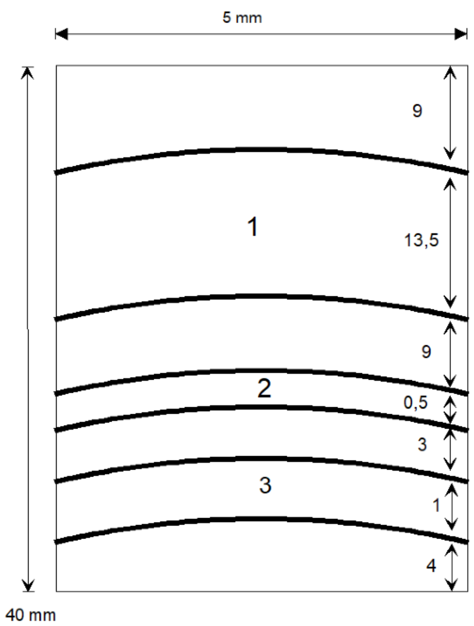
Rk standard

The surface of this standard is made up of turned grooves (average curve radius approx. 150 mm). The surface consists of a hardened nickel coating (> 900HV1) on a base body made from brass.
The calculated roughness structure emulates real workpiece surfaces. In contrast to the conventional ground standard pieces this new standard features well defined and uniform surface profiles. The standard is being supplied with both a calibration certificate and also the ASCII data set of the profiles of the sections 1 and 2. This enables the user to compare his own measurements with the calibration data. The calibration certificate comprises of the following roughness parameters: Rk, Rvk, Rpk, Rz ISO.
In addition this calibration piece features more useful surface profile types which are used to check the proper functionality of the roughness tester.

Layout of the surface profiles with functional areas 1, 2, 3:

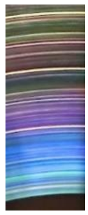


1: Roughness profile

2: Calibration grooves

3: Knife edges

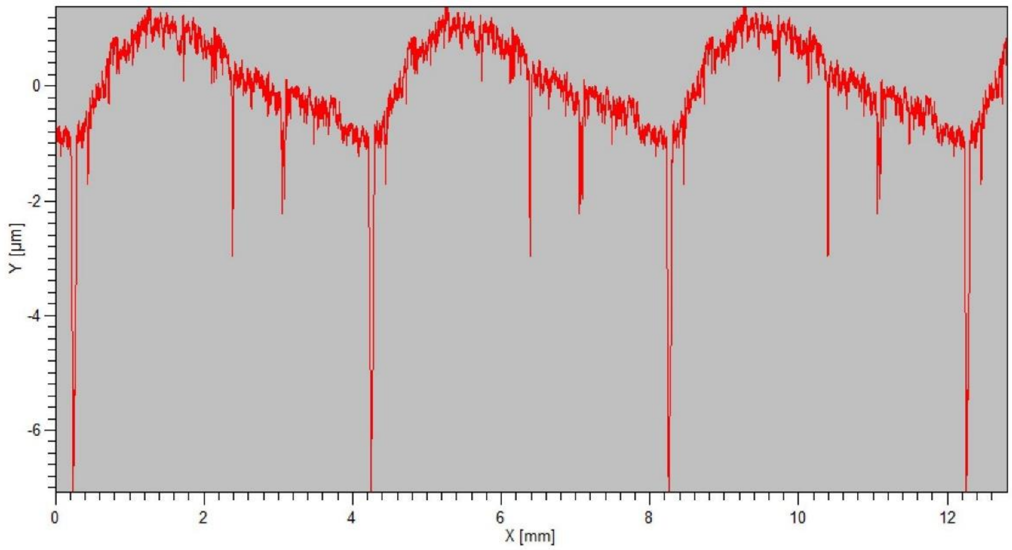
Mirror surfaces



Thickness of the standard piece: 10 mm
The most important calibration data are engraved in the side face of the specimen.

All features 1-3 are a bit lowered with respect to the upper surface in order that they are protected somewhat if a user puts the piece down inadvertedly with the functional surface looking downwards.

