

### L1007

BALL & NEEDLE CAGES

#### Material

Ball steel (100Cr6 to DIN 5401, class 3), ball cage plastic (PA 12).  
Can also be supplied with corrosion resistant stainless balls (AISI 304) balls, plastic balls (POM) or ceramic balls.

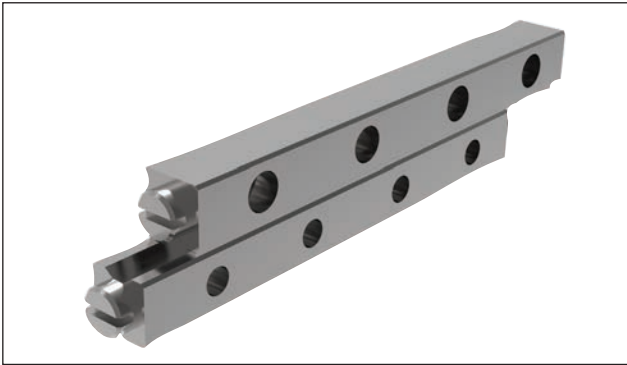
#### Technical Notes

When ordering please specify the length required (must be a multiple of pitch, p).  
Supplied in max. 1 metre lengths.

#### Tips

Ordering example:  
L1007.030-020 is a 3mm diameter ball strip length 84mm with 20 rollers (as 20xp = 84mm).

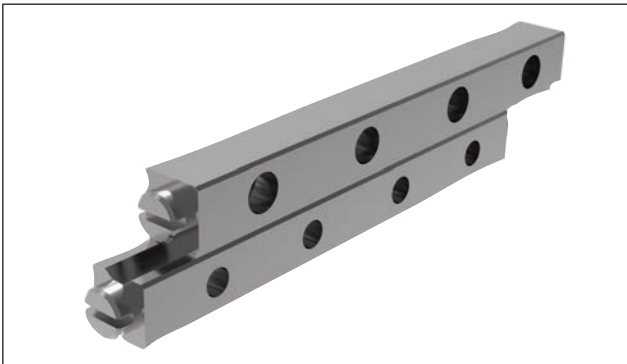
Order No.	d <sub>1</sub>	p <sub>1</sub>	h <sub>1</sub>	w <sub>1</sub>	d <sub>2</sub>
L1007.020-xxx	2.0	3.0	5.0	0.75	2.1
L1007.030-xxx	3.0	4.2	7.0	1.00	3.2
L1007.040-xxx	4.0	5.8	6.3	1.30	4.2
L1007.050-xxx	5.0	6.8	8.0	1.50	5.2
L1007.060-xxx	6.0	7.8	9.0	1.60	6.2
L1007.080-xxx	8.0	12.0	12.0	2.00	8.2
L1007.090-xxx	9.0	11.5	15.0	2.00	9.2
L1007.100-xxx	10.0	12.5	13.2	2.50	10.2
L1007.110-xxx	11.0	14.0	13.7	2.50	11.2
L1007.120-xxx	12.0	15.0	15.0	2.50	12.2
L1007.160-xxx	16.0	20.0	20.0	3.50	16.2



### Standard cross roller rail sets

#### L1000 & L1001

- Seven rail profiles (Sizes 1-12)
- Lengths: 20mm to 1 metre
- L1000 standard rail set
- L1001 corrosion resistant rail sets



### Deep groove and anti-creep rail sets

#### L1002 + L1003

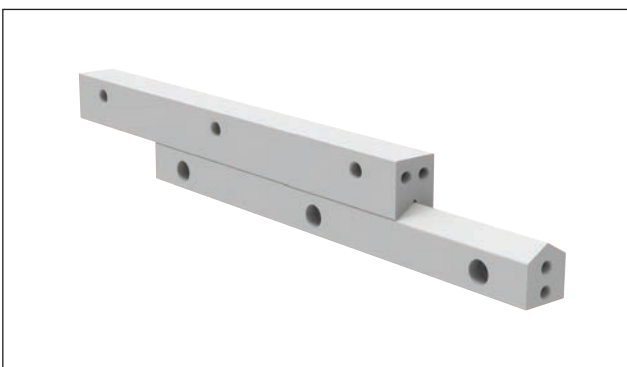
- 3 x load capacity of standard rail sets (due to deep V groove)
- Two rail profiles (Sizes 4 & 6)
- Lengths 50mm to 400mm
- Anti-creep versions for high acceleration applications



### Needle roller rail sets

#### L1004

- Heavy load ratings and needle rollers are used
- Five rail profile size
- Lengths: 200mm to 1.2 metres



### Anti-friction coated rail sets

#### L1005 & L1006

- Same profile as needle roller rails but contact face Teflon coated.
- Ideal for harsh, dirty conditions
- Vibration damping characteristics



Our cross roller rail sets are of the highest quality.

