VYRTYCH

VYRTYCH a.s.
Židněves 116
294 06 Březno
Česká republika

IČO: 278 62 470
DIČ: CZ27862470

CONFORMITY DECLARATION

We, VYRTYCH a.s. on base of tests provided by Accredited testing laboratory No 1206 for physical factors of State Health Institute hereby declare the conformity with norm

ČSN EN ISO 14644-1

Clean rooms and corresponded controlled areas – Classification of air cleanness according to particles concentration for LUMINAIRES series:

BORDER-N-LED-M598, BORDER-N-LED-M600, BORDER-N-LED-M623, BORDER-N-LED-625/PB

meets the requirements for clean areas

CLASS 4, 5, 6, 7, 8 and 9

according to above mentioned norm

ISO Classification number (n)	Maximum concentration limits (particles/m3 of air) for particles equal to and larger than the considered snes shown below					
	0,1µm	0,2µm	0,3µm	0,5µm	1µm	5µm
ISO Class 1	10	2				
ISO Class 2	100	24	10	4		
ISO Class 3	1000	237	102	35	8	
ISO Class 4	10000	2370	1020	352	83	
ISO Class 5	100000	23700	10200	3520	832	29
ISO Class 6	1000000	237000	102000	35200	8320	293
ISO Class 7				352000	83200	2930
ISO Class 8				3520000	832000	29300
ISO Class 9				35200000	8320000	293000

Supplement :
Accredited testing report No 1.6./ČP/22/19 – MEASUREMENT OF SOLID VAPOUR PARTICLES NUMBER

VYRTYCH a.s., Židněves 116
294 06 Březno, Česká republika
IČO: 27862470, DIČ: CZ27862470

Petr Beneš
Head of technical department

Židněves, 01.09.2023

Test Report No. 1.6/ČP/22/19
Measurement of the number of particles of determinate aerosol in air

Expertise No.:	EX 221361, SZÚ/15078/2022
Costumer:	VYRTYCH a. s., Židněves 116, 294 06 Březno
Date of measurement:	3. – 4.11.2022
Reason of measurement:	**Verification of luminaires for clean rooms** – Manufacturer VYRTYCH a.s.
Place of measurement:	Operating room Klinika Dr. Pírka, Mladá Boleslav
Measurement performed by:	Ing. Z. Mathauserová, J. Kořízková - NIPH

Test method and evaluation

The test method of measuring dustiness in clean rooms was used, i. e. determining of the number of solid aerosol particles with dimensions ≥ 0,5 μm and ≥ 5,0μm accordance to Annex B of ČSN EN ISO 14644-1:2019 Cleanrooms and associated controlled environments - Part 1: Classification of air cleanliness by particle concentration and accordance to the document of the Laboratory for Physical Factors – SOP No.2/1.6 Determination of cleanliness classes defined cleanroom.
One measurement (one data reading on the measuring device) is a two-minute sampling of air at an air flow through a particle counter of 1ft^3 / min - the results are converted to a volume of 1 m^3 of air according to the requirements of the standard
A clean room without installed item-by-item luminaires was monitored, after verifying the cleanliness class of the operating room, luminaires *FILA-N-LED-2,21-OP-10000-236-4K, NORD-N-LED-CG-5100-236-G2-4K, NORD-N-LED-OPG-10000-236-G2-4K, BORDER-N-LED-SQ-OP-7000-4K, ODIS-LED-SQ-OP-7600-4K, HOOVER/3-LED-SQ-MP-7100-4K, HOOVER/3-LED-SQ-GLM-7100-4K, HOOVER4-LED-SQ-OP-6100-4K, HOOVER4-LED-SQ-MP-6100-4K, HOOVER4-LED-SQ-GLM-6100-4K,HOUND/3-MAG-LED-SQ-GLM-5100-4K, HOUND4-MAG-LED-SQ-GLM-5300-4K*were placed and turned on. After an hour of operation of the luminaires, repeated measurement of the number of particles of determinate aerosol in air was performed - the conclusion follows from the comparison of the obtained data.

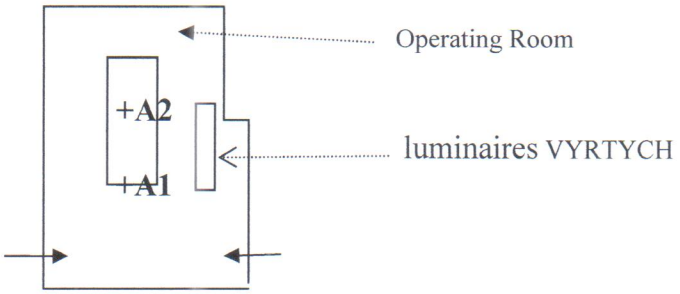
Used equipment:

Particle counter - CI-200 model, serial No. 034316, CC No. 6014-KL-C0067-21 from 23. 11. 2021, which determines and registers numbers of dust particles in 6 dimension intervals from 0,2 to 10 μm.

