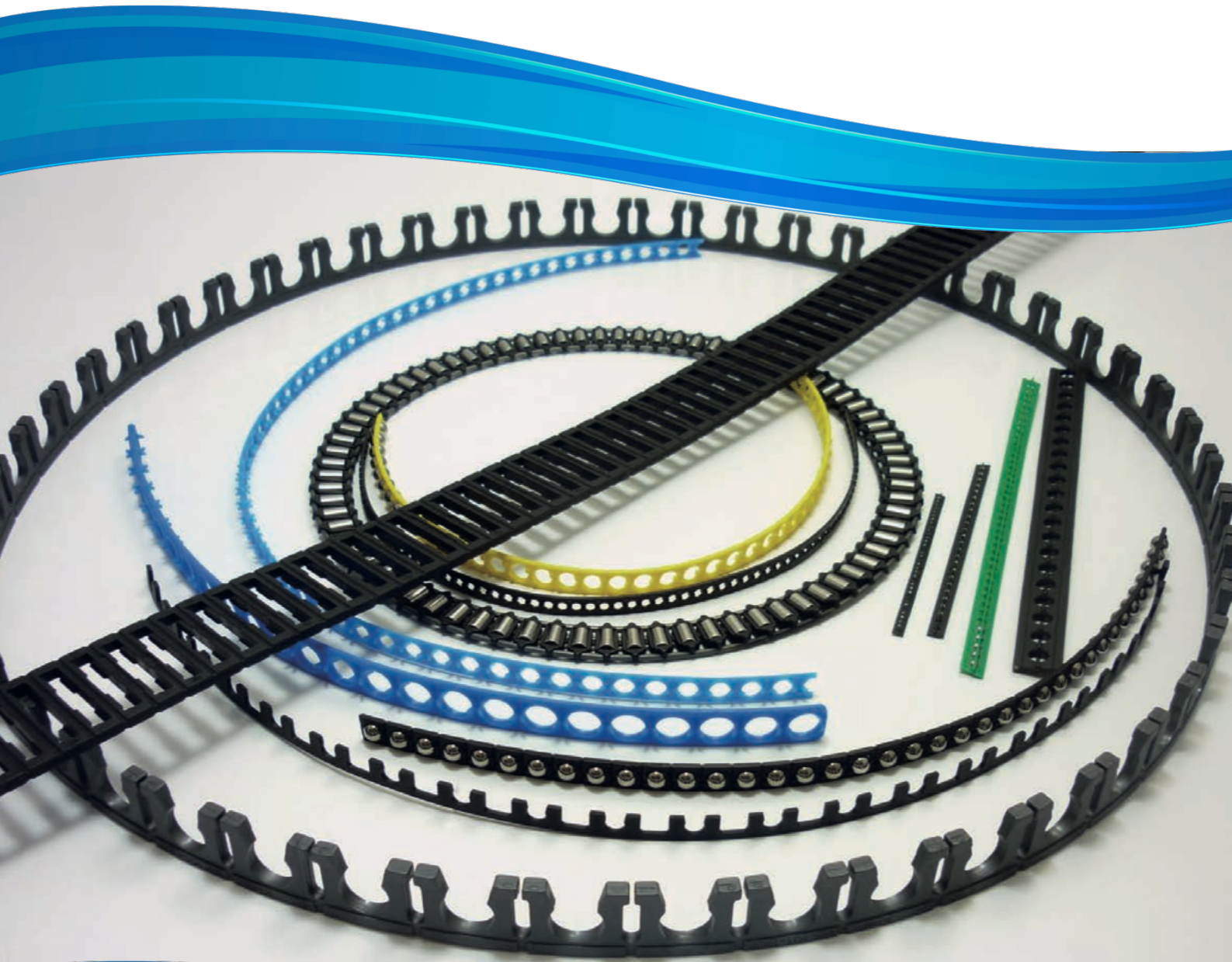


Ball Bearing Cages



ITM UNITEC
ENGINEERED BEARINGS

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Aus Gründen der ständigen Weiterentwicklung unserer Erzeugnisse müssen Änderungen vorbehalten bleiben.

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(Table of dimensions)

This booklet was prepared with the greatest care and all the data were checked for correctness. However, we cannot be liable for any wrong or incomplete data.

For reasons of constant further development, we must reserve the right to modify our products.

Description of product

Plastic cage strip for roller bearings of any length and diameter?
In nearly all shapes, for roller or ball bearings?
Also for straight stretches or similar applications?

**Plastic cage strips in metre lengths
for roller bearings**



As soon as he is concerned with the development and manufacture of ball bearings or linear guides, every technician, designer, calculator or buyer is confronted by these questions.

For these professions, the ball or roller cage strip is often a design or procurement problem.

There are high equipment costs and mechanical costs for individual parts, considerable tooling costs, which have to be passed on to the customer for prototypes, quality problems of mechanical manufacture, problems of accuracy of repetition for pre-series and mass production series.

These unpleasant problems also trouble other departments, eg: work preparation, quality assurance or assembly, so that a mechanically produced cage strip can cause a considerable part of delays in delivery.

The aim of ITM's development is therefore that our product – the plastic cage strip in metre lengths, should use all the technical and economic advantages of the plastic extrusion process.

With the newly developed manufacturing process, using this sophisticated technique, ITM are able to supply a roller bearing accessory without problems, which meets the individual ideas and the high demands of the customers.

This publication is intended to make the selection and purpose of our products clear and to give your design department detailed data on them.

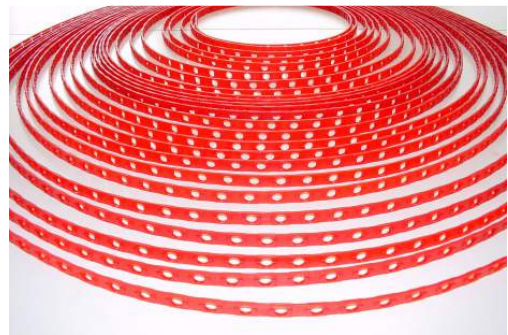
Ball bearing cages

Advantages

Shapes

ITM cage strips in metre lengths can be used for ball or roller tracks for every diameter. Due to a specially selected profile, where the ring sliding area is made stronger and the ball area more labile, they can be bent to small running circle diameters. This advantage is supported by thin places in the sliding area of the cage strip, which are deliberately arranged between the so-called ball windows, to prevent jamming of the balls or rollers.

Can be used for nearly every running circle diameter, due to the shape



Summary of other advantages

Assembly

- No more small parts
- Cage strips with ball or roller holders can be inserted and assembled with the balls in the ball bearings
- Ball or roller cage strips can be used for nearly all diameter ranges, due to the shape

Operation

- Exact determination of cage end play for different expansion due to temperature difference
- Suitable for high circumferential speeds with ball guides
- ITM cage strips with ball or roller guides provide quiet and even running
- Better sliding

Technique

The selection of standard cages for ball tracks provides many variations with different ball sizes, but only one cage dimension. Very good surface quality due to the extrusion process.

Ball bearing cages

Material

Apart from precision, the main feature in the development of the ITM cage strips was to find suitable material, which, due to various additives, fulfils and even improves important operational qualities.

A thermoplastic material is preferably used as the material for ITM cage strips. The polyamide extruded PA 12 is a polycondensation product of Laurinlactams. Starting from natural petroleum, it is produced according to the following scheme:

Laurinlactams – Natural petroleum – Butane – Butadiene – Cyclododecatrien – Cyclododecanon – Laurinlactam – Polyamide.

Polyamide PA 12 with the lowest water absorption, with a density of 1,01 is one of the lightest commercially available polyamides. This material offers the most favourable properties for cage strips.

**Can be coloured according
to the customer`s requests**



Important properties

- Great strength together with great toughness
- Excellent wear and sliding properties
- Chemical resistance, eg: against petrol, grease and oil
- Excellent behaviour at low temperatures
- Good dimensional stability
- Low water absorption

Due to these properties, polyamide PA 12 meets many requirements made of roller or ball cage strips for ball bearings.

