

MarGage. Standards, Gages and Gage Blocks

Rectangular Gages Blocks

Application

- As comparison reference and utilization standards in the field of length measurement
- For checking gages and measuring instruments
- For setting devices of all types designed for length measurement and in particular their displays
- Can be used individually or in combinations by wringing several blocks together (see illustration)

Accuracy

The manufacturing process is based on DIN EN ISO 3650, Mahr gage blocks are produced with the utmost care.

Marking

Gage blocks of all grades are clearly and individually marked with an identification number.

Material

Mahr gage blocks are made either of stainless steel or of the ceramic compound zirconium oxide ZrO₂ (Circonimar).

Heat Expansion Coefficient

Steel	$11.5 \times 10^{-6} \text{ K}^{-1}$
Circonimar	$9.5 \times 10^{-6} \text{ K}^{-1}$

Calibration Certificate

Gage blocks in sets are supplied with a Mahr calibration certificate stating deviations from the nominal size, this confirms the traceability to National Standards.

For single gage blocks Mahr calibration certificates are available on request.

A calibration certificate from the Mahr DKD Calibration Laboratory is recommended for gage blocks of calibration grade K in the range between 0,5 and 100 mm

Dimensions

	Nominal dimension mm	Cross section mm
from	0.5 - 10	30 x 9
over	10 - 1000	35 x 9



DEUTSCHER KALIBRIERDIENST



GERMAN CALIBRATION SERVICE
Calibration Laboratory for Length
Measurement
ACCREDITED BY THE
PHYSIKALISCH-TECHNISCHE
BUNDESANSTALT (PTB)

As a part of the German Calibration Service, the Mahr Calibration Laboratory calibrates steel and ceramic gage blocks of all brands in the range between 0.5 and 100 mm and issues calibration certificates. The gage block sets are marked with the official DKD calibration label.

Calibration is based on the contract concluded between the Physikalisch-Technischen Bundesanstalt in Braunschweig and the company Mahr.

Selection of Rectangular Gage Block Sets

There are three criteria's to be considered:

1 Calibration and Tolerance classes according to DIN EN ISO 3650

Four tolerances classes are available.

Calibration class K

As primary factory standard, particularly for the calibration of subsidiary test laboratories, e.g. for gage blocks of lower tolerance classes. Supplied on request with DKD calibration certificate, indicating the deviation from the nominal size for each gage block.

Calibration class 0

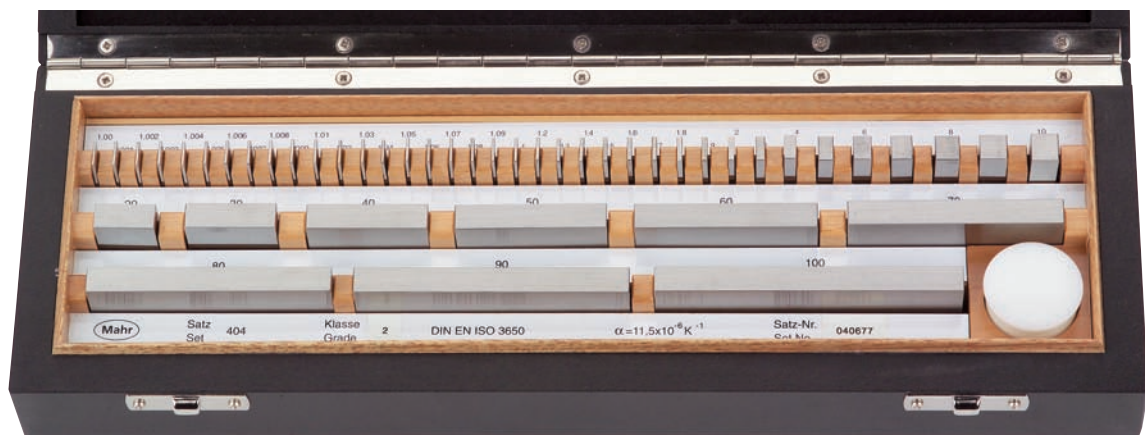
For maximum accuracy requirements. To be used as basic standards in test laboratories and precision inspection rooms, where other gage blocks and high accuracy measuring instruments are calibrated.

Tolerance class 1

For high standards of accuracy. As reference gage block for the inspection room. Designed to perform particularly accurate measurements. For setting indicating measuring instruments and for checking precision gages.

Tolerance class 2

For checking production gages of quality IT 6 and IT 7. For setting indicating measuring instruments and for checking accurate dimensions in the jig and tool industry.



404

2 Material

Steel or ceramic, depending on application.

