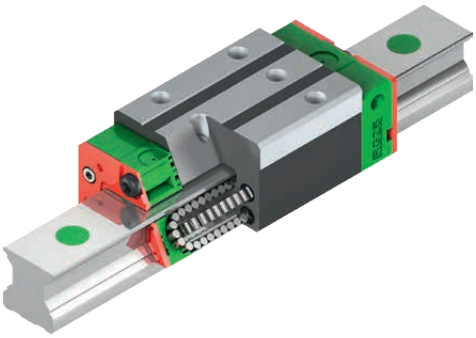
3.6 RG and QR series

3.6.1 Properties of the linear guideways, series RG and QR

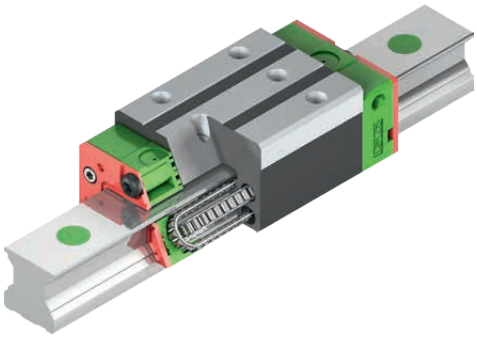
The HIWIN linear guideways of the RG series use rollers rather than balls as rolling elements. The RG series provides extremely good rigidity and very good loading capacity. It is designed with a 45° contact angle. Its linear contact surface greatly reduces deformation from the loading produced and therefore ensures very good rigidity and loading capacity in all 4 loading directions. The linear guides of the RG series are therefore ideal for use in high-precision manufacturing.
The models of the QR series with SynchMotion™ technology offer all the positive properties of the standard series RG. Controlled movement of the rollers at a defined distance also results in improved synchronous performance, higher reliable travel speeds, extended lubrication intervals and less running noise. Since the installation dimensions of the QR blocks are identical to those of the RG blocks, they are also fitted on the RGR standard rail and can therefore be interchanged with ease. For more information, refer to Page 24.

3.6.2 Design of the RG/QR series

- 4-row recirculation roller bearing guide
- 45° contact angle
- Various sealing variants depending on the field of application
- 6 options for connecting grease nipple and lubrication adapter
- SynchMotion™ technology (QR series)



Design of the RG series



Design of the QR series

Advantages:

- Zero play
- Interchangeable
- Very high load ratings
- Very high rigidity
- Low displacement forces even with high preload

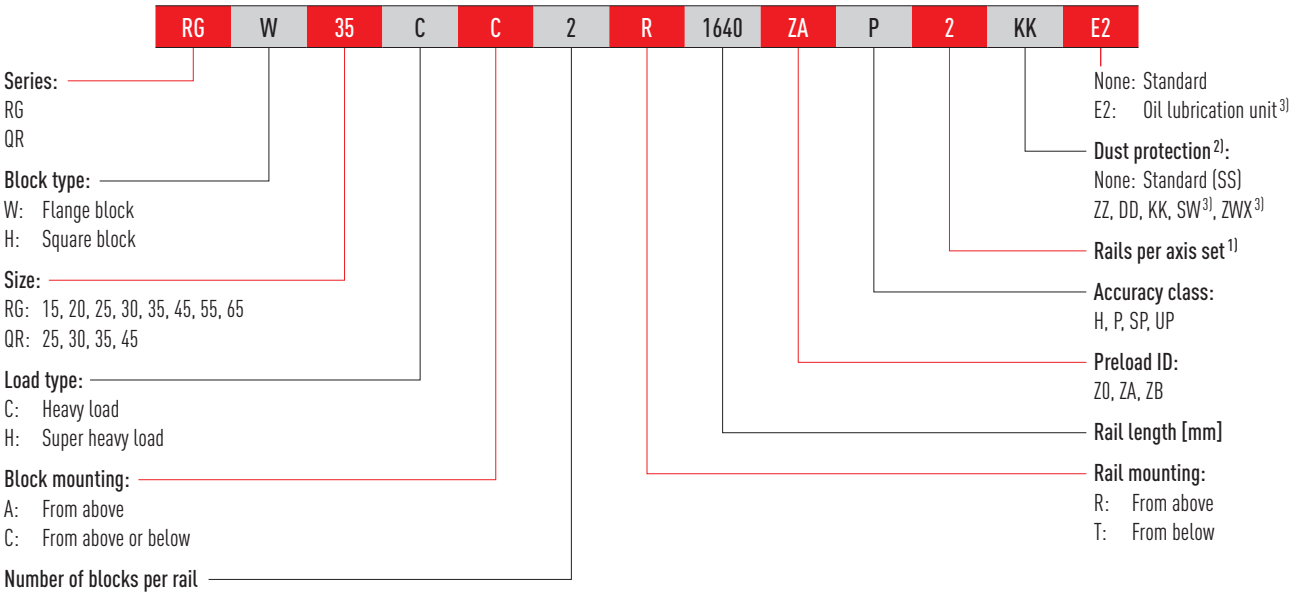
Additional advantages of QR series:

- Improved synchronous performance
- Optimized for higher travel speeds
- Extended lubrication intervals
- Less running noise
- Higher dynamic load capacities

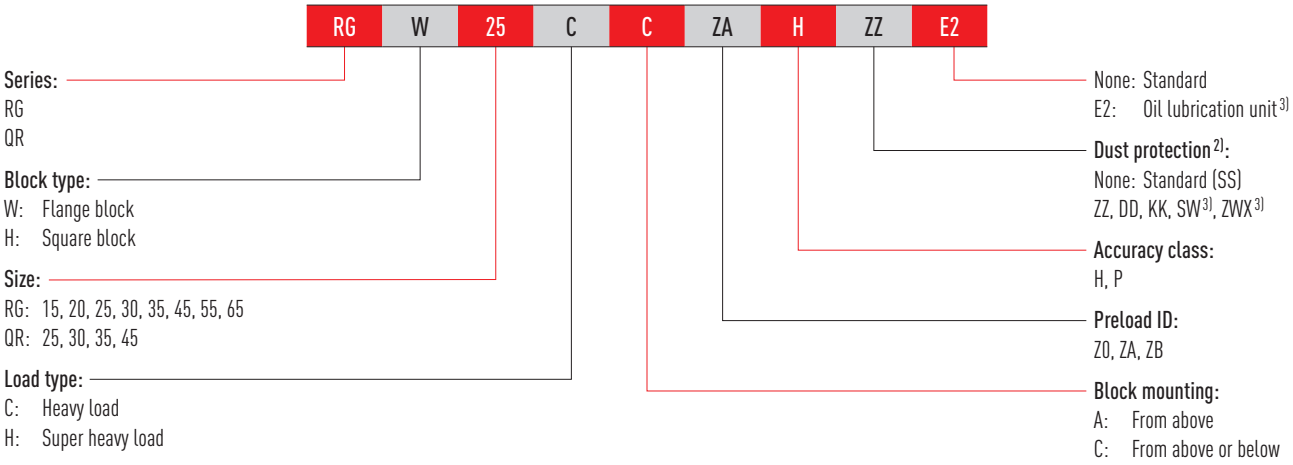
3.6.3 Order codes for the RG/QR series

For RG/QR linear guideways, a distinction is made between fully assembled and unmounted models. The dimensions of both models are the same. The main difference is that the block and rail in unmounted models can be freely interchanged. The order codes of the series include the dimensions, model, accuracy class, preload etc.

