Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(1) EU-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

PTB 04 ATEX 4002 **Issue: 6**

(4) Product: Piston pump, type "MEX 0544"

(5) Manufacturer: DÜRR TECHNIK GmbH & Co. KG

(6) Address: Pleidelsheimer Straße 30, 74321 Bietigheim-Bissingen, Germany

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential Test Report PTB Ex 21-40005.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 80079-36:2016, EN 80079-37:2016, EN 16852:2016

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:

Equipment: II 1/2G Ex h IIA T3 Ga/Gb **Protective system: II G IIA**

or **Equipment: II 1/2G Ex h IIB1 T3 Ga/Gb** **Protective system: II G IIB1**

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, March 30, 2021

Dr.-Ing. M. Thedens
Regierungsdirektor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 29

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(13) # SCHEDULE

(14) **EU-Type Examination Certificate Number PTB 04 ATEX 4002, Issue: 6**

(15) Description of Product

The piston pump of type "MEX 0544 xxxx" is provided with integrated flame arresters at their intake and outlet ends and can be used as vacuum pumps for extracting and conveying potentially explosive fuel-vapour/air mixtures of explosion group IIA or IIB1 and temperature class T3. The pump is suited for use as vapour recovery pump in vapour recovery systems for dispensing units of filling stations. As a vapour recovery pump, the "MEX 0544 xxxx" piston pump serves additionally as an autonomous protection system and prevent flames from flashing back into the storage tanks should an ignition occur at the filler nozzle. A separate protection with flame arresters for the vapour recovery pipe inside the dispensing unit of filler stations is therefore not required.

The piston pump uses the wobble piston principle, i.e. connecting rod and piston are rigidly connected. With every full rotation of the shaft, the vapour mixture is drawn into the cylinder at the suction nozzle through the flame arrester and the crank casing as the piston moves down. With every upward movement of the piston, the vapour mixture is compressed in the cylinder and discharged through the flame arrester in the outlet branch into the downstream pipeline.

The suction nozzle and the outlet branch are each provided with an integrated flame arrester of their own. Different designs of flame arresters are applied:

Explosion group IIA

- Flame arresters – in the form of a metal ribbon – consist of a corrugated and a smooth ribbon made from stainless steel. Both ribbons are 10 mm wide and 0.15 mm thick and are rolled up to form tightly packed spiral layers. The vapour/air mixtures can pass through the triangular ducts with a maximum height of 0.7 mm that are thus created, while flashback is to be prevented.
- Flame arresters made of ceramics are provided with circular ducts with a sides length of the ducts is max. 0.60 mm and the minimum overall length of the flame arrester of at least 13 mm, through which a vapor-air mixture can flow, but prevents flame penetration.
- Flame arresters made of ceramics are provided with circular channels with a maximum diameter of 0.55 mm and the minimum overall length of the flame arrester of at least 13 mm, through which a vapor-air mixture can flow, but prevents flame penetration.

Explosion group IIB1:

- The flame arresters – in the form of a metal ribbon – consist of a corrugated and a smooth ribbon made from stainless steel. Both ribbons are 10 mm wide and 0.15 mm thick and are rolled up to form tightly packed spiral layers. The vapour/air mixtures can pass through the triangular ducts with a maximum height of 0.5 mm that are thus created, while flashback is to be prevented.

The piston pump of type "MEX 0544 xxxx" is connected to the driving motor as a block assembly, with a coupling element and a fan provided between the motor shaft and the crankshaft of the pump. The fan ensures that the space between the piston pump and the motor will always be adequately ventilated.

Potentially explosive atmospheres do therefore not have to be expected to occur permanently or for long periods of time at the shaft gap of the piston pump, i.e. the maximum conditions that have to be expected are Zone 1 conditions. Two different designs of the fan and the shaft sealing are applied. Variant 1 (older design) shall only be used for explosion group IIA, whereas variant 2 (new design) may be used for both, explosion group IIA and IIB1.

The piston pump of type "MEX 0544 xxxx" is driven by an explosion-protected motor that complies with equipment group 2G. The following elements can be combined:

- Motor with shaft end on one side, together with one piston pump
- Motor with shaft ends on both sides, together with two piston pumps.

