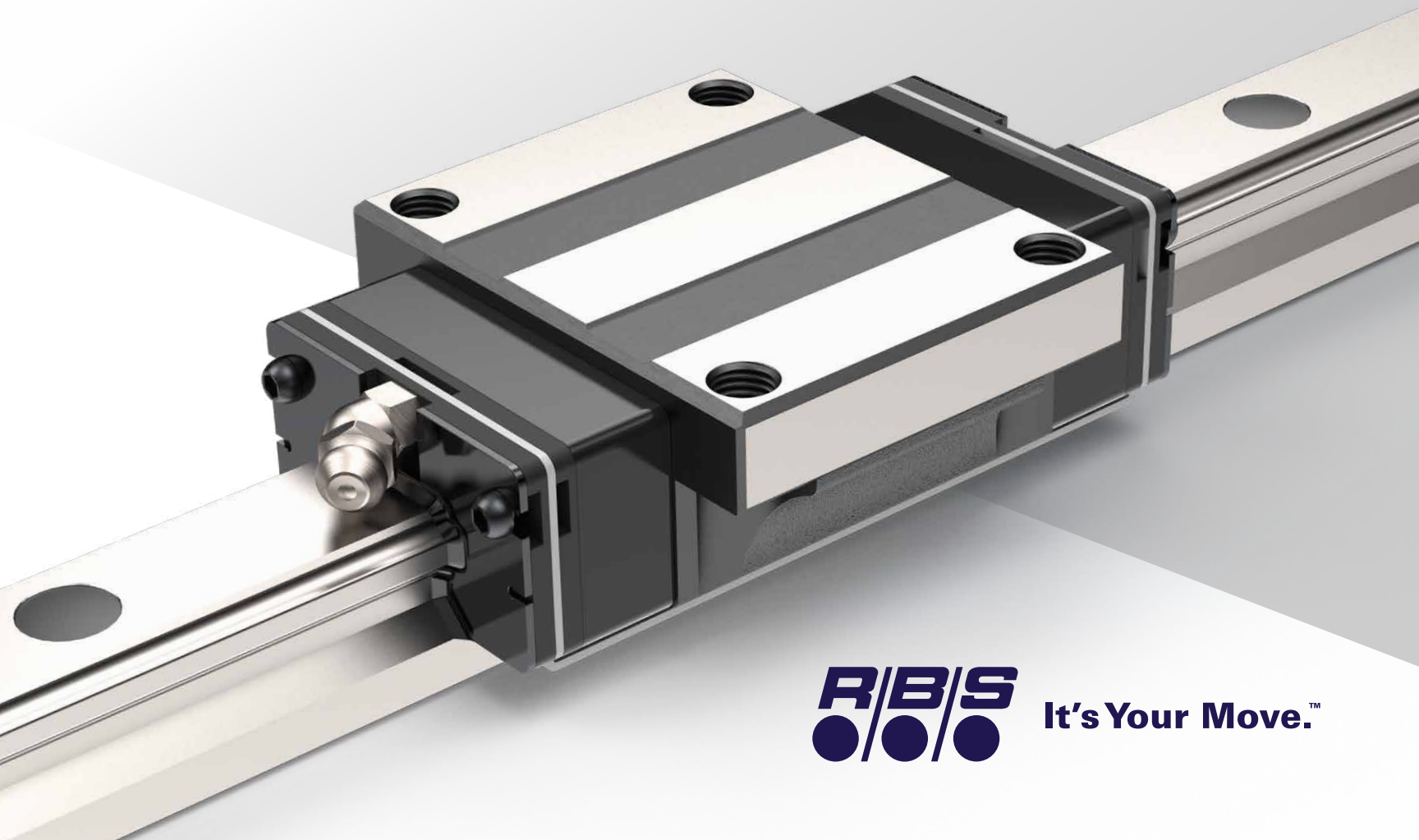
ROCKFORD BALL SCREW

LINEAR GUIDE RAIL SYSTEMS



RBS

It's Your Move.™

ROCKFORD BALL SCREW

LINEAR GUIDE RAIL SYSTEMS

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Disclaimer

This catalog contains basic information relating to Rockford Ball Screw, LLC and related products. The catalog including all information, charts, formulas, factors, accuracy standards, tolerances and application examples contained herein, should only be considered a reference for the customer's selection of appropriate products and may not apply for all applications. This should not replace a proper application analysis conducted by an experienced, knowledgeable design engineer. Product selection should be based on the specific application requirements and conditions, which may vary greatly depending on many factors. No specific product application should be based solely on the information contained in this catalog.

OUR CUSTOMERS COME FIRST

Ian McBain founded the Rockford Ball Screw Company in 1973 with three goals in mind:

1. **Provide the customer with a quality product**
2. **Provide the customer with a competitive price**
3. **Provide the product on time**

International Organization for Standardization ISO 9001

Today, the Rockford Ball Screw Company continues as a family owned and operated business, and Ian's three goals endure as the backbone of our growth and commitment to our customers needs.

Rockford Ball Screw products are built to the highest performance design standards. Extensive engineering expertise and a state-of-the-art manufacturing facility ensure top performance and reliability in our products. Our linear guide rail systems, ball screw and ACME screw product lines feature over 200 standard models and one of the largest inventories in the industry.

Rockford Ball Screw is an ISO 9001 Certified company committed to to continuous improvement and dedication to total customer satisfaction. Call us today and see for yourself what "service" really means!

CUSTOM SPECIALIZED SERVICES

High-Quality Products

Rockford Ball Screw offers linear motion solutions, built to the highest performance design standards. Our extensive engineering expertise and state-of-the-art manufacturing facility ensure top performance and reliability in our products.

We offer one of the largest inventories of linear guide rail systems, ball screw and ACME screw product lines in the industry and our offerings are continually growing and evolving. Our extensive product lines include catalogued, non-catalogued, standard, and non-standard offerings. If you don't see what you're looking for, all you have to do is ask.

Value-Add Customization Services

Have you been told, "It can't be done"?

Call Rockford Ball Screw.

When customers bring us their ideas, we don't say, "No," or push them toward our standard offerings.

Rather, we act as a trusted partner and seek to cooperatively find solutions through implementation of services such as:

- Feasibility assesments
- Formal engineering analyses

We take variable concepts all the way through implementation, including custom design, development, production, assembly work, and installation.

Customers Come First

Rockford Ball Screw customers receive the highest level of quality, service, and engineering expertise. Our specially trained staff and state-of-the-art manufacturing facility and equipment work in concert to effectively fulfill customer needs - whether they require standard or custom offerings.

We offer one of the highest services-to-client ratio in the industry. Our customers have direct access to RBS personnel - including sales, development, engineering, etc. - as needed to support their requirements.

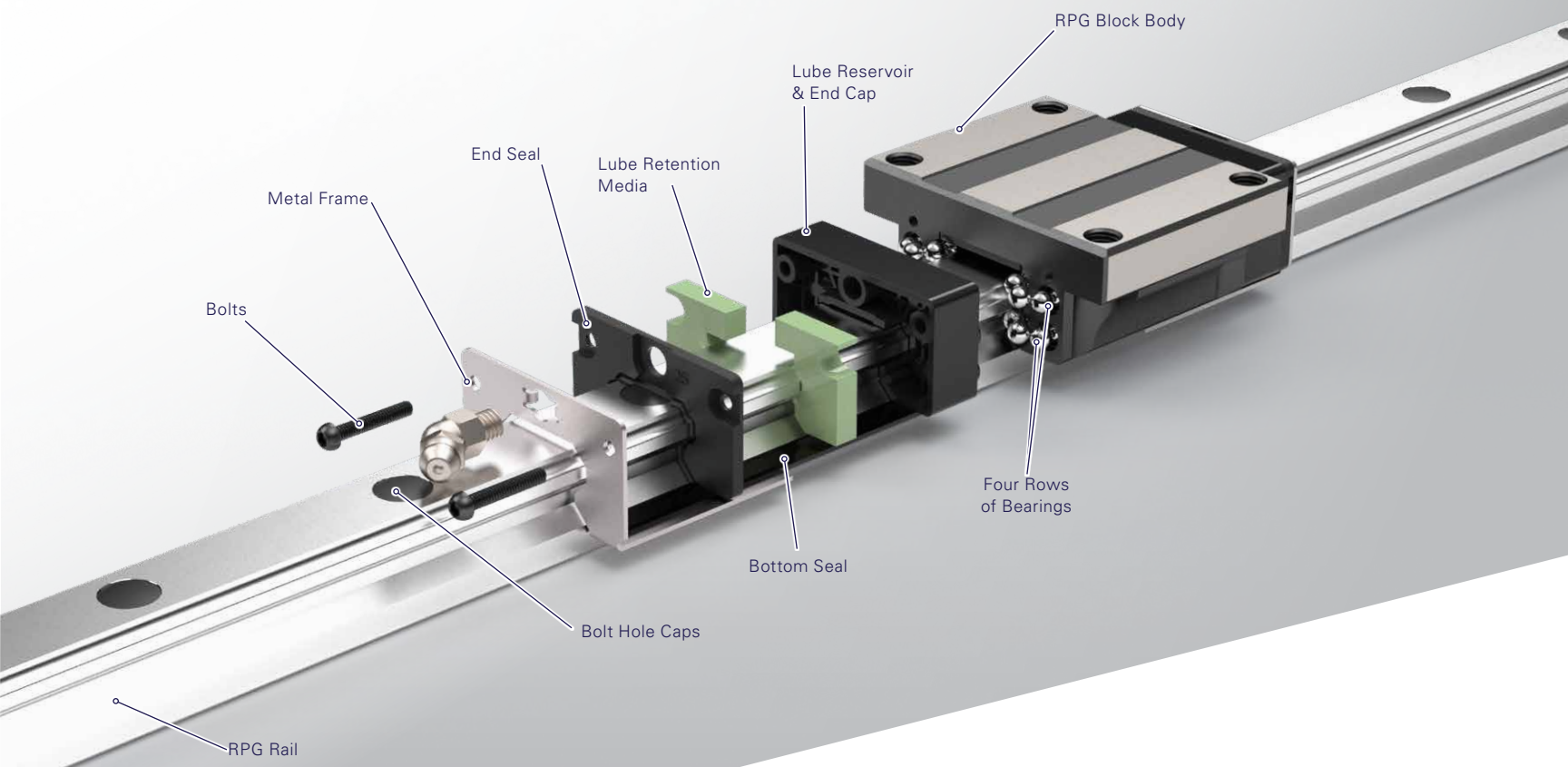
We believe in and are committed to partnering with our customers at the front end of projects to put a program in place for success across the entire lifecycle - from prototyping through production.