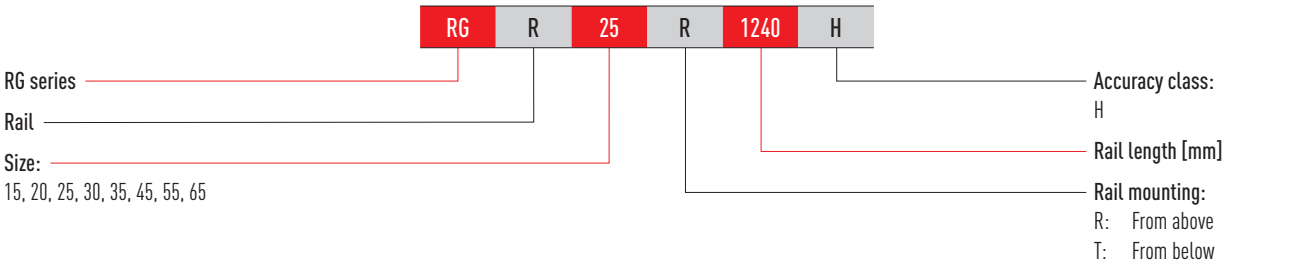
Order code for linear guideway (fully assembled)



Order code for block (unmounted)



Order code for rail (unmounted)



Note:

1) The figure 2 is also a quantity, i.e. one item of the above-mentioned article consists of a pair of rails. No number is specified for individual rails. By default multi-part rails are delivered with staggered butt joints.

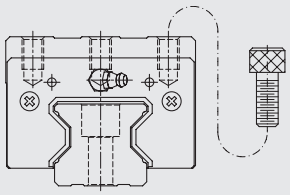
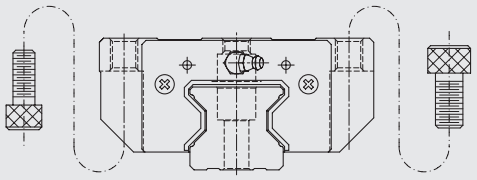
2) You will find an overview of the individual sealing systems on Page 22

3) Only available for RG

3.6.4 Block types

HIWIN provides square and flange blocks for the linear guideways. Given their low height and large mounting surface, flange blocks are suited to large loads.

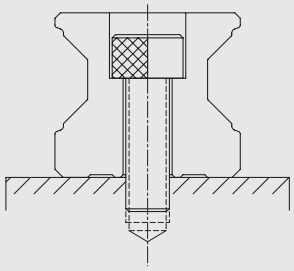
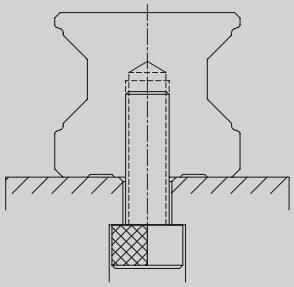
Table 3.97 **Block types**

Type	Series/size	Structure	Height [mm]	Typical application
Square type	RGH-CA RGH-HA		28 – 90	○ Automation technology ○ Transport technology ○ CNC machining centres ○ High-performance cutting machines ○ CNC grinding machines ○ Injection moulding machines ○ Portal milling machines ○ Machines and systems requiring high rigidity ○ Machines and systems requiring high load rating ○ Spark erosion machines
Flange type	RGW-CC RGW-HC		24 – 90	

3.6.5 Rail types

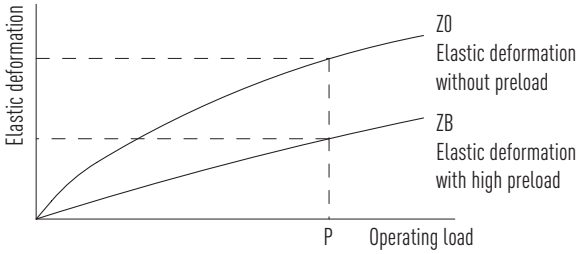
In addition to rails with standard fastening from above, HIWIN also provides rails for fastening from below.

Table 3.98 **Rail types**

Fastening from above	Fastening from below
	
RGR_R	RGR_T

3.6.6 Preload

Definition
Every rail type can be preloaded based on the size of the balls. The curve shows that the rigidity doubles at higher preload. The RG/QR series offers three standard preload classes for various applications and conditions.

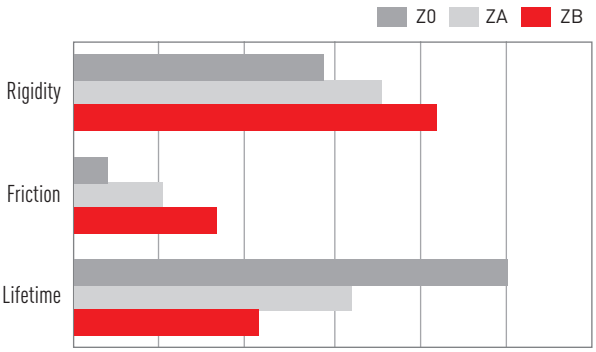


Preload ID

Table 3.99 **Preload ID**

ID	Preload		Application
Z0	Light preload	0.02 – 0.04 C_{dyn}	Constant load direction, little impact, low precision required
ZA	Medium preload	0.07 – 0.09 C_{dyn}	High precision needed
ZB	High preload	0.12 – 0.14 C_{dyn}	Very high rigidity required, with vibration and impact

The diagram shows the relationship between rigidity, frictional resistance and nominal lifetime. For smaller models, a preload of no more than ZA is recommended to avoid the lifetime being shortened as a result of preload.



