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**TESTED[®]
DEVICE**

THOMAS CABLE Co., Ltd.
THOMFLEX-CLEANROOM C
Report No. TH 1312-682

DUPLICATE

Statement of
Qualification

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Customer: THOMAS CABLE Co., Ltd.
20-4, Yeochon-Ri
Ochang-Myun, Cheongwon-Kun
Chungbuk 363-884
South Korea

Component tested:

Category: Energy Supply
Subcategory: Cable Systems
Type: THOMFLEX-CLEANROOM C series (black)
• TP 04: 2 x 0.25 mm² (Manufacturing date: 07/22/2013)
• TP 05: 4 x 1.5 mm² (Manufacturing date: 07/22/2013)
• TP 06: 4 x 4.0 mm² (Manufacturing date: 07/22/2013)

Random check measurements of particle emission (airborne) at representative points

Test procedure: According to VDI 2083-9.1, ISO 14644-1
Each standard stated refers to the version valid at the time of testing.

Measuring instruments: Optical Particle Counter:
Model LasAir II 110 with measuring channels of $\geq 0.1 \mu\text{m}$, $\geq 0.2 \mu\text{m}$,
 $\geq 0.3 \mu\text{m}$, $\geq 0.5 \mu\text{m}$, $\geq 1.0 \mu\text{m}$ and $\geq 5.0 \mu\text{m}$

Test parameters of the test environment:

- Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1
- Air flow velocity:..... 0.45 m/s
- Air flow guidance:vertical unidirectional air flow
- Temperature:22 °C \pm 0.5 °C (71.6 °F \pm 0.9 °F)
- Relative humidity: 45 % \pm 5 %

Test parameters of the test execution:

- Energy chain: igus E61.29.50.075.0
- Chain bending radius: r=75 mm
- Stroke length:..... s=820 mm
- Cable length TP 04: l=835 mm
- Cable length TP 05: l=830 mm
- Cable length TP 06: l=835 mm
- Parameter set 1: $v_1=0.5 \text{ m/s}$; $a_1=1.0 \text{ m/s}^2$
- Parameter set 2: $v_2=1.0 \text{ m/s}$; $a_2=2.0 \text{ m/s}^2$
- Parameter set 3: $v_3=2.0 \text{ m/s}$; $a_3=4.0 \text{ m/s}^2$

Test results / Classification:
(according to ISO 14644-1)

The THOMFLEX-CLEANROOM C series is suitable for use in cleanrooms fulfilling the following Air Cleanliness Class:

Parameters	Air Cleanliness Class
$v_1=0.5 \text{ m/s}$; $a_1=1.0 \text{ m/s}^2$	ISO 3
$v_2=1.0 \text{ m/s}$; $a_2=2.0 \text{ m/s}^2$	ISO 1
$v_3=2.0 \text{ m/s}$; $a_3=4.0 \text{ m/s}^2$	ISO 1
Overall result	ISO 3

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The measuring equipment used for the qualification is regularly calibrated and is based on national and international standards. In the case where no national standards exist, the measuring procedure used corresponds with technical regulations and norms valid at the time of the measurement. The documents drawn up for this procedure are available for viewing.

The validity of this certificate applies only to the mentioned product in this particular condition for a duration of 5 years.
Further information: www.tested-device.com.

Fraunhofer Institute for
Manufacturing Engineering and Automation IPA

Department Ultraclean Technology
and Micromanufacturing

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Stuttgart, February 11, 2014
Place, Date

[Signature]
i.A. Project manager