Rockford Ball Screw supports every major CAD software program - incompatibility is never an issue!

Additional Resources

- Visit Rockford Ball Screw's website for more information **www.rockfordballscrew.com**
- A full product catalogue is available as a downloadable PDF on our website
- Or call **(800) 475-9532** to request a hard copy of the product catalog
- Our website offers **interactive CAD configurators**
- Contact our technical staff at **(800) 475-9532** to discuss your specific application

CHARACTERISTICS & ADVANTAGES



Four Way Equal Loading

RPG blocks have four raceways, each having a 45º contact angle.
This allows equal loading in all directions; pressing, lifting & transverse.

High Rigidity & Self Alignment

The Double Face (DF) configuration and circular arc raceways of the block offer high rigidity while maintaining self-alignment.

Universal Rail

Both standard (RPGH) and low-height (RPGS) blocks use a common rail. Both sides of the rail are ground as datum references.

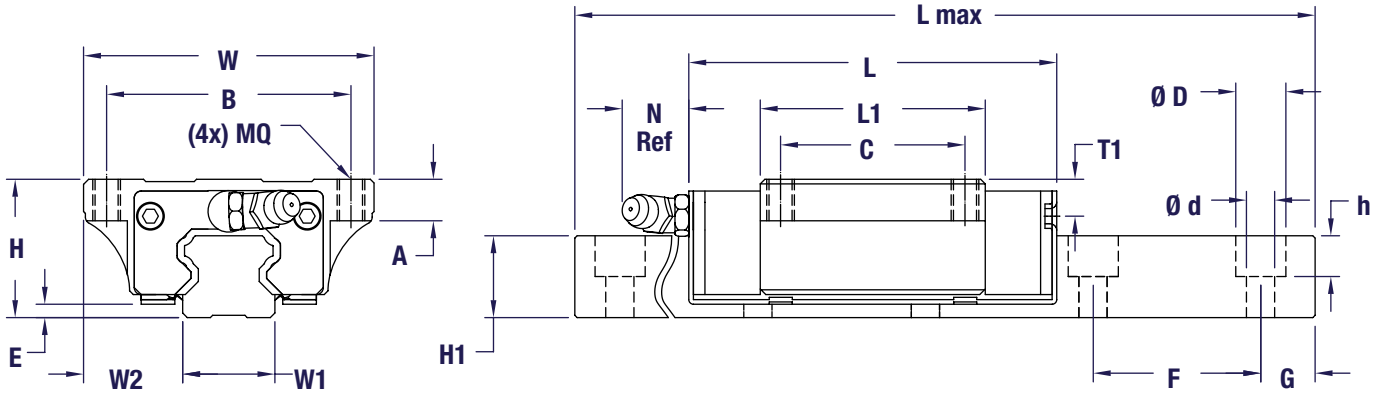
Enhanced Features Are Standard

End seals are a standard feature on each block; most sizes also have a long-life lubrication reservoir, a metal seal retention frame and side seals. Since interchangeability specification tolerances are tightly held, when using multiple parallel rails simply order multiple assemblies. Mounting Bolt hole protective caps are included with every rail.

Industry Standard Mounting/Envelope Dimensions

Designed in accordance with international standards.

A & AL TAPPED/THROUGH HOLE WITH FLANGE



A & AL Product Dimension Data

Model No.	Assembly (mm / in)				RPGH Block								RPGH Rail			
	H	W	W2	E	L	B	C	MQxA	L1	Oil Hole	T1	N	W1	H1	F	dxDxh
	mm	mm	mm	mm	mm	mm	mm		mm		mm	mm	mm	mm	mm	mm
	in	in	in	in	in	in	in		in		in	in	in	in	in	in
RPG15HA	24	47	16	2.5	68	38	30	M5×8	40	Ø3	4.3	5	15	14	60	4.5x7.5×5.3
	0.945	1.850	0.630	0.098	2.677	1.496	1.181		1.575		0.169	0.197	0.591	0.551	2.362	.177x.295x.209
RPG20HA	30	63	21.5	2.9	79.8	53	40	M6×9	48.8	M6x1	7	15.6	20	18	60	6×9.5×8.5
	1.181	2.480	0.846	0.114	3.142	2.087	1.575		1.921		0.276	0.614	0.787	0.709	2.362	.236x.374x.335
RPG20HAL	30	63	21.5	5	92.4	53	40		63.4		7	15.6	20	18	60	6×9.5×8.5
	1.181	2.480	0.846	0.197	3.638	2.087	1.575		2.496		0.276	0.614	0.787	0.709	2.362	.236x.374x.335
RPG25HA	36	70	23.5	4.9	90	57	45	M8x12	57	M6x1	7.8	15.6	23	22	60	7x11x9
	1.417	2.756	0.925	0.193	3.543	2.244	1.772		2.244		0.307	0.614	0.906	0.866	2.362	.275x.433x.354
RPG25HAL	36	70	23.5	7	110.1	57	45		79.1		7.8	15.6	23	22	60	7x11x9
	1.417	2.756	0.925	0.276	4.335	2.244	1.772		3.114		0.307	0.614	0.906	0.866	2.362	.275x.433x.354
RPG30HA	42	90	31	9	109	72	52	M10×12	72	M6×1	7	15.6	28	26	80	9x14x12
	1.654	3.543	1.220	0.354	4.291	2.835	2.047		2.835		0.276	0.614	1.102	1.024	3.150	.354x.551x.472
RPG30HAL	42	90	31	9	131.3	72	52		94.3		7	15.6	28	26	80	9x14x12
	1.654	3.543	1.220	0.354	5.169	2.835	2.047		3.713		0.276	0.614	1.102	1.024	3.150	.354x.551x.472
RPG35HA	48	100	33	7.6	111	82	62	M10×13	80	M6×1	8	15.6	34	29	80	9x14x12
	1.890	3.937	1.299	0.299	4.370	3.228	2.441		3.150		0.315	0.614	1.339	1.142	3.150	.354x.551x.472
RPG35HAL	48	100	33	9.5	134.8	82	62		105.8		8	15.6	34	29	80	9x14x12
	1.890	3.937	1.299	0.374	5.307	3.228	2.441		4.165		0.315	0.614	1.339	1.142	3.150	.354x.551x.472
RPG45HA	60	120	37.5	12.05	140.2	100	80	M12×15	105	M8×1	8.5	16	45	38	105	14×20×17
	2.362	4.724	1.476	0.474	5.520	3.937	3.150		4.134		0.335	0.630	1.772	1.496	4.134	.551x.787x.669
RPG45HAL	60	120	37.5	14	163	100	80		129.8		8.5	16	45	38	105	14×20×17
	2.362	4.724	1.476	0.551	6.417	3.937	3.150		5.110		0.335	0.630	1.772	1.496	4.134	.551x.787x.669

Rail Part Numbering

RPG 25 N — 1200

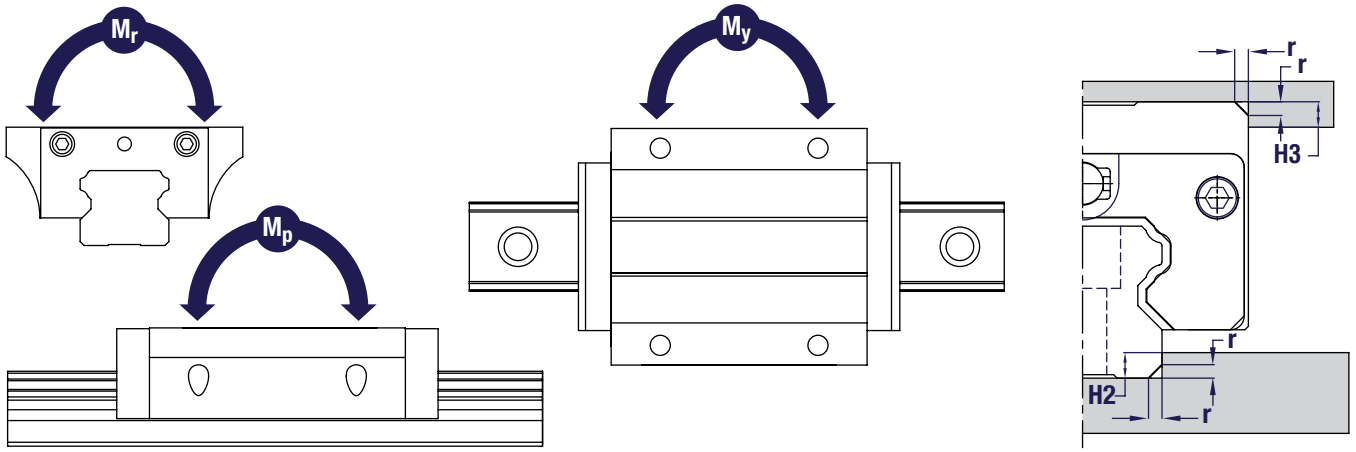
- **Model Code**: Model **RPG**
- **Size**: 15 20 25 30 35 45
- **Accuracy Grade**: **N**: Normal; **H**: High; **P**: Precision*
- Rail Length (mm)

Block Part Numbering

RPG 25 H AL B N 1

- **Model Code**: Model **RPG**
- **Size**: 15 20 25 30 35 45
- **Type Code**: **H**: Int'l Standard; **S**: Low Profile
- **Flange Type**:
  - **A**: Tapped/through hole with Flange; Standard Block
  - **AL**: Tapped/through hole with Flange; Long Block
  - **R**: Blind tapped hole without Flange; Standard Block
  - **RL**: Blind tapped hole without Flange; Long Block
  - **W**: Low profile blind tapped without Flange; Standard Block
  - **V**: Low profile blind tapped without Flange; Short Block
- **Accessory Code**: **A**: Metal Scraper Kit; **B**: End Seal Kit; **C**: Scraper & End Seal Kit; **BLANK**: No Accessory
- **Accuracy Grade**: **N**: Normal; **H**: High; **P**: Precision*
- **Preload**: **F**: Clearance*; **0**: No Preload; **1**: Light Preload; **2**: Medium Preload*

