



# Fraunhofer

## TESTED<sup>®</sup> DEVICE

WERMA Signaltechnik  
eSIGN

**Report No. WE 2309-1457**

DUPLICATE

Statement of  
Qualification

Product series  
**Particle Emission**

Customer	WERMA Signaltechnik GmbH + Co. KG Dürbheimer Strasse 15 78604 Rietheim-Weilheim Germany
Component tested	
Category:	Working Place and Operator
Subcategory:	Equipment Parts
Product name:	eSIGN Tested Products: <ul style="list-style-type: none"><li>• eSIGN 9 Segments - floor mounting (manufacturing date: 4/25/2023)</li><li>• eSIGN 9 Segments – wall mounting (manufacturing date: 4/25/2023)</li><li>• eSIGN 9 Segments - pipe mounting (manufacturing date: 4/25/2023)</li><li>• eSIGN IO-Link 9 Segments with siren – floor mounting (manufacturing date: 6/16/2023)</li><li>• eSIGN 15 Segments – floor mounting (manufacturing date: 4/6/2023)</li><li>• eSIGN IO-Link 15 Segments with siren – floor mounting (manufacturing date: 6/16/2023)</li><li>• eSIGN IO-Link 15 Segments with siren – wall mounting (manufacturing date: 6/16/2023)</li><li>• eSIGN IO-Link 15 Segments with siren – pipe mounting (manufacturing date: 6/16/2023)</li><li>• eSIGN IO-Link 15 Segments with siren WH – floor mounting (manufacturing date: 7/17/2023)</li></ul>


Random sampling of particle emissions (airborne) at representative sites

Standards/Guidelines:	ISO 14644-1, -14 The norms stated generally refer to the version valid at the time of the tests.
Test devices:	Optical particle counter: LasAir II 110 and LasAir III 110 with measuring ranges $\geq 0.1\text{ }\mu\text{m}$ , $\geq 0.2\text{ }\mu\text{m}$ , $\geq 0.3\text{ }\mu\text{m}$ , $\geq 0.5\text{ }\mu\text{m}$ , $\geq 1.0\text{ }\mu\text{m}$ and $\geq 5.0\text{ }\mu\text{m}$
Test environment parameters:	<ul style="list-style-type: none"><li>• Cleanroom Air Cleanliness Class (according to ISO 14644-1):..... ISO 1</li><li>• Airflow velocity:.....0.45 m/s</li><li>• Airflow pattern:..... vertical laminar flow</li><li>• Temperature: .....22 °C <math>\pm</math> 0.5 °C</li><li>• Relative humidity: ..... 45 % <math>\pm</math> 5 %</li></ul>
Test procedure parameters:	<ul style="list-style-type: none"><li>• Structure-borne noise: ..... approx. 50 Hz</li><li>• Key: ..... 2 (900 Hz, permanent)</li><li>• Volume: .....85 dB (A)</li><li>• Installation position 1: ..... hanging on clean room ceiling element</li><li>• Installation position 2: .....standing on clean room ceiling element</li></ul>

Test result / Classification	When operated under the specified test conditions, the signaltower series eSIGN is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1:								
	<table><tr><th>Test parameter(s)</th><th>Air Cleanlines Class</th></tr><tr><td>Installation position: hanging Structure-borne noise: 50 Hz</td><td>2</td></tr><tr><td>Installation position: standing Structure-borne noise: 50 Hz</td><td>2</td></tr><tr><td>Overall result</td><td>2</td></tr></table>	Test parameter(s)	Air Cleanlines Class	Installation position: hanging Structure-borne noise: 50 Hz	2	Installation position: standing Structure-borne noise: 50 Hz	2	Overall result	2
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Overall result	2								
	Please note: Transport damages, incorrect installation, aging behavior, etc. can influence the test result.								

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.

Detailed information and parameters of the test environment can be found in the Fraunhofer IPA test report.

Fraunhofer Institute for Manufacturing Engineering and Automation IPA	WE 2309-1457 Report No. first document	Stuttgart, October 18, 2023 Place, date of first document issued
Department of Ultraclean Technology and Micromanufacturing	-- Report No. current document	-- Place, current date
Nobelstrasse 12 70569 Stuttgart Germany	on behalf of Dr.-Ing. Frank Bürger, Project Manager Fraunhofer IPA	

This document only applies to the named product in its original state and is valid for a period of 5 years from the date the first document was issued. The document can be verified under [www.tested-device.com](http://www.tested-device.com).