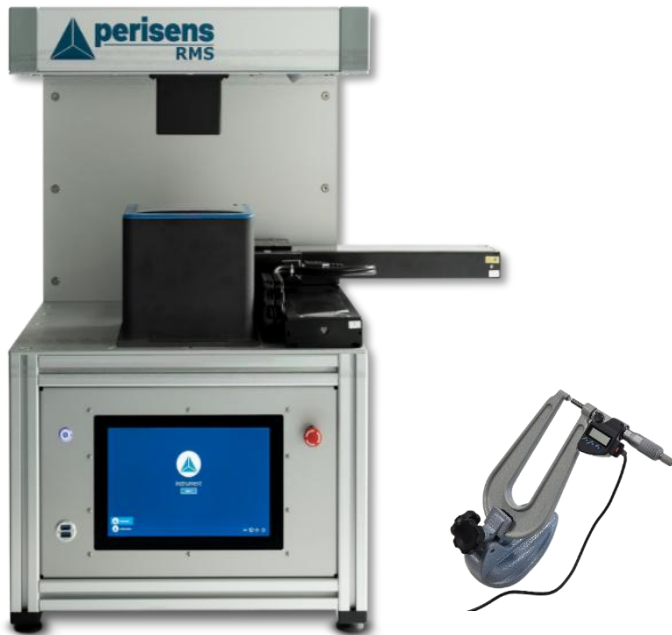


RMS MATERIAL CHARACTERIZATION SAMPLE REQUIREMENTS

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Measurement Setup



Measurement devices

- ▲ RMS-D-77|79G, perisens
 - ▲ Measurement frequency
76 to 81GHz
 - ▲ One-way transmission measurement
in **amplitude** and **phase** (S21)
at 76 to 81 GHz
 - ▲ Material characterization
calculation of **relative permittivity** and **loss tangent**
from thickness and transmission
at **76.5 GHz** (if not agreed otherwise)
- ▲ Micrometer screw
 - ▲ Total thickness measurement with
about $\pm 5 \mu\text{m}$ accuracy
 - ▲ **Coating thickness must be provided by the customer**
with $\pm 1 \mu\text{m}$ accuracy or better

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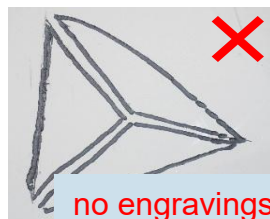
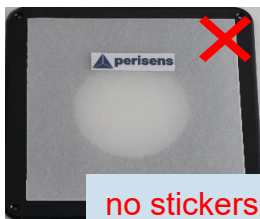
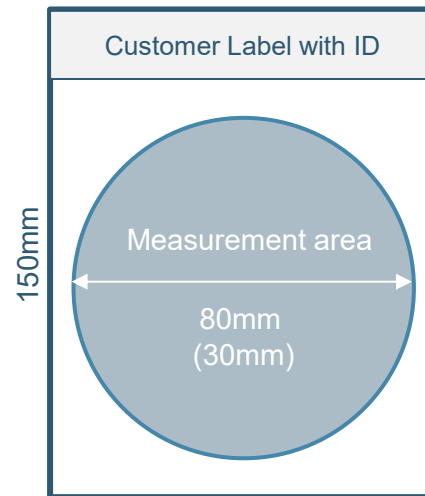
General Sample Requirements

- ▲ Measurement requires **flat sample** of min. 85 x 85 mm² size
(with reduced accuracy min. 35 x 35 mm²)
- ▲ Circular measurement area with a diameter of 80 mm
(with reduced accuracy with a diameter of 30 mm)
- ▲ Requirement of the **measurement area**
 - ▲ Thickness tolerance of $\pm 50 \mu\text{m}$ or better
 - ▲ Free of structures and contours
 - ▲ Free of engravings and scratches
 - ▲ Free of markings, labels and stickers

(please use printed labels outside the measurement area and if possible, not handwritten)

Sample example

100mm



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Requirements for Multilayer Samples (e.g. Coatings)

- ▲ **One Measurement** allows to characterize **one point** on the material
- ▲ For **multi-layer samples (coated samples)**, all material properties except of one must be known.
e.g., for the characterization of a coating on a substrate, the permittivity and loss tangent of the substrate must be known or measured in a separate measurement with pure substrate.
- ▲ For paint characterization the following samples must be measured
 - ▲ Pure substrate → to characterize the substrate
 - ▲ Substrate + primer → to characterize the primer
 - ▲ Substrate + clear coat → to characterize the clear coat
 - ▲ Substrate + base coat + clear coat → to characterize the base coat
- ⚠ The base coat should always be characterized with clear coat as the clear coat affects the properties of the base coat!
- ⚠ A primer should not be used (unless it is necessary for adhesion reasons) for the characterization of clear and base coat as it adds additional inaccuracies.