*Consult factory



A & AL Product Performance Data

Model No.	Ref. Data		Basic Load Rating		Static Moment			Weight		Shoulder Height		Radius
	Lmax†	G	(C_{50}) Dynamic	(C_0) Static	M_r	M_p	M_y	Block	Rail	Rail (H2)	Block (H3)	Rail/Block (r)
	mm	mm	N	N	Nm	Nm	Nm	Kg	Kg/m	mm	mm	mm
	in	in	lbf	lbf	ft·lbf	ft·lbf	ft·lbf	lb	lb/ft	in	in	in
RPG15HA	4000	20	8336	13239	99	67	67	0.21	1.40	2	5	0.8
	157.480	0.787	1874	2976	73	49	49	0.46	0.94	0.079	0.197	0.031
RPG20HA	4000	20	13729	23536	235	143	143	0.40	2.60	2.4	6	0.8
	157.480	0.787	3086	5291	174	106	106	0.88	1.75	0.094	0.236	0.031
RPG20HAL	4000	20	16181	29420	294	233	233	0.52	2.60	2.4	6	0.8
	157.480	0.787	3638	6614	217	172	172	1.15	1.75	0.094	0.236	0.031
RPG25HA	4000	20	19123	31381	361	224	224	0.57	3.60	4.4	7	1.2
	157.480	0.787	4299	7055	266	165	165	1.26	2.42	0.173	0.276	0.047
RPG25HAL	4000	20	25497	45111	519	446	446	0.72	3.60	4.4	7	1.2
	157.480	0.787	5732	10141	383	329	329	1.59	2.42	0.173	0.276	0.047
RPG30HA	4000	20	27949	47072	659	424	424	1.10	5.20	6.4	8	1.2
	157.480	0.787	6283	10582	486	312	312	2.43	3.49	0.252	0.315	0.047
RPG30HAL	4000	20	35304	62763	879	739	739	1.40	5.20	6.4	8	1.2
	157.480	0.787	7937	14110	648	545	545	3.09	3.49	0.252	0.315	0.047
RPG35HA	4000	20	37756	60801	1034	608	608	1.60	7.20	7.1	9	1.2
	157.480	0.787	8488	13669	762	448	448	3.53	4.84	0.280	0.354	0.047
RPG35HAL	4000	20	47072	81395	1384	1077	1077	2.00	7.20	7.1	9	1.2
	157.480	0.787	10582	18298	1021	794	794	4.41	4.84	0.280	0.354	0.047
RPG45HA	4000	22.5	63743	102970	2317	1351	1351	2.70	12.30	11.5	11	1.6
	157.480	0.886	14330	23149	1709	997	997	5.95	8.27	0.453	0.433	0.063
RPG45HAL	4000	22.5	75511	127486	2868	2068	2068	3.60	12.30	11.5	11	1.6
	157.480	0.886	16976	28660	2116	1525	1525	7.94	8.27	0.453	0.433	0.063

Rail Accessories

RPG 25 SCRAPER

Model Code
Model **RPG**

Size
15 20 25 30 35 45

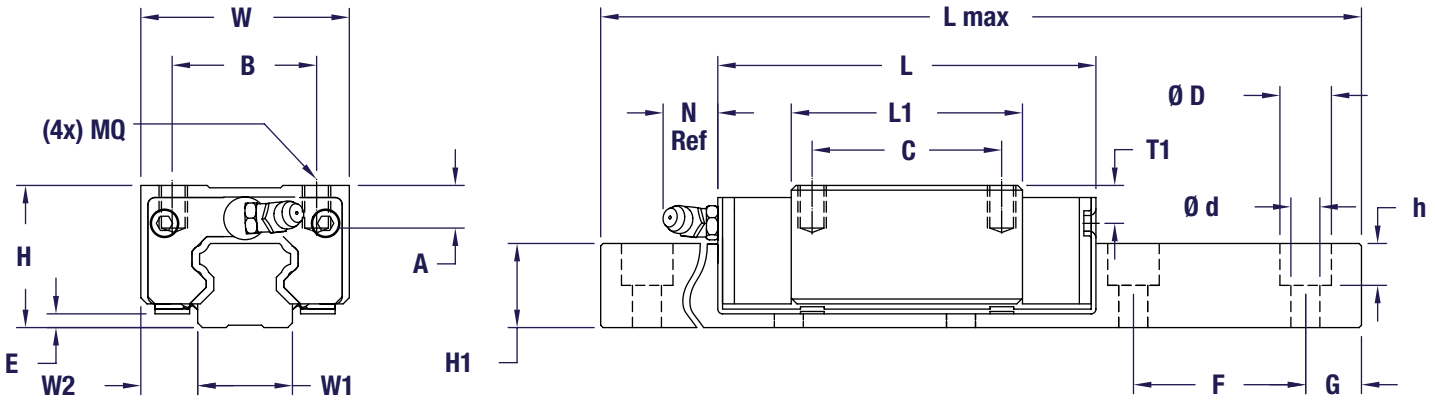
Accessory
Scraper: 2 Metal Scrapers
End Seal: 2 End Seals (New Bolts & Lube Fitting provided if necessary)
Scraper/SL: 2 Metal Scrapers & 2 End Seals (New Bolts & Lube Fitting provided if necessary)
Capplugs: Rail Bolt Hole Caps

Bolt Torque

		Torque in Steel		Torque in Aluminum	
Rail Size	Bolt Size	Nm	ft-lbf	Nm	ft-lbf
RPG15	M4x16	4	3	2	1.5
RPG20	M5x20	8.8	6.5	4.4	3.25
RPG25	M6x25	13.7	10	6.8	5
RPG30	M8x30	30	22	15	11
RPG35	M8x30	30	22	15	11
RPG45	M12x40	120	88.5	58	42.75

†Lmax Tolerance: @4,000 mm (+0.0/-20mm)

R & RL BLIND TAPPED HOLE WITHOUT FLANGE



R & RL Product Dimension Data

Model No.	Assembly (mm / in)				RPGH Block								RPGH Rail			
	H	W	W2	E	L	B	C	MQxA	L1	Oil Hole	T1	N	W1	H1	F	dxDxh
	mm	mm	mm	mm	mm	mm	mm		mm		mm	mm	mm	mm	mm	mm
	in	in	in	in	in	in	in		in		in	in	in	in	in	in
RPG15HR	28	34	9.5	2.5	68	26	26	M4×6	40	Ø3	8.3	5	15	14	60	4.5x7.5X5.3
	1.102	1.339	0.374	0.098	2.677	1.024	1.024		1.575		0.327	0.197	0.591	0.551	2.362	.177x.295x.209
RPG20HR	30	44	12	2.9	79.8	32	36	M5×8	48.8	M6x1	7	15.6	20	18	60	6×9.5×8.5
	1.181	1.732	0.472	0.114	3.142	1.260	1.417		1.921		0.276	0.614	0.787	0.709	2.362	.236x.374x.335
RPG20HRL	30	44	12	5	92.4	32	50		63.4		7	15.6	20	18	60	6×9.5×8.5
	1.181	1.732	0.472	0.197	3.638	1.260	1.969		2.496		0.276	0.614	0.787	0.709	2.362	.236x.374x.335
RPG25HR	40	48	12.5	4.9	90	35	35	M6x10	57	M6x1	11.8	15.6	23	22	60	7x11x9
	1.575	1.890	0.492	0.193	3.543	1.378	1.378		2.244		0.465	0.614	0.906	0.866	2.362	.275x.433x.354
RPG25HRL	40	48	12.5	7	110.1	35	50		79.1		11.8	15.6	23	22	60	7x11x9
	1.575	1.890	0.492	0.276	4.335	1.378	1.969		3.114		0.465	0.614	0.906	0.866	2.362	.275x.433x.354
RPG30HR	45	60	16	9	109	40	40	M8×13	72	M6×1	10	15.6	28	26	80	9x14x12
	1.772	2.362	0.630	0.354	4.291	1.575	1.575		2.835		0.394	0.614	1.102	1.024	3.150	.354x.551x.472
RPG30HRL	45	60	16	9	131.3	40	60		94.3		10	15.6	28	26	80	9x14x12
	1.772	2.362	0.630	0.354	5.169	1.575	2.362		3.713		0.394	0.614	1.102	1.024	3.150	.354x.551x.472
RPG35HR	55	70	18	7.6	111	50	50	M8×13	80	M6×1	15	15.6	34	29	80	9×14×12
	2.165	2.756	0.709	0.299	4.370	1.969	1.969		3.150		0.591	0.614	1.339	1.142	3.150	.354x.551x.472
RPG35HRL	55	70	18	9.5	134.8	50	72		105.8		15	15.6	34	29	80	9×14×12
	2.165	2.756	0.709	0.374	5.307	1.969	2.835		4.165		0.591	0.614	1.339	1.142	3.150	.354x.551x.472
RPG45HR	70	86	20.5	12.05	140.2	60	60	M10×16	105	M8×1	18.5	16	45	38	105	14×20×17
	2.756	3.386	0.807	0.474	5.520	2.362	2.362		4.134		0.728	0.630	1.772	1.496	4.134	.551x.787x.669
RPG45HRL	70	86	20.5	14	163	60	80		129.8		18.5	16	45	38	105	14×20×17
	2.756	3.386	0.807	0.551	6.417	2.362	3.150		5.110		0.728	0.630	1.772	1.496	4.134	.551x.787x.669

