



Fraunhofer

**TESTED[®]
DEVICE**

edding International GmbH
e-8011 black/blue/red
Report No. ED 1001-504

DUPLICATE

Statement of
Qualification

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Customer: edding International GmbH
Bookkoppel 7
22926 Ahrensburg
Germany

Component tested: Cleanroom marker

Type: edding 8011 cleanroom marker (black/blue/red)

Tests performed:

- 1) Random check measurements of particle emission (airborne) at representative points
- 2) Outgassing behaviour
- 3) Surface cleanability regarding particles
- 4) Chemical resistance

Test parameters:

- 1) Writing velocity: 6,6 m/min
Paper feed: 75 mm/min
Writing angle: 70°
Load: 70 g
Foil: PP
Rotation around the straight axle
- 2) Assessment of the outgassing behaviour relative to total volatile organic compounds (TVOC) at 23 °C
- 3) Application of fluorescent testing contamination, following cleaning via ultrasonic bath
Cleaning agent ElmaClean EC 100 (5 %); duration 15s
- 4) Chemicals: isopropanol (100 %), sulphuric acid (5 %), formalin (37 %), hydrogen peroxide (30 %) and ammonia (25 %)
Incubation time: 1 h, 3 h, 6 h and 24 h (immersion in liquids)

Test results / classification:

1) Particle emission

Test piece	Air Cleanliness Class (in accordance to ISO 14644-1)
black	2
blue	3
red	3

2) Outgassing

Test piece	Specific outgassing rate TVOC 23 °C SER [g/units*s]
black	1.1 x 10 ⁻⁸
blue	3.1 x 10 ⁻⁸
red	2.6 x 10 ⁻⁸

3) Surface cleanability
No traces of test contamination were detected on the cleanroom marker after cleaning. Due to the size range of the fluorescing particles between 1 µm and 20 µm, it can be assumed that the test piece can be cleaned highly effective using the cleaning procedure described.

4) Chemical resistance
On exposure to the representative reagents mentioned, the test piece showed to have a very good chemical resistance.

Standards / guidelines used for the qualification:

- 1) VDI 2083 Part 1, 4 and 9.1; ISO 14644-1
- 2) ISO 16000-6,-9,-11; DIN 38406-5
- 3) VDI 2083 Part 9.1
- 4) ISO 2812-1; ISO 4628-1, -6

Test parameters of the cleanroom environment:

Cleanroom of Air Cleanliness Class ISO Class 1 (according to ISO 14644-1)

Air flow velocity: 0.45 m/s

Air flow guidance: vertical unidirectional air flow from ceiling to floor (raised floor)

Temperature: 22 °C ± 0.5 °C (71.6 °F ± 0.9 °F)

Relative humidity: 45 % ± 5 %

Test chamber: 1 l inert glas jar
GC/MS: Perkin Elmer Clarus 600
TD: Perkin Elmer ATD 650

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.


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Stuttgart, April 8, 2010

Place, date

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Project manager