Standards

TESA TECHNOLOGY

Choice of material

Steel
Steel standards have proven their reliability for over a century. Steel is an ideal reference material for the comparison measurement method used in Metrology, ensuring their reliability.
Steel standards are highly resistant to wear and have excellent adhesive properties. However, this material needs to be protected against corrosion, making it essential to properly maintain these standards, which can then be used for many years.

Tungsten Carbide
Tungsten carbide standards are nearly 10 times more wear-resistant than steel standards. They are particularly sought after for frequent use and their excellent adhesive properties.

Ceramic
Ceramic standards offer extreme resistance to wear and scratches. The adhesion of their measuring surfaces is never compromised due to the physical properties of this material. They are corrosion-resistant and are particularly insensitive to hand perspiration.

Selection of the precision grade

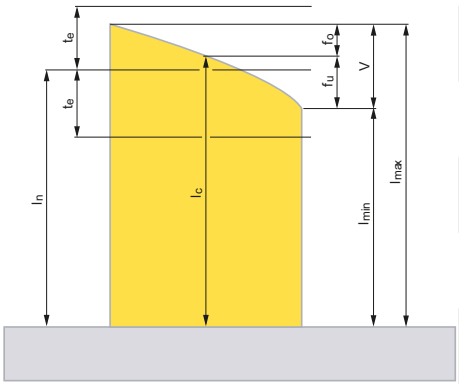
Grade 2
The gauges of this grade are typically used as standard reference gauges at production site inspection stations for the adjustment and calibration of instruments and other measuring equipment, as well as for the verification and adjustment of tooling, devices, or machines.

Grade 1
These gauges are also considered transfer standards used for the adjustment and calibration of gauges and measuring instruments at production control stations.

Grade 0
These gauges are reference standards for the company intended for calibration laboratories and other climate-controlled measuring stations, where they are used for the adjustment and calibration of gauges and measuring instruments.

Grade K
Grade K gauges are reference standards intended for metrology laboratories of national institutes, laboratories accredited or not by a national calibration service, and measurement laboratories. They are used for calibrating gauges or other standards of the same precision and measuring instruments.

Limit Deviations and Tolerances (Definition)



t_e	Limit deviations of lengths at any point relative to the nominal length
t_v	Tolerances for length variation
t_f	Flatness tolerances
l_n	Nominal length
l_c	Length at the center

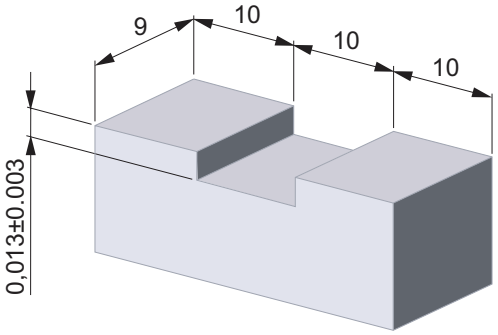
Limit Deviations and Tolerances according to ISO 3650