3.6.7 Load ratings and torques

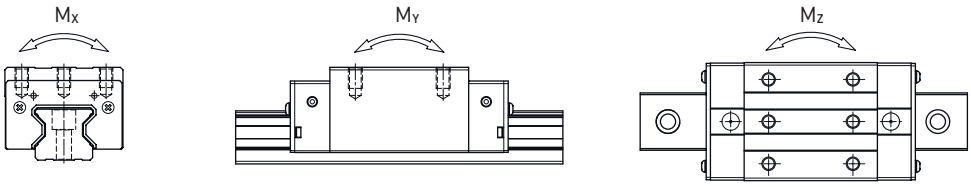


Table 3.100 **Load ratings and torques for series RG/QR**

Series/size	Dynamic load rating C_{dyn} [N] [1]	Static load rating C_0 [N]	Dynamic moment [Nm]			Static moment [Nm]		
			M_X	M_Y	M_Z	M_{0X}	M_{0Y}	M_{0Z}
RG_15C	11,300	24,000	147	82	82	311	173	173
RG_20C	21,300	46,700	296	210	210	647	460	460
RG_20H	26,900	63,000	373	358	358	872	837	837
RG_25C	27,700	57,100	367	293	293	758	605	605
QR_25C	38,500	54,400	511	444	444	722	627	627
RG_25H	33,900	73,400	450	457	457	975	991	991
QR_25H	44,700	65,300	594	621	621	867	907	907
RG_30C	39,100	82,100	688	504	504	1,445	1,060	1,060
QR_30C	51,500	73,000	906	667	667	1,284	945	945
RG_30H	48,100	105,000	845	784	784	1,846	1,712	1,712
QR_30H	64,700	95,800	1,138	1,101	1,101	1,685	1,630	1,630
RG_35C	57,900	105,200	1,194	792	792	2,170	1,440	1,440
QR_35C	77,000	94,700	1,590	1,083	1,083	1,955	1,331	1,331
RG_35H	73,100	142,000	1,508	1,338	1,338	2,930	2,600	2,600
QR_35H	95,700	126,300	1,975	1,770	1,770	2,606	2,335	2,335
RG_45C	92,600	178,800	2,340	1,579	1,579	4,520	3,050	3,050
QR_45C	123,200	156,400	3,119	2,101	2,101	3,959	2,666	2,666
RG_45H	116,000	230,900	3,180	2,748	2,748	6,330	5,470	5,470
QR_45H	150,800	208,600	3,816	3,394	3,394	5,278	4,694	4,694
RG_55C	130,500	252,000	4,148	2,796	2,796	8,010	5,400	5,400
RG_55H	167,800	348,000	5,376	4,942	4,942	11,150	10,250	10,250
RG_65C	213,000	411,600	8,383	5,997	5,997	16,200	11,590	11,590
RG_65H	275,300	572,700	10,839	10,657	10,657	22,550	22,170	22,170

[1] Dynamic load rating for travel distance of 100,000 m

3.6.8 Rigidity

Rigidity depends on preload. Formula F 3.18 can be used to determine deformation depending on rigidity.

F 3.18

$$\delta = \frac{P}{k}$$

δ Deformation [µm]
P Operating load [N]
k Rigidity [N/µm]

Table 3.101 **Radial rigidity for series RG/QR**

Load class	Series/ size	Rigidity depending on preload		
		Z0	ZA	ZB
Heavy load	RG_15C	482	504	520
	RG_20C	586	614	633
	RG_25C	682	717	740
	QR_25C	616	645	665
	RG_30C	809	849	876
	QR_30C	694	726	748
	RG_35C	954	1,002	1,035
	QR_35C	817	856	882
	RG_45C	1,433	1,505	1,554
	QR_45C	1,250	1,310	1,350
	RG_55C	1,515	1,591	1,643
	RG_65C	2,120	2,227	2,300
Super heavy load	RG_20H	786	823	848
	RG_25H	873	917	947
	QR_25H	730	770	790
	RG_30H	1,083	1,136	1,173
	QR_30H	910	950	980
	RG_35H	1,280	1,344	1,388
	QR_35H	1,090	1,140	1,170
	RG_45H	1,845	1,938	2,002
	QR_45H	1,590	1,660	1,720
	RG_55H	2,079	2,182	2,254
	RG_65H	2,931	3,077	3,178

Unit: N/µm

3.6.9 Dimensions of the RG/QR blocks

3.6.9.1 RGH/QRH

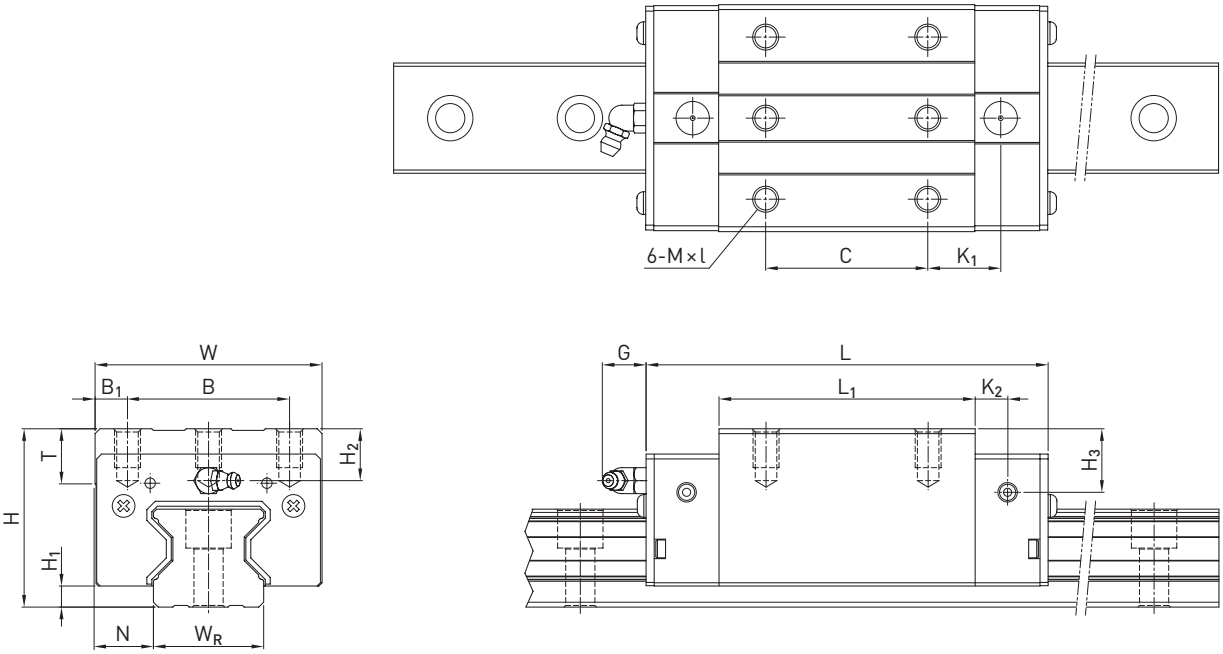
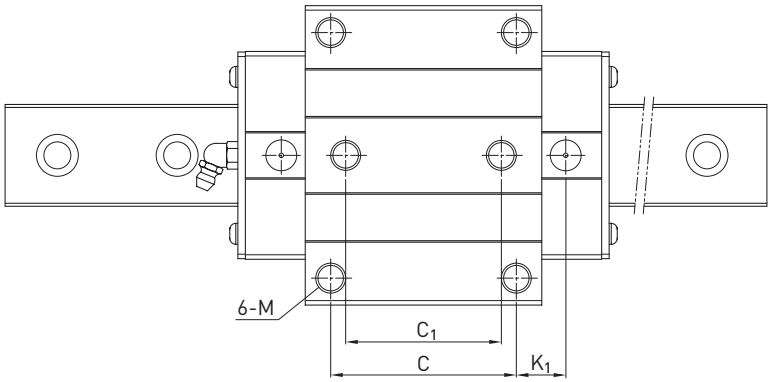