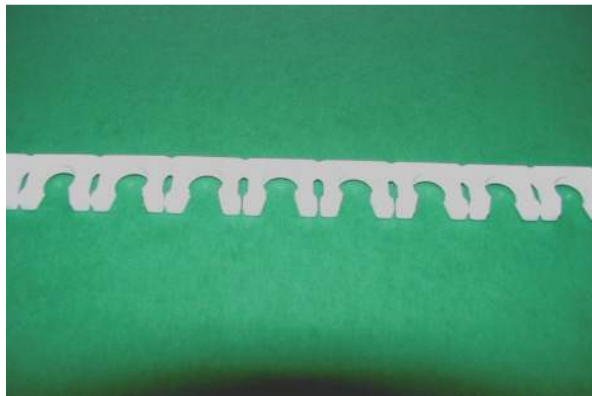
Ball bearing cages

Additions

With regard to resistance to wear, polyamides are superior to other plastics in steel / plastic or aluminium / plastic pairings. The higher the crystallinity and therefore the surface hardness, the lower is the wear. Wear also depends on the speed of sliding, lubrication and surface quality of the bearing rings (sliding surfaces).

By adding lubricants, eg: graphite or MoS₂, the wear or the coefficient of sliding friction can be reduced, see the following table.

Material	Coefficient of wear K x 10 ¹⁷	Coefficient of sliding friction
Natural polyamide	3000	0,35
Polyamide with graphite	2000	0,10 – 0,20
Polyamide with MoS ₂	1000	0,10 – 0,15



Ball cage strip type KK 101 (snap cage) natural polyamide (left) and with MoS₂ added (right)

For this reason, ITM also offer roller or ball cage strips with added MoS₂.

Due to the manufacturing process, the superimposed spraying of individual cage segments, there are stresses in the cage strip. These stresses are removed or at least reduced by tempering. Tempering is done in hot air. The cage strip is then conditioned in warm water.

The general thermal, electrical and mechanical properties of the cage strip material used by ITM are shown in the following data sheet.

All the test data are measured on test samples, which were stored for two weeks in a standard climate (23°C / 50% relative humidity).

Ball bearing cages

Extruded polyamide (PA 12)



Melting temperature DSC max.		°C	dry	178
Crude density	DIN 53479	kg/dm ³	dry	1.01.
Water absorption 23 °/ 50%	DIN 53417	%	--	0.7
in water 23 °C	DIN 53495	%	--	1.5
Linear shrinkage		%	--	0.8–2.0
Retention of shape ISO 75 0.46 N/mm ² (B)	DIN 53461	°C	after storage	150
1.82 N/mm ² (A)		°C	5 hours 150 °	50
Vicat softening temp. 9.81 N (A)	DIN 53460	°C	dry	170
49.05 N (B)		°C	dry	135
Linear thermal coeff. of expansion	DIN 52328	K ⁻¹	dry	12 · 10 ⁻⁵
Max. temp. of use, continuous		°C	--	80
Short term		°C	--	140
Specific resistance	DIN 53482	Ω cm	dry conditioned	10 ¹³
Voltage strength	DIN 53481	kV/mm	dry conditioned	38
Creep current strength KC	DIN 53480	V	dry conditioned	> 600
Yield stress	DIN 53455	N/mm ² N/mm ²	dry conditioned	40
Extension at yield stress	DIN 53455	% %	dry conditioned	8
Tearing strength	DIN 53455	N/mm ² N/mm ²	dry conditioned	60
Extension at tearing	DIN 53455	% %	dry conditioned	275
Elastic modulus in tension	DIN 53457	N/mm ² N/mm ²	dry conditioned	1100
3,5% bending stress	DIN 53452	N/mm ² N/mm ²	dry conditioned	35
Shore hardness D	DIN 53505	--	dry conditioned	67
Impact toughness at -40 °C	DIN 53453	kJ/m ² kJ/m ²	dry conditioned	--
Impact toughness	DIN 53453	kJ/m ² kJ/m ²	dry conditioned	--
Charpy notch toughness (Charpy)	DIN 53453	kJ/m ² kJ/m ²	dry conditioned	10
Charpy notch toughness (Charpy) at -40 °C	DIN 53453	kJ/m ² kJ/m ²	dry conditioned	6

Ball bearing cages

Resistance to



Temperature

Ball and linear bearing manufacturers who use our plastic cage strips have determined the suitability of the material by internal investigations, according to the cage shape, and have included them in their catalogues.

For the material PA 12 for continuous operation, a temperature of 90° to 100°C and for short term use, a permitted temperature of 100 to 120°C has been found.

For glass fibre reinforced PA 12 (30% GF), this rises to 100° to 110°C for continuous operation and 120° to 130°C for short term use.

By short term use one means 300 – 500 hours for the material PA 12 and 500 – 1000 hours for the material PA 12GF.

The actual heat resistance of the material to the appearance of embrittlement is considerably higher.

The temperature limits of the standard ball bearing cages in continuous operation are –40°C and + 100°C, and for short term operation up to +120°.

Vacuum

On using our cages in a vacuum, one can say that in a vacuum, low molecular parts can evaporate. According to experts, the part of these compounds is very small and it has no effect on the mechanical properties of the cage material.

Argon (rare gas)

From various material tests, the material is 100% resistant to argon.

Halogen gases

Halogen gases can be based on bromine or chlorine.

As the halogen gases are very corrosive, the materials PA 12 and PA 12GF are unsuitable for use exposed to them.

Halogen gases cause dimensional changes and reduction in mechanical strength.

Ball bearing cages

Cage end play



Due to different expansions of plastic cage strips and the surrounding bearing rings made of steel or aluminium, the cage strips must be fitted with suitable end play. For cage shape surrounding ball bearings, we recommend the following at temperature differences of:

$\Delta t = 50^\circ\text{C}$ and $\Delta t = 30^\circ\text{C}$ the following end play of the cage strips:

Running circle \varnothing DL [mm]	Steel bearing rings min. end play		Aluminium bearing rings min. end play	
	$\Delta t = 50^\circ\text{C}$	$\Delta t = 30^\circ\text{C}$	$\Delta t = 50^\circ\text{C}$	$\Delta t = 30^\circ\text{C}$
up to 200	3,5	2,1	3,1	1,9
up to 300	5,2	3,1	4,7	2,8
up to 400	6,9	4,1	6,2	3,7
up to 500	8,6	5,2	7,8	4,7
up to 600	10,4	6,2	9,3	5,6
up to 700	12,1	7,3	10,9	6,5
up to 800	13,8	8,3	12,4	7,5
up to 900	15,5	9,3	14,0	8,4
up to 1.000	17,3	10,4	15,5	9,3
up to 1.100	19,0	11,4	17,1	10,3
up to 1.200	20,7	12,4	18,6	11,2
up to 1.300	22,5	13,5	20,2	12,1
up to 1.400	24,2	14,5	21,8	13,1
up to 1.500	25,9	15,5	23,3	14,0
up to 1.600	27,6	16,6	24,9	14,9
up to 1.700	29,4	17,6	26,4	15,9
up to 1.800	31,1	18,6	28,0	16,8
up to 1.900	32,8	19,7	29,5	17,7
up to 2.000	34,5	20,7	31,1	18,7

Ball bearing cages

Special products

Distance pieces

A series of ball and cross roller distance pieces for different bearing shapes are contained in the standard range.



Ball bearing cages for standard series

Cages in different materials are contained in the standard range for different standard series, eg: ball cages for grooved ball bearings (6000 series) or axial roller bearings.

Special cage strips

Special cage strips for different shapes are produced together with the customers and are, of course, protected. These articles are not contained in the standard range.



Distance pieces, ball bearing cages for standard series and special cage strips on request.