Nominal length mm	Grade											
	K			0			1			2		
	$\pm t_e$ µm	$\pm t_v$ µm	$\pm t_f$ µm	$\pm t_e$ µm	$\pm t_v$ µm	$\pm t_f$ µm	$\pm t_e$ µm	$\pm t_v$ µm	$\pm t_f$ µm	$\pm t_e$ µm	$\pm t_v$ µm	$\pm t_f$ µm
$0,5 < l_n \leq 10$	0,20	0,05	0,05	0,12	0,10	0,10	0,20	0,16	0,15	0,45	0,30	0,25
$10 < l_n \leq 25$	0,30	0,05	0,05	0,14	0,10	0,10	0,30	0,16	0,15	0,60	0,30	0,25
$25 < l_n \leq 50$	0,40	0,06	0,05	0,20	0,10	0,10	0,40	0,18	0,15	0,80	0,30	0,25
$50 < l_n \leq 75$	0,50	0,06	0,05	0,25	0,12	0,10	0,50	0,18	0,15	1,00	0,35	0,25
$75 < l_n \leq 100$	0,60	0,07	0,05	0,30	0,12	0,10	0,60	0,20	0,15	1,20	0,35	0,25
$100 < l_n \leq 150$	0,80	0,08	0,05	0,40	0,14	0,10	0,80	0,20	0,15	1,60	0,40	0,25
$150 < l_n \leq 200$	1,00	0,09	0,10	0,50	0,16	0,15	1,00	0,25	0,18	2,00	0,40	0,25
$200 < l_n \leq 250$	1,20	0,10	0,10	0,60	0,16	0,15	1,20	0,25	0,18	2,40	0,45	0,25
$250 < l_n \leq 300$	1,40	0,10	0,10	0,70	0,18	0,15	1,40	0,25	0,18	2,80	0,50	0,25
$300 < l_n \leq 400$	1,80	0,12	0,10	0,90	0,20	0,15	1,80	0,30	0,18	3,60	0,50	0,25
$400 < l_n \leq 500$	2,20	0,14	0,10	1,10	0,25	0,15	2,20	0,35	0,18	4,40	0,60	0,25
$500 < l_n \leq 600$	2,60	0,16	0,15	1,30	0,25	0,18	2,60	0,40	0,20	5,00	0,70	0,25
$600 < l_n \leq 700$	3,00	0,18	0,15	1,50	0,30	0,18	3,00	0,45	0,20	6,00	0,70	0,25
$700 < l_n \leq 850$	3,40	0,20	0,15	1,70	0,30	0,18	3,40	0,50	0,20	6,50	0,80	0,25
$800 < l_n \leq 900$	3,80	0,20	0,15	1,90	0,35	0,18	3,80	0,50	0,20	7,50	0,90	0,25
$900 < l_n \leq 1000$	4,20	0,25	0,15	2,00	0,40	0,18	4,20	0,60	0,20	8,00	1,00	0,25

Sets of 11 gauge blocks for the calibration of UPC/UPD gauge blocks comparators

Standard	ISO 3650
Calibration method	Interferometry or mechanical comparison
Material	6 mm bridge gauge block: Hard metal Other blocks: Special alloy steel
Grade	K
Included in delivery	1x special 6 mm bridge-shaped gauge block for capturing measurement errors of the lower probe 5x pairs of gauge blocks: 0,5 - 0,5 mm 1,0 - 1,005 mm 1,0 - 1,01 mm 4,0 - 4,0 mm 100,0 - 100,0 mm Calibration certificate

Article number	Designation	Max. perm. errors µm	Calibration method
S59110152	Set of 11 gauge blocks + PTB certificate	Deviation in center: U = ± 0,015	Interferometry
S59110489	Set of 11 gauge blocks + DAkkS certificate	Deviation in center: U = ± 0,030	Mechanical comparison



Special 6 mm bridge-shaped gauge block

Set of 9 additional metric gauge blocks for calibrating the UPD measuring device

Standard	ISO 3650
Calibration method	Interferometry or mechanical comparison
Material	Special alloy steel
Grade	K
Included in delivery	Blocks: 1, 5, 10, 15, 20, 25, 50, 75, 100 mm Calibration certificate

Article number	Designation	Max. perm. errors µm	Calibration method
S59300107	Set of 9 gauge blocks + PTB certificate	Deviation in center: ± (0,02 + 0,2 x 10-6 x L) (L in m)	Interferometry
S59300104	Set of 9 gauge blocks + SCS certificate	Deviation in center: ± (0,05 + 0,5 x 10-6 x L) (L in m)	Mechanical comparison

