CERTIFICATE OF CONFORMITY

1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**

2. **Certificate No:** **FM20US0103X**

3. **Equipment:**
   (Type Reference and Name) **VEGAPULS 64 and VEGAPULS 69,**
   Level Transmitter Radar Sensors

4. **Name of Listing Company:** **VEGA Grieshaber KG**

5. **Address of Listing Company:** **Am Hohenstein 113**
   D-77761 Schiltach, Baden-Wuerttemberg
   Germany

6. The examination and test results are recorded in confidential report number:

   PR451544 dated 20th May 2021

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   FM Class 3600:2018, FM Class 3610:2018, FM Class 3810:2018,
   ANSI/IEC 60529:R2011, ANSI/UL 60079-0:2019, ANSI/UL 60079-11:2014,
   ANSI/UL 60079-26:2017, ANSI/UL 61010-1:2018, ANSI/UL 122701:2017, NEMA 250:2018

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.

9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested, and Approved.

Certificate issued by:

J.E. Marquedant
VP, Manager – Electrical Systems

20 May 2021
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

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10. **Equipment Ratings:**

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 64) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, with intrinsically safe process connections suitable for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC Ga, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0/1, Group IIC Ga/Gb, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 1, Group IIC Gb, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual, hazardous (classified) locations with an ambient temperature rating of -40 ºC to +80 ºC, indoor and outdoor (Type 4X/6P, IP66/IP67, IP66/IP68) environments with dual seal process connection.

In type of protection intrinsically safe apparatus, the level transmitter radar sensor (VEGAPULS 69) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, with intrinsically safe process connections suitable for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC Ga, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0/1, Group IIC Ga/Gb, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 1, Group IIC Gb, with intrinsically safe process connections "ia" suitable for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's operation manual, hazardous (classified) locations with an ambient temperature rating of -40 ºC to +80 ºC, indoor and outdoor (Type 4X/6P, IP66/IP67, IP66/IP68) environments with dual seal process connection.

11. The marking of the equipment shall include:

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the level transmitter radar sensor (VEGAPULS 64) equipment is labelled with the following marking(s).

Intrinsic Safe for Cl I, Div 1, Gp ABCD T6...T1; Cl II, Div 1, Gp EFG T6...T1; Cl III;

Cl I, Zn 0, 0/1, 1 AEx ia IIC T6...T1 Ga, Ga/Gb, Gb

Ta = -40 ºC to +80 ºC

Temperature -process: See manual and approval documents

Install per Drawing 65296; Type 4X/6P; IP66/IP67; IP66/IP68; Dual Seal

WARNING – Potential electrostatic charging hazard – See instructions

WARNING – To prevent ignition of flammable or combustible atmospheres, read, understand, and adhere to the manufacturer's live maintenance procedures

WARNING – Substitution of components may impair intrinsic safety

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In type of protection intrinsically safe apparatus with intrinsically safe process connections, the level transmitter radar sensor (VEGAPULS 69) equipment is labelled with the following marking(s).

Intrinsic Safe for Cl I, Div 1, Gp ABCD T6...T1; Cl II, Div 1, Gp EFG T6...T1; Cl III;
Cl I, Zn 0, 0/1, 1 AEx ia IIC T6...T1 Ga, Ga/Gb, Gb
Ta = -40 ºC to +80 ºC
Temperature -process: See manual and approval documents
Install per Drawing 65298; Type 4X/6P; IP66/IP67; IP66/IP68; Dual Seal
WARNING – Potential electrostatic charging hazard – See instructions
WARNING – To prevent ignition of flammable or combustible atmospheres, read, understand, and adhere to the manufacturer's live maintenance procedures
WARNING – Substitution of components may impair intrinsic safety

12. **Description of Equipment:**

General – The VEGAPULS level transmitter radar sensors are designed for industrial and hazardous (classified) location applications. Radar sensor types VEGAPULS 64 and 69 are for use in explosive atmospheres caused by the presence of combustible gases or dusts, used for monitoring and control of filling levels by means of microwave technology based on the FMCW (frequency modulated continuous wave) measurement principle, which is an indirect method of distance measurement. The devices use high-frequency microwave signals in the GHz range to detect the distance between the sensor and the product surface level and are suitable for applications with process temperatures up to +195 ºC and process pressures up to 2.5 MPa (362.5 psig).