Place of measurement was a clean room of the operating room with a verified cleanliness class 5 under the laminar air supply (except for the laminar cleanliness class 4/5) according to ČSN EN ISO 14644-1. The measurement took place "at rest ", i.e. without no personnel present in the room.

Measurement results:

In Tab. 1 are the requirements for a clean room of cleanliness class 4 and 5 according to ČSN EN ISO 14644-1, Tab. 2 - 5 shows the measured values of the number of particles of determinate aerosol.



Scheme measurement

Tab. 1: Requirements for cleanliness air according to ČSN EN ISO 14644-1 and Decree No. 84/2008 Coll.

Cleanliness classes of air (at rest)	Number of particles **in 1m^3** of air	
	≥ 0,5 μm	≥ 5,0 μm
4	**352**	**-**
5	**3 520**	**29**

Tab. 2: Measured values of the number of solid aerosol particles in the operating field where the luminaires *FILA-N-LED-2,21-OP-10000-236-4K, NORD-N-LED-CG-5100-236-G2-4K, NORD-N-LED-OPG-10000-236-G2-4K* were placed (3.11.2022).

Before installing the luminaire A1		Before installing the luminaire A2		After installing the luminaire A1		After installing the luminaire A2	
Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger	
0,5 μm	5,0 μm	0,5 μm	5,0 μm	0,5 μm	5,0 μm	0,5 μm	5,0 μm
4	0	6	1	3	0	4	1
5	1	8	1	3	0	4	1
4	0	2	0	6	0	6	1
3	0	2	0	4	0	2	0
4	1	4	1	3	1	3	0
4	**0**	**4**	**1**	**4**	**0**	**4**	**1**
Number of particles in **1 m^3**		Number of particles in **1 m^3**		Number of particles in **1 m^3**		Number of particles in **1 m^3**	
141	**14**	**145**	**21**	**125**	**10**	**125**	**21**

Note: Due to the very low measured values and the nature of test, uncertainty of measurement was not determined.

Tab. 3: Measured values of the number of solid aerosol particles in the operating field where the luminaires *BORDER-N-LED-SQ-OP-7000-4K, ODIS-LED-SQ-OP-7600-4K, HOOVER/3-LED-SQ-MP-7100-4K* were placed (3.11.2022).

Before installing the luminaire				After installing the luminaire			
A1		A2		A1		A2	
Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger	
0,5 µm	5,0 µm	0,5 µm	5,0 µm	0,5 µm	5,0 µm	0,5 µm	5,0 µm
5	0	8	1	3	0	4	0
6	1	6	0	3	0	7	2
4	0	2	0	1	0	7	1
3	0	4	2	4	0	3	0
5	1	3	0	8	1	2	0
5	**0**	**5**	**1**	**5**	**0**	**5**	**1**
Number of particles in **1 m^3**		Number of particles in **1 m^3**		Number of particles in **1 m^3**		Number of particles in **1 m^3**	
171	**14**	**153**	**21**	**171**	**10**	**153**	**21**

Note: Due to the very low measured values and the nature of test, uncertainty of measurement was not determined.

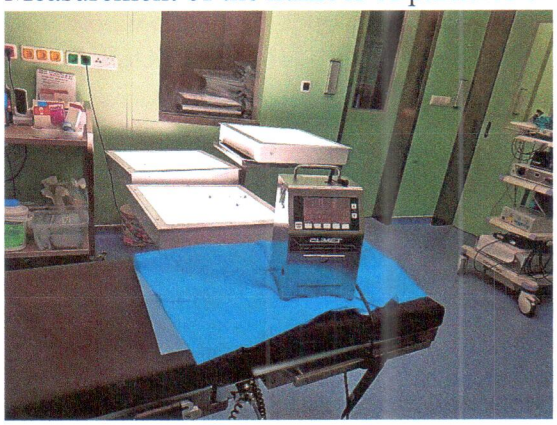
Tab. 4: Measured values of the number of solid aerosol particles in the operating field where the luminaires *HOOVER/3-LED-SQ-GLM-7100-4K, HOOVER4-LED-SQ-OP-6100-4K, HOOVER4-LED-SQ-MP-6100-4K* were placed (4.11.2022).

