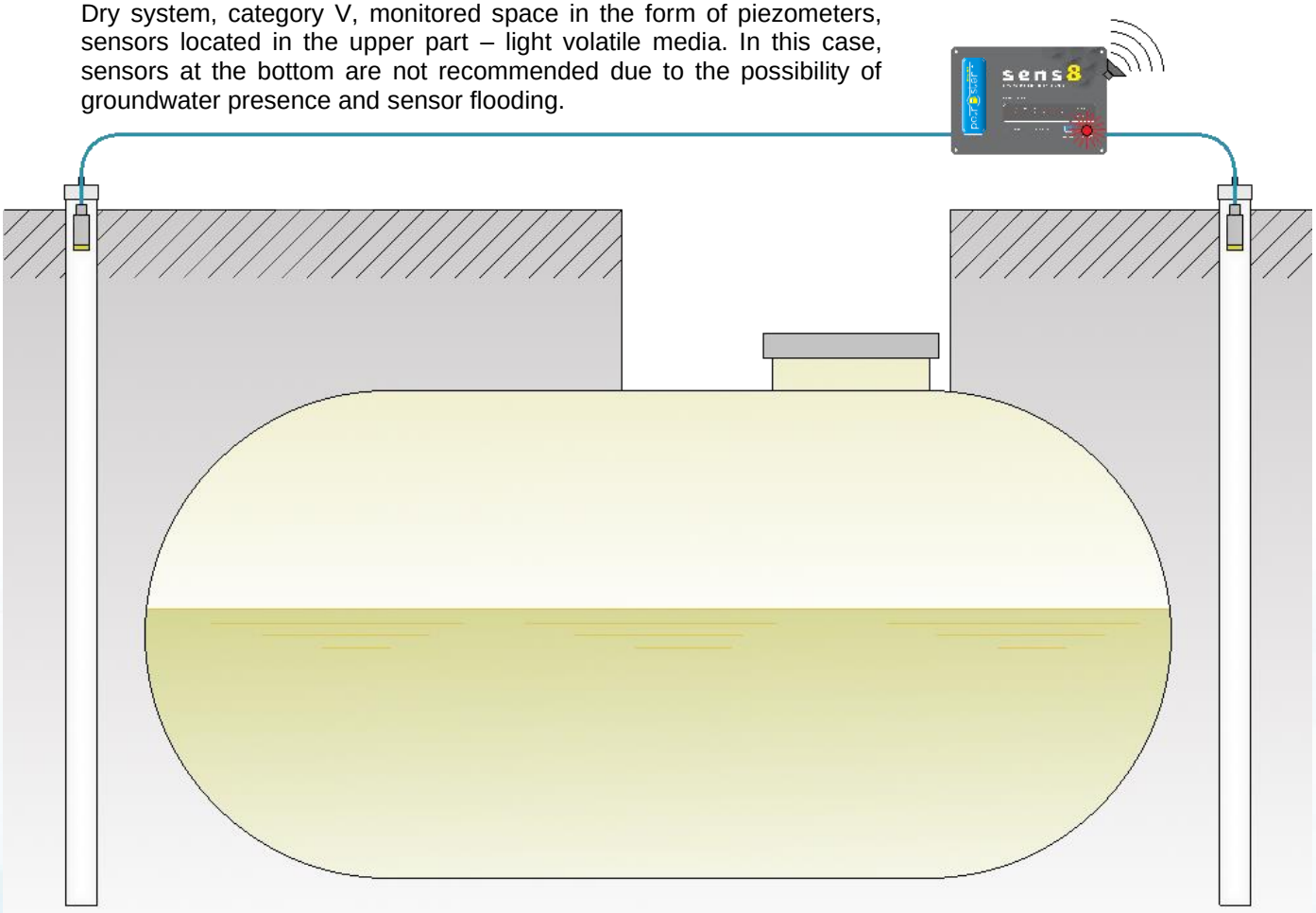
Dry system, category III, double-walled space with a pipe connection from the bottom to the outside, volatile media with vapors heavier than the environment.



Dry system, category III, fully double-walled space with a nozzle in the upper part of the jacket



Dry system, category V, monitored space in the form of piezometers, sensors located in the upper part – light volatile media. In this case, sensors at the bottom are not recommended due to the possibility of groundwater presence and sensor flooding.