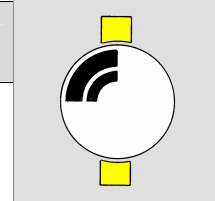
Ball bearing cages

Possibilities of use

Examples

Four point ball bearing

Shape : with 2 bearing rings
Shape of cage : KK 101
 KK 102 (2 bearing rings and filler)

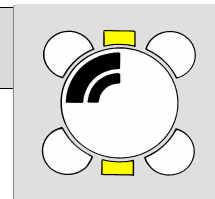


Shape : with 3 bearing rings
Shape of cage : KK 100, KK 101, KK 102, KK 107, KKVK, KKAK...R

Wire four point ball bearing

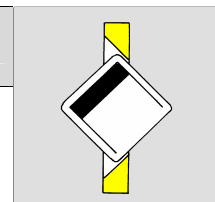
Shape : with 2 bearing rings
Shape of cage : KK 101

Shape : with 3 bearing rings
Shape of cage : KK 100, KK 101, KK 102, KK 107, KKVK, KKAK...R



Cross roller bearing

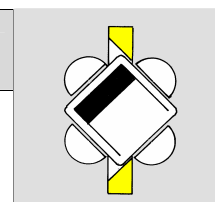
Shape : with 2 bearing rings and filler
Shape of cage : KK 202, KKXR



Shape : with 3 bearing rings
Shape of cage : KK 202, KKXR

Wire cross roller bearing

Shape : with 2 bearing rings and filler
Shape of cage : KK 202, KKXR



Shape : with 3 bearing rings
Shape of cage : KK 202, KKXR

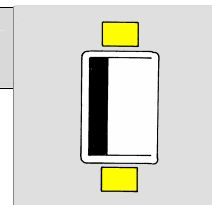
Ball bearing cages

Possibilities of use

Examples

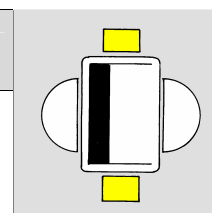
Radial roller bearing

Shape : with 2 bearing rings
Shape of cage : KK 202, KKRR, KKBF



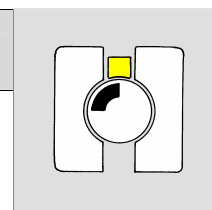
Wire radial roller bearing

Shape : with 2 bearing rings
Shape of cage : KK 202, KKRR, KKBF



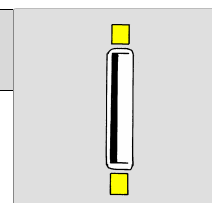
Thin ring bearing

Shape : with 2 bearing rings
Shape of cage : KK 101



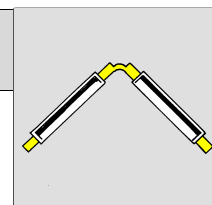
Needle roller bearing

Shape : with 2 bearing rings (radial bearing)
Shape of cage : KKRR, KKBF



Straight guide (linear guide)

All the above shapes can be produced as straight guides, where every ITM standard cage strip can be used in metre lengths.



Further information in ITM publication LLK 100 (linear bearing cages).

Ball cage KCLK

Series KCLK – cage strips filled with balls

General

Ball cages of series KCLK are ball cages of series KK 100 and KK 107 with ball guides and holders, which are supplied filled with balls. The ball cage strips are offered in metre lengths or cut ready for installation.

The standard balls for filled cage strips of series KCLK are made of the material 100Cr6 according to DIN 5401 / Grade 28 (class 3). Variants made of other materials, eg: corrosion-resistant steel X46Cr13 / 1.4034 or POM plastic and AL_2O_3 ceramic are also possible.

Possibilities of use

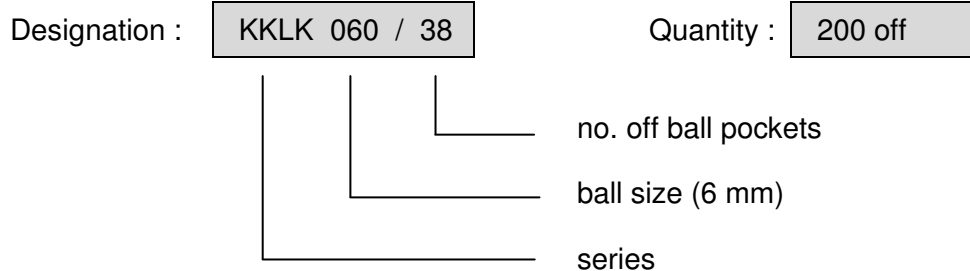
All rotating (and linear) movements based on ball track systems, eg:

- Four point ball bearings
- Grooved ball bearings
- Ball rotating joints
- Wire ball bearing elements or complete bearings
- Skew ball bearings (in certain conditions)
- Rotating joints

Minimum quantity	- none
Material	- PA 12
Colouring	- at the manufacturer`s choice
Suffixes for balls (examples)	- corrosion-resistant steel SS
	- plastic POM
	- ceramic ALO

Example of order / inquiry

Ball cage cut to length with 38 balls 6 mm diam. (note cage end play page 8)



Ball cage in metre lengths, filled with 6 mm diam. balls made of corrosion-resistant steel (SS)

Designation: Quantity :

Ball cage KKLK

Series KKLK cage strips filled with balls

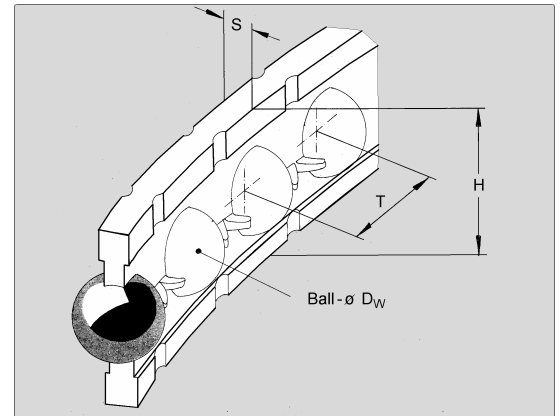
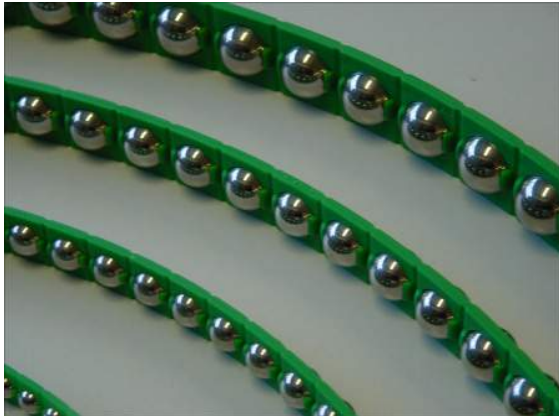


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball Ø		H	S	T	D 2)
	D _w	[inch]				
KKLK 021/...	2,000		5,0	0,75	3,0	2,1
KKLK 023/...	2,381	3/32	6,0	0,80	3,6	2,5
KKLK 031/...	3,000		7,0	1,00	4,2	3,2
KKLK S32/...	3,175	1/8	4,4	0,70	4,2	3,3
KKLK 032/...	3,175	1/8	7,0	1,00	4,2	3,2
KKLK 039/...	3,969	5/32	6,3	1,30	5,8	4,2
KKLK 040/...	4,000		6,3	1,30	5,8	4,2
KKLK 047/...	4,762	3/16	8,0	1,50	6,8	5,2
KKLK 050/...	5,000		8,0	1,50	6,8	5,2
KKLK 060/...	6,000		9,0	1,60	7,8	6,2
KKLK 063/...	6,350	1/4	9,0	1,60	7,8	6,5
KKLK 079/...	7,938	5/16	12,0	2,00	12,0	8,2
KKLK 080/...	8,000		12,0	2,00	12,0	8,2
KKLK 09C/...	9,000		11,6	2,00	11,5	9,2
KKLK 090/...	9,000		15,0	2,00	11,5	9,2
KKLK 095/...	9,525	3/8	12,6	2,50	12,0	9,7
KKLK 100/...	10,000		13,2	2,50	12,5	10,2
KKLK 110/...	11,000		13,7	2,50	14,0	11,2
KKLK 111/...	11,112	7/16	13,7	2,50	14,0	11,2
KKLK 12C/...	12,000		15,0	2,50	15,0	12,2
KKLK 127/...	12,700	1/2	22,0	3,50	16,0	13,0
KKLK 160/...	16,000		20,0	3,50	20,0	16,2

- 1) Other dimensions on request
- 2) D = Diameter of ball pocket

Ball cage KK 100

Series KK 100 with guide and holder



General

Ball cages of series KK 100 are made with ball guides and have ball holders on the ball pockets. The ball cages are supplied in metre lengths, without balls, on transport reels.