The VEGAPULS 64 is a level transmitter radar sensor designed for continuous level measurement of liquids. The small process fittings offer particular advantages in small tanks or tight mounting spaces. The signal focusing allows the use in vessels with many installations such as stirrers and heating spirals.

The VEGAPULS 69 is a level transmitter radar sensor designed for continuous measurement of bulk solids under different process conditions. The sensor is intended for level measurement in very high silos, large bunkers, and segmented vessels. The VEGAPULS 69 can be equipped with an encapsulated plastic antenna or a lens antenna integrated in the metal flange. Due to this, adaptation to different applications is possible.

Each level transmitter radar sensors may be provided with or without an additional isolated single chamber enclosure allocated for a remote VEGADIS 81, which houses the PLICSCOM display for remote installation purposes.

The plics®plus sensors allow adjustment for the various applications through the use of new application parameters.

Construction – The single chamber enclosure versions are comprised of aluminum with metric or NPT threaded hubs and a threaded mating cover with or without an inspection display window; or stainless-steel casting with metric or NPT threaded hubs and a threaded mating cover with or without an inspection display window; or stainless steel electropolished with metric threaded hubs and a threaded mating cover with or without an inspection display window.

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The dual chamber enclosure versions, with or without explosionproof/flameproof type of protection feedthrough between chambers, is comprised of aluminum with metric or NPT threaded hubs and two threaded mating covers with or without an inspection display window; or stainless-steel casting with metric or NPT threaded hubs and two threaded mating covers with or without an inspection display window. The dual chamber enclosure may contain a feedthrough that meets the requirements for the secondary seal for Dual Seal rating.

The base chassis of the aluminum and stainless-steel casting enclosures includes a lid lock for the single chamber enclosure version and two lid locks for the dual chamber enclosure version. A metallic and silicon breather element is optionally threaded into the enclosure for pressure compensation. When installed in the dual chamber enclosure in Dual Seal rated configuration, the breather element is located between the primary and secondary seals and serves as the required means to annunciate and leakage ventilate in the case of primary seal failure.

The VEGADIS 81 is constructed from one of two different single chamber enclosure versions, variant in design, and installed to a socket and base plate. Each of the VEGADIS 81 display single chamber enclosure versions is comprised of aluminum with metric or NPT threaded hubs and a threaded mating cover with an inspection display window; or stainless-steel casting with metric or NPT threaded hubs and a threaded mating cover with an inspection display window.

For the various enclosure designs the connection terminals to the signal and supply circuit are accessible by unscrewing the enclosure cover. Visible is the PLICSCOM display indicator, situated within the top or side chamber of the enclosure, depending on the single or dual chamber enclosure version. Furthermore, there are holes to contact the parameterization bushing of the electronics inserts mounted on digital part behind the cover. There are two M20 x 1.5 metric or 1/2-inch NPT cable entries in the bottom of the enclosure; one of which is sealed with a cable gland, where applicable, or rigid conduit, and the other is sealed with a blanking plug. Each of the single chamber, dual chamber, and VEGADIS 81 enclosures is equipped with an internal and external earthing terminal. The signal and supply circuits are electrically isolated from elements that may be earthed, while the metal elements of the level transmitter radar sensors are electrically connected to earth terminals.

The electronics assembly of the level transmitter radar sensors is constructed from the 2 wire (4-20 mA) design transmitters with superposed HART™ signal.

For more specifics concerning construction and description details of the level transmitter radar sensor, reference the manufacturer's sales literature and specification sheets.

Ratings – The equipment is certified to the following ratings.

The ambient operating temperature range is -40 ºC to +80 ºC, depending upon type of protection and model configuration, when properly mounted and installed.

The process temperature range of the media is -196 ºC to +195 ºC, with a maximum working pressure range of -0.1 to 2.5 MPa (-14.5 to 362.5 psig) within a maximum measuring range of 120 m.