3 Size of Sets

The 404 or 404 C is a particularly convenient set with 46 gage blocks including one for each decimal. Larger sets are particularly suited to inspection rooms and gage testing facilities, since they offer the following advantages:

- A required dimension can be made up quicker as fewer gage blocks are needed
- Several gage block combinations can be formed from the same dimension
- Greater accuracy as individual deviations add up to smaller overall error
- Less wear as a given gage block is not used as often

Rectangular Gage Blocks made of Steel

Sets

- Vertical arrangement to save space
- Scope of supply: wooden case with clear labeling strips, Mahr calibration certificate (see Page 13-2)
- See the following table for nominal sizes, increments and tolerance classes:

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm	Increments mm	Gage blocks
402/K	K	4800403	32	1.005	-	1
402/0	0	4800400		1.01 - 1.09	0.01	9
402/1	1	4800401		1.1 - 1.9	0.1	9
402/2	2	4800402		1 - 9	1	9
				10 - 30	10	3
				50	-	1
404/K	K	4800003	46	1.001 - 1.009	0.001	9
404/0	0	4800000		1.01 - 1.09	0.01	9
404/1	1	4800001		1.1 - 1.9	0.1	9
404/2	2	4800002		1 - 9	1	9
				10 - 100	10	10
406/K	K	4800014	87	0.5	-	1
406/0	0	4800010		1.001 - 1.009	0.001	9
406/1	1	4800011		1.01 - 1.49	0.01	49
406/2	2	4800012		1 - 9.5	0.5	18
				10 - 100	10	10
408/K	K	4800027	111	0.5	-	1
408/0	0	4800020		1.001 - 1.009	0.001	9
408/1	1	4800021		1.01 - 1.49	0.01	49
408/2	2	4800022		1 - 24.5	0.5	48
				25 - 100	25	4
409/K	K	4800033	121	0.5	-	1
409/0	0	4800030		1.001 - 1.009	0.001	9
409/1	1	4800031		1.01 - 1.49	0.01	49
409/2	2	4800032		1.6 - 1.9	0.1	4
				1 - 24.5	0.5	48
				25, 30, 40, 50, 60, 70, 75, 80, 90, 100		10

Test Sets for Calipers

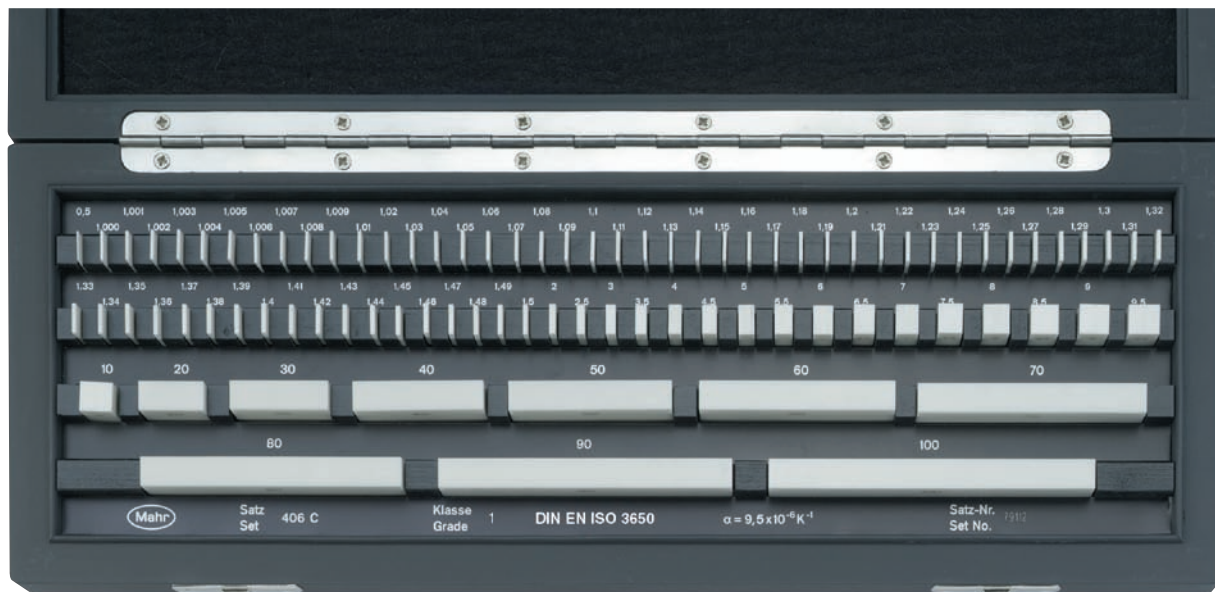
Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm
411/1	1	4800343	4	41.3 / 131.4 / 243.5 / 281.2
411/2	2	4800344	4	41.3 / 131.4 / 243.5 / 281.2
415/1	1	4800339	5	41.3 / 131.4 / 243.5 / 281.2 / 481.1
415/2	2	4800340	5	41.3 / 131.4 / 243.5 / 281.2 / 481.1