Rail Part Numbering

RPG 25 N — 1200

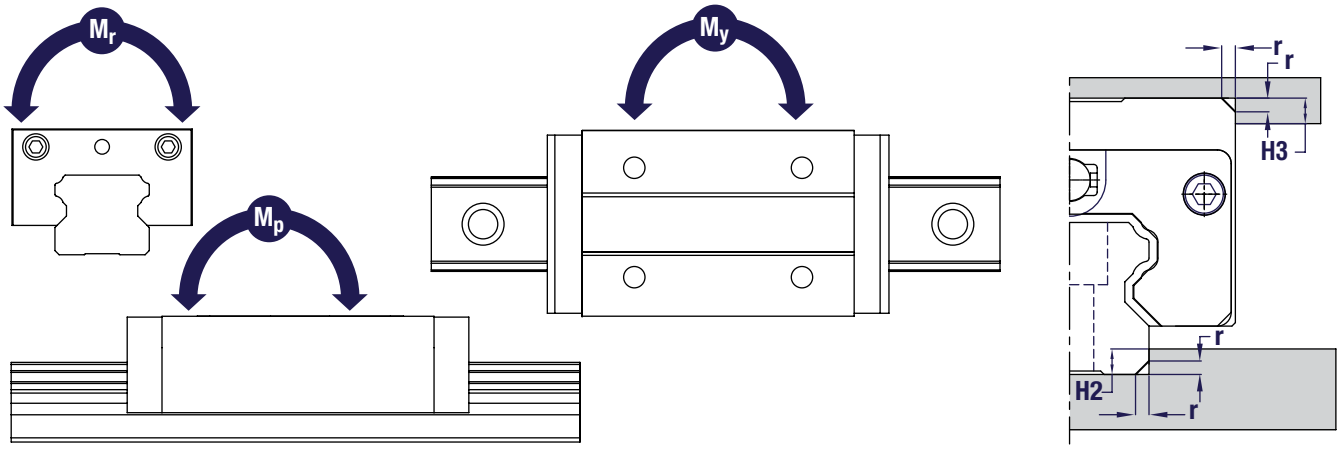
- **Model Code**: Model **RPG**
- **Size**: **15** **20** **25** **30** **35** **45**
- **Accuracy Grade**: **N**: Normal; **H**: High; **P**: Precision*
- Rail Length (mm)

Block Part Numbering

RPG 25 H AL B N 1

- **Model Code**: Model **RPG**
- **Size**: **15** **20** **25** **30** **35** **45**
- **Type Code**: **H**: Int'l Standard; **S**: Low Profile
- **Flange Type**:
  - **A**: Tapped/through hole with Flange; Standard Block
  - **AL**: Tapped/through hole with Flange; Long Block
  - **R**: Blind tapped hole without Flange; Standard Block
  - **RL**: Blind tapped hole without Flange; Long Block
  - **W**: Low profile blind tapped without Flange; Standard Block
  - **V**: Low profile blind tapped without Flange; Short Block
- **Accessory Code**: **A**: Metal Scraper Kit; **B**: End Seal Kit; **C**: Scraper & End Seal Kit; **BLANK**: No Accessory
- **Accuracy Grade**: **N**: Normal; **H**: High; **P**: Precision*
- **Preload**: **F**: Clearance*; **0**: No Preload; **1**: Light Preload; **2**: Medium Preload*

*Consult factory



R & RL Product Performance Data

Model No.	Ref. Data		Basic Load Rating		Static Moment			Weight		Shoulder Height		Radius
	Lmax†	G	(C_{50}) Dynamic	(C_0) Static	M_r	M_p	M_y	Block	Rail	Rail (H2)	Block (H3)	Rail/Block (r)
	mm	mm	N	N	Nm	Nm	Nm	Kg	Kg/m	mm	mm	mm
	in	in	lbf	lbf	ft·lbf	ft·lbf	ft·lbf	lb	lb/ft	in	in	in
RPG15HR	4000	20	8336	13239	99	67	67	0.19	1.40	2	5	0.8
	157.480	0.787	1874	2976	73	49	49	0.42	0.94	0.079	0.197	0.031
RPG20HR	4000	20	13729	23536	235	143	143	0.31	2.60	2.4	6	0.8
	157.480	0.787	3086	5291	174	106	106	0.68	1.75	0.094	0.236	0.031
RPG20HRL	4000	20	16181	29420	294	233	233	0.47	2.60	2.4	6	0.8
	157.480	0.787	3638	6614	217	172	172	1.04	1.75	0.094	0.236	0.031
RPG25HR	4000	20	19123	31381	361	224	224	0.45	3.60	4.4	7	1.2
	157.480	0.787	4299	7055	266	165	165	0.99	2.42	0.173	0.276	0.047
RPG25HRL	4000	20	25497	45111	519	446	446	0.56	3.60	4.4	7	1.2
	157.480	0.787	5732	10141	383	329	329	1.23	2.42	0.173	0.276	0.047
RPG30HR	4000	20	27949	47072	659	424	424	0.91	5.20	6.4	8	1.2
	157.480	0.787	6283	10582	486	312	312	2.01	3.49	0.252	0.315	0.047
RPG30HRL	4000	20	35304	62763	879	739	739	1.20	5.20	6.4	8	1.2
	157.480	0.787	7937	14110	648	545	545	2.65	3.49	0.252	0.315	0.047
RPG35HR	4000	20	37756	60801	1034	608	608	1.50	7.20	7.1	9	1.2
	157.480	0.787	8488	13669	762	448	448	3.31	4.84	0.280	0.354	0.047
RPG35HRL	4000	20	47072	81395	1384	1077	1077	1.90	7.20	7.1	9	1.2
	157.480	0.787	10582	18298	1021	794	794	4.19	4.84	0.280	0.354	0.047
RPG45HR	4000	22.5	63743	102970	2317	1351	1351	2.30	12.30	11.5	11	1.6
	157.480	0.886	14330	23149	1709	997	997	5.07	8.27	0.453	0.433	0.063
RPG45HRL	4000	22.5	75511	127486	2868	2068	2068	2.80	12.30	11.5	11	1.6
	157.480	0.886	16976	28660	2116	1525	1525	6.17	8.27	0.453	0.433	0.063

Rail Accessories

RPG 25 SCRAPER

Model Code
Model **RPG**

Size
15 20 25 30 35 45

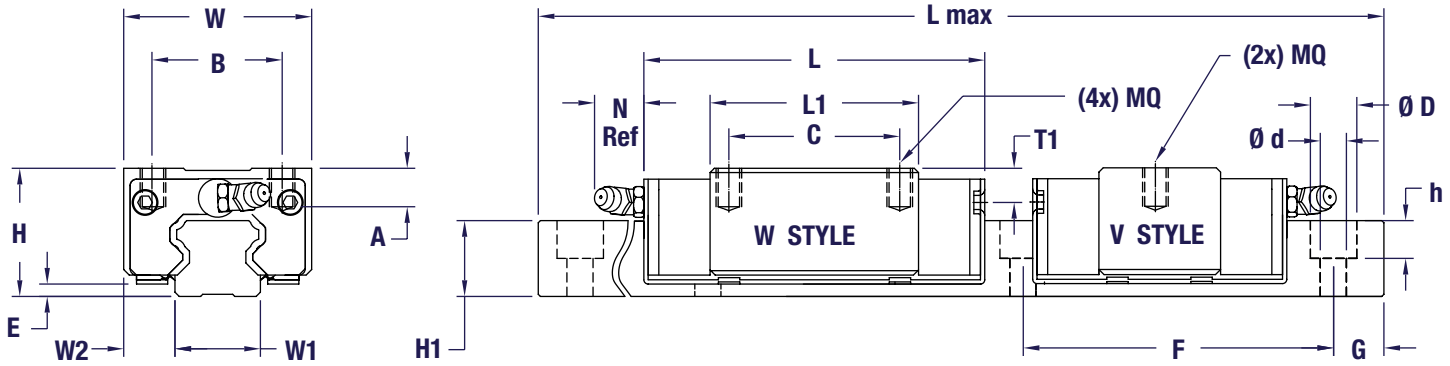
Accessory
Scraper: 2 Metal Scrapers
End Seal: 2 End Seals (New Bolts & Lube Fitting provided if necessary)
Scraper/SL: 2 Metal Scrapers & 2 End Seals (New Bolts & Lube Fitting provided if necessary)
Capplugs: Rail Bolt Hole Caps

Bolt Torque

		Torque in Steel		Torque in Aluminum	
Rail Size	Bolt Size	Nm	ft-lbf	Nm	ft-lbf
RPG15	M4x16	4	3	2	1.5
RPG20	M5x20	8.8	6.5	4.4	3.25
RPG25	M6x25	13.7	10	6.8	5
RPG30	M8x30	30	22	15	11
RPG35	M8x30	30	22	15	11
RPG45	M12x40	120	88.5	58	42.75

†Lmax Tolerance: @4,000 mm (+0.0/-20mm)

W & V LOW PROFILE BLIND TAPPED HOLE WITHOUT FLANGE



W & V Product Dimension Data

Model No.	Assembly (mm / in)				RPGH Block								RPGH Rail			
	H	W	W2	E	L	B	C	MQxA	L1	Oil Hole	T1	N	W1	H1	F	dxDxh
	mm	mm	mm	mm	mm	mm	mm		mm		mm	mm	mm	mm	mm	mm
	in	in	in	in	in	in	in		in		in	in	in	in	in	in
RPG15SW	24	34	9.5	2.5	68	26	26	M4×5.6	40	Ø3	4.3	5	15	14	60	4.5x7.5×5.3
	0.945	1.339	0.374	0.098	2.677	1.024	1.024		1.575		0.169	0.197	0.591	0.551	2.362	.177x.295x.209
RPG15SV	24	34	9.5	4.6	47.6	26			21.6		4.3	5	15	14	60	4.5x7.5×5.3
	0.945	1.339	0.374	0.181	1.874	1.024			0.850		0.169	0.197	0.591	0.551	2.362	.177x.295x.209
RPG20SW	28	42	11	2.9	79.8	32	32	M5×6.4	48.8	M6x1	5	15.6	20	18	60	6×9.5×8.5
	1.102	1.654	0.433	0.114	3.142	1.260	1.260		1.921		0.197	0.614	0.787	0.709	2.362	.236x.374x.335
RPG20SV	28	42	11	5	57	32			28		5	15.6	20	18	60	6×9.5×8.5
	1.102	1.654	0.433	0.197	2.244	1.260			1.102		0.197	0.614	0.787	0.709	2.362	.236x.374x.335
RPG25SW	33	48	12.5	4.9	90	35	35	M6x8	57	M6x1	4.8	15.6	23	22	60	7x11x9
	1.299	1.890	0.492	0.193	3.543	1.378	1.378		2.244		0.189	0.614	0.906	0.866	2.362	.275x.433x.354
RPG25SV	33	48	12.5	7	62.5	35			31.5		4.8	15.6	23	22	60	7x11x9
	1.299	1.890	0.492	0.276	2.461	1.378			1.240		0.189	0.614	0.906	0.866	2.362	.275x.433x.354
RPG30SW	42	60	16	9	109	40	40	M8×11.5	72	M6×1	7	15.6	28	26	80	9x14x12
	1.654	2.362	0.630	0.354	4.291	1.575	1.575		2.835		0.276	0.614	1.102	1.024	3.150	.354x.551x.472
RPG30SV	42	60	16	9	75.6	40			38.6		7	15.6	28	26	80	9x14x12
	1.654	2.362	0.630	0.354	2.976	1.575			1.520		0.276	0.614	1.102	1.024	3.150	.354x.551x.472
RPG35SW	48	70	18	7.6	111	50	50	M8×11.2	80	M6×1	8	15.6	34	29	80	9x14x12
	1.890	2.756	0.709	0.299	4.370	1.969	1.969		3.150		0.315	0.614	1.339	1.142	3.150	.354x.551x.472
RPG35SV	48	70	18	9.5	74.7	50			45.7		8	15.6	34	29	80	9x14x12
	1.890	2.756	0.709	0.374	2.941	1.969			1.799		0.315	0.614	1.339	1.142	3.150	.354x.551x.472
RPG45SW	60	86	20.5	12.05	140.2	60	60	M10×13	105	M8×1	8.5	16	45	38	105	14×20×17
	2.362	3.386	0.807	0.474	5.520	2.362	2.362		4.134		0.335	0.630	1.772	1.496	4.134	.551x.787x.669