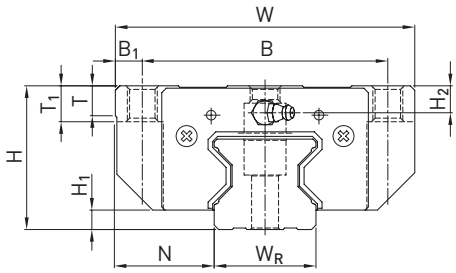
Table 3.102 **Dimensions of the block**

Series/ size	Installation dimensions [mm]			Dimensions of the block [mm]													Load ratings [N]		Weight [kg]
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	K_2	G	M × l	T	H_2	H_3	C_{dyn}	C_0	
RGH15CA	28	4.0	9.5	34	26	4.0	26	45.0	68.0	13.40	4.70	5.3	M4 × 8	6.0	7.6	10.1	11,300	24,000	0.20
RGH20CA	34	5.0	12.0	44	32	6.0	36	57.5	86.0	15.80	6.00	5.3	M5 × 8	8.0	8.3	8.3	21,300	46,700	0.40
RGH20HA							50	77.5	106.0	18.80							26,900	63,000	0.53
RGH25CA	40	5.5	12.5	48	35	6.5	35	64.5	97.9	20.75	7.25	12.0	M6 × 8	9.5	10.2	10.0	27,700	57,100	0.61
RGH25HA							50	81.0	114.4	21.50							33,900	73,400	0.75
QRH25CA	40	5.5	12.5	48	35	6.5	35	66.0	9.9	20.75	7.25	12.0	M6 × 8	9.5	10.2	10.0	38,500	54,400	0.60
QRH25HA							50	81.0	112.9	21.50							44,700	65,300	0.74
RGH30CA	45	6.0	16.0	60	40	10.0	40	71.0	109.8	23.50	8.00	12.0	M8 × 10	9.5	9.5	10.3	39,100	82,100	0.90
RGH30HA							60	93.0	131.8	24.50							48,100	105,000	1.16
QRH30CA	45	6.0	16.0	60	40	10.0	40	71.0	109.8	23.50	8.00	12.0	M8 × 10	9.5	9.5	10.3	51,500	73,000	0.89
QRH30HA							60	93.0	131.8	24.50							64,700	95,800	1.15
RGH35CA	55	6.5	18.0	70	50	10.0	50	79.0	124.0	22.50	10.00	12.0	M8 × 12	12.0	16.0	19.6	57,900	105,200	1.57
RGH35HA							72	106.5	151.5	25.25							73,100	142,000	2.06
QRH35CA	55	6.5	18.0	70	50	10.0	50	79.0	124.0	22.50	10.00	12.0	M8 × 12	12.0	16.0	19.6	77,000	94,700	1.56
QRH35HA							72	106.5	151.5	25.25							95,700	126,300	2.04
RGH45CA	70	8.0	20.5	86	60	13.0	60	106.0	153.2	31.00	10.00	12.9	M10 × 17	16.0	20.0	24.0	92,600	178,800	3.18
RGH45HA							80	139.8	187.0	37.90							116,000	230,900	4.13
QRH45CA	70	8.0	20.5	86	60	13.0	60	106.0	153.2	31.00	10.00	12.9	M10 × 17	16.0	20.0	24.0	123,200	156,400	3.16
QRH45HA							80	139.8	187.0	37.90							150,800	208,600	4.10
RGH55CA	80	10.0	23.5	100	75	12.5	75	125.5	183.7	37.75	12.50	12.9	M12 × 18	17.5	22.0	27.5	130,500	252,000	4.89
RGH55HA							95	173.8	232.0	51.90							167,800	348,000	6.68
RGH65CA	90	12.0	31.5	126	76	25.0	70	160.0	232.0	60.80	15.80	12.9	M16 × 20	25.0	15.0	15.0	213,000	411,600	8.89
RGH65HA							120	223.0	295.0	67.30							275,300	572,700	12.13

For dimensions of rail, see Page 111, for standard and optional lubrication adapter, see Page 128.