Individual Rectangular Gage Blocks 417

- Tolerance classes K, 0, 1, 2
- From nominal dimension of greater than 125 mm, gage blocks are supplied in a wooden case
- Special sizes are available on request

	Nominal sizes mm	Increments mm
over	0.5 - 1	0.05
	1 - 100	same a set 409
	125 - 200	25
	250 - 500	50
	600 - 1000	100

Rectangular Gage Blocks made of Ceramic



406 C

Features

- Resistant to both impact and breakage. Virtually no warping of material if surfaces become scratched or edges damaged. Longer retention of wringing ability
- Corrosion-resistant, Circonimar is even without protective measures extremely resistant to alkalis, acids, oil, grinding fluid and other aggressive media
- Non-magnetic Circonimar is anti-static, anti-magnetic and non-conductive. It does not attract dust or dirt and is suitable to use in the presence of magnetic fields
- Ideal for all applications. The outstanding features of all ceramic gage blocks from Mahr provide unrivalled flexibility in practical use. Circonimar is equally well suited to inspection-room conditions and the rigors of workshop applications
- Extremely durable, thus providing a long service life as well being highly robust compared to all other materials currently be used in metrology. Therefore the interval between inspections are distinctly greater
- Similar coefficient of expansion to steel, thus allowing unrestricted use even at unfavorable temperatures
- Easy to handle. No material is easier to deal with than Circonimar; Circonimar has excellent wringing properties, no corrosion, no need for lubrication, low weight and scratch-resistant

Rectangular Gage Blocks made of Ceramic

Sets

- Vertical arrangement to save space
- Scope of supply: wooden case with clear labeling strips, Mahr calibration certificate (see Page 13-2)

Nominal sizes, increments and tolerance classes

Please refer to the table below:

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm	Increments mm	Gage blocks
402 C/K	K	4800094	32	1.005	-	1
402 C/0	0	4800095		1.01 - 1.09	0.01	9
402 C/1	1	4800096		1.1 - 1.9	0.1	9
402 C/2	2	4800097		1 - 9	1	9
				10 - 30	10	3
				50	-	1
404 C/K	K	4800088	46	1.001 - 1.009	0.001	9
404 C/0	0	4800008		1.01 - 1.09	0.01	9
404 C/1	1	4800009		1.1 - 1.9	0.1	9
404 C/2	2	4800004		1 - 9	1	9
				10 - 100	10	10
406 C/K	K	4800016	87	0.5	-	1
406 C/0	0	4800018		1.001 - 1.009	0.001	9
406 C/1	1	4800019		1.01 - 1.49	0.01	49
406 C/2	2	4800017		1 - 9.5	0.5	18
				10 - 100	10	10
408 C/K	K	4800025	111	0.5	-	1
408 C/0	0	4800028		1.001 - 1.009	0.001	9
408 C/1	1	4800029		1.01 - 1.49	0.01	49
408 C/2	2	4800026		1 - 24.5	0.5	48
				25 - 100	25	4
409 C/K	K	4800036	121	0.5	-	1
409 C/0	0	4800038		1.001 - 1.009	0.001	9
409 C/1	1	4800039		1.01 - 1.49	0.01	49
409 C/2	2	4800037		1.6 - 1.9	0.1	4
				1 - 24.5	0.5	48
				25, 30, 40, 50, 60, 70, 75, 80, 90, 100		