- Close tolerance  $\pm 5\mu$
- Speeds up to 50 m/min
- Temperature range  $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  up to  $+250^{\circ}\text{C}$  if applying a temperature factor
- Through hardened to  $60 \pm 2$  HRC
- Acceleration up to  $50 \text{ m/sec}^2$
- Typical 0.003 coefficient of friction dependent on mounting surface accuracy

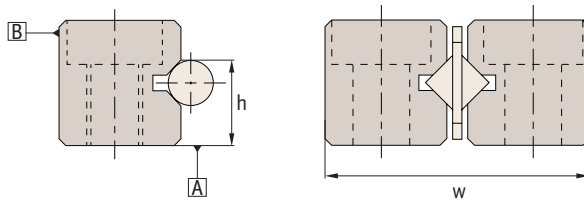
### Expected life calculation:

$$\text{Life (Km)} L = (C/P)^{3.3} \times 1.15 \times 10^5 \text{m}$$

C = effective dynamic load (N)

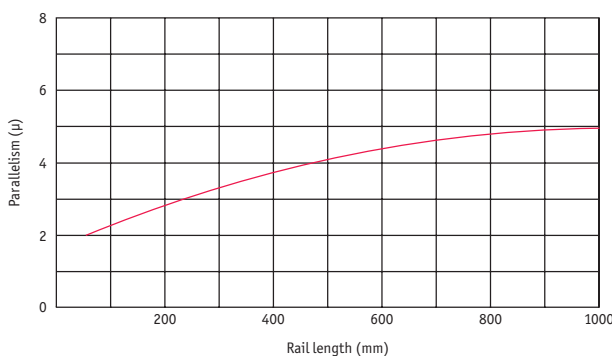
P = equivalent load (N)

### Accuracy Specification:



Accuracy level	
Parallelism of rolling plane A&B	graph below
Allowable height tolerance (h)	$\pm 0,02$
Paired mutual height tolerance (h)	0,01
Allowable width tolerance (w)	$+0, -0,02$

### Parallelism



### Lubrication:

The units are lubricated with lithium soap lubricant. Relubricate if required.

### Working life calculation:

$$L_h \text{ (hours)} = \frac{L \times 10^6}{2 \times L_s \times n \times 60}$$

L = Life (Km), see above

$L_s$  = Stroke Length (mm)

n = Number of operations/min

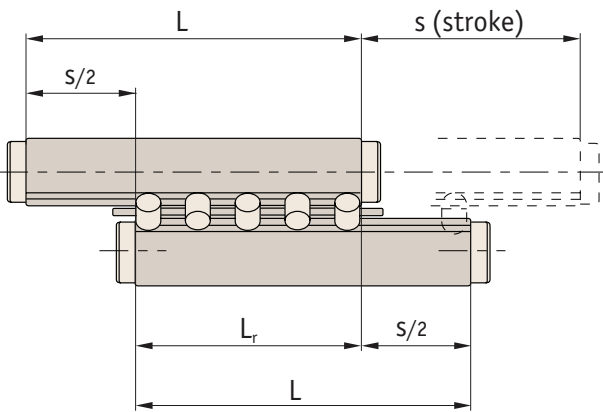
Straightness		
Length (mm)		Straightness (μ)
Above	Below	
0	50	2,0
50	100	2,0
100	160	3,0
160	310	3,0
310	510	4,0
510	600	4,0

(Ra 0,2 μm)



### Load capacity depends on:

- Rail size
- Number of rollers in cage
- Load rating = number of rollers x load rating/roller
- Number of rollers ( $N_r$ ) = cage length ( $L_c$ ) / pitch  $p$
- Cage length affects the stroke and travel of the system



### Load calculations

Calculations of retainer length and number of rollers:

$$L_r = \frac{L - S}{2}$$

$L_r$  = distance between two rollers in ends of retainer (mm)

$L$  = rail length (mm)

$S$  = stroke length (mm)

### Worked example:

Assume L1000.09-400 with a stroke of 250mm:

Cage length =  $400 - (250/2) = 275$ mm

Roller  $\varnothing = 9$ mm with a pitch (see table) of 18mm:

Number of rollers =  $275/18 = 15$

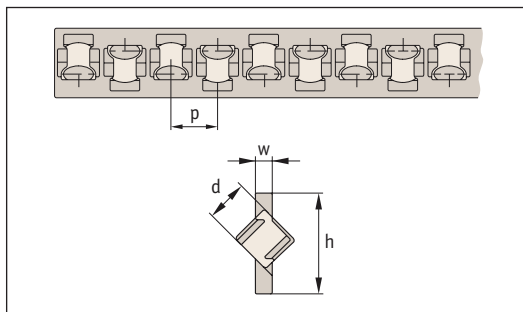
Load rating of system = load/roller\* x no. of rollers

(a pair of rollers) =  $2420\text{N} \times 15$

= 36,300N

\*See product table for allowable load per roller.