3.6.9.2 RGW/QRW





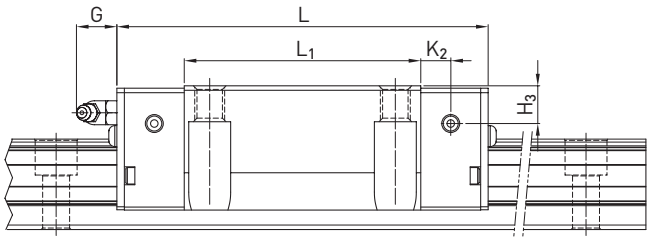


Table 3.103 **Dimensions of the block**

Series/ size	Installation dimensions [mm]			Dimensions of the block [mm]															Load ratings [N]		Weight [kg]
	H	H_1	N	W	B	B_1	C	C_1	L_1	L	K_1	K_2	G	M	T	T_1	H_2	H_3	C_{dyn}	C_0	
RGW15CC	24	4.0	16.0	47	38	4.5	30	26	45.0	68.0	11.40	4.70	5.3	M5	6.0	7	3.6	6.1	11,300	24,000	0.22
RGW20CC	30	5.0	21.5	63	53	5.0	40	35	57.5	86.0	13.80	6.00	5.3	M6	8.0	10	4.3	4.3	21,300	46,700	0.47
RGW20HC									77.5	106.0	23.80								26,900	63,000	0.63
RGW25CC	36	5.5	23.5	70	57	6.5	45	40	64.5	97.9	15.75	7.25	12.0	M8	9.5	10	6.2	6.0	27,700	57,100	0.72
RGW25HC									81.0	114.4	24.00								33,900	73,400	0.91
QRW25CC	36	5.5	23.5	70	57	6.5	45	40	66.0	97.9	15.75	7.25	12.0	M8	9.5	10	6.2	6.0	38,500	54,400	0.71
QRW25HC									81.0	112.9	24.00								44,700	65,300	0.90
RGW30CC	42	6.0	31.0	90	72	9.0	52	44	71.0	109.8	17.50	8.00	12.0	M10	9.5	10	6.5	7.3	39,100	82,100	1.16
RGW30HC									93.0	131.8	28.50								48,100	105,000	1.52
QRW30CC	42	6.0	31.0	90	72	9.0	52	44	71.0	109.8	17.50	8.00	12.0	M10	9.5	10	6.5	7.3	51,500	73,000	1.15
QRW30HC									93.0	131.8	28.50								64,700	95,800	1.51
RGW35CC	48	6.5	33.0	100	82	9.0	62	52	79.0	124.0	16.50	10.00	12.0	M10	12.0	13	9.0	12.6	57,900	105,200	1.75
RGW35HC									106.5	151.5	30.25								73,100	142,000	2.40
QRW35CC	48	6.5	33.0	100	82	9.0	62	52	79.0	124.0	16.50	10.00	12.0	M10	12.0	13	9.0	12.6	77,000	94,700	1.74
QRW35HC									106.5	151.5	30.25								95,700	126,300	2.38
RGW45CC	60	8.0	37.5	120	100	10.0	80	60	106.0	153.2	21.00	10.00	12.9	M12	14.0	15	10.0	14.0	92,600	178,800	3.43
RGW45HC									139.8	187.0	37.90								116,000	230,900	4.57
QRW45CC	60	8.0	37.5	120	100	10.0	80	60	106.0	153.2	21.00	10.00	12.9	M12	14.0	15	10.0	14.0	123,200	156,400	3.41
QRW45HC									139.8	187.0	37.90								150,800	208,600	4.54
RGW55CC	70	10.0	43.5	140	116	12.0	95	70	125.5	183.7	27.75	12.50	12.9	M14	16.0	17	12.0	17.5	130,500	252,000	5.43
RGW55HC									173.8	232.0	51.90								167,800	348,000	7.61
RGW65CC	90	12.0	53.5	170	142	14.0	110	82	160.0	232.0	40.80	15.80	12.9	M16	22.0	23	15.0	15.0	213,000	411,600	11.63
RGW65HC									223.0	295.0	72.30								275,300	572,700	16.58

For dimensions of rail, see Page 111, for standard and optional lubrication adapter, see Page 128.

3.6.10 Dimensions of the RG rail

The RG rails are used for both the RG and QR blocks.

3.6.10.1 Dimensions of RGR_R

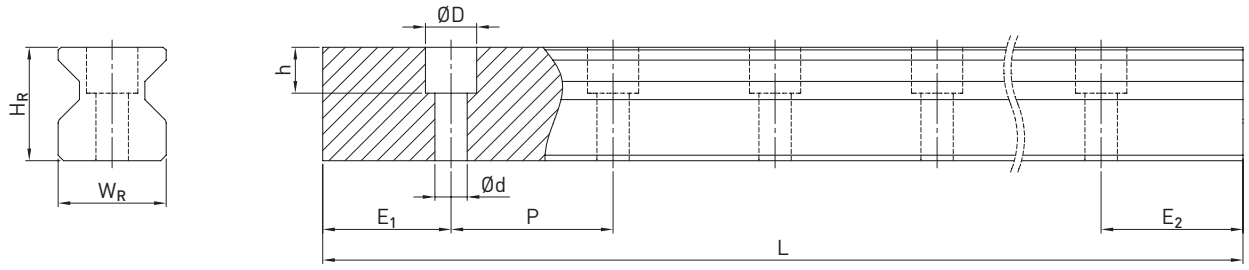


Table 3.104 **Dimensions of rail RGR_R**

Series/ size	Assembly screw for rail [mm]	Dimensions of rail [mm]						Max. length [mm]	Max. length $E_1 = E_2$ [mm]	Min. length [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	H_R	D	h	d	P						
RGR15R	M4 × 20	15	16.5	7.5	5.7	4.5	30.0	4,000	3,960.0	72	6	24.0	1.70
RGR20R	M5 × 25	20	21.0	9.5	8.5	6.0	30.0	4,000	3,960.0	74	7	23.0	2.66
RGR25R	M6 × 30	23	23.6	11.0	9.0	7.0	30.0	4,000	3,960.0	76	8	22.0	3.08
RGR30R	M8 × 35	28	28.0	14.0	12.0	9.0	40.0	4,000	3,920.0	98	9	31.0	4.41
RGR35R	M8 × 35	34	30.2	14.0	12.0	9.0	40.0	4,000	3,920.0	98	9	31.0	6.06
RGR45R	M12 × 45	45	38.0	20.0	17.0	14.0	52.5	4,000/5,600 [1]	3,937.5/5,437.5 [1]	129	12	40.5	9.97
RGR55R	M14 × 55	53	44.0	23.0	20.0	16.0	60.0	4,000/5,600 [1]	3,900.0/5,500 [1]	148	14	46.0	13.98
RGR65R	M16 × 65	63	53.0	26.0	22.0	18.0	75.0	4,000/5,600 [1]	3,900.0/5,500 [1]	180	15	60.0	20.22

[1] Optional version on request

3.6.10.2 Dimensions RGR_T (rail mounting from below)

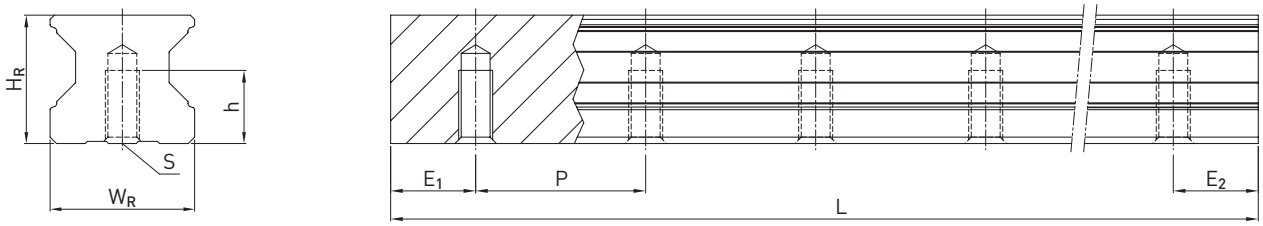


Table 3.105 **Dimensions of rail RGR_T**

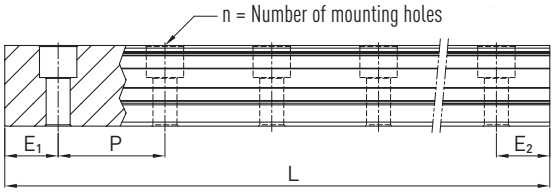
Series/ size	Dimensions of rail [mm]					Max. length [mm]	Max. length $E_1 = E_2$ [mm]	Min. length [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
	W_R	H_R	S	h	P						
RGR15T	15	16.5	M5	8.0	30.0	4,000	3,960.0	72	6	24.0	1.86
RGR20T	20	21.0	M6	10.0	30.0	4,000	3,960.0	74	7	23.0	2.76
RGR25T	23	23.6	M6	12.0	30.0	4,000	3,960.0	76	8	22.0	3.36
RGR30T	28	28.0	M8	15.0	40.0	4,000	3,920.0	98	9	31.0	4.82
RGR35T	34	30.2	M8	17.0	40.0	4,000	3,920.0	98	9	31.0	6.48
RGR45T	45	38.0	M12	24.0	52.5	4,000	3,937.5	129	12	40.5	10.83
RGR55T	53	44.0	M14	24.0	60.0	4,000	3,900.0	148	14	46.0	15.15
RGR65T	63	53.0	M20 [1]	30.0	75.0	4,000	3,900.0	180	15	60.0	21.24