Rail Part Numbering

RPG 25 N — 1200

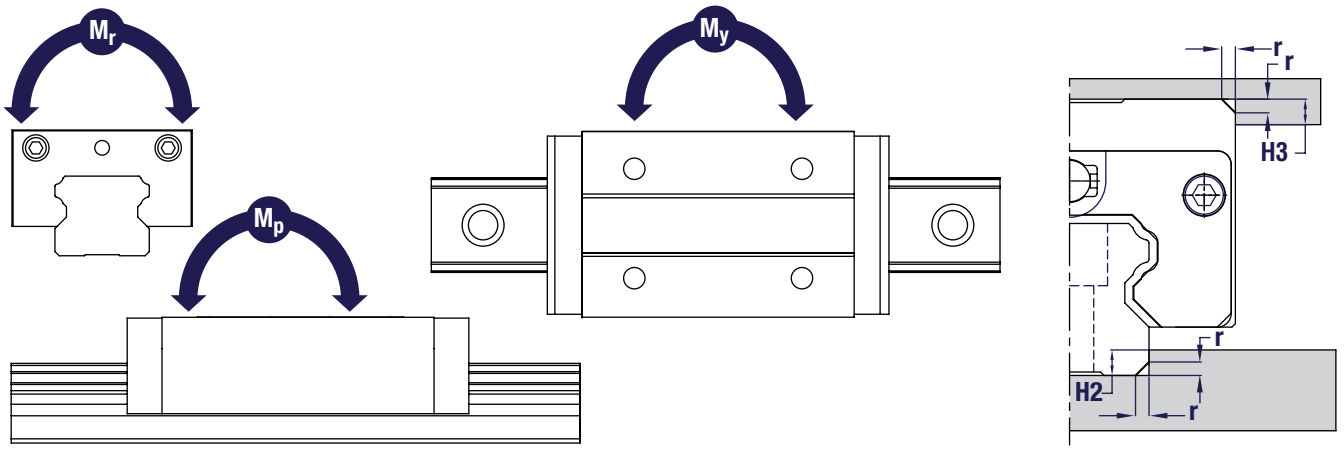
- **Model Code**: Model **RPG**
- **Size**: 15 | 20 | 25 | 30 | 35 | 45
- **Accuracy Grade**: **N**: Normal; **H**: High; **P**: Precision*
- Rail Length (mm)

Block Part Numbering

RPG 25 H AL B N 1

- **Model Code**: Model **RPG**
- **Size**: 15 | 20 | 25 | 30 | 35 | 45
- **Type Code**: **H**: Int'l Standard; **S**: Low Profile
- **Flange Type**:
  - **A**: Tapped/through hole with Flange; Standard Block
  - **AL**: Tapped/through hole with Flange; Long Block
  - **R**: Blind tapped hole without Flange; Standard Block
  - **RL**: Blind tapped hole without Flange; Long Block
  - **W**: Low profile blind tapped without Flange; Standard Block
  - **V**: Low profile blind tapped without Flange; Short Block
- **Accessory Code**: **A**: Metal Scraper Kit; **B**: End Seal Kit; **C**: Scraper & End Seal Kit; **BLANK**: No Accessory
- **Accuracy Grade**: **N**: Normal; **H**: High; **P**: Precision*
- **Preload**: **F**: Clearance*; **0**: No Preload; **1**: Light Preload; **2**: Medium Preload*

*Consult factory



W & V Product Performance Data

Model No.	Ref. Data		Basic Load Rating		Static Moment			Weight		Shoulder Height		Radius
	Lmax†	G	(C_{50}) Dynamic	(C_0) Static	M_r	M_p	M_y	Block	Rail	Rail (H2)	Block (H3)	Rail/Block (r)
	mm	mm	N	N	Nm	Nm	Nm	Kg	Kg/m	mm	mm	mm
	in	in	lbf	lbf	ft·lbf	ft·lbf	ft·lbf	lb	lb/ft	in	in	in
RPG15SW	4000	20	8336	13239	99	67	67	0.17	1.40	2	5	0.8
	157.480	0.787	1874	2976	73	49	49	0.37	0.94	0.079	0.197	0.031
RPG15SV	4000	20	5099	6669	50	18	18	0.10	1.40	2.4	6	0.8
	157.480	0.787	1146	1499	37	13	13	0.22	0.94	0.094	0.236	0.031
RPG20SW	4000	20	13729	23536	235	143	143	0.26	2.60	2.4	6	0.8
	157.480	0.787	3086	5291	174	106	106	0.57	1.75	0.094	0.236	0.031
RPG20SV	4000	20	9316	13729	69	48	48	0.17	2.60	4.4	7	1.2
	157.480	0.787	2094	3086	51	35	35	0.37	1.75	0.173	0.276	0.047
RPG25SW	4000	20	19123	31381	361	224	224	0.38	3.60	4.4	7	1.2
	157.480	0.787	4299	7055	266	165	165	0.84	2.42	0.173	0.276	0.047
RPG25SV	4000	20	12258	17162	172	68	68	0.21	3.60	6.4	8	1.2
	157.480	0.787	2756	3858	127	50	50	0.46	2.42	0.252	0.315	0.047
RPG30SW	4000	20	27949	47072	659	424	424	0.81	5.20	6.4	8	1.2
	157.480	0.787	6283	10582	486	312	312	1.79	3.49	0.252	0.315	0.047
RPG30SV	4000	20	17162	23536	330	114	114	0.48	5.20	7.1	9	1.2
	157.480	0.787	3858	5291	243	84	84	1.06	3.49	0.280	0.354	0.047
RPG35SW	4000	20	37756	60801	1034	608	608	1.20	7.20	7.1	9	1.2
	157.480	0.787	8488	13669	762	448	448	2.65	4.84	0.280	0.354	0.047
RPG35SV	4000	22.5	24517	35794	609	205	205	0.80	7.20	11.5	11	1.6
	157.480	0.886	5512	8047	449	151	151	1.76	4.84	0.453	0.433	0.063
RPG45SW	4000	22.5	63743	102970	2317	1351	1351	2.10	12.30	11.5	11	1.6
	157.480	0.886	14330	23149	1709	997	997	4.63	8.27	0.453	0.433	0.063

Rail Accessories

RPG 25 SCRAPER

Model Code
Model **RPG**

Size
15 20 25 30 35 45

Accessory
Scraper: 2 Metal Scrapers
End Seal: 2 End Seals (New Bolts & Lube Fitting provided if necessary)
Scraper/SL: 2 Metal Scrapers & 2 End Seals (New Bolts & Lube Fitting provided if necessary)
Capplugs: Rail Bolt Hole Caps

Bolt Torque

		Torque in Steel		Torque in Aluminum	
Rail Size	Bolt Size	Nm	ft-lbf	Nm	ft-lbf
RPG15	M4x16	4	3	2	1.5
RPG20	M5x20	8.8	6.5	4.4	3.25
RPG25	M6x25	13.7	10	6.8	5
RPG30	M8x30	30	22	15	11
RPG35	M8x30	30	22	15	11
RPG45	M12x40	120	88.5	58	42.75

†Lmax Tolerance: @4,000 mm (+0.0/-20mm)

Joined rails can be utilized to solve a myriad of different design challenges. For example, joined rails may be used to extend the length of a guideway system beyond that of a single rail or provide an access portal for guide block removal and installation.

RBS maintains an extensive inventory of linear guide rails to serve our customers with best in industry lead times, including joined rail applications. Our rails are 4000 mm long for all sizes, when longer lengths are needed, we provide precision machining services to ensure each joined rail connection aligns perfectly for smooth block travel across each joint. Give our technical staff a call at (800) 475-9532 to discuss your specific joined rail application needs.

Note: Due to the special manufacturing and dimensional considerations associated with joined rail systems, Rockford Ball Screw requires consulting our factory prior to ordering.

In joined rail applications, it is preferred to have a rail locating or datum surface to assist in proper alignment across the joined sections and provide additional stability. (*Ref. Linear Guide Rail Installation Procedures. PDF on website.*)

For assembly purposes, the corresponding mating end of each rail will be identified with an alpha numeric numbering system as shown below in *Fig. 11*. This illustration also shows several design dimensions that will be required prior to supplying a joined rail system.