Possibilities of use

All rotating (and linear) movements based on ball track systems, eg:

- Four point ball bearings
- Grooved ball bearings
- Ball rotating joints
- Wire ball bearing elements or complete bearings
- Skew ball bearings (in certain conditions)
- Rotating joints

Minimum quantities

Supplied in quantities of with minimum quantity added price from 100 m without minimum quantity added price (alternative, series KCLK without added price)

Material

PA 12

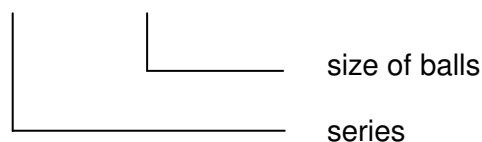
Colouring

At the manufacturer`s choice

Example of order / inquiry:

Designation :

Quantity :



Ball cage KK 100

Series KK 100 with guide and holders

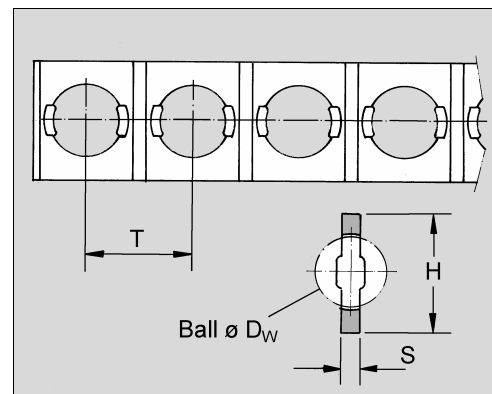
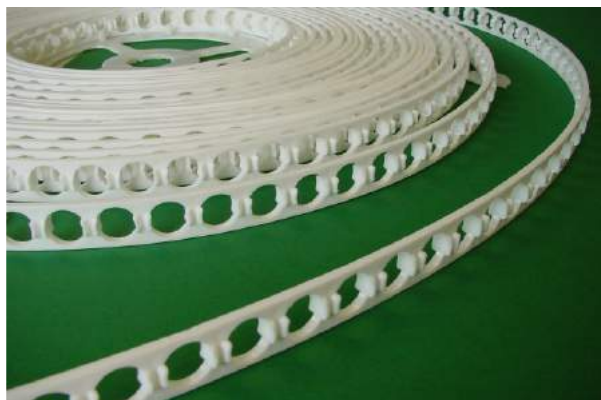


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball Ø		H	S	T	D 2)
	D _w	[inch]				
KK 100-2,000	2,000		5,0	0,75	3,0	2,1
KK 100-2,381	2,381	3/32	6,0	0,80	3,6	2,5
KK 100-3,175	3,000		7,0	1,00	4,2	3,2
KK 100-3,175	3,175	1/8	7,0	1,00	4,2	3,2
KK 100 F-08	7,938	5/16	12,0	2,00	12,0	8,2
KK 100 F-08	8,000		12,0	2,00	12,0	8,2
KK 100-08 S24	7,938	5/16	14,0	2,00	24,0	8,2
KK 100-08 S24	8,000		14,0	2,00	24,0	8,2
KK 100-09A	9,000		15,0	2,00	11,5	9,2
KK 100-09C	9,000		11,6	2,00	11,5	9,2
KK 100 D-9,525	9,525	3/8	12,6	2,50	12,0	9,7
KK 100 K-9,525	9,525	3/8	12,6	3,00	24,0	9,7
KK 100 D-10	10,000		13,2	2,50	12,5	10,2
KK 100-10,319	10,319	13/32	22,0	3,50	13,0	10,5
KK 100-11C	11,000		13,7	2,50	14,0	11,2
KK 100-11C	11,112	7/16	13,7	2,50	14,0	11,2
KK 100-12C	12,000		15,0	2,50	15,0	12,2
KK 100-12,7	12,500		22,0	3,50	16,0	13,0
KK 100-12,7	12,700	1/2	22,0	3,50	16,0	13,0
KK 100-13,494	13,494	17/32	22,0	3,50	17,0	14,0
KK 100-13,494	13,500		22,0	3,50	17,0	14,0
KK 100-16	15,875	5/8	20,0	3,50	20,0	16,2
KK 100-16	16,000		20,0	3,50	20,0	16,2
KK 100-17	17,000		28,0	4,00	21,0	17,5
KK 100-17	17,462	11/16	28,0	4,00	21,0	17,5
KK 100-20 C	20,000		24,2	3,50	25,0	20,2
KK 100-20,638	20,638	13/16	31,0	4,50	25,0	21,0
KK 100-22H30	22,000		30,0	6,00	27,5	23,2
KK 100-22H30	22,225	7/8	30,0	6,00	27,5	23,2
KK 100-22H30	23,000		30,0	6,00	27,5	23,2
KK 100-22H30	23,019	29/32	30,0	6,00	27,5	23,2

1) Other dimensions on request

2) D = Diameter of ball pocket

Ball cage KK 101

Series KK 101, opened as snap cage



General

Ball cages of series KK 101 are opened on one side and can therefore be snapped on to the corresponding ball series. The cage strips are provided with a ball cup in the ball pocket from ball diameter 9,525 upwards, but are not provided with a ball holder. The cage strip is preferably guided on the bearing edges, due to the limited ball guidance. The cage strips are supplied as metre lengths, without balls, on transport reels.

Possibilities of use

All rotating movements based on ball track systems, and which are mainly produced by „Condrad filling“, eg:

- Four point ball bearings
- Grooved ball bearings
- Ball rotating joints
- Wire ball bearing elements or complete bearings
- Rotating guides

Minimum quantities

Supplied in quantities of < 100 m with minimum quantity added price
from 100 m without minimum quantity added price

Material

PA 12

Colouring

At the manufacturer`s choice

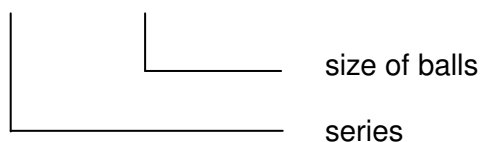
Example of order / inquiry:

Designation :

KK 101 – 12,7

Quantity :

500 metres



Ball cage KK 101

Series KK 101, opened as snap cage

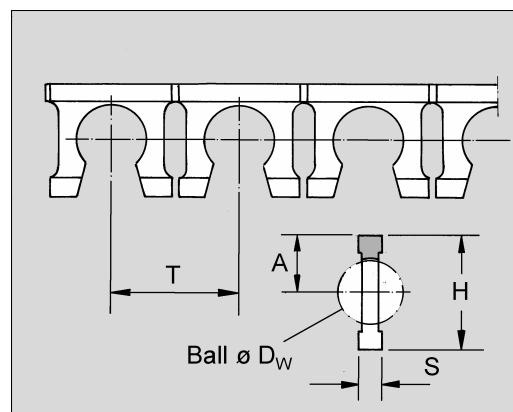


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball Ø		H	A	S	T	D 2)
	D _w	[inch]					
KK 101-3,175	3,175	1/8	5,0	3,00	1,1	6,2	3,3
KK 101-3,962	3,962	5/32	6,2	3,10	1,4	7,9	4,1
KK 101-4,762	4,762	3/16	7,7	3,85	1,7	9,5	4,9
KK 101-05	5,000		7,5	3,70	1,5	10,0	5,2
KK 101-06	6,000		9,0	4,50	2,0	12,0	6,2
KK 101-6,350	6,350	1/4	10,5	5,25	2,2	12,7	6,5
KK 101-08	7,938	5/16	14,0	7,00	2,5	16,0	8,2
KK 101-08	8,000		14,0	7,00	2,5	16,0	8,2
KK 101-9,525	9,525	3/8	16,0	9,40	3,5	19,0	9,8
KK 101-10,319	10,319	13/32	22,0	11,00	3,5	20,0	10,5
KK 101-12,0	12,000		18,0	9,00	4,0	24,0	12,2
KK 101-12,7	12,700	1/2	22,0	11,00	4,5	25,0	13,0
KK 101-13,494	13,494	17/32	22,0	11,00	4,5	27,0	14,0
KK 101-13,494	13,500		22,0	11,00	4,5	27,0	14,0
KK 101-16,0	16,000		28,0	14,00	5,5	32,0	16,5
KK 101-20,0	20,000		29,0	14,50	8,0	38,5	20,2

1) Other dimensions on request

2) D = Diameter of ball pocket

Ball cage KK 102

Series KK 102, holed strip without ball holders



General

Ball cages of series KK 102 are so-called „holed strips“ without ball guide and ball holders. The cage strip is guided on the bearing edges.