Sets of 32 gauge blocks, metric

Standard	ISO 3650
Included in delivery	1x gauge block: 1.005 mm 9x gauge blocks: 1.01 ÷ 1.09 mm, increment = 0.01 mm 9x gauge blocks: 1.1 ÷ 1.9 mm, increment = 0.1 mm 9x gauge blocks: 1 ÷ 9 mm, increment = 1 mm 4x gauge blocks: 10, 20, 30, 60 mm + calibration certificate according to: Steel sets, all grades: DAkkS certificate Tungsten carbide sets, all grades: UKAS certificate Ceramic sets, all grades: UKAS certificate

		Grade			
		K	0	1	2
Material	Steel	**0651516027**	**0651515027**	**0651511027**	**0651512028**
	Tungsten carbide	**0651526027**	**0651525027**	**0651521027**	**-**
	Ceramic	**0651536027**	**0651535027**	**0651531027**	**-**

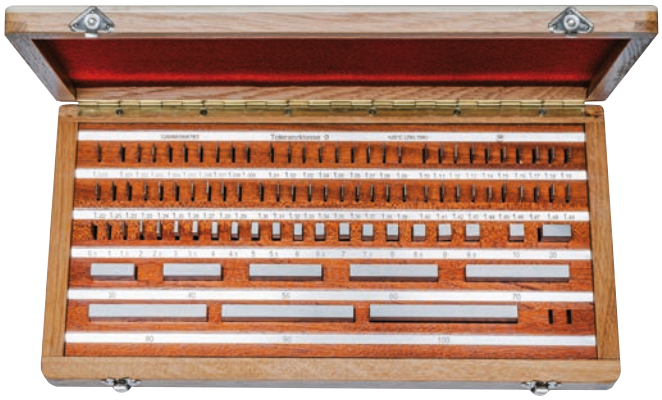
Sets of 47 gauge blocks, metric

0651515021

Standard	ISO 3650
Included in delivery	1x gauge block: 1,005 mm 9x gauge blocks: 1,01 ÷ 1,09 mm, increment = 0,01 mm 9x gauge blocks: 1,1 ÷ 1,9 mm, increment = 0,1 mm 24x gauge blocks: 1 ÷ 24 mm, increment = 1 mm 4x gauge blocks: 25 ÷ 100 mm, increment = 25 mm + calibration certificate according to: Steel sets, all grades: DAkkS certificate Tungsten carbide sets, all grades: UKAS certificate Ceramic sets, all grades: UKAS certificate

		Grade			
		K	0	1	2
Material	Steel	**0651516021**	**0651515021**	**0651511021**	**0651512021**
	Tungsten carbide	**-**	**0651525021**	**0651521021**	**-**
	Ceramic	**0651536021**	**0651535021**	**0651531021**	**-**

Sets of 88 gauge blocks, metric



0651515014

Standard	ISO 3650
Included in delivery	1x gauge block: 1,005 mm 9x gauge blocks: 1,001 ÷ 1,009 mm, increment = 0,001 mm 49x gauge blocks: 1,01 ÷ 1,49 mm, increment = 0,01 mm 19x gauge blocks: 0,5 ÷ 9,5 mm, increment = 0,5 mm 10x gauge blocks: 10 ÷ 100 mm, increment = 10 mm + calibration certificate according to: Steel sets, all grades: DAkkS certificate Tungsten carbide sets, all grades: UKAS certificate Ceramic sets, all grades: UKAS certificate

		Grade			
		K	0	1	2
Material	Steel	**0651516014**	**0651515014**	**0651511014**	**0651512014**
	Tungsten carbide	**-**	**0651525014**	**0651521014**	**-**
	Ceramic	**0651536014**	**0651535014**	**0651531014**	**-**

Sets of 112 gauge blocks, metric

0652511012

Standard	ISO 3650
Included in delivery	1x gauge block: 1,0005 mm 9x gauge blocks: 1,001 ÷ 1,009 mm, increment = 0,001 mm 49x gauge blocks: 1,01 ÷ 1,49 mm, increment = 0,01 mm 49x gauge blocks: 0,5 ÷ 24,5 mm, increment = 0,5 mm 4x gauge blocks: 25 ÷ 100 mm, increment = 25 mm + calibration certificate according to: Steel sets, all grades: DAkkS certificate Tungsten carbide sets, all grades: UKAS certificate Ceramic sets, all grades: UKAS certificate

