TRANSLATION

DEKRA Testing and Certification GmbH

Expert Body for Explosion Protection and Plant Safety

Assessment report on the test of the electrostatic properties of two membrane-filter materials "JX243ALU-2-B-C-ECOWEB" and "JX243ALU-2-B-ECOWEB"

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Reference:	19DTC 10664 BVS-MiM

DEKRA Testing and Certification GmbH
Bochum, dated 12.11. 2019

Signed: Hübner

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1. Subject	Two membrane-filters
2. Type/description	JX243ALU-2-B-C-ECOWEB JX243ALU-2-B-ECOWEB
3. Manufacturer/client	JP Air Tech
4. Test documents	- Application of 04.11.2019 - Test specimen as of 30.10.2019
5. Applicable standards	IEC/TS 60079-32-1:2013+AMD1:2017 IEC 60079-32-2:2015 TRGS 727:2016 DIN 54345-1:1992 DIN 54345-5:1985
6. Test equipment	- High-resistance tester Sefelec Teraohmmeter, E2417 ring electrode type C, E2433 strip electrode, E2432 - Thermo-hygrograph Ahlborn Mess- und Regelungstechnik GmbH Almemo 2470-1SRH, E2409

7. Description

The company JP Air Tech, of Sakskøbing, Denmark, submitted two different membrane-filter materials of the type "JX243ALU-2-B-C-ECOWEB" and "JX243ALU-2-B-ECOWEB" for a test and assessment of their electrostatic properties, regarding the use in hazardous areas, where explosive atmospheres are present.

8. Assessment

Resistance and charge transfer measurements were conducted, to make statements on the electrostatic chargeability. For those tests, the specimen have been stored at the testing conditions of a temperature of (23 ± 2) °C and relative humidity of (25 - 30) % for at least 24 hours and were then tested at the same conditions.

8.1 Resistance measurements

The filter material of type "JX243ALU-2-B-C-ECOWEB" and "JX243ALU-2-B-ECOWEB" were examined according to DIN 54345-1 and DIN 54345-5 by applying a measuring voltage of 1000 V, unless stated differently, to assess the electrostatic chargeability. Tests applying an adjusted measuring voltage were carried out, if the high voltage and the low resistance led to current values, lying outside the measuring range of the measuring equipment or if the risk of damaging the equipment was too high.

Test according to DIN 54345-1 and DIN 54345-5

DIN 54345-1: Surface resistance R_S (geometric median of four measurement values each):

Filter material	R_S front	R_S rear
JX243ALU-2-B-C-ECOWEB	**~ 2 x 10^2 Ω; 1 V**	**~ 2x 10^2 Ω; 1 V**
JX243ALU-2-B-ECOWEB	**~ 2 x 10^2 Ω; 1 V**	**~ 2x 10^2 Ω; 1 V**

According to IEC/TS 60079-32-1, the surface resistance value has to be **< 10^4 Ω** for **conductive** filter materials. TRGS 727 distinguishes between **conductive** filter materials with a surface resistance value of **≤ 10^4 Ω** and **dissipative** filter materials, with a surface resistance value of **≤ 10^8 Ω.**

The membrane filter materials "JX243ALU-2-B-C-ECOWEB" and "JX243ALU-2-B-ECOWEB" can therefore be classified as **conductive,** in accordance with both regulations.

DIN 54345-1: Volume resistance R_V (geometric median of four values, each):

Filter material	**Volume resistance R_V**
JX243ALU-2-B-C-ECOWEB	**> 10^{12} Ω.; Sparkover voltage at 1000 V**
JX243ALU-2-B-ECOWEB	**> 10^{12} Ω.; Sparkover voltage at 1000 V**

During the measurement, a sparkover voltage at 1000 V has been detected. Lower applied voltages result in insulating contact resistance of **> 10^{12} Ω.**. Therefore it is important to ensure that the membrane filter sheets are **permanently and safely** integrated into the operational equipotential bonding **from both sides** of the filter material.

DIN 54345-5: Strip resistance R_{st} in longitudinal and transversal directions (arithmetic mean of four samples) resulting in:

Filter material	**Longitudinal R_{ST}**	**Transversal R_{ST}**
JX243ALU-2-B-C-ECOWEB	**~ 2 x 10^2 Ω; 1 V**	**~ 2 x 10^2 Ω; 1 V**
JX243ALU-2-B-ECOWEB	**~ 2 x 10^2 Ω; 1 V**	**~ 2 x 10^2 Ω; 1 V**

The measured values of the strip resistances show that possible charges can be **dissipated** along the individual membrane filter material.

According to IEC/TS 60079-32-1, only earthed, conductive filter materials are to be used in potentially explosive gas atmospheres. If hybrid mixtures are present only earthed, conductive and dissipative filter materials with permanent contact to earth are to be used, according to TRGS 727.

In accordance with IEC/TS 60079-32-1 only earthed, conductive filter materials are to be used in dust explosion hazardous areas with conductive dusts of dust explosion group IIIC with a minimum ignition energy < 30 mJ or with metallic dusts, with a minimum ignition energy < 30 mJ

In dust explosion hazardous areas with conductive dusts of dust explosion group IIIC or with dusts with a minimum ignition energy (MIE) ≤ 3 mJ according to TRGS 727, only earthed, conductive filter materials, as well as conductive filter materials with ground contact, are to be used.

Accordingly, due to their conductive properties, both membrane filter materials can be used **without any restrictions** in gas and dust explosion hazardous areas in accordance with both regulations.

9. Evaluation

The membrane filter materials of type "JX243ALU-2-B-ECOWEB" and "JX243ALU-2-B-C-ECOWE" fulfil the requirements for conductive filter materials of the IEC/TS 60079-32-1 and TRGS 727 standards. Therefore both membrane filters can be used in areas with gas and dust explosion hazards without any restrictions, **if both sides** of the filter materials are earthed.

Assuming that both membrane filter materials are **permanently and safely** integrated into the operational equipotential bonding **from both sides** of the filter material ensuring an earth leakage resistance of **< 10^6 Ω.**, they can be used in zones 0, 1 and 2 with gas explosion groups IIA, IIB and IIC and in zones 20, 21 and 22 with dust explosion groups IIIA, IIIB and IIIC.

Note:
If these assessed material properties are ensured for each product supplied and if, simultaneously, these properties are also permanently ensured by the operational use, then there are no objections against the use of the earthed materials in the hazardous areas mentioned above as far as their electrostatic properties are concerned and the restrictions stated are observed. This statement only applies on the condition that the products manufactured comply with the test specimen. Whether the compliance of the products manufactured with the test specimen is observed by the manufacturer is not monitored by DEKRA Testing and Certification GmbH.

In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, Germany, 12.11.2019

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