Possibilities of use

All rotating movements which are based on ball track systems, and which mainly have filling holes by means of filling stoppers, eg:

- Four point ball bearings
- Grooved ball bearings
- Surface-hardened ball rotating joints
- Rotating guides

Minimum quantities

Supplied in quantities of < 100 m with minimum quantity extra price
from 100 m without minimum quantity extra price

Material

PA 12

Colouring

At the manufacturer`s choice

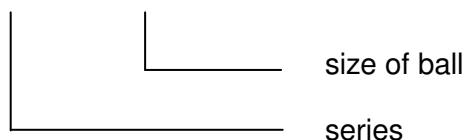
Example of order / inquiry

Designation :

KK 102 – 12

Quantity :

500 metres



Ball cage KK 102

Series KK 102, holed strip without ball holders

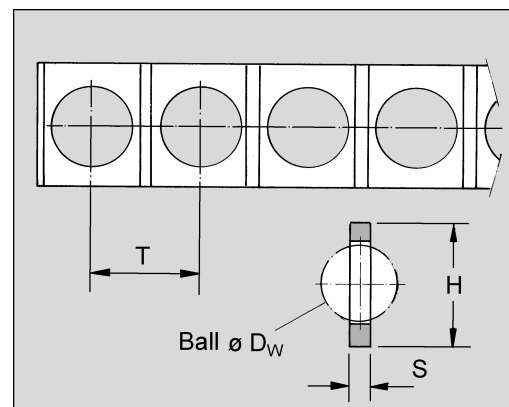


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball Ø		H	S	T	D 2)
	D _w	[inch]				
KK 102-10,319	10,000		22,0	3,5	13,0	10,5
KK 102-10,319	10,319	13/32	22,0	3,5	13,0	10,5
KK 102-12	11,906	15/32	18,0	2,5	14,0	12,2
KK 102-12	12,000		18,0	2,5	14,0	12,2
KK 102-12,7	12,500		22,0	3,5	16,0	13,0
KK 102-12,7	12,700	1/2	22,0	3,5	16,0	13,0
KK 102-14	14,000		22,0	3,5	16,0	14,4
KK 102-14	14,288	9/16	22,0	3,5	16,0	14,4
KK 102-15H25	15,000		25,0	4,0	18,8	15,2
KK 102-15H25	15,081	19/32	25,0	4,0	18,8	15,2
KK 102-17	16,000		28,0	4,0	21,0	17,5
KK 102-17	16,669	21/32	28,0	4,0	21,0	17,5
KK 102-17	17,000		28,0	4,0	21,0	17,5
KK 102-18	18,000		28,0	4,0	22,5	18,5
KK 102-18	18,256	23/32	28,0	4,0	22,5	18,5
KK 102-20H28	19,050	3/4	28,0	4,0	25,0	20,5
KK 102-20H28	19,844	25/32	28,0	4,0	25,0	20,5
KK 102-20H28	20,000		28,0	4,0	25,0	20,5
KK 102-20D	20,000		30,0	3,0	25,5	21,3
KK 102-20D	20,638	13/16	30,0	3,0	25,5	21,3
KK 102-20D	21,000		30,0	3,0	25,5	21,3
KK 102-20DT	20,000		30,0	3,0	51,0	21,3
KK 102-20DT	20,638	13/16	30,0	3,0	51,0	21,3
KK 102-20DT	21,000		30,0	3,0	51,0	21,3
KK 102-22H30	22,000		30,0	3,0	27,5	22,5
KK 102-22H30	22,225	7/8	30,0	3,0	27,5	22,5
KK 102-25,4	25,000		37,5	5,0	30,6	26,0
KK 102-25,4	25,400	1	37,5	5,0	30,6	26,0
KK 102-30	30,000		42,0	6,0	36,0	30,5
KK 102-30	30,162	1 3/16	42,0	6,0	36,0	30,5
KK 102-35	34,925	1 3/8	45,0	8,0	45,0	37,0
KK 102-35	35,000		45,0	8,0	45,0	37,0
KK 102-35	36,000		45,0	8,0	45,0	37,0

1) Other dimensions on request

2) D = Diameter of ball pocket

Ball cage KK 107

Series KK 107, with guide and holders

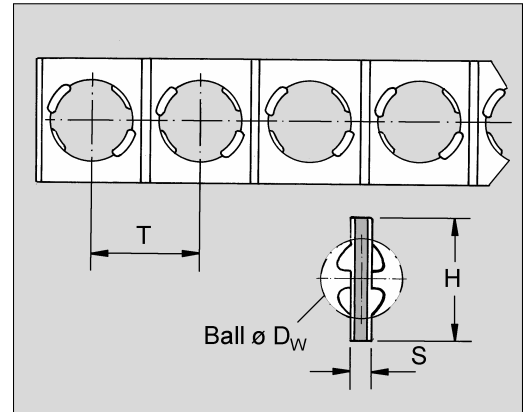
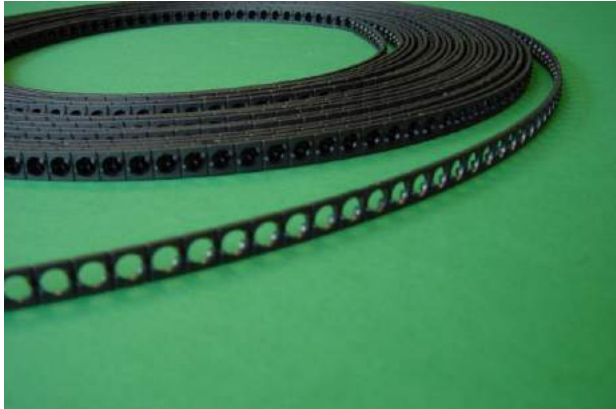


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball Ø		H	S	T	D 2)
	D _w	[inch]				
KK 107-3,175	3,175	1/8	4,4	0,7	4,2	3,3
KK 107-4,0	3,969	5/32	6,3	1,3	5,8	4,2
KK 107-4,0	4,000		6,3	1,3	5,8	4,2
KK 107-5,0	4,762	3/16	8,0	1,5	6,8	5,2
KK 107-5,0	5,000		8,0	1,5	6,8	5,2
KK 107-6,0	6,000		9,0	1,6	7,8	6,2
KK 107-6,35	6,350	1/4	9,0	1,6	7,8	6,5

1) Other dimensions on request

2) D = Diameter of ball pocket

General

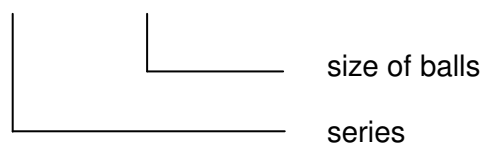
Ball cages of series KK 107 are mainly designed for small ball sizes with correspondingly small diameters.

The cage strips are guided and have skewed cross-arranged ball holders. This arrangement makes an optimum reduced ball part possible and causes sufficient holding with small running circle diameters.

The cage strips are supplied in metre lengths, without balls, on transport reels. For cage strips filled with balls, see series KCLK.

Example of order / inquiry

Designation : Quantity :



Ball cage KKVK 101

Series KKVK 101 – compound ball cage

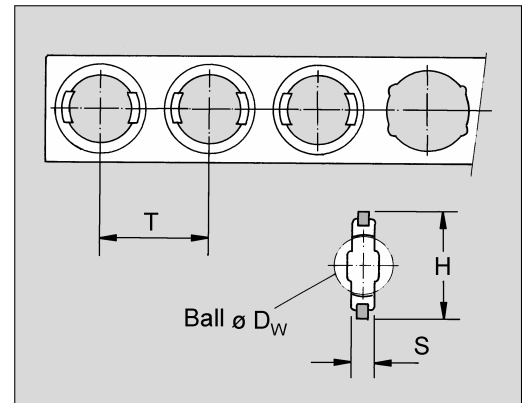


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball Ø		H	S	T	D 2)
	D _w	[inch]				
KKVK 101-6,35	6,35	1/4	12	2	11,67	6,5

1) Other dimensions on request

2) D = Diameter of ball pocket

General

Ball cages of series KKVK 101 are so-called guided compound cages.

They consist of a punched metal strip (support) and extruded plastic cups (ball pockets). The support is made of corrosion-resistant steel and the ball pocket of extruded TEFLON / PTFE.

These and other combinations of materials, eg. with ceramic balls make use in a high temperature range possible. Ball cages KKVK 101 can only be supplied in limited lengths.

Example of order / inquiry:

With reference to type KKVK, the order or inquiry should be as detailed as possible. For a tender to be made, apart from the running circle, the required combination of materials for the support, balls and plastic cups is required.

Ball cage KKAK

Series KKAK – axial ball cage strip

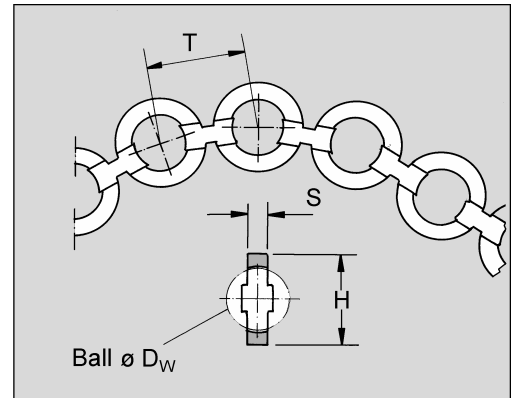


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball Ø D _w [inch]	H	S	T	D 2)
KKAK 104-06	6,00	9	2	10	6,1

1) Other dimensions on request

2) D = Diameter of ball pocket

General

Ball cages of series KKAK are guided axial ball cage strips specially designed for axial pressure bearings. The cage strips are supplied not filled, in metre lengths or cut, or ready to install filled with balls.