		Grade			
		K	0	1	2
Material	Steel	**0651516012**	**0651515012**	**0651511012**	**0651512012**
	Tungsten carbide	**-**	**0651525012**	**0651521012**	**-**
	Ceramic	**0651536012**	**0651535012**	**0651531012**	**-**

Sets of 122 gauge blocks, metric

0651511011

Standard	ISO 3650
Included in delivery	1x gauge block: 1,0005 mm 9x gauge blocks: 1,001 ÷ 1,009 mm, increment = 0,001 mm 49x gauge blocks: 1,01 ÷ 1,49 mm, increment = 0,01 mm 4x gauge blocks: 1,6 ÷ 1,9 mm, increment = 0,1 mm 49x gauge blocks: 0,5 ÷ 24,5 mm, increment = 0,5 mm 8x gauge blocks: 30 ÷ 100 mm, increment = 10 mm 2x gauge blocks: 25, 75 mm + calibration certificate according to: Steel sets, all grades: DAkkS certificate Tungsten carbide sets, all grades: UKAS certificate Ceramic sets, all grades: UKAS certificate

		Grade			
		K	0	1	2
Material	Steel	**0651516011**	**0651515011**	**0651511011**	**0651512011**
	Tungsten carbide	**-**	**0651525011**	**-**	**-**
	Ceramic	**0651536011**	**0651535011**	**-**	**-**

Set with 12 precision squares

06769002

Dimensions	Measuring faces: 6.35 x 76.2 mm (1/4 x 3 in)
Material	Hardened steel
Max. perm. errors	30 in
Included in delivery	12x blocks: 1/4°, 1/2°, 1°, 2°, 3°, 4°, 5°, 10°, 15°, 20°, 25°, 30°

Article number	Designation
06769002	Set of 12 angle gauge blocks

Setting rings, metric

Max. perm. errors	The cylindricity errors make no allowance for a rim of 1 mm.
Particular characteristic(s)	All listed values are determined through a 2-point measurement taken at half-height of the setting ring. The measuring direction is marked with 2 strokes. The measured actual dimension is engraved on every setting master.

Article number	Designation	Max. perm. cylindricity error, µm	Uncertainty of measurement, µm	Diameter mm
00843200	Ring gauge	1,5	1,5	4
00843201	Ring gauge	1,5	1,5	5,5
00840114	Ring gauge	1,5	1,5	6
00840101	Ring gauge	1,5	1,5	8
00840115	Ring gauge	1,5	1,5	8,5
00840102	Ring gauge	1,5	1,5	10
00840103	Ring gauge	1,5	1,5	11
00840116	Ring gauge	1,5	1,5	12,5
00840104	Ring gauge	1,5	1,5	15
00840105	Ring gauge	1,5	1,5	17
00840117	Ring gauge	1,5	1,5	17,5
00840106	Ring gauge	1,5	1,5	25
00840107	Ring gauge	2	2	35
00843230	Ring gauge	2	2	45
00840108	Ring gauge	2	2	50
00843239	Ring gauge	2	2	60
00840109	Ring gauge	2	2	70
00840118	Ring gauge	2	2	85
00840110	Ring gauge	2	2	90
00840111	Ring gauge	2,5	2,5	110
00840112	Ring gauge	2,5	2,5	125
00840113	Ring gauge	2,5	4	175

