

# RMS Material Characterization Sample Requirements

<b>Version</b>	<b>Author</b>	<b>Comment</b>	<b>Date</b>
1.1	F. Pfeiffer	Creation of document	20.10.2022
1.2	F. Pfeiffer	Update document	30.01.2023

## Measurement Setup



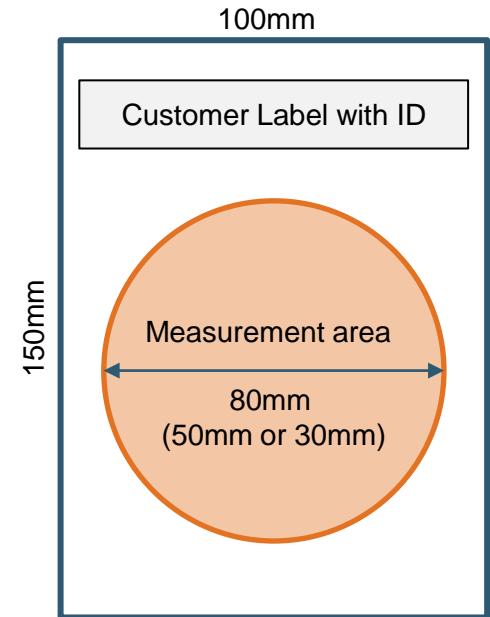
### Measurement devices

- RMS-D-77/79G, perisens
  - Measurement frequency 76 to 81 GHz
  - 1-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, Mitutoyo
  - Total thickness measurement with about  $\pm 5\mu\text{m}$  accuracy
  - **Coating thickness must be provided by customer**

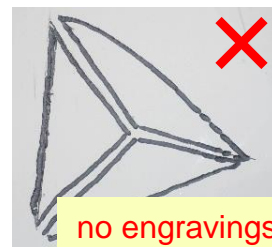
## General Sample Requirements

- Measurement requires flat sample of min. 80x80mm<sup>2</sup> size (with reduced accuracy min. 30x30mm<sup>2</sup>)
- Circular measurement area of D80mm (with reduced accuracy D50mm or D30mm)
- Requirement of **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



Please include a note in the package if samples consist of sensitive layers (e.g. PVD) that are not allowed to be touched

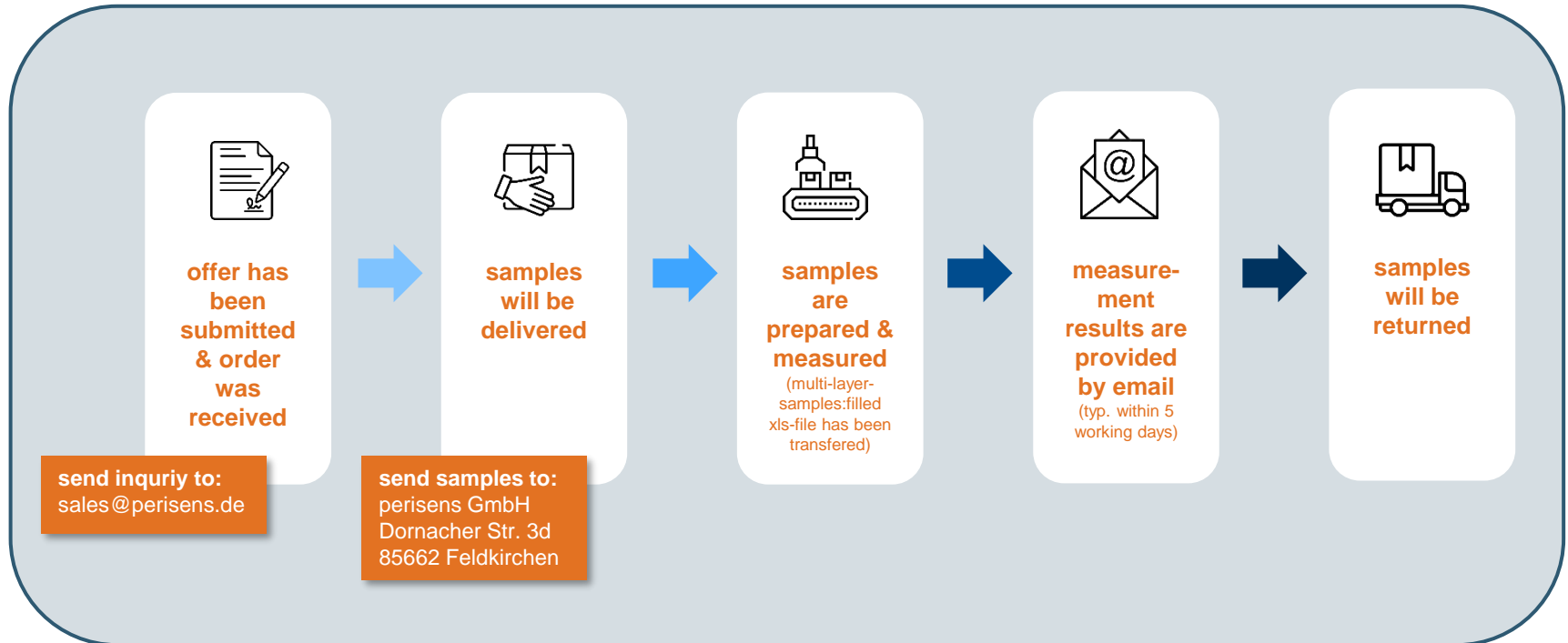
## Requirements for Multilayer Samples (e.g. Coatings)

- **One measurement** allows to **characterize one material**  
 For multi-layer 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.
- Thickness of coatings must be provided by customer (perisens only measures the total thickness of the sample)
  - The thickness values can be provided before the measurement or after return of the samples.
  - 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 standardize 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 unknown. Please specify the thickness in $\mu\text{m}$ 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 $\mu\text{m}$					
	1st layer	2nd layer	3rd layer	4th layer	1st layer		2nd layer		3rd layer	
	thickness	+- tolerance	thickness	+- tolerance	thickness	+- tolerance	thickness	+- tolerance	thickness	+- tolerance
example 1	sabic 1234	primer1234	base_coat 1234	clear_coat 1234			12,00	2,00	15,00	2,00
example 2	sabic xyz									
1										
2										

# Material Characterization Process

The process steps at a glance

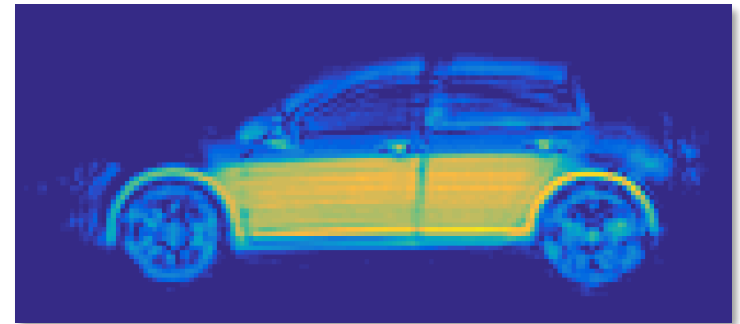


photography, Nikon  
380 – 780nm wavelength



1:18 model

imaging radar, perisens  
3.9 – 4.0mm wavelength



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

perisens GmbH | Dornacher Straße 3d | 85622 Feldkirchen b. München | Germany

Phone: +49 89 959 277 500 | Fax: +49 89 959 277 529

[www.perisens.de](http://www.perisens.de)