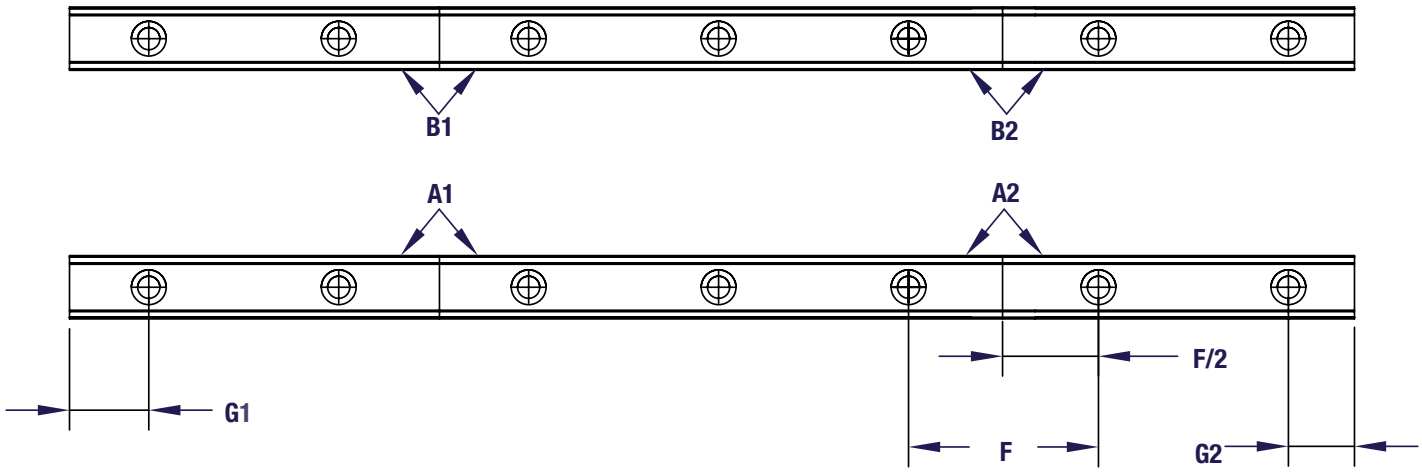


Fig. 11 Standard Joined Rail Configuration

PRODUCTS SELECTION PROCESS & INDEX

Select Series & Size of Rail

Life Estimation

Select Accuracy

Select Preload and Calculate Rigidity & Friction

Mounting Error Tolerances

Lubrication Considerations

Select Accessories

Additional Online Resources

Selecting A Linear Guideway

Linear Guide Rail Installation Procedures

Application Data Sheet

Basic Dynamic Load Rating C_{50}

The Basic Dynamic Load Rating C_{50} is used to calculate the Fatigue/Service Life of a linear guide system that is in motion and under load. The Dynamic Load Rating is defined as a load of constant magnitude applied in a downward direction to the center of the guide block which theoretically furnishes 50km of L_{10} life.

The following formula may be used to convert the Basic Dynamic Load Rating C_{50} to an equivalent Dynamic Load Rating for 100km of Rated Fatigue Life C_{100}:

$$C_{100} = \left(\frac{C_{50}}{1.26}\right)$$

The Dynamic Load Rating C_{50} can be found in our Product Charts (pages 5-10)

Fatigue Life (Service Life) L_{10}

Fatigue Life (L_{10}) is the total linear distance of travel displaced without incidental high cycle metal fatigue (flaking) by 90% of identical linear motion systems operating independently under the same conditions. This life calculation is also referred to as Service Life or Normal Life.

For linear guide systems utilizing balls as the rolling element, the fatigue service life can be calculated using the following formula:

$$L_{10} = 50\text{km} * \left(\frac{C_{50}}{P_m}\right)^3$$

L_{10} = Fatigue Life (km)
C_{50} = Basic Dynamic Load Rating (N) (50km)
P_m = Mean Applied Load to ball slide (N)

See Selection Guide Example (Ref. Selecting a Linear Guideway. PDF on website)

Basic Static Load Rating C_0

The Basic Static Load Rating is defined as the maximum allowable Static Load which can be applied in a downward direction to the center of the guide block. The application of loads in the excess of the Basic Static Load Rating will exceed the elastic properties of the material and yield permanent deformation. The resulting sum of the ball and raceway deformations is theoretically equivalent to .0001 times the diameter of the rolling element.

The Basic Static Load Rating C_0 can be found in our Product Charts (pages 5-10)

Basic Static Moment Load Rating M_0

The Basic Static Moment Load Rating defines the magnitude of a moment which applied about one of three axes of freedom will yield the same degree of permanent raceway and bearing ball deformation as referred to in the Basic Static Load Rating C_0.

M_p = Pitching motion of guide block
M_y = Yawing motion of guide block
M_r = Rolling motion of guide block

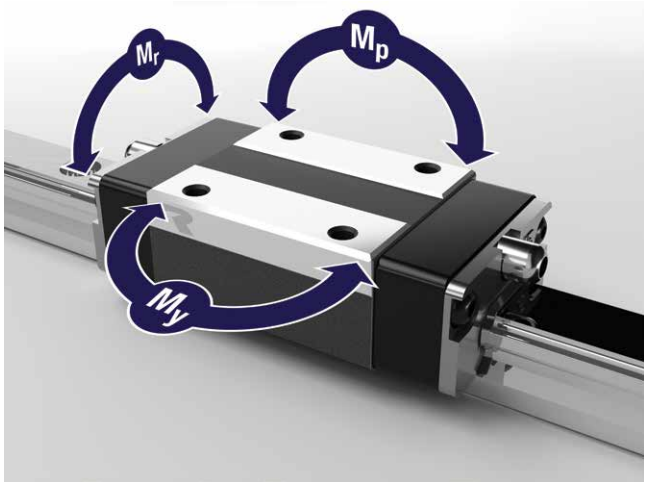


Fig. 13 Profile Guide Moment Diagram

Equivalent Load P_e

When two or more loads are applied simultaneously from different directions (Normal loads and Transverse loads), a combined equivalent load, P_e should be calculated as shown below. This calculated equivalent load should be used in evaluating systemic L_{10} Service Life and Design Safety Factor (f_s).

$$P_e \text{ (Equivalent Load)} = | P_n | + | P_t |$$

P_n = Normal Load
P_t = Transverse Load

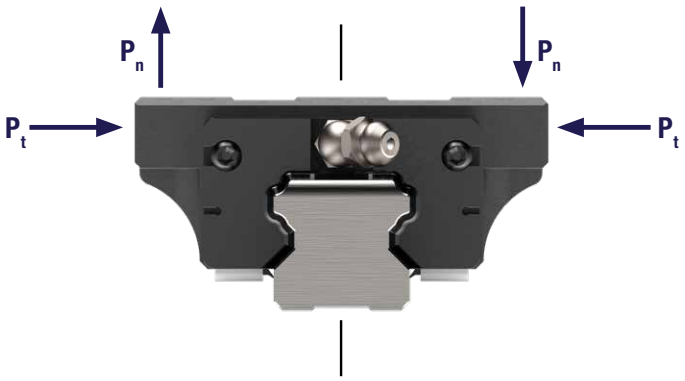


Fig. 14A Equivalent Load

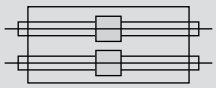
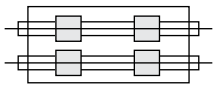
Appli-cation	Arrangement of Linear Guide	Load Evaluation Matrix per Unique Application				
		Load		Moment Load		
		Up/Down Normal	Right/Left Transverse	Rolling	Pitching	Yawing
1		P_n	P_t	M_r	M_p	M_y
2		P_n	P_t	M_r		
3		P_n	P_t		M_p	M_y
4		P_n	P_t			

Table 14 General Calculation Requirement for Load and Moment Evalutaion

Mean (Average Loads) P_m

The Mean Load is characterized as a load of constant value that results in a quantity of work equivalent to that of the original application. The Mean Load should be utilized in evaluating the Fatigue/Service Life (L_{10}) of an application given the assumption that instantaneous peak loads do not exceed the Static Load Rating (C_0) of the product. The remainder of this section will describe and address several typical Mean Loading conditions.

Mean Load calculations are used when the loading of systems and individual blocks varies as the system moves from point to point in an application. In general terms, the majority of loading profiles fall into one of three categories: **Stepwise Loading**, **Linear Loading** and **Sinusoidal Loading**. Each case presents a unique Mean Load calculation method as depicted in the following diagrams and specified in the associated equations.

Stepwise Loading

The system load increases (or decreases) in predictable plateaus over distances traveled. (Example: way covers collapsing)

When the load varies in steps:

$$P_m = \sqrt[3]{\frac{1}{X_t}\left(P_1^3 * X_1 + P_2^3 * X_2 \cdots + P_n^3 * X_n\right)}$$

P_m = Mean Load (N)
$P_1, P_2 \ldots P_n$ = Varying Load (N)
X_t = Total Distance Traveled (mm)
$X_1, X_2 \ldots X_n$ = Distance Traveled Under Various Loads (mm)

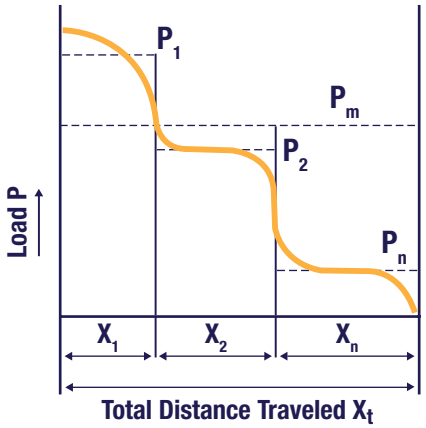


Fig. 14B Stepwise Loading

Linear Loading

The system load increases (or decreases) in direct proportion to the distance traveled.
(Example: compressing a spring)

