



# Fraunhofer

## TESTED<sup>®</sup> DEVICE

RK Rose+Krieger GmbH  
RK DuoLine R60  
**Report No. RK 1404-704**

DUPLICATE

Statement of  
Qualification

Particle Emission

# Statement of Qualification

**Customer:** RK Rose+Krieger GmbH  
 Potsdamer Strasse 9  
 32375 Minden  
 Germany

**Component tested**

Category: Automation Components

Subcategory: Linear Units

Product name: DuoLine R60  
 (article number: TD17A5T1A11A02069; manufacturing date: CW 43/2014;  
 stroke: 1780mm)

**Test result / Classification:**  
 (in acc. with ISO 14644-1)

When operated without an extraction system, the linear unit RK DuoLine R60 (TD17A5T1A11A02069) is suitable for use in cleanrooms fulfilling the following air cleanliness specifications according to ISO 14644-1:

| Parameter                                       | Air Cleanliness Class |
|---|-----------------------|
| $v_1 = 0.25 \text{ m/s}; a = 4.0 \text{ m/s}^2$ | ISO 6                 |
| $v_2 = 0.5 \text{ m/s}; a = 4.0 \text{ m/s}^2$  | ISO 6                 |
| $v_3 = 1.0 \text{ m/s}; a = 4.0 \text{ m/s}^2$  | ISO 6                 |
| <b>Overall result</b>                           | <b>ISO 6</b>          |

## Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines: VDI 2083-9.1; ISO 14644-1  
 The norms stated refer to the relevant editions applicable at the time of the tests.

Test devices: Optical particle counter:  
 LasAir II 110 with measuring ranges  $\geq 0.1 \mu\text{m}$ ,  $\geq 0.2 \mu\text{m}$ ,  $\geq 0.3 \mu\text{m}$ ,  $\geq 0.5 \mu\text{m}$ ,  $\geq 1.0 \mu\text{m}$  und  $\geq 5.0 \mu\text{m}$

Test environment parameters:

- Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1
- Airflow velocity:..... 0.45 m/s
- Airflow pattern:.....vertical laminar flow
- Temperature:.....  $22^\circ\text{C} \pm 0.5^\circ\text{C}$
- Relative humidity:.....  $45\% \pm 5\%$

Test procedure parameters:

- Extraction:.....none
- Installation position:.....vertical
- Power unit:..... indirect, with RK DuoLine Z60 Clean
- Travelling distance:.....s = 1700mm
- Velocities:..... $v_1 = 0.25 \text{ m/s}; v_2 = 0.5 \text{ m/s}; v_3 = 1.0 \text{ m/s}$
- Acceleration:.....a =  $4.0 \text{ m/s}^2$

The measuring devices used for the qualification tests are calibrated at regular intervals; their results can be traced back to national and international standards. In cases where no national standards exist, the test procedure implemented complies with the technical regulations and norms applicable at the time of the test. The relevant documentation can be viewed on request at any time.

For further information about the test environment and parameters, please refer to the Fraunhofer IPA test report.

Fraunhofer Institute for  
 Manufacturing Engineering and Automation IPA

Stuttgart, March 4, 2015

Place, date of first document issued

Department of Ultraclean Technology  
 and Micromanufacturing

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 Place, current date

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