Example of order / inquiry:

Designation : Quantity :

Cage strip not filled

Designation : Quantity :

Cage strip ready to install
Equipped with 20 off 6 mm diameter balls

Ball cage KKAK... A

Series KKAK – axial ball cages

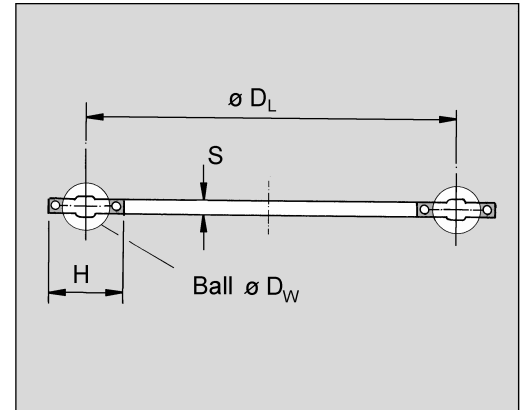


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball \varnothing D_W		H	S	T 2)	Running circle $\varnothing D_L$
	[inch]					
KKAK 6... A	6,000		13	3,0	9,0	> 100
KKAK 9,525... A	9,525	3/8	20	3,5	20,0	> 150
KKAK 11... A	11,000		19	4,0	14,5	> 200
KKAK 11,906... A	11,906	15/32	20	5,0	15,5	> 200
KKAK 12... A	12,000		20	5,0	15,5	> 200
KKAK 14... A	14,000		21	6,0	17,0	> 200

1) Other dimensions on request

2) Ball spacing (division)

General

Ball cages of series KKAK... A are guided axial ball cages specially designed for axial pressure bearings. The cages are so-called combination cages and consist of butt-welded precision steel rings (supports) and snap-on cage strips.

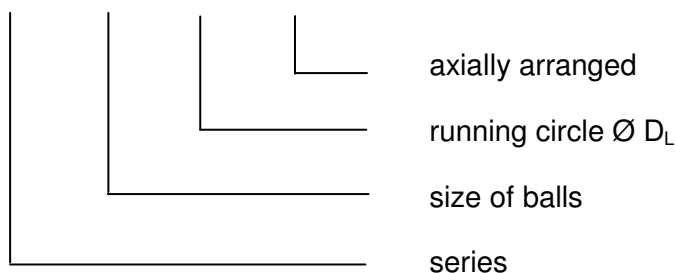
They are manufactured ready to install in the appropriate running circle diameter and may be filled with balls or offered and supplied without balls.

Due to the ideal shape, they can easily be made as segment cages, eg: for divided ball bearings or arcs with limited area.

Example of order:

Designation : **KKAK 9,525 1160 A**

Quantity : **200 off**



Ball cage KKAK... R

Series KKAK – radial ball cages

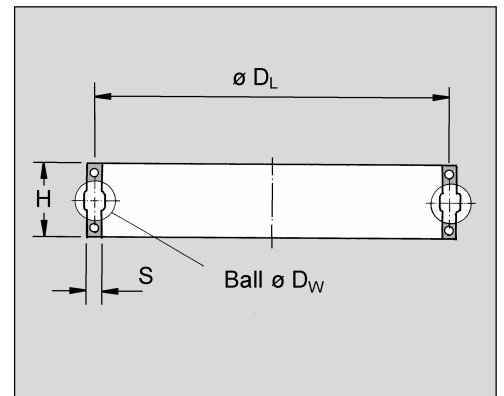


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball \varnothing D_W [inch]	H	S	T 2)	Running circle $\varnothing D_L$
KKAK 6... R	6,000	13	3,0	9,0	> 50
KKAK 9,525... R	9,525	20	3,5	20,0	> 200
KKAK 11... R	11,000	19	4,0	14,5	> 100
KKAK 11,906... R	11,906	20	5,0	15,5	> 100
KKAK 12... R	12,000	20	5,0	15,5	> 100
KKAK 14... R	14,000	21	6,0	17,0	> 100

1) Other dimensions on request

2) Ball spacing (division)

General

Ball cages of series KKAK... R are guided ball cages specially designed for ball bearings and ball bearing elements.

The cages are so-called combination cages and consist of butt-welded precision steel rings (supports) and radial snap-on cage strips.

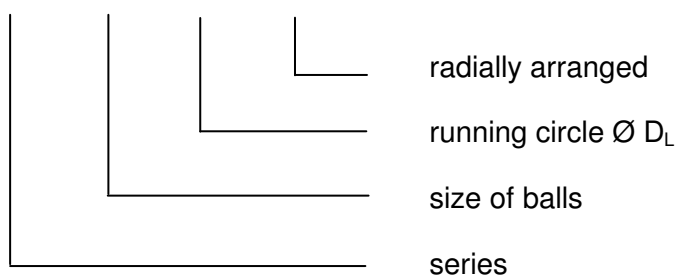
They are manufactured ready to fit on the appropriate running circle $\varnothing D_L$ and can be filled with balls or offered and supplied without balls.

Due to the ideal shape, they can easily be made as segment cages, eg: for divided ball bearings or arcs with limited area.

Example of order:

Designation : **KKAK 11 0200 R**

Quantity : **50 off**



Ball cage KKAK... S

Series KKAK – skew ball cages

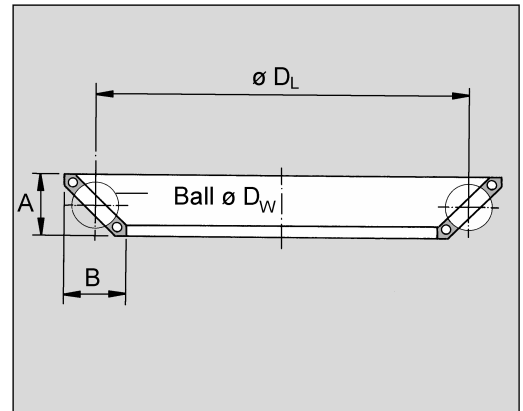


Table of dimensions [dimensions in mm]

ITM-type 1)	Ball \varnothing D_w		A	B	T 2)	Running circle $\varnothing D_L$
	[inch]					
KKAK 11... S	11,000		14	14	14,5	> 150
KKAK 11,906... S	11,906	15/32	15	15	15,5	> 150
KKAK 12... S	12,000		15	15	15,5	> 150
KKAK 14... S	14,000		15	15	17,0	> 150

1) Other dimensions on request

2) Ball spacing (division)

General

Ball cages of series KKAK... S are guided ball cages specially designed for skew ball bearings and skew ball bearing elements, preferably with a pressure angle of 45° .

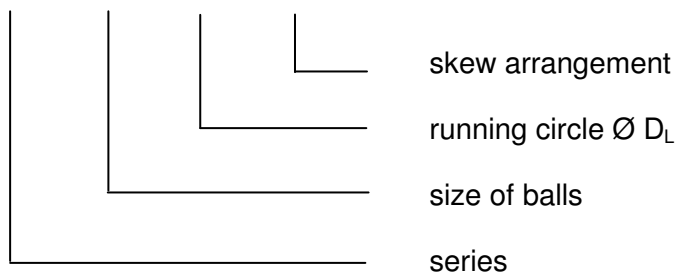
The cages are so-called combination cages and consist of butt-welded precision steel rings (supports) and the skewed snap-on cage strips, matching the pressure angle.

They are manufactured ready to install to the required running circle diameter and may be filled with balls or offered and supplied without balls.

Example of order:

Designation : **KKAK 11 0200 S**

Quantity : **50 off**



Radial needle roller set KKRK (KKBF)

Series KKRK 200 – needle roller cage strip



General

Radial needle roller sets of series KKRK (KKBF) are single row held plastic cage strips for needle rollers.

The cage strips are offered and supplied in metre lengths without needle rollers with ITM type designation KKRK 200 and with needle rollers with ITM type designation KKBF

Minimum quantities

For ITM type KKRK 200 from 100 m without minimum quantity extra price.


For quantities < 100 m with minimum quantity extra price.

Needle rollers of type KKBF (incl. needle rollers NRB / G2) no minimum quantity charge.