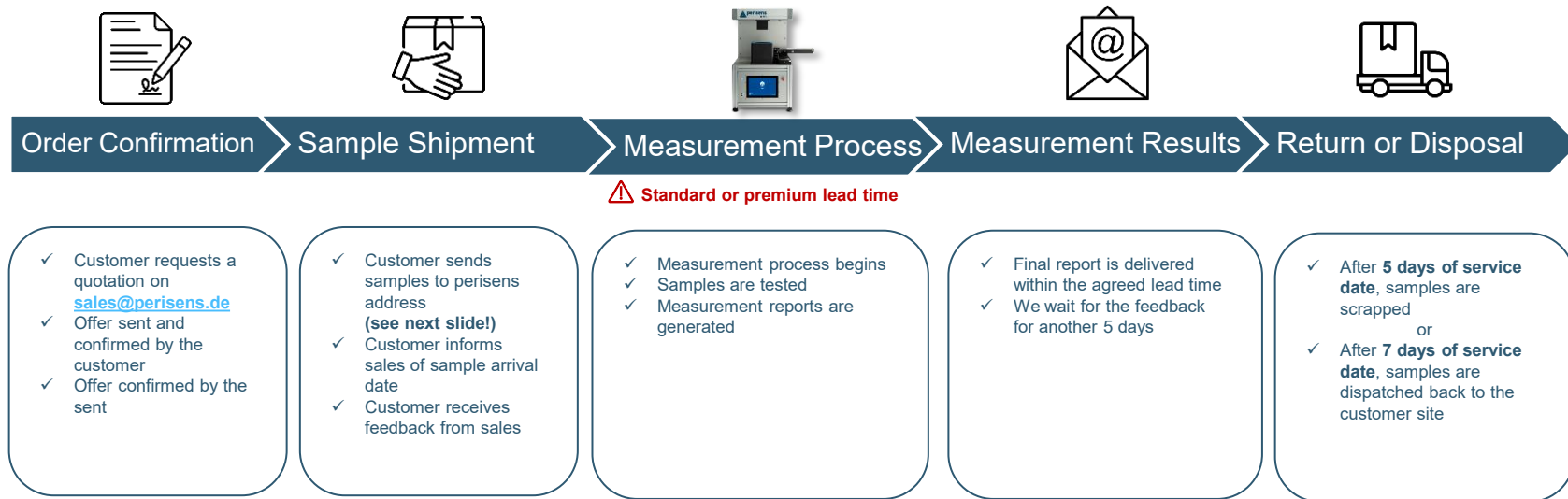
Thickness and Measurement Recommendations

- ▲ Thickness of coatings must be provided by customer
(Note: perisens can only measure the total thickness of the sample using a micrometer screw!)
- ▲ We recommend to measure the paint thickness by a microscope using a microtome and the substrate thickness with a micrometer screw
- ▲ The thickness values can be provided before the measurement or after return of the samples
(after return of the samples allows to measure the thickness destructively at the center of the sample)
- ▲ Please use perisens xls file (download [here](#)) to provide thickness data of coatings.

RMS Measurement Template									
Company:		Date:		Editor:		Email:			
Dear Customer, thank you for ordering measurements with our Radome Measurement System (RMS). Please help us to standarize the process and fill the following table as far as designations and thicknesses of your samples under test are known. We will measure the total thickness of the samples. Therefore maximum one thickness value of the total layer stack can remain unkown. Please specifiy the thickness in μm accuracy. If thickness values for different layers are not filled in or the layer to be determined is not selected, we will calculate the effective permittivity of the total layer stack.									
#	designation of				thickness in μm				
	1st layer	2nd layer	3rd layer	4th layer	1st layer	2nd layer	3rd layer		
	thickness	+- tolerance	thickness	+- tolerance	thickness	+- tolerance	thickness	+- tolerance	
example 1	sabic 1234		primer1234		base_coat 1234		clear_coat 1234		
example 2	sabic xyz								
1									
2									

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Measurement Process Workflow

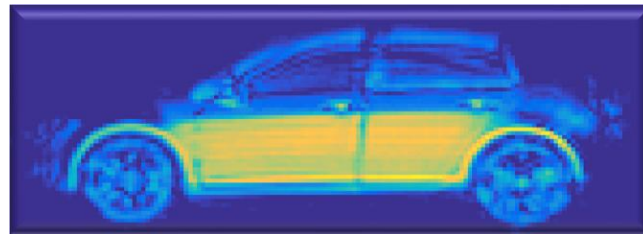


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Photography, Nikon
380 – 780nm Wavelength

1:18 Model



Imaging Radar, perisens
3.9 – 4.0mm Wavelength

We are looking forward to a good cooperation on the same wavelength!

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