Setting rings, imperial

00850106

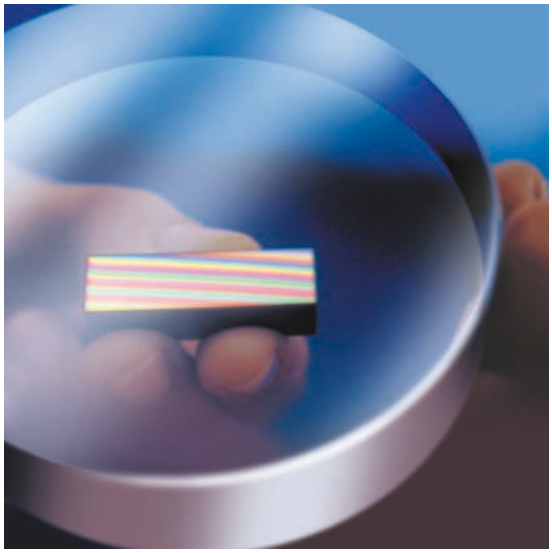
Max. perm. errors	The cylindricity errors make no allowance for a rim of 1 mm.
Particular characteristic(s)	All listed values are determined through a 2-point measurement taken at half-height of the setting ring. The measuring direction is marked with 2 strokes. The measured actual dimension is engraved on every setting master.

Article number	Designation	Max. perm. cylindricity error, µm	Uncertainty of measurement, µm	Diameter in
00850101	Ring gauge	1,5	1,5	.35
00850102	Ring gauge	1,5	1,5	.425
00850103	Ring gauge	1,5	1,5	.5
00850104	Ring gauge	1,5	1,5	.6
00850105	Ring gauge	1,5	1,5	.7
00850106	Ring gauge	1,5	1,5	1
00850107	Ring gauge	2	2	1.4
00850108	Ring gauge	2	2	2
00850109	Ring gauge	2	2	2.8
00850110	Ring gauge	2	2	3.6
00850111	Ring gauge	2,5	2,5	4.4
00850112	Ring gauge	2,5	2,5	5
00850113	Ring gauge	2,5	4	7

Optical flats

• USE
- For checking the flatness and adherence of reference gauges or any other parts with flat faces of the same precision.

02530075



Parallelism	Parallelism between the measuring faces is not guaranteed.
Flatness	0,125 µm
Included in delivery	Optical flat Declaration of Conformity

Article number	Designation	Diameter mm	Epaisseur mm
02530050	Optical flat	50	15
02530075	Optical flat	75	20

Optical flats with two parallel faces

• USE
- For checking the flatness and parallelism of the measuring faces of external micrometers and similar instruments

• TESTING PROCESS
- The difference in length of the interference lenses corresponds to one quarter or one third of the micrometer screw pitch (0,5 mm) respectively

Max. perm. errors	Length compared to the nominal dimension: ± 100 µm Flatness: ≤ 27.335 mm: 0,15 µm ≥ 52.000 mm: 0,20 µm Parallelism: ≤ 27.335 mm: 0,4 µm ≥ 52.000 mm: 0,5 µm
Included in delivery	Optical flat(s) Déclaration de conformité

Article number	Designation	Diameter mm	Epaisseur mm
02510000	Set of optical flats	31	12 ÷ 12,375
02510100	Set of optical flats	31	27 ÷ 27,335
02510200	Set of optical flats	31	52 ÷ 52,335
02510300	Set of optical flats	31	77 ÷ 77,335
02510001	Optical flat	31	12
02510002	Optical flat	31	12,125
02510003	Optical flat	31	12,25
02510004	Optical flat	31	12,375
02510101	Optical flat	31	27
02510102	Optical flat	31	27,165
02510103	Optical flat	31	27,335
02510201	Optical flat	31	52
02510202	Optical flat	31	52,165
02510203	Optical flat	31	52,335
02510301	Optical flat	31	77
02510302	Optical flat	31	77,165
02510303	Optical flat	31	77,335