[1] Deviating from DIN 645

Note:
1. The tolerance for E is +0.5 to – 1 mm for standard rails and 0 to – 0.3 mm for joints.
2. If the $E_{1/2}$ dimensions are not indicated, the maximum possible number of mounting holes will be determined under consideration of $E_{1/2}$ min.
3. The rails are shortened to the required length. If the $E_{1/2}$ dimensions are not indicated, these will be carried out symmetrically.

3.6.10.3 Calculating the length of rails

HIWIN offers rails in customized lengths. To prevent the risk of the end of the rail becoming unstable, the value E must not exceed half of the distance between the mounting holes (P). At the same time, the value $E_{1/2}$ should be between $E_{1/2}$ min and $E_{1/2}$ max so that the mounting hole does not rupture.



F 3.19

$$L = (n - 1) \times P + E_1 + E_2$$

L Total length of the rail [mm]
n Number of mounting holes
P Distance between two mounting holes [mm]
$E_{1/2}$ Distance from the middle of the last mounting hole to the end of the rail [mm]

3.6.10.4 Tightening torques for mounting bolts

Insufficient tightening of the mounting bolts strongly compromises the precision of the linear guideway. The following tightening torques are recommended for the relevant screw sizes.

Table 3.106 **Tightening torques of the mounting bolts according to ISO 4762-12.9**

Series/size	Screw size	Torque [Nm]	Series/size	Screw size	Torque [Nm]
RG_15	M4 × 20	4	**RG/QR_35**	M8 × 35	31
RG_20	M5 × 25	9	**RG/QR_45**	M12 × 45	120
RG/QR_25	M6 × 30	14	**RG_55**	M14 × 55	160
RG/QR_30	M8 × 35	31	**RG_65**	M16 × 65	200

3.6.10.5 Cover caps for mounting holes of rails

The cover caps are used to keep the mounting holes free of chips and dirt. The standard plastic caps are provided with each rail. Optional cover caps must be ordered separately.

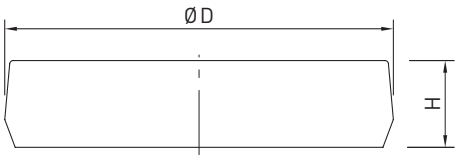


Table 3.107 **Cover caps for mounting holes of rails**

Rail	Screw	Article number			Ø D [mm]	Height H [mm]
		Plastic (200 pcs.)	Brass	Steel		
RGR15R	M4	5-002218	5-001344	–	7.5	1.2
RGR20R	M5	5-002220	5-001350	5-001352	9.5	2.5
RGR25R	M6	5-002221	5-001355	5-001357	11.0	2.8
RGR30R	M8	5-002222	5-001360	5-001362	14.0	3.5
RGR35R	M8	5-002222	5-001360	5-001362	14.0	3.5
RGR45R	M12	5-002223	5-001324	5-001327	20.0	4.0
RGR55R	M14	5-002224	5-001330	5-001332	23.0	4.0
RGR65R	M16	5-002225	5-001335	5-001337	26.0	4.0

3.6.11 Sealing systems

Various sealing systems are available for HIWIN blocks. You will find an overview on Page 22. The table below shows the total length of the blocks with the different sealing systems. Sealing systems suitable for these sizes are available.

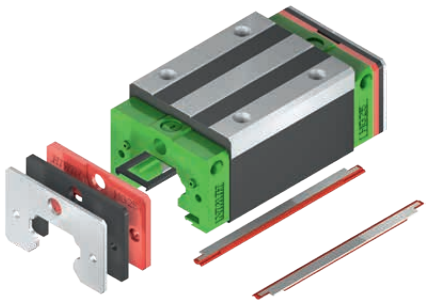


Table 3.108 **Total length of block with different sealing systems**

Series/ size	Total length L					
	SS	DD	ZZ	KK	SW	ZWX
RG_15C	68.0	72.4	70.0	74.4	–	–
RG_20C	86.0	90.4	88.0	92.4	–	–
RG_20H	106.0	110.4	108.0	112.4	–	–
RG_25C	97.9	102.3	99.9	104.3	–	–
QR_25C	97.7	102.3	99.9	104.3	–	–
RG_25H	114.4	118.8	116.4	120.8	–	–
QR_25H	112.9	117.3	114.9	119.3	–	–
RG_30C	109.8	114.6	112.8	117.6	–	–
QR_30C	109.8	114.6	112.8	117.6	–	–
RG_30H	131.8	136.6	134.8	139.6	–	–
QR_30H	131.8	136.6	134.8	139.6	–	–
RG_35C	124.0	129.0	127.0	132.0	–	–
QR_35C	124.0	129.0	127.0	132.0	–	–
RG_35H	151.5	156.5	154.5	159.5	–	–
QR_35H	151.5	156.5	154.5	159.5	–	–
RG_45C	153.2	160.4	156.2	163.4	156.5	166.2
QR_45C	153.2	160.4	156.2	163.4	–	–
RG_45H	187.0	194.2	190.0	197.2	190.3	200.0
QR_45H	187.0	194.2	190.0	197.2	–	–
RG_55C	183.7	190.9	186.7	193.9	186.9	198.3
RG_55H	232.0	239.2	235.0	242.2	235.2	246.6
RG_65C	232.0	240.8	235.0	243.8	235.2	245.3
RG_65H	295.0	303.8	298.0	306.8	298.2	308.3

Unit: mm

3.6.11.1 Designation of seal sets

The sealing sets are always supplied along with the assembly material and include the parts needed in addition to the standard seal.