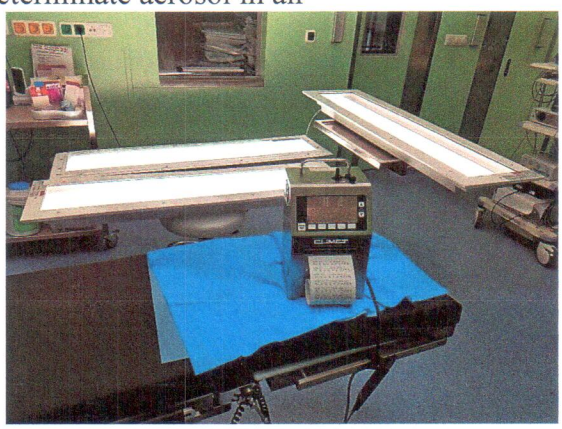
Before installing the luminaire				After installing the luminaire			
A1		A2		A1		A2	
Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger	
0,5 µm	5,0 µm	0,5 µm	5,0 µm	0,5 µm	5,0 µm	0,5 µm	5,0 µm
6	0	2	0	3	0	4	0
4	1	3	0	3	0	2	1
2	0	2	0	2	0	2	1
3	0	3	0	4	0	3	0
5	0	2	1	6	1	3	0
4	**0**	**2**	**0**	**4**	**0**	**3**	**0**
Number of particles in **1 m^3**		Number of particles in **1 m^3**		Number of particles in **1 m^3**		Number of particles in **1 m^3**	
141	**7**	**85**	**7**	**128**	**10**	**99**	**14**

Tab. 5: Measured values of the number of solid aerosol particles in the operating field where the luminaires *HOOVER4-LED-SQ-GLM-6100-4K, HOUND/3-MAG-LED-SQ-GLM-5100-4K, HOUND4-MAG-LED-SQ-GLM-5300-4K* were placed (4.11.2022).

Before installing the luminaire				After installing the luminaire			
A1		A2		A1		A2	
Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger		Number of particles **in 1ft^3** of size and larger	
0,5 µm	5,0 µm	0,5 µm	5,0 µm	0,5 µm	5,0 µm	0,5 µm	5,0 µm
4	0	7	1	3	1	4	0
6	1	2	1	3	0	6	0
2	0	5	0	1	0	6	2
3	0	1	0	4	0	2	0
5	1	4	1	6	1	3	1
5	**0**	**4**	**1**	**3**	**0**	**4**	**1**
Number of particles in **1 m^3**		Number of particles in **1 m^3**		Number of particles in **1 m^3**		Number of particles in **1 m^3**	
171	**14**	**138**	**21**	**113**	**14**	**148**	**21**

Measurement of the number of particles of determinate aerosol in air





The Laboratory declares that all results apply to the given measurements only. This report shall not by reproduced, except in full, without the written approval of the technical head of laboratory.

Date: 8. 12. 2022

Prepared by and approved: Ing. Z. Mathauserová
Technical head of Laboratory

END OF TEST REPORT

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Center for occupational hygiene and occupational medicine
National Reference Laboratory for Dust and Microclimate in the work environment

Statement on the Test Report No. 1.6/MKL/22/19

Measurement of the number of particles of determinate aerosol in air for the purpose of verification of luminaires manufactured by VYRTYCH a.s. for clean rooms

Expertise No.: EX 221361, SZÚ/15078/2022
Date of measurement: 3. – 4. 12. 2022

CONCLUSION

Installed luminaires FILA-N-LED-2,21-OP-10000-236-4K, NORD-N-LED-CG-5100-236-G2-4K, NORD-N-LED-OPG-10000-236-G2-4K, BORDER-N-LED-SQ-OP-7000-4K, ODIS-LED-SQ-OP-7600-4K, HOOVER/3-LED-SQ-MP-7100-4K, HOOVER/3-LED-SQ-GLM-7100-4K, HOOVER4-LED-SQ-OP-6100-4K, HOOVER4-LED-SQ-MP-6100-4K, HOOVER4-LED-SQ-GLM-6100-4K, HOUND/3-MAG-LED-SQ-GLM-5100-4K, HOUND4-MAG-LED-SQ-GLM-5300-4K were not a source of pollution of clean room, during their operation did not release any solid aerosol particles into the clean room air. Due to its identical construction, used materials and the installation procedure into the ceiling of the clean room are recessed luminaires of the entire product type FILA-N-LED, NORD-N-LED, BORDER-N-LED, HOOVER/3-LED, HOOVER4-LED, HOUND/3-MAG-LED, HOUND4-MAG-LED, ODIS-LED suitable for use in all types of clean rooms.

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8. 12. 2022

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