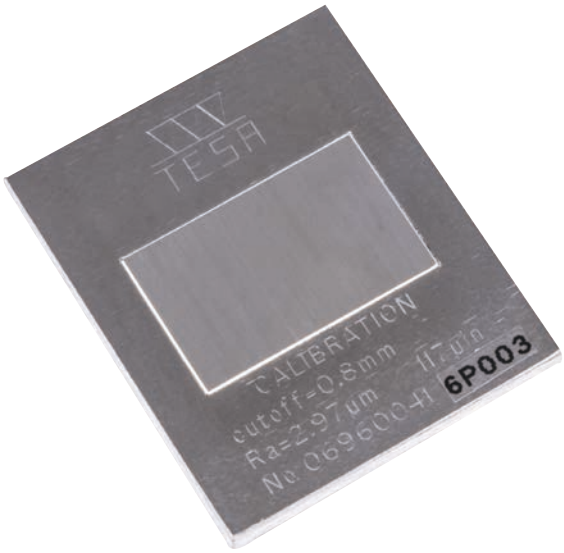
Sets of adjustable parallels

06769010

Material	Hardened steel
Function(s)	Each parallel consists of two conical parts assembled using a dovetail joint. Two fixing screws lock the parallel at the desired dimension.
Included in delivery	1x parallel: height = 10 ÷ 13 mm, length = 44 mm, width = 7 mm 1x parallel: height = 13 ÷ 17 mm, length = 54 mm, width = 7 mm 1x parallel: height = 17 ÷ 24 mm, length = 68 mm, width = 7 mm 1x parallel: height = 24 ÷ 33 mm, length = 90 mm, width = 7 mm 1x parallel: height = 33 ÷ 44 mm, length = 106 mm, width = 7 mm 1x parallel: height = 44 ÷ 57 mm, length = 129 mm, width = 7 mm Screwdriver

Article number	Designation
06769010	Set of 6 adjustable parallels

Surface roughness standards



06960041

Standard	ISO 5436-1

Article number	Designation
06960041	Roughness standard, Ra = 2,97 µm
06960066	Roughness standard, Ra = 1 µm
06960065	Roughness standard, Ra = 0,5 µm
06960064	Roughness standard, Ra = 0,1 µm

Dummy probes

The reference probes, also called "dummy probes", are resistance dividers. Each probe simulates a given length very accurately. Reference probes are connected to the instrument instead of standard probes for checking or calibrating electronic devices that can be connected to TESA inductive probes.

Dimensions	Ø 18 x 118 mm
Degree of protection	IP40
Particular characteristic(s)	Input impedance: 970 ± 50 Ω (13 kHz) or 2150 ± 50 Ω (0 µm normal) Phase (13 kHz): 71 ± 2° Input resistance: 100 ± 5 Ω Output impedance (13 kHz): 1000 ± 2 Ω Phase (13 kHz): 0,2° Dummy probe (half-bridge), sensitivity 73.75 mV/V/mm Suitable for instruments characterized as follows: Frequency: 13 ± 0,65 kHz Voltage: 3 ± 0,015 Vrms (2 symmetrical voltages of 1,5 Vrms) Output and input impedance: ≤ 0,2 Ω and 2000 Ω, resp.
Included in delivery	Measurement report

Article number	Designation
S41078077	Dummy probe, ± 0 µm
S41078079	Dummy probe, ± 3 µm
S41078231	Dummy probe, ± 5 µm
S41078081	Dummy probe, ± 10 µm
S41078228	Dummy probe, ± 100 µm
S41078230	Dummy probe, ± 190 µm
S41078087	Dummy probe, ± 300 µm
S41078332	Dummy probe, ± 500 µm
S41078751	Dummy probe, ± 1000 µm
S41078752	Dummy probe, ± 1900 µm
S41077249	Set of 3 dummy probes, ± 0 µm, ± 100 µm, ± 1000 µm
S41078654	Set of 2 dummy probes, ± 190 µm, ± 1900 µm

Setting standard for UNIMASTER

01110501

Article number	Designation
01110501	Setting standard for UNIMASTER