Motors manufactured by the companies Elnor, Rael and Brimo/Daming are applied, whereby only the Elnor motor, which is approved for operation at 60 Hz and a maximum speed of 1800 rpm, can be used for explosion group IIB1.

The following variants are possible:

Motor	Shaft sealing / fan	Flame arrester
Elnor 50 Hz	Type 1	IIA, ceramic or stainless steel
Rael	Type 2	IIA, ceramic or stainless steel
Elnor 50 Hz	Type 2	IIA, ceramic or stainless steel
Elnor DC 24 V	Type 2	IIA, ceramic or stainless steel
Brimo/Daming 5-50 Hz*	Type 2	IIA, ceramic or stainless steel
Elnor 60 Hz	Type 2	IIB1, stainless steel

* In principle, the Brimo / Daming motor is suitable for being operated with a frequency converter. Operation with a frequency converter is not permitted within the scope of this EU-type examination certificate.

The piston pump of type "MEX 0544 xxxx" is rated for pressures between 0.1 bar (abs.) and ambient pressure at the suction end, and for an operating overpressure of 150 mbar at the pressure side. An internal overflow protection ensures that the maximum operating overpressure at the pressure side will not exceed 500 mbar, even if the pipeline should be blocked.

The piston pump of type "MEX 0544 xxxx" is intended for use at ambient temperatures between -40 °C and +60 °C.

Requirements for explosion protection:

Category 1: Internal parts of the piping connections in the suction nozzle and the outlet branch of the "MEX 0544 xxxx" piston pump

Category 2: External parts of the "MEX 0544 xxxx" piston pump (pump casing, driving motor)

(16) Test Report PTB Ex 21-40005

Result: The piston pump of type "MEX 0544 xxxx" meets the requirements of Directive 2014/34/EU for equipment of equipment group II, category 1/2 G, and can be installed and operated as a vapour recovery pump in potentially explosive atmospheres of Zone 1 and can be used for conveying flammable gases and vapours from hazardous areas of Zone 0 (gases and vapours of explosion group IIA or IIB1 and temperature classes T1 to T3 in accordance with ISO 80079-36:2016).

As a vapour recovery pump in dispensing units of filling stations, the piston pump of type "MEX 0544 xxxx" fulfils additionally the function of an autonomous protection system to prevent flashback should potentially explosive vapour/air mixtures of explosion group IIA or IIB1 deflagrate or detonate when igniting at the filler nozzle.

Notes for operation:

The piston pump of type "MEX 0544 xxxx" may be used as a vapour recovery pump for extracting fuel vapour/air mixtures in dispensing units of filling stations. As a vapour recovery pump it also fulfils the function of an autonomous protection system and can be used as flame arrester in vapour recovery systems to prevent flashback should an ignition occur at the filler nozzle. The following maximum hose and pipe lengths are permitted between the filler nozzle and the vacuum pump:

a) Vapour recovery hoseline with an inside diameter ≤ 10 mm in the coaxial hose with a length of ≤ 10 m, or alternatively

b) Coaxial hose with an outside diameter ≤ 38 mm with a length of ≤ 6 m,

in each case together with a downstream pipeline DN 15 ($G^1/_2$) ≤ 3 m.

The tanks mentioned in Test Reports PTB Ex 05-45017 and PTB Ex 05-45027 may in addition be installed in the DN 15 ($G^1/_2$) pipeline between the filler nozzle and the "MEX 0544 xxxx" piston pump at a distance of between 0.3 m and 2.5 m in front of the piston pump. The minimum length of the pipeline between hose and tank shall be 0.5 m.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 04 ATEX 4002, Issue: 6

(17) Specific conditions of use

none

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

According to Article 41 of Directive 2014/34/EU, EC-type examination certificates which have been issued according to Directive 94/9/EC prior to the date of coming into force of Directive 2014/34/EU (April 20, 2016) may be considered as if they were issued already in compliance with Directive 2014/34/EU. By permission of the European Commission supplements to such EC-type examination certificates and new issues of such certificates may continue to hold the original certificate number issued before April 20, 2016.

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. M. Thedens
Regierungsdirektor

Braunschweig, March 30, 2021

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