The equipment is designated for installation transient overvoltages up to levels of overvoltage category III and environmentally classified as pollution degree 4.

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In type of protection intrinsically safe apparatus with intrinsically safe process connections, the barrier protected radar sensor (VEGAPULS 64) equipment is connected to a certified intrinsically safe circuit with the following maximum entity parameter values.

Supply and signal circuit (+ (terminal 1), - (terminal 2)) electronics compartment (single chamber enclosure) and terminal compartment (dual chamber enclosure); only for connection to a certified intrinsically safe circuit, with the following maximum values:
Vmax (Ui) = 30 V; Imax (Ii) = 131 mA; Pi = 983 mW; Ci ≈ 0 nF; Li ≤ 10 µH

Display and adjustment circuit (terminals 5, 6, 7, 8), electronics or plug connection compartment (dual chamber enclosure); only for connection to a certified intrinsically safe circuit, with the following maximum values:
C·cable = 1.98 µF; L·cable = 212 µH

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the barrier protected radar sensor (VEGAPULS 69) equipment is connected to a certified intrinsically safe circuit with the following maximum entity parameter values.

Supply and signal circuit (+ (terminal 1), - (terminal 2)) electronics compartment (single chamber enclosure) and terminal compartment (dual chamber enclosure); only for connection to a certified intrinsically safe circuit, with the following maximum values:
Vmax (Ui) = 30 V; Imax (Ii) = 131 mA; Pi = 983 mW; Ci ≈ 0 nF; Li ≤ 10 µH

Supply and signal circuit (+ (terminal 7), - (terminal 8)) terminal compartment (dual chamber enclosure); only for connection to a certified intrinsically safe circuit, with the following maximum values:
Vmax (Ui) = 30 V; Imax (Ii) = 131 mA; Pi = 901 mW; Ci ≈ 0 nF; Li ≤ 5 µH

Display and adjustment circuit (terminals 5, 6, 7, 8), electronics or plug connection compartment (dual chamber enclosure); only for connection to a certified intrinsically safe circuit, with the following maximum values:
C·cable = 1.98 µF; L·cable = 212 µH

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Model Codes – The equipment is identified with the following model code structure.

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the level transmitter radar sensor (VEGAPULS 64) equipment is designated with the following model code(s).

VEGAPULS PS64.abcdefghijklm, Level Transmitter.

Reference Control Drawing No. 65296 for Entity Parameter values

a = Certification: F or V
b = Approval: C or O
c = Antenna/Material: B, D, F, G, H, I, T or U
de = Process fitting/material: two-digit alphanumeric code for industry recognized type connection with suitable pressure ratings and any type which complies with appropriate international or national standards
f = Seal/process temperature: A, B, C, D, E, F, G, H, I, J, K, L, P, Q, R, S, T, U, V, W or Y
g = Electronics: H
h = Additional electronics: X
i = Housing/protection: 3, 4, 5, 8, A, D, H, S, V or W
j = Cable entry/connection: 1, D, N, Q or Y, or one-digit alphanumeric code for connection or cable gland suitable for the application
k = Display/adjustment module PLICSCOM: A, B, F, K, L or X
l = Additional equipment: 1, 2, V or X
m = Certificates: M or X

* For f = A, B, C, D, E, F, G, H, I, J, K, L, P, Q, R, S, T, U, V, W or Y, reference Operating Instructions No. 65296 manual for maximum permissible ambient temperature and temperature class alignment tables up to T·process = +195 ºC

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In type of protection intrinsically safe apparatus with intrinsically safe process connections, the level transmitter radar sensor (VEGAPULS 69) equipment is designated with the following model code(s).

VEGAPULS PS69.abcdefghijklm, Level Transmitter.