Section 1: Rk Profile



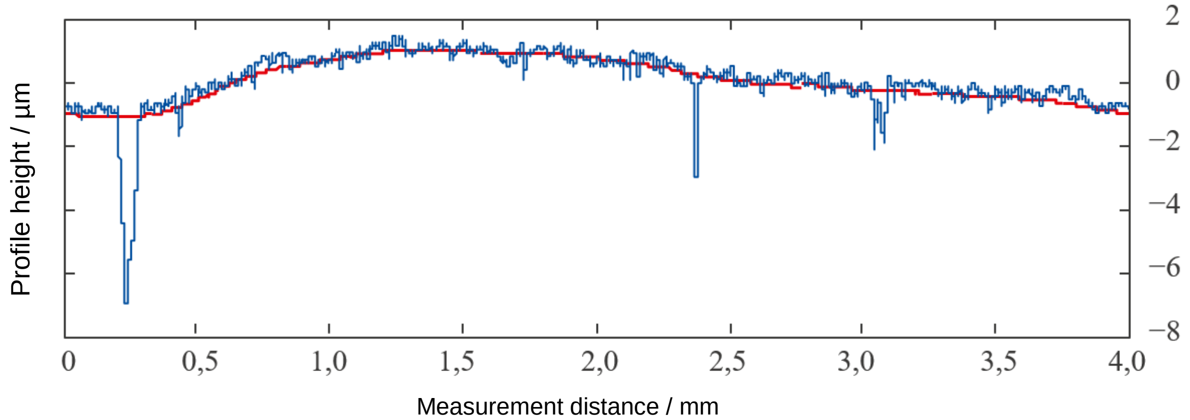
Nominal values [µm]: Rk 0.40 Rpk 0.2 Rvk 2.0 Mr2 80%

The true values are listed in the calibration certificate.

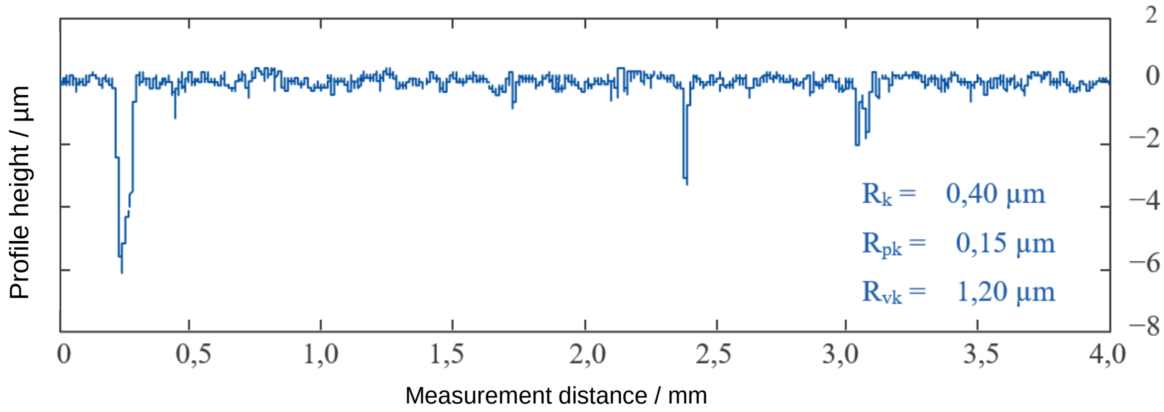
The roughness profile emulates the honing structure of an engine cylinder bore. This standard lends itself for both stylus and optical roughness measuring instruments and is of specific benefit when checking the calibration condition of roughness testers used to measure functional surfaces.

The essential properties of the cylinder face are described by the Rk parameter family. In the subsequent example the roughness profile of the standard is shown as well as the filter line applying the specific filter procedure according to DIN EN ISO 13565-1.

Rk standard and filter line (ISO 13565-1)



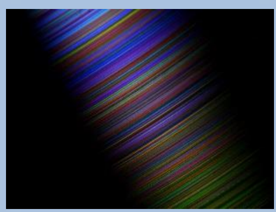
R profile (ISO 13565-1)



Due to the periodic continuation of the surface profile (s. graph on previous page) the measurement can start at any location on the standard.

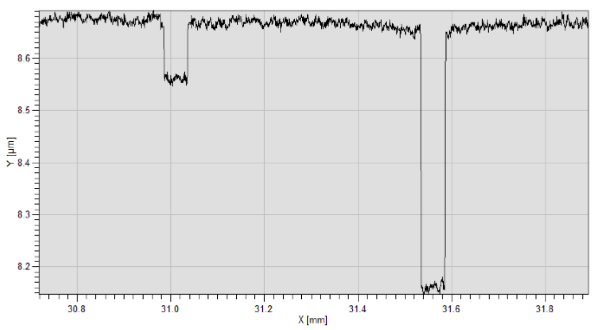
The nominal values are stable and their repeatability is independent on the measuring spot. Here is a listing of the parameters of a typical repeatability measurement with corresponding standard deviation (k=2) of the parameters:

Rk = 0.387 ± 0.007 µm
Rpk = 0.156 ± 0.005 µm
Rvk = 1.194 ± 0.020 µm



Section 2: Calibration grooves

There are 2 calibration grooves the depths of which are also given in the calibration certificate or are seperately measured using an interferometer.
The grooves serve to check the vertical amplification of the instrument.