When the load varies linearly:

$$P_m = \frac{1}{3}\,(P_{min} + 2 \cdot P_{max})$$

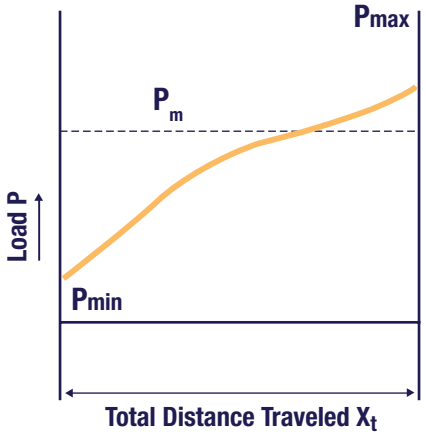


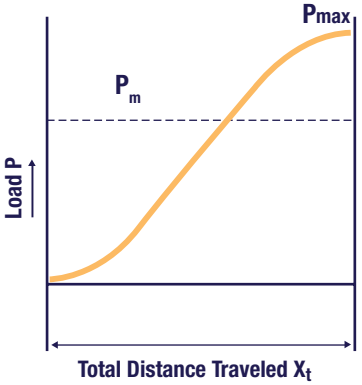
Fig. 15A Linear Loading

Sinusoidal Loading

The system load increases (or decreases) slowly at the beginning of travel, increases (or decreases) very rapidly in the center portion of travel, and increases (or decreases) at the rate equal to that at the beginning of travel at the end of the stroke. (Example: compressing a column of air)

When the load varies sinusoidally:

$P_m = 0.65\ P_{max}$



$P_m = 0.75\ P_{max}$

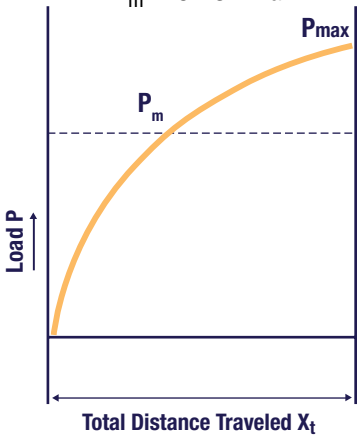


Fig. 15B—15C Sinusoidal Loading

Design Safety Factor f_s

Design Safety Factor is used to account for peak acceleration/deceleration loads caused by vibrations, impacts, or inertial forces.

Design Safety Factor (f_s) represents the ratio of either the Basic Static Load Rating (C_0) or Basic Static Moment Load Rating (M_0) to the actual applied system load or moment.

$$f_s = \left(\frac{f_c * C_0}{P_e}\right) \quad \text{or} \quad f_s = \left(\frac{f_c * M_0}{M}\right)$$

f_s = Design Safety Factor
f_c = Contact Factor (See *Table 15A* on *page 15*)
C_0 = Basic Static Load Rating
M_0 = Basic Static Permissible Moments ($M_r/M_p/M_y$)
P_e = Equivalent Load
M = Applied Moment Load

Operating Conditions	Loading Conditions	Minimum f_s
At Rest	Impact Load Is Small, Little Or No Vibration	1.0 - 1.7
	Impact, Moment Loads Or Vibration Present	1.7 - 3.0
During Motion	Impact Load Is Small, Little Or No Vibration	1.0 - 2.0
	Impact, Moment Loads Or Vibration Present	2.0 - 5.0

Table 15 Reference Values for Design Safety Factor

Contact Factor f_c

When multiple blocks are used on the same rail in close proximity to one another, uniform load distribution is difficult to achieve due to mounting surface errors, moment loading and other factors.

As a general rule, adjacent blocks are in close proximity when the space between adjacent blocks on the same rail is less than or equal to the L_1 dimension of a given block. Refer to the chart and illustration below for applicable close contact factors.

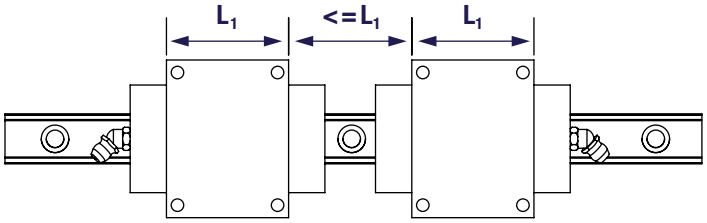


Fig. 16 Block Proximity

Number of blocks used in close contact	Contact Factor f_C
Normal Use (not in close contact)	1
2	0.81
3	0.72
4	0.66
5	0.61
6 or more	0.6

Table 16A Contact Factor (f_c)

Load Factor f_w

When vibrations and/or impacts are present during a reciprocating movement, the instantaneous loads can be difficult to fully quantify. In these instances, a load contact factor f_w should be used.

Vibration/ Impact	Speed (V)	f_W
Faint $0 \le f_w < .25g$	**Hyper-slow** $V \le 0.25m/sec$	1 - 1.2
Weak $.25 \le f_w < .50g$	**Slow** $.25 < V \le 1m/sec$	1.2 - 1.5
Moderate $.50 \le f_w < 1.0g$	**Medium** $1 < V \le 2m/sec$	1.5 - 2
Strong $1.0 \le f_w < 2.0g$	**Fast** $V > 2m/sec$	2 - 3.5

Table 16B Load Factor (f_w)

Temperature & Hardness Rating/Factors

RPG linear guides will operate with no loss of efficiency or degredation in load carrying capacity up to 80˚ C (176˚ F). Under these conditions, a temperature adjustment factor will not be necessary. If the ambient temperature exceeds 80˚ C (176˚ F), please consult factory for further assistance.

Life Calculation

In applications where it is difficult to fully quantify all loads and/or peak acceleration/deceleration loading acting on a linear guide system, the L_{10} life should be calculated using the following formula:

$$L_{10} = \left(\frac{f_c}{f_w} * \frac{C_{50}}{P_m} \right)^3 * 50km$$

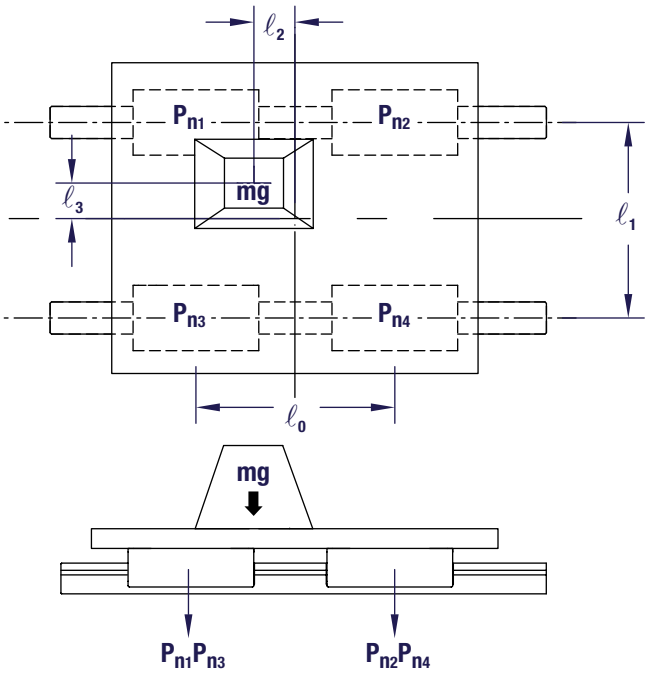
L_{10} = Resultant Life (km)
C_{50} = Basic Dynamic Load Rating (N) (50 km)
P_m = Mean Load (N)
f_c = Contact Factor
f_w = Load Factor

LOAD CALCULATION

The loads acting on the a linear guide system vary according to the location of the center of gravity, the thrust, the load position, the moment loading due to acceleration and deceleration, the cutting forces and other external forces.

Below are some common guide system arrangements, please contact the factory if your application is not shown.

Horizontal Orientation



$$P_{n1} = \frac{1}{4}mg + \frac{\ell_2}{2\ell_0}mg + \frac{\ell_3}{2\ell_1}mg + \frac{\ell_2\ell_3}{\ell_0\ell_1}mg$$

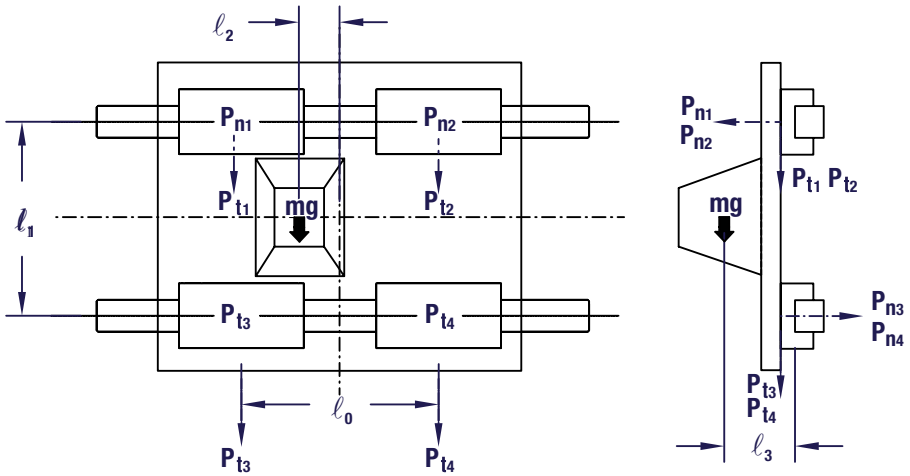
$$P_{n2} = \frac{1}{4}mg - \frac{\ell_2}{2\ell_0}mg + \frac{\ell_3}{2\ell_1}mg - \frac{\ell_2\ell_3}{\ell_0\ell_1}mg$$

$$P_{n3} = \frac{1}{4}mg + \frac{\ell_2}{2\ell_0}mg - \frac{\ell_3}{2\ell_1}mg - \frac{\ell_2\ell_3}{\ell_0\ell_1}mg$$

$$P_{n4} = \frac{1}{4}mg - \frac{\ell_2}{2\ell_0}mg - \frac{\ell_3}{2\ell_1}mg + \frac{\ell_2\ell_3}{\ell_0\ell_1}mg$$

$P_{n1, 2, 3, 4}$ = Resultant Normal Loads on Blocks
m = Mass of Applied Load (kg)
g = 9.8 m/sec^2

Perpendicular Orientation (Wall Mount)