Examples of orders / inquiries:


Needle roller cage strip for own filling and cutting to length

Designation : Quantity :



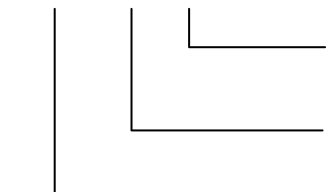
Needle roller set for cutting to length

Designation : Quantity :



Needle roller set ready to install

Designation : Quantity :



Radial needle roller set KKRK (KKBF)

Series KKRK 200 – needle roller cage strip

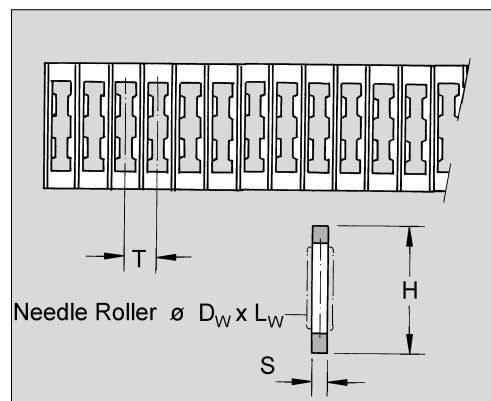
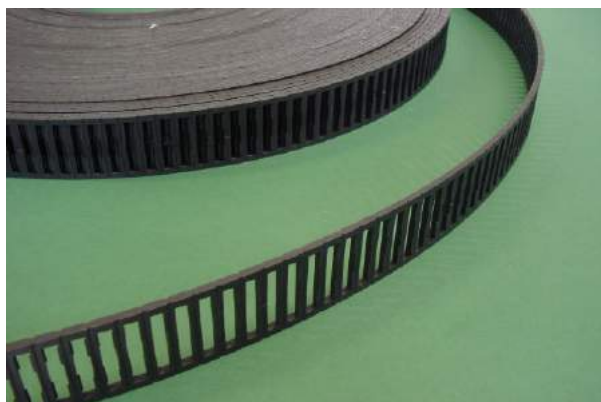


Table of dimensions [dimensions in mm]

ITM-type 1) without needle	ITM-type 2) with needle	Needle roller Ø D_w x L_w	H	S	T	No. of needle per metre
KKRK 200-01	KKBF 1510 3)	1,5 x 7,8	10	1,1	2,9	344
KKRK 200-025	KKBF 2518	2,5 x 13,8	18	2,0	4,8	208
KKRK 200-03	KKBF 3020	3,0 x 15,8	20	2,5	5,2	192
KKRK 200-04	KKBF 4030	4,0 x 23,8	30	3,0	7,0	142
KKRK 200-05 B	KKBF 5023	5,0 x 15,0	23	3,5	8,0	125
KKRK 200-05	KKBF 5035	5,0 x 27,8	35	3,5	9,0	111
KKRK 200-12	KKBF 12040	12,0 x 30,0	40	5,0	16,0	62

- 1) Other dimensions on request
- 2) Further information, eg: numbers, installation, installed diameter etc. of filled radial needle roller sets of series KKBF can be seen in ITM publication UFT (see survey of publications page 34).
- 3) The radial needle roller set KKBF 1510 was originally designed for sensitive balancing systems and has a reduced ball holder. It is therefore recommended that ready to install needle roller sets, not metre lengths, should be discussed with the manufacturer.

Radial roller cage KKRR

Series KKRR 207 – radial roller cage strip

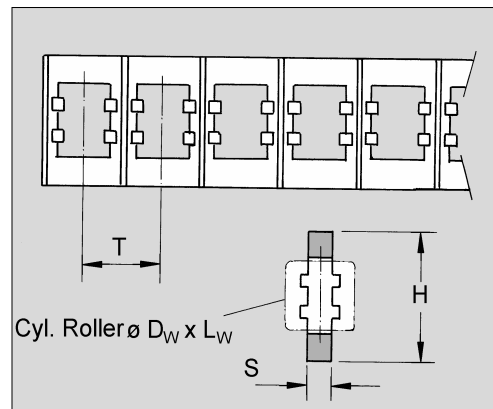


Table of dimensions [dimensions in mm]

ITM-type 1) without rollers	ITM-type with rollers	Cylinder roller $\varnothing D_W \times L_W$	H	S	T	L	No. of Cyl.-rollers per metre
KKRR 207-05	KKRR 0505	5 x 5,0	10	2,5	7,5	5,2	133
KKRR 207-10	KKRR 1010	10 x 10,0	16	2,5	13,0	10,2	76
KKRR 207-10	KKRR 1009	10 x 9,8	16	2,5	13,0	10,2	76
KKRR 207-16	KKRR 1616	16 x 16,0	18	4,0	22,0	16,2	45
KKRR 207-16	KKRR 1615	16 x 15,8	28	4,0	22,0	16,2	45

1) Other dimensions on request

General

Radial roller cages of series KKRR are single row guided plastic cage strips for cylindrical rollers. The cage strips are offered and supplied in metre lengths without cylindrical rollers as ITM type KKRR 207 and the rollers are supplied as ITM type KKRR... .

Examples of order / inquiry:

Radial roller cage strip for own filling and cutting to length

Designation : Quantity :

Radial roller cage for own cutting to length

Designation : Quantity :

cage strip with rollers 10 x 10 series

Radial roller cage ready to install

Designation : Quantity :

ready to install cut to correct length (note cage end play, page 8)

Roller cage KK 202

Series KK 202 – radial roller / cross roller cage strip

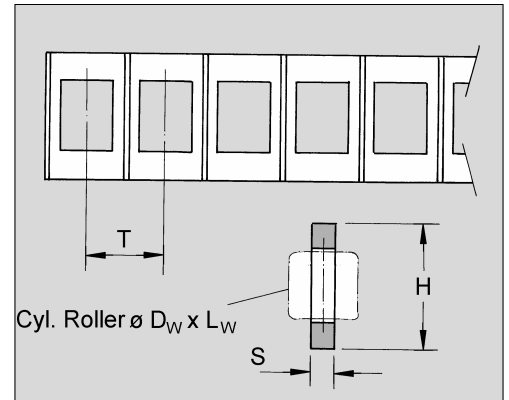
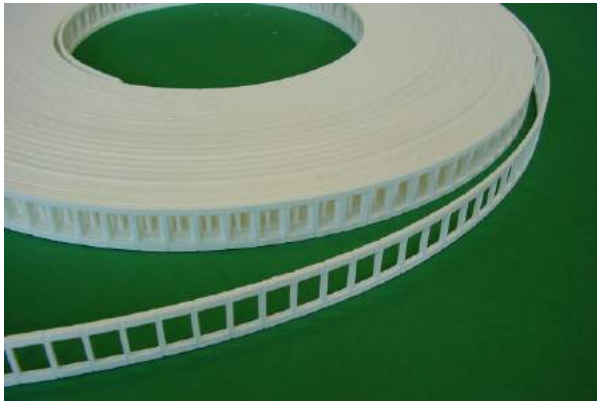


Table of dimensions [dimensions in mm]

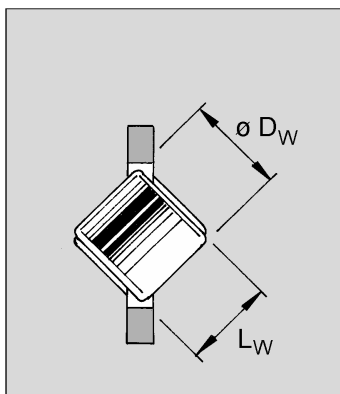
ITM-type 1)	Cross roller Ø D _W x L _W	H	S	T	L
KK 202-10 H 22	10 x 9,8	22	2,5	12,3	14,0
KK 202-10	10 x 7,9	20	3,9	12,3	12,3

ITM-type 1)	Radial roller Ø D _W x L _W	H	S	T	L
KK 202-10 H 22	10 x 13,5	22	2,5	12,3	14,0
KK 202-10	10 x 12,0	20	3,9	12,3	12,3

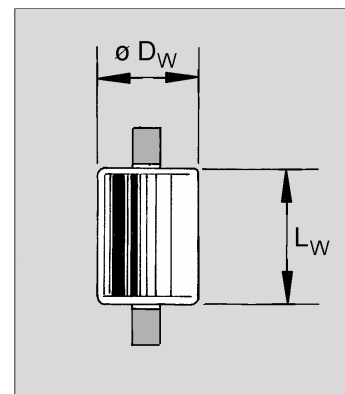
1) Other dimensions on request

General

Roller cages of series KK 202 are so-called „hole strips“ without roller guides and roller holders. The cage strip is guided on the bearing edges. It can be used for track systems with cross rollers and with radial rollers.