7. MAINTENANCE AND OPERATION:

The sensor should be used in accordance with its intended purpose and within the recommended inspection intervals. To ensure proper operation, a service inspection is recommended every six months and required once a year. Inspection intervals may be shortened if operating conditions indicate the need for more frequent inspections, such as internal plant regulations or harsh working conditions, e.g., sensor contamination, medium condensation, and others. Inspections should be carried out by a qualified service technician and confirmed with an appropriate protocol.

The inspection should include:

• Visual inspection of the sensor, wiring, and connections

• Cleaning the sensor by removing deposits and dirt from the housing and head using a soft cloth or brush

• Checking the sensor's electronic functionality by simulating an alarm state

If an alarm state is detected, the cause of the activation should be removed, and before reusing the sensor, a service check must be performed, including a mandatory functionality test. If the sensor is submerged, it should be disconnected from the power supply, dried, and tested for proper operation. If any deviations from normal operation or damage to the sensor are detected, it should be replaced with a new one of the same type.

If any mechanical or electronic defect is observed that affects the sensor's performance or could lead to malfunction in the near future, the sensor must be replaced with a new one. Sensor repairs are not anticipated.

8. SENSOR DATA:

Operating Temperature	-30°C … +75°C for T6 class -30°C … +80°C for T5 class

Max Power Supply	12,5 V
Max Current	0,19 A
Max Power	1,3 W
Weight (excluding cable)	0,075kg
ATEX Certification	II 1G Ex ia IIC T6…T5 Ga ATEX No: JSHP 20ATEX0005X
Dimensions	Total length (excluding cable): 72 mm, Length to thread: 60 mm, Body diameter: 16 mm, Head diameter: 16.6 mm
Material	Body: Acid-resistant stainless steel Head: Brass and bronze sinter

J.S. Hamilton Poland Sp. z o.o.
(do dnia 30.04.2018r. JOAiCW TEST Sp. z o.o.)
Jednostka Notyfikowana NB 2057
ul. Wyzwolenia 14
41-103 Siemianowice Śląskie

CERTYFIKAT BADANIA TYPU UE

(1)

(2) Urządzenie lub system ochronny przeznaczony do użytku w atmosferze potencjalnie wybuchowej
Dyrektywa 2014/34/UE

(3) Certyfikat badania typu UE Nr: **JSHP 20 ATEX 0005X**

(4) Produkt: **Czujnik oparów PetroVAP**

(5) Producent: **PETROSTER Sp.J.**
Jan Dziura-Bartkiewicz, Grzegorz Bartkiewicz

(6) Adres: **30-240 Kraków, ul. B. Leśmiana 2**

(7) Niniejszy produkt wraz ze swymi odmianami jest określony w załączniku do niniejszego certyfikatu oraz w wymienionych w nim dokumentach.

(8) J.S. Hamilton Poland Sp. z o.o., Jednostka Notyfikowana nr 2057, zgodnie z Artykułem 17 Dyrektywy 2014/34/UE Parlamentu Europejskiego i Rady z dnia 26 lutego 2014, zaświadcza, że produkt został uznany za zgodny z zasadniczymi wymaganiami zdrowia i bezpieczeństwa, dotyczącymi projektowania i budowy produktów przeznaczonych do użytku w atmosferze potencjalnie wybuchowej, przedstawionymi w załączniku II Dyrektywy.

Oceny i wyniki badań zostały wyszczególnione w poufnym raporcie Nr JSHP/RW/46/19/RM

(9) Zgodność z wymaganiami bezpieczeństwa i ochrony zdrowia zrealizowano poprzez zgodność z normami:

PN-EN IEC 60079-0:2018:09 *(EN IEC 60079-0:2018)*
PN-EN 60079-11:2012 *(EN 60079-11:2012)*

(10) Jeśli za numerem certyfikatu umieszczono znak „X", wskazuje to, że produkt podlega szczególnym warunkom użytkowania określonym w załączniku do niniejszego certyfikatu.

(11) Niniejszy certyfikat badania typu UE odnosi się tylko do projektu i konstrukcji określonego produktu. Certyfikat nie obejmuje pozostałych wymagań Dyrektywy dotyczących procesu produkcji i wprowadzenia produktu do obrotu.

Niniejszy certyfikat obowiązuje w całości z załącznikiem (załącznikami).

(12) Oznakowanie produktu musi zawierać poniższe symbole:

II 1G Ex ia IIC T6...T5 Ga

JEDNOSTKA NOTYFIKOWANA HAMILTON POLAND Sp. z o.o. NB 2057 JEDNOSTKA NOTYFIKOWANA

Romuald Matłachowski
p.o. Kierownika Jednostki

Siemianowice Śl., dnia 20 lutego 2020 r.

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