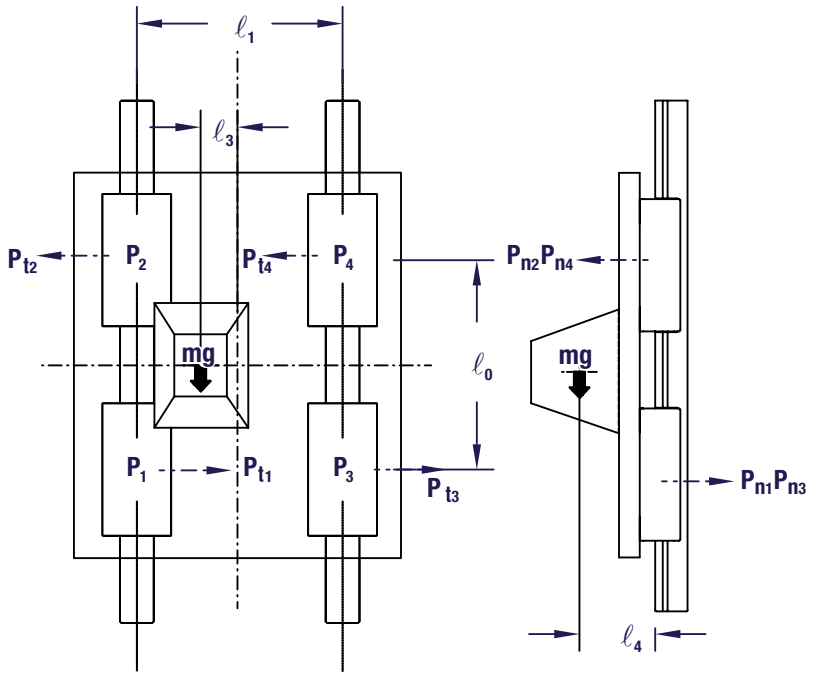
$$P_{n1} = P_{n2} = P_{n3} = P_{n4} = \frac{\ell_4}{2\ell_1}mg$$

$$P_{t1} = P_{t3} = \frac{1}{4}mg + \frac{\ell_2}{2\ell_0}mg$$

$$P_{t2} = P_{t4} = \frac{1}{4}mg - \frac{\ell_2}{2\ell_0}mg$$

$P_{n1, 2, 3, 4}$ = Resultant Normal Loads on Blocks
$P_{t1, 2, 3, 4}$ = Resultant Transverse Loads on Blocks
m = Mass of Applied Load (kg)
g = 9.8 m/sec^2

Vertical Orientation

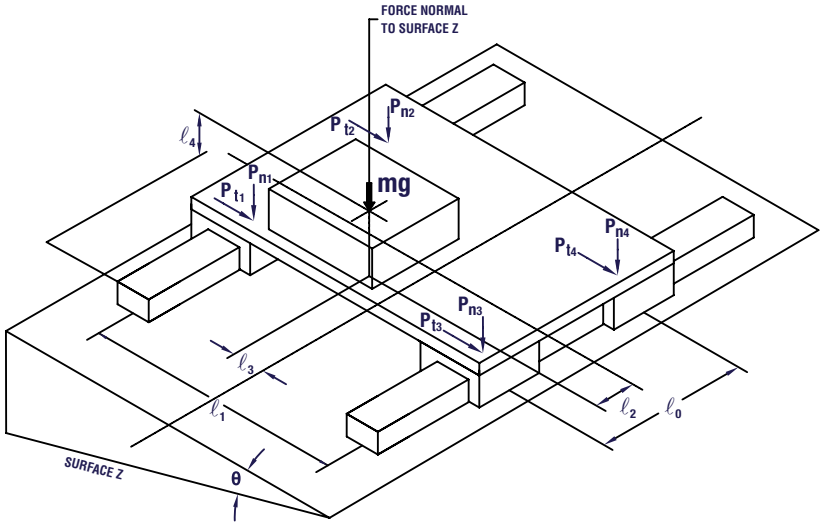


$$P_{n1} = P_{n2} = P_{n3} = P_{n4} = \frac{\ell_4}{2\ell_0} mg$$

$$P_{t1} = P_{t2} = P_{t3} = P_{t4} = \frac{\ell_3}{2\ell_0} mg$$

$P_{n1, 2, 3, 4}$ = Resultant Normal Loads on Blocks
$P_{t1, 2, 3, 4}$ = Resultant Transverse Loads on Blocks
m = Mass of Applied Load (kg)
g = 9.8 m/sec^2

Angled Orientation



$$P_{n1} = \frac{mg\cos\theta}{4} + \frac{mg\cos\theta\,\ell_2}{2\ell_0} + \frac{mg\cos\theta\,\ell_3}{2\ell_1} - \frac{mg\sin\theta\,\ell_4}{2\ell_1} + \frac{\ell_2\ell_3}{\ell_0\ell_1} mg\cos\theta$$

$$P_{n2} = \frac{mg\cos\theta}{4} - \frac{mg\cos\theta\,\ell_2}{2\ell_0} + \frac{mg\cos\theta\,\ell_3}{2\ell_1} - \frac{mg\sin\theta\,\ell_4}{2\ell_1} - \frac{\ell_2\ell_3}{\ell_0\ell_1} mg\cos\theta$$

$$P_{n3} = \frac{mg\cos\theta}{4} + \frac{mg\cos\theta\,\ell_2}{2\ell_0} - \frac{mg\cos\theta\,\ell_3}{2\ell_1} + \frac{mg\sin\theta\,\ell_4}{2\ell_1} - \frac{\ell_2\ell_3}{\ell_0\ell_1} mg\cos\theta$$

$$P_{n4} = \frac{mg\cos\theta}{4} - \frac{mg\cos\theta\,\ell_2}{2\ell_0} - \frac{mg\cos\theta\,\ell_3}{2\ell_1} + \frac{mg\sin\theta\,\ell_4}{2\ell_1} + \frac{\ell_2\ell_3}{\ell_0\ell_1} mg\cos\theta$$

$$P_{t1} = P_{t3} = \frac{mg\sin\theta}{4} + \frac{mg\sin\theta\,\ell_2}{2\ell_0}$$

$$P_{t2} = P_{t4} = \frac{mg\sin\theta}{4} - \frac{mg\sin\theta\,\ell_2}{2\ell_0}$$

$P_{n1, 2, 3, 4}$ = Resultant Normal Loads on Blocks
$P_{t1, 2, 3, 4}$ = Resultant Transverse Loads on Blocks
m = Mass of Applied Load (kg)
g = 9.8 m/sec^2
θ = Angle of Incline

Additional Online Resources

Selecting A Linear Guideway

Linear Guide Rail Installation Procedures

Running Parallelism

Running parallelism is defined as the deviation of parallelism between the reference datum surface of the guide block and the reference surface of the rail when the guide block is moving over the entire length of the rail.

RPG blocks have one qualified datum edge where as the rail edges are universal, meaning both edges of the rail are considered datum edges.

Difference in Height (△H)

By definition, difference in height is the maximum difference in height (H) measured between any pair of blocks on the same rail or set of rails mounted on the same plane.

Difference in Width (△W)

The maximum difference in width (W) between each block mounted on the same rail is known as the difference in width.

Note: The accuracy is measured at the center or central area of the block.

	Accuracy Grade		
	Normal (N)	High (H)	Precision (P)
Tolerance of Height (H)	+/- 0.10	+/- 0.04	+ 0.00 - 0.04
Tolerance of Width (W)	+/- 0.10	+/- 0.04	+ 0.00 - 0.04
Difference of Heights (△H)	0.03	0.02	0.01
Difference of Widths (△W)	0.03	0.02	0.01
Running parallelism of block surface C in relation to A	△C refer to chart below		
Running parallelism of block surface D in relation to B	△D refer to chart below		

Table 19 Accuracy Table (mm)

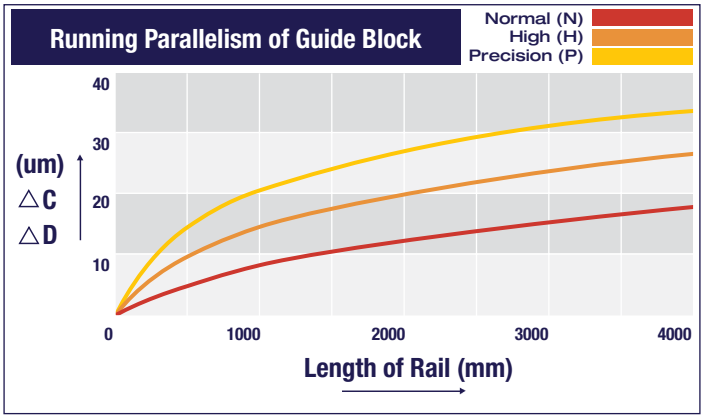
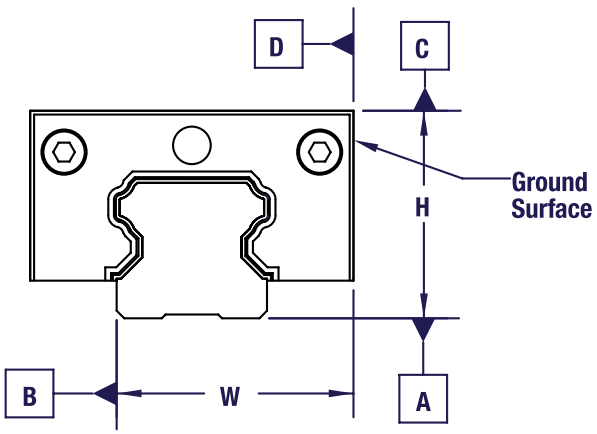


Fig. 19B Running Parallelism of Guide Block



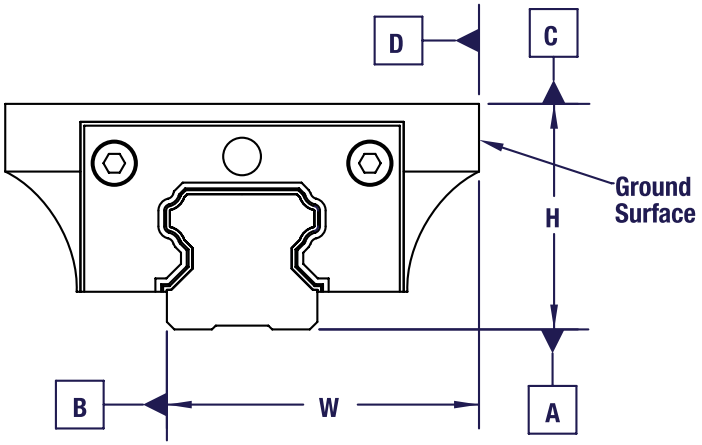