Cross roller



Radial roller

Example of order / inquiry

Designation :

Quantity :

Roller cage KKXR

Series KKXR – cross roller cage strip

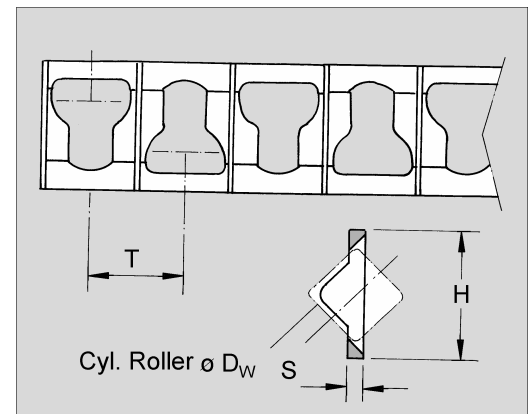


Table of dimensions [dimensions in mm]

ITM-type 1)	Cross roller Ø D _w	H	S	T
KKXR 209-06	6	12	1,0	7,5
KKXR 209-10	10	22	2,0	12,5
KKXR 209-14	14	28	3,0	17,5
KKXR 209-16	16	32	3,0	20,0
KKXR 209-20	20	40	3,0	25,0
KKXR 209-25	25	47	3,5	32,0

1) Other dimensions on request

General

Roller cages of series KKXR are cage strips for track systems with cross rollers. One of the advantages of these separator strips would be that compared with distance pieces the time consuming endplay setting by using balance distance pieces is no longer required.

The roller pockets have a one-sided guide without roller holders. The cage strip is preferably filled via filling holes in the track system, but is suitable for bearings with split bearing rings, too.

The guide is arranged for the bearing ring without filling stopper. Therefore two winding directions (winding direction A / B) are offered, which must be noted in the order.

Example of order / inquiry:

KKXR 209-14 -A- 100 metres

Designation

Winding direction

Quantity



Winding direction -A-



Winding direction -B-

Roller cage KVSR

Series KVSR – skew roller cage

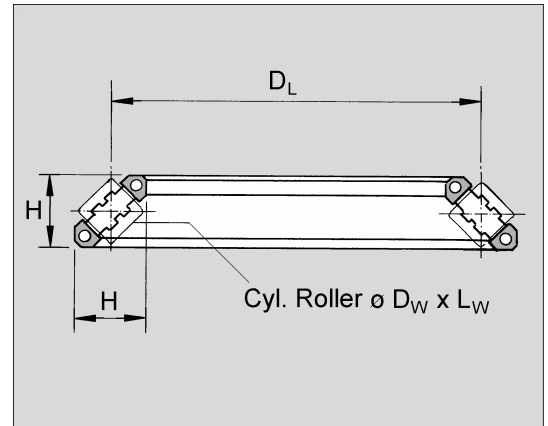


Table of dimensions [dimensions in mm]

ITM-type 1)	Cylindrical rollers		H x H	Area of use Running circle $\varnothing D_L$	
	D_W	L_W		$\varnothing D_L$ min.	$\varnothing D_L$ max.
KVSR 18	18	18	27 x 27	250	~ 1800

1) Other dimensions on request

General

Skew roller cages of series KVSR are combination cages. Stable precision steel wire rings (so-called supports) are completed with a plastic roller cage strip into a skew roller cage with a preferred pressure angle of 45°.

By the combination principle, all pressure angles from 0° (axial roller set) to 90° (radial roller set) can be produced.

The supports are manufactured exactly to the diameter as a closed ring. The cylindrical rollers are held and guided in the roller pockets.

Example of order / inquiry:

State manufactured by the manufacturer ready to install on running circle diameter ($\varnothing D_L$).

KVSR-18

Designation

420 mm

Running circle $\varnothing D_L$

15 off

Quantity

Roller cage AXK

Series AXK – axial roller sets

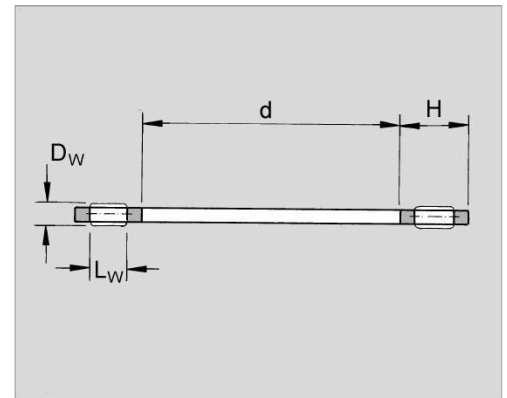
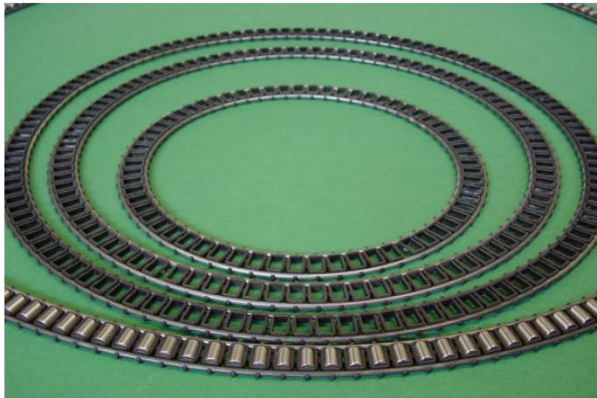


Table of dimensions [dimensions in mm]

ITM-type 1)	Cylindrical rollers		Area of use Shaft diameter		H	T 2)
	D _w	L _w	d min.	d max.		
AXK 4015	4	8	100	~ 1000	15	7,5
AXK 5015	5	8	100	~ 1000	15	8,0
AXK 5020	5	15	120	~ 1200	20	8,0
AXK 7025	7	14	350	~ 1200	25	11,0
AXK 18036	18	18	400	~ 1800	36	23,0

1) Other dimensions on request

2) Roller spacing (division)

General

Axial roller sets of series AXK are combination cages. Stable precision steel wire rings (so-called supports) are completed by a plastic roller cage strip into an axial roller set with a pressure angle of 0°. By the combination principle, other pressure angles, eg: 30° or 45° (skew roller cages) can be produced.

The supports are manufactured exactly to the diameter as a closed ring. The cylindrical rollers are held and guided in the roller pockets.

Example of order / inquiry:

AXK 5015

Designation

0220

Area of use
Shaft diameter (mm)

20 off

Quantity

Roller cage KKBF

Series KKBF – radial roller sets

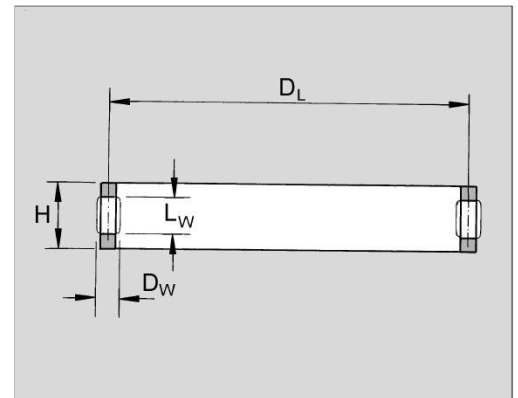


Table of dimensions [dimensions in mm]

ITM-type 1)	Cylindrical roller		Area of use Running circle diameter		H	T 2)
	D _w	L _w	D _L min.	D _L max.		
KKBF 4015	4	8	100	~ 1000	15	7,5
KKBF 5015	5	8	100	~ 1000	15	8,0
KKBF 5020	5	15	120	~ 1000	20	8,0
KKBF 7025	7	14	150	~ 1200	25	11,0
KKBF 18036	18	18	200	~ 1800	36	23,0

1) Other dimensions on request

2) Roller spacing (division)

General

Radial roller sets of series KKBF are combination cages. Stable precision steel wire rings (so-called supports) are completed by a plastic roller cage strip into a roller set with a pressure angle of 90°.

The supports are manufactured exactly to the running circle diameter (D_L) as a closed ring. The supports may be provided with an impact position, so that the radial roller set can also be mounted in a sunken running track. The types KKBF 4015, 5015 and 7025 are eminently suitable for producing multi-row radial roller sets.

Example of order / inquiry:

KKBF 5015	0400	10 off
Designation	Running circle Ø D _L (mm)	Quantity



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