RG 25 SS

Series:
RG
QR

Size:
RG: 15, 20, 25, 30, 35, 45, 55, 65
QR: 25, 30, 35, 45

Dust protection ID:
SS: Standard seal
ZZ: End seal with scraper
DD: Double end seal
KK: Double end seal with scraper
SW: End seal with double sealing lip
ZWX: End seal with double sealing lip and scraper

3.6.12 Friction

The table shows the maximum frictional resistance of the individual end seal. Depending on sealing setup (SS, ZZ, DD, KK), the value may have to be multiplied. The values indicated apply to blocks on uncoated rails. Higher friction forces occur on coated rails.

Table 3.109 **Frictional resistance of the single-lipped seals**

Series/size	Friction force [N]	Series/size	Friction force [N]
RG_15	2.0	**RG/QR_35**	3.5
RG_20	2.5	**RG/QR_45**	4.2
RG/QR_25	2.8	**RG_55**	5.1
RG/QR_30	3.3	**RG_65**	6.7

3.6.13 Lubrication unit E2

You will find more information about the lubrication unit in the general information in Section „2.6.3 Oil lubrication unit E2" on Page 15.

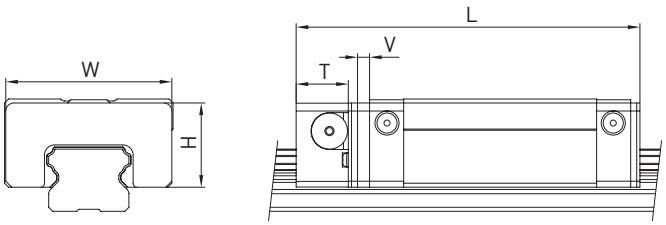


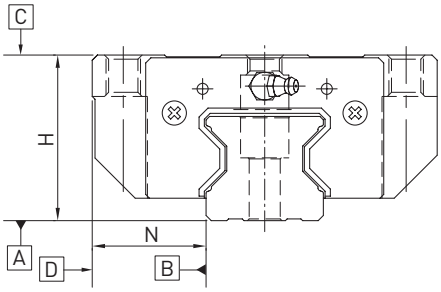
Table 3.110 **Dimensions of block with lubrication unit E2**

Model	Dimensions of the block [mm]								Oil quantity [cm³]	Mileage [2] [km]
	W	H	T	V	L_{SS} [1]	L_{ZZ} [1]	L_{DD} [1]	L_{KK} [1]		
RG_25C	46.8	29.2	13.5	3.5	114.9	116.9	119.3	121.3	5.0	6,000
RG_25H	46.8	29.2	13.5	3.5	131.4	133.4	135.8	137.8	5.0	6,000
RG_30C	58.8	34.9	13.5	3.5	126.8	129.8	131.6	134.6	7.5	8,000
RG_30H	58.8	34.9	13.5	3.5	148.8	151.8	153.6	156.6	7.5	8,000
RG_35C	68.8	40.3	13.5	3.5	141.0	144.0	146.0	149.0	10.7	10,000
RG_35H	68.8	40.3	13.5	3.5	168.5	171.5	173.5	176.5	10.7	10,000
RG_45C	83.8	50.2	16.0	4.5	173.7	176.7	180.9	183.9	18.5	20,000
RG_45H	83.8	50.2	16.0	4.5	207.5	210.5	214.7	217.7	18.5	20,000
RG_55C	97.6	58.4	16.0	4.5	204.2	207.2	211.4	214.4	26.5	30,000
RG_55H	97.6	58.4	16.0	4.5	252.5	255.5	259.7	262.7	26.5	30,000
RG_65C	121.7	76.1	16.0	4.5	252.5	255.5	261.3	264.3	50.5	40,000
RG_65H	121.7	76.1	16.0	4.5	315.5	318.5	324.3	327.3	50.5	40,000

[1] Total length depending on selected dust protection. SS = Standard dust protection
[2] Mileage at which the oil tank level should be checked at the very latest.

3.6.14 Tolerances depending on accuracy class

The RG and QR series are available in four accuracy classes depending on parallelism between block and rail, height accuracy H and accuracy of width N. The choice of accuracy class is determined by the machine requirements.



3.6.14.1 Parallelism

Parallelism of stop surfaces D and B of block and rail and parallelism of top of block C to mounting surface A of rail. Ideal linear guideway installation is required, as is a measurement in the centre of the block.

Table 3.111 **Tolerance of parallelism between block and rail**

Rail length [mm]	Accuracy class			
	H	P	SP	UP
– 100	7	3	2	2
100 – 200	9	4	2	2
200 – 300	10	5	3	2
300 – 500	12	6	3	2
500 – 700	13	7	4	2
700 – 900	15	8	5	3
900 – 1100	16	9	6	3
1100 – 1500	18	11	7	4
1500 – 1900	20	13	8	4
1900 – 2500	22	15	10	5
2500 – 3100	25	18	11	6
3100 – 3600	27	20	14	7
3600 – 4000	28	21	15	7

Unit: µm

3.6.14.2 Accuracy – height and width

Height tolerance of H
Permissible absolute dimension variance of height H, measured between centre of screw-on surface C and underside of rail A, with block in any position on the rail.

Height variance of H
Permissible variance of height H between several blocks on a rail, measured in the same rail position.

Width tolerance of N
Permissible absolute dimension variance of width N, measured between centre of screw-on surfaces D and B, with block in any position on the rail.

Width variance of N
Permissible variance of width N between several blocks on a rail, measured in the same rail position.

Table 3.112 **Height and width tolerances**

Series/size	Accuracy class	Height tolerance of H (T_H)	Width tolerance of N	Height variance of H	Width variance of N
RG_15, 20	H (High)	± 0.03	± 0.03	0.01	0.01
	P (Precision)	0/– 0.03 [1] ± 0.015 [2]	0/– 0.03 [1] ± 0.015 [2]	0.006	0.006
	SP (Super precision)	0/– 0.015	0/– 0.015	0.004	0.004
	UP (Ultra precision)	0/– 0.008	0/– 0.008	0.003	0.003
RG_25, 30, 35 **QR_25, 30, 35**	H (High)	± 0.04	± 0.04	0.015	0.015
	P (Precision)	0/– 0.04 [1] ± 0.02 [2]	0/– 0.04 [1] ± 0.02 [2]	0.007	0.007
	SP (Super precision)	0/– 0.02	0/– 0.02	0.005	0.005
	UP (Ultra precision)	0/– 0.01	0/– 0.01	0.003	0.003
RG_45, 55 **QR_45**	H (High)	± 0.05	± 0.05	0.015	0.02
	P (Precision)	0/– 0.05 [1] ± 0.025 [2]	0/– 0.05 [1] ± 0.025 [2]	0.007	0.01
	SP (Super precision)	0/– 0.03	0/– 0.03	0.005	0.007
	UP (Ultra precision)	0/– 0.02	0/– 0.02	0.003	0.005
RG_65	H (High)	± 0.07	± 0.07	0.02	0.025
	P (Precision)	0/– 0.07 [1] ± 0.035 [2]	0/– 0.07 [1] ± 0.035 [2]	0.01	0.015
	SP (Super precision)	0/– 0.05	0/– 0.05	0.007	0.01
	UP (Ultra precision)	0/– 0.03	0/– 0.03	0.005	0.007

Unit: mm

[1] Fully assembled linear guideway
[2] Unmounted linear guideway

3.6.14.3 Permissible mounting surface tolerances

Once the requirements relating to the accuracy of the mounting surfaces are met, the good accuracy, rigidity and lifetime of the RG and QR series linear guideways are achieved.