Single Rectangular Gage Blocks 417 C

- Tolerance classes K, 0, 1, 2
- Special sizes are available on request

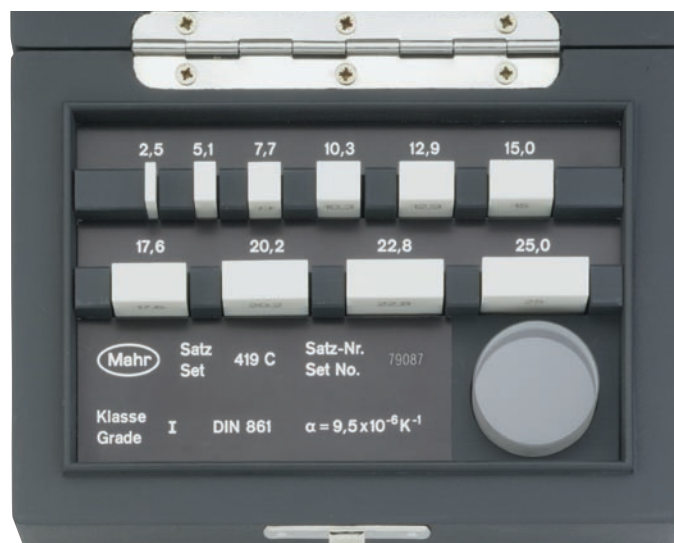
Nominal sizes mm	Increments mm
0.5	-
1	-
1.0005	-
1.001 - 1.009	0.001
1.01 - 1.5	0.01
1.6 - 2.0	0.1
2.5 - 25.0	0.5
30 - 100	10

Pair of Protective Rectangular Gage Blocks 418 C

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm	Increments mm	Gage blocks
418 C/0	0	4800085	2	2	-	2
418 C/1	1	4800086	2	2	-	2

Test Set for Micrometers 419 C (DIN 863)

Catalog no.	Tolerance class	Order no.	Quantity per set	Nominal sizes mm
419 C/1	1	4800090	10	2.5 / 5.1 / 7.7 / 10.3 / 12.9 / 15.0 / 17.6 / 20.2 / 22.8 / 25 plus 1 optical parallel dia. 30 mm



Accessories for Rectangular Gage Blocks



Rectangular Gage Block Holder and Measuring Jaws Accessory Set 420

- In conjunction with Gage Blocks for gaging both work pieces and fixtures
- To check, set and adjust setting gages and measuring instruments
- For scribing and marking
- Delivered in a wooden case

Order no. **4800100**

Components include:

- 2 Pairs of Measuring Jaws 420 m
- 1 Scriber Point 420 a
- 1 Centering Point 420 z
- 3 Holder 420 h for Gages Blocks
clamping width 0-70, 0-120, 100-220 mm
- 1 Stand 420 f for Gage Block Holder

Individual Accessories

Components included in the 420 set are also individually available:

Measuring Jaws 420 m

Cross section 9 x 9 mm

For internal and external measurements in conjunction with a Gage Block Holder 420 h and Gage Blocks

Thickness mm	Order no.
2 x 2 mm = 4 mm	4800110
2 x 5 mm = 10 mm	4800111

Scriber Point 420 a cross section 9 x 9 mm

Order no. **4800112**

Centering Point 420 z cross section 9 x 9 mm

Order no. **4800113**

Holder 420 h for Rectangular Gage Blocks

Clamping width mm	Order no.
0 - 70	4800120
0 - 120	4800121
100 - 220	4800122
100 - 420	4800123
400 - 820	4800124

Stand 420 f for Holder 420 h*

Hardened and lapped. Height 25 mm
Tolerance $\pm 2 \mu\text{m}$

Order no. **4800114**

* Clamping width up to 420 mm

Optical Flat 421

- To test the surface flatness on precision components or measuring instruments according to the interference principle
- Supplied in a wooden case



Dia. mm	Thickness mm	Flatness deviation μm	Order no.
45	11	≤ 0.1	4800140
100	20	≤ 0.1	4800135
150	30	≤ 0.1	4800136
300	50	≤ 0.4	4800137

Optical Parallel 421 P

Dia. mm	Thickness mm	Flatness deviation μm	Parallelism deviation μm	Order no.
30	12	≤ 0.15	0.4	4800180

Contact Thermometer 422



- For checking/taking the temperature
- With silver contact base, gold-plated to prevent tarnishing
- With a holding magnet to be attached to the thermometer in vertical or on inclined surfaces
- U-shaped with clamping screw
- Scope of supply: thermometer, magnet and wooden case

Readings 0.2°C
Measuring range 16-26°C

Order no. 4800170

Wooden Tongs 423

- To prevent heat transfer when handling gage blocks
- Self closing. See illustration below.

Order no. 4800142

Maintenance Set 424

- The most important equipment for inspecting and maintaining gage blocks
- Delivered in a wooden case.

Order no. 4800130



Components include:

Optical Flat 421

- To test the surface flatness of measuring surfaces according to the interference principle. Diameter 45 mm

Wooden Tongs 423

- To prevent heat transfer when handling gage block, self closing

Granite lapping stone

- To remove burr and other damage on surfaces of gage blocks. High accuracy version

Jar of special Vaseline

- To protect steel gage blocks against the rust

Brush and suede cloth

- To clean the gage blocks