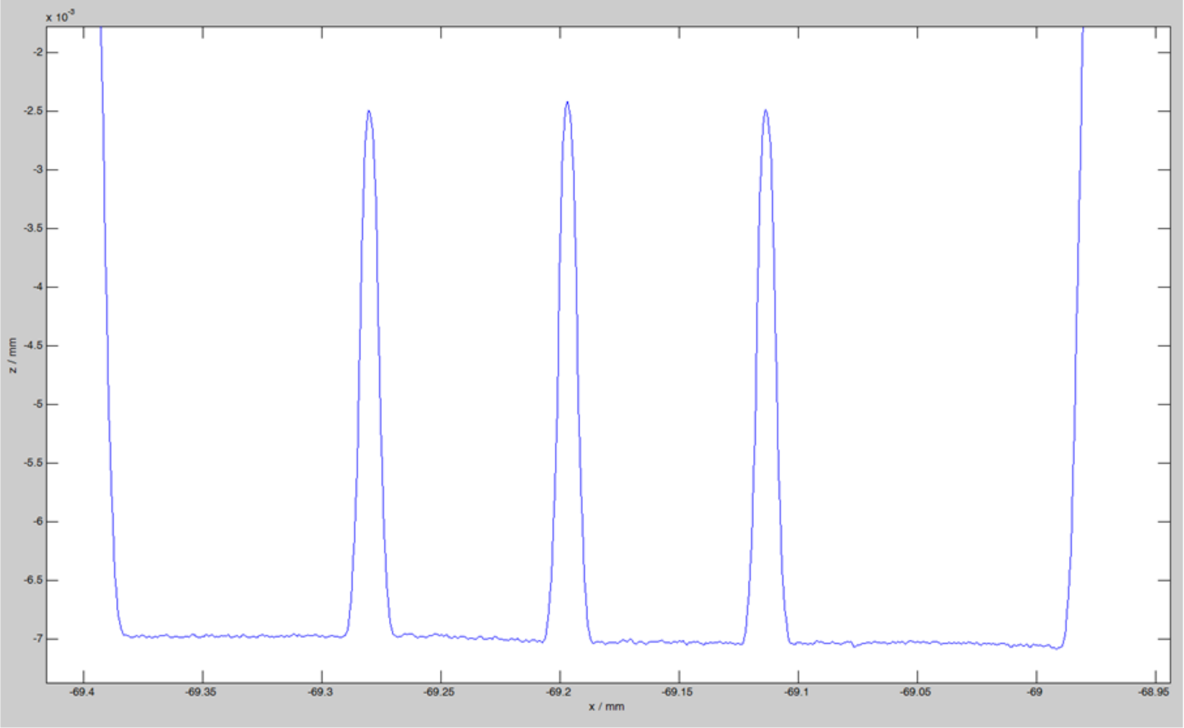
2 rectangle calibration grooves, nominal depths: 0.5 µm + 1 µm, separation distance approx. 0.5 mm, groove width approx. 50 µm.

Section 3: Knife edges

These sharp profile edges serve to check the integrity of the stylus tip and one can also measure the tip radius. In order that good results are obtained the knife edge radius needs to be much smaller than the stylus tip radius. In this case the stylus tip radius is imaged by the knife edge radius if one moves the stylus across the knife edge. In order not to damage the knife edges one must use a small drive speed such as 0.1 mm/s or less. Such a small drive speed makes sure that one gets enough measurement data points on the tip radius.

3 knife edges, approx. 8 µm amplitude, 90° edge angle, distance approx. 0.1 mm, centrically placed in a groove with a width of approx. 1mm and approx. 12 µm deep.

The knife edges must be as sharp as possible. Using an AFM we measured the edges having a radius of a few nanometers.



Mirror surface

This surfaces can be used to measure the (time dependent) measurement value noise and the noise induced by the drive unit. The vibrations present at the measurement place and also the intrinsic noise of the instrument can be measured by lowering the stylus onto the specimen surface. Ideally one will see a uniform signal in the lower nm range.

A scan of the stylus across the mirror surface will result in a profile showing the difference between the mirror surface and the measurement profile due to the influence of the drive unit (low and high frequency components).

Evaluation software

Optionally an evaluation software module is available to check the stylus tip from the profile obtained when scanning across the knife edges.

By default the standard piece is delivered with the roughness profile only.

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