Tolerance for the parallelism of the reference surface (P)

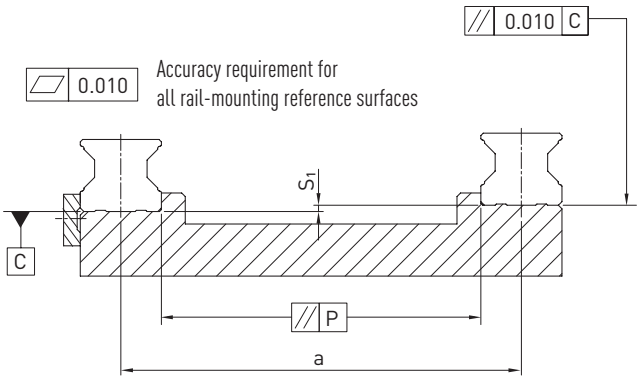


Table 3.113 **Maximum tolerance for parallelism (P)**

Series/size	Preload class		
	Z0	**ZA**	**ZB**
RG_15	5	3	3
RG_20	8	6	4
RG/QR_25	9	7	5
RG/QR_30	11	8	6
RG/QR_35	14	10	7
RG/QR_45	17	13	9
RG_55	21	14	11
RG_65	27	18	14

Unit: µm

Tolerance for the height of the reference surface (S_1)

F 3.20 $$S_1 = a \times K - T_H$$

S_1 Max. height tolerance [mm]
a Distance between rails [mm]
K Coefficient of the height tolerance
T_H Tolerance of height H acc. to Table 3.112

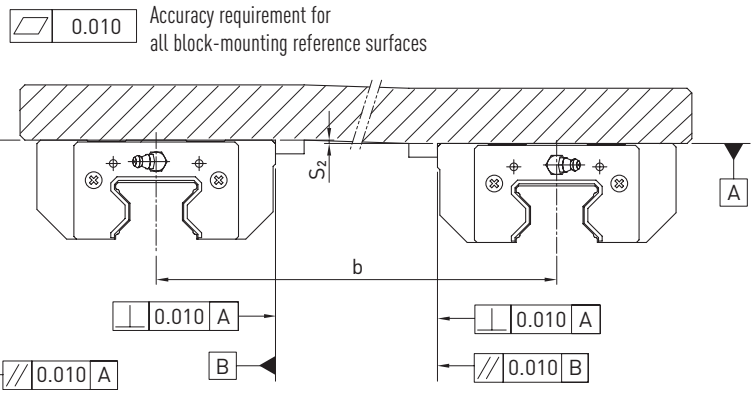
Table 3.114 **Coefficient of height tolerance (K)**

Series/size	Preload class		
	Z0	**ZA**	**ZB**
RG_15 – 65/QR_25 – 45	2.2×10^{-4}	1.7×10^{-4}	1.2×10^{-4}

Note: If $S_1 < 0$, select another tolerance class!

Height tolerance of the block mounting surface

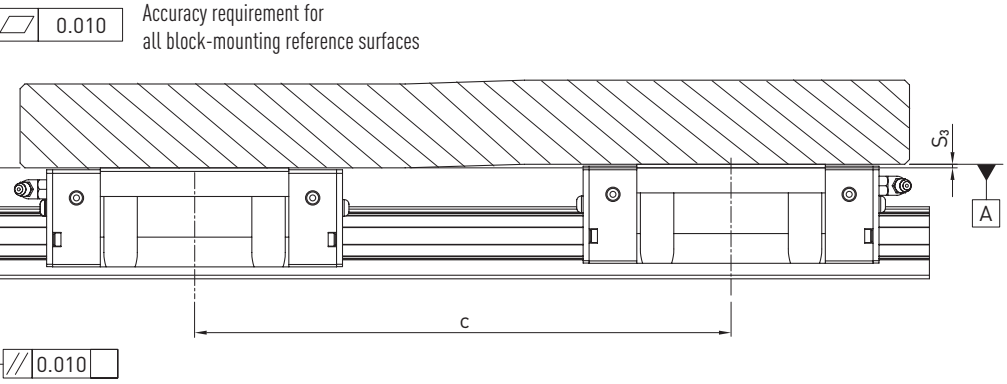
- The height tolerance of the reference surface in the parallel use of two or more blocks (S_2)



F 3.21 $S_2 = b \times 4.2 \times 10^{-5}$

S_2 Max. height tolerance [mm]
b Distance between blocks [mm]

- The height tolerance of the reference surface in the parallel use of two or more blocks (S_3)



F 3.22 $S_3 = c \times 4.2 \times 10^{-5}$

S_3 Max. height tolerance [mm]
c Distance between blocks [mm]

3.6.15 Shoulder heights and fillets

Imprecise shoulder heights and fillets of mounting surfaces compromise precision and may lead to conflicts with the block or rail profiles. The following shoulder heights and edge profiles must be observed in order to avoid assembly problems.

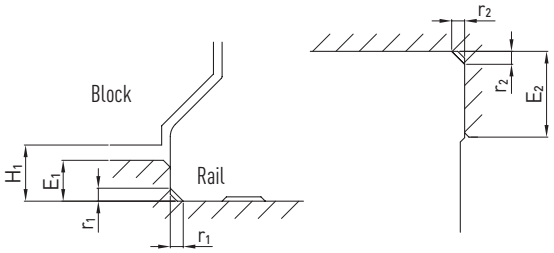


Table 3.115 **Shoulder heights and fillets**

Series/size	Max. edge radius r_1	Max. edge radius r_2	Shoulder height of reference edge of rail E_1	Shoulder height of reference edge of block E_2	Clearance under block H_1
RG_15	0.5	0.5	3.0	4.0	4.0
RG_20	0.5	0.5	3.5	5.0	5.0
RG/QR_25	1.0	1.0	5.0	5.0	5.5
RG/QR_30	1.0	1.0	5.0	5.0	6.0
RG/QR_35	1.0	1.0	6.0	6.0	6.5
RG/QR_45	1.0	1.0	7.0	8.0	8.0
RG_55	1.5	1.5	9.0	10.0	10.0
RG_65	1.5	1.5	10.0	10.0	12.0

Unit: mm