Allowable load rating with a 3x safety factor compared to static load.



### Plastic cage



L1008.###-PR-xxx

Plastic cage with steel rollers,  
for horizontal and vertical use.

### Steel cage



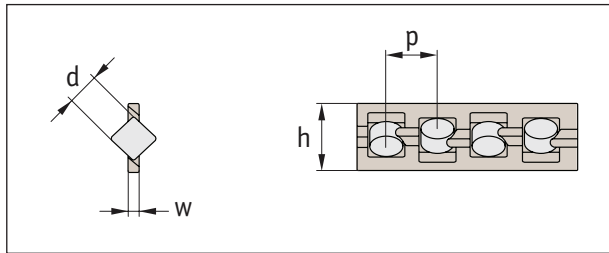
L1008.###-AA-xxx

Steel cage with steel rollers,  
for horizontal use only.

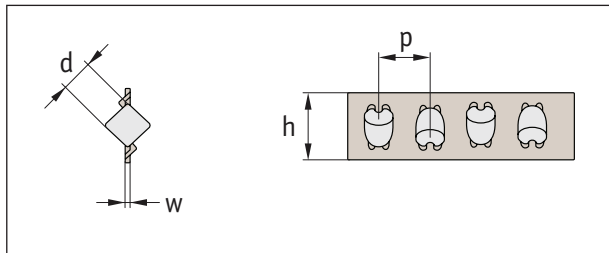
Order no.	d	p	h	w	Cage material
L1008.020-PR-xxx	2	3,9	5	0,75	Plastic - black
L1008.030-PR-xxx	3	5,0	7	1,00	Plastic - black
L1008.060-PR-xxx	6	8,5	14	2,00	Plastic - black
L1008.090-PR-xxx	9	14,0	20	3,00	Plastic - black
L1008.020-AA-xxx	2	4	5,5	0,80	Steel
L1008.030-AA-xxx	3	5	7,5	0,50	Steel
L1008.060-AA-xxx	6	12	14	0,80	Steel
L1008.090-AA-xxx	9	18	19,5	1,00	Steel
L1008.120-AA-xxx	12	22	25	1,20	Steel



### Plastic cage (type PR)



### Steel cage (type AA)

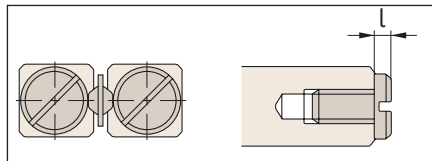


Roller load ratings (per roller)			
Rail size	Max. dynamic load $C_0$ N	Max. static load C N	Allowable* load N
1	125	144	48
2	290	290	95
3	630	760	250
4	1230	1170	390
6	2570	2630	870
9	7190	7270	2420
12	14700	13100	4300

The more rollers the greater the load capacity

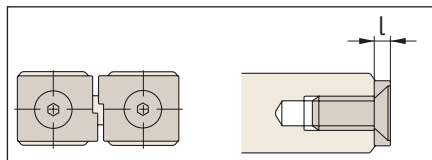
\* Allowable load is 1/3 of max. static load/roller, to allow a safety factor in calculations of 3.

### End pieces



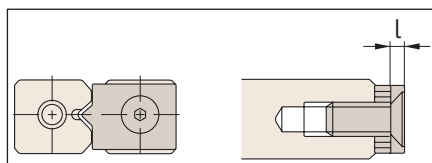
#### Type GA

- For horizontal applications, most used.



#### Type GB

- For horizontal or vertical applications.

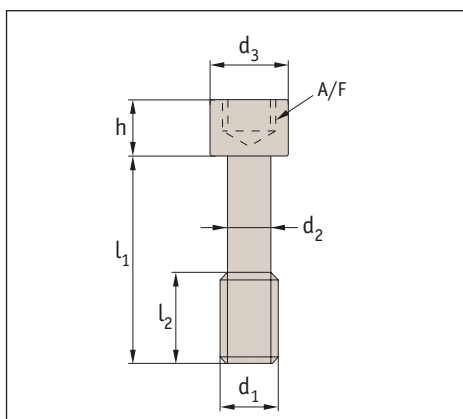


#### Type GC

- For horizontal or vertical applications.
- Mount on longer rail only.

Rail size	Type		
	GA l	GB l	GC l
1	1,5	-	-
2	2	3	-
3	2	2	3
6	3	3	5
9	3	4	6
12	3	5	8

### End screws



Rail	h	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	l <sub>1</sub>	l <sub>2</sub>	A/F
3	3	M3	2,3	5	12	5	2,5
6	5	M5	3,9	8	20	8	4
9	6	M6	4,6	8,5	30	12	5
12	8	M8	6,25	11,3	40	17	6