Reference Control Drawing No. 65298 for Entity Parameter values

a = Certification: F or V
b = Approval: C
c = Antenna/Material: B, C, T or U
de = Process fitting/material: two-digit alphanumeric code for industry recognized type connection with suitable pressure ratings and any type which complies with appropriate international or national standards
f = Seal/process temperature: A, B, C, D, E or F, or one-digit alphanumeric code for seal suitable for application including the given process temperature
g = Electronics: H
h = Additional electronics: X or Z
i = Housing/protection: 3, 4, 5, 8, A, D, H, S, V or W
j = Cable entry/connection: 1, D, N or Q, or one-digit alphanumeric code for connection or cable gland suitable for the application
k = Display/adjustment module PLICSCOM: A, B, F, K, L or X
l = Additional equipment: R, V or X
m = Certificates: M or X

* For f = A, B, C, D, E or F, reference Operating Instructions No. 65298 manual for maximum permissible ambient temperature and temperature class alignment tables up to T·process = +195 °C

13. **Specific Conditions of Use:**

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the level transmitter radar sensor (VEGAPULS 64) equipment is designated with the following specific conditions of use.

1. For Division 1, Zone 0, and Zone 1 Approvals, the radar sensors are suitable for process connections to Class I, II and III, Division 1, Groups A, B, C, D, E, F and G and Class I, Zone 0, Group IIC hazardous (classified) locations.
2. Maximum permissible custom cable length is limited by the parameters Co and Lo of the intrinsically safe barrier. Consult the certificate of the intrinsically safe barrier to retrieve the parameters Co and Lo.
3. The equipment is marked for Zone 0/1, and may only be mounted through or form part of the boundary wall to Class I, Zone 0, hazardous (classified) locations when the process pressure is within the range of 0.8...1.1 bar. For other locations, the maximum permissible working pressure is 25 bar (362.5 psig).
4. Dual Seal rating is available only for Housing option type “D”, type “S” and type “W”.
5. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth. The equipment shall be installed and maintained such that hazards caused by electrostatic discharge are excluded.
6. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
7. The level transmitter shall be installed in such a way that contact between the measuring sensor and the tank wall will be excluded with sufficient safety, considering the tank installations and the flow conditions inside the tank.

8. The maximum permitted ambient temperature of the level transmitter is +80 ºC. To avoid the effects of process temperatures and other thermal effects, care shall be taken to ensure the surrounding ambient temperature and the ambient temperature inside the equipment enclosure does not exceed +80 ºC. Adherence to the manufacturer's installation manual must be followed for fulfillment of this requirement.

In type of protection intrinsically safe apparatus with intrinsically safe process connections, the level transmitter radar sensor (VEGAPULS 69) equipment is designated with the following specific conditions of use.

1. For Division 1, Zone 0, and Zone 1 Approvals, the radar sensors are suitable for process connections to Class I, II and III, Division 1, Groups A, B, C, D, E, F and G and Class I, Zone 0, Group IIC hazardous (classified) locations.
2. Maximum permissible custom cable length is limited by the parameters Co and Lo of the intrinsically safe barrier. Consult the certificate of the intrinsically safe barrier to retrieve the parameters Co and Lo.
3. The equipment is marked for Zone 0/1, and may only be mounted through or form part of the boundary wall to Class I, Zone 0, hazardous (classified) locations when the process pressure is within the range of 0.8...1.1 bar. For other locations, the maximum permissible working pressure is 20 bar (290 psig).
4. Dual Seal rating is available only for Housing option type "D", type "S" and type "W".
5. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth. The equipment shall be installed and maintained such that hazards caused by electrostatic discharge are excluded.
6. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
7. The level transmitter shall be installed in such a way that contact between the measuring sensor and the tank wall will be excluded with sufficient safety, considering the tank installations and the flow conditions inside the tank.
8. The maximum permitted ambient temperature of the level transmitter is +80 ºC. To avoid the effects of process temperatures and other thermal effects, care shall be taken to ensure the surrounding ambient temperature and the ambient temperature inside the equipment enclosure does not exceed +80 ºC. Adherence to the manufacturer's installation manual must be followed for fulfillment of this requirement.

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

15. **Schedule Drawings:**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History:**

Details of the supplements to this certificate are described below:

Date	Description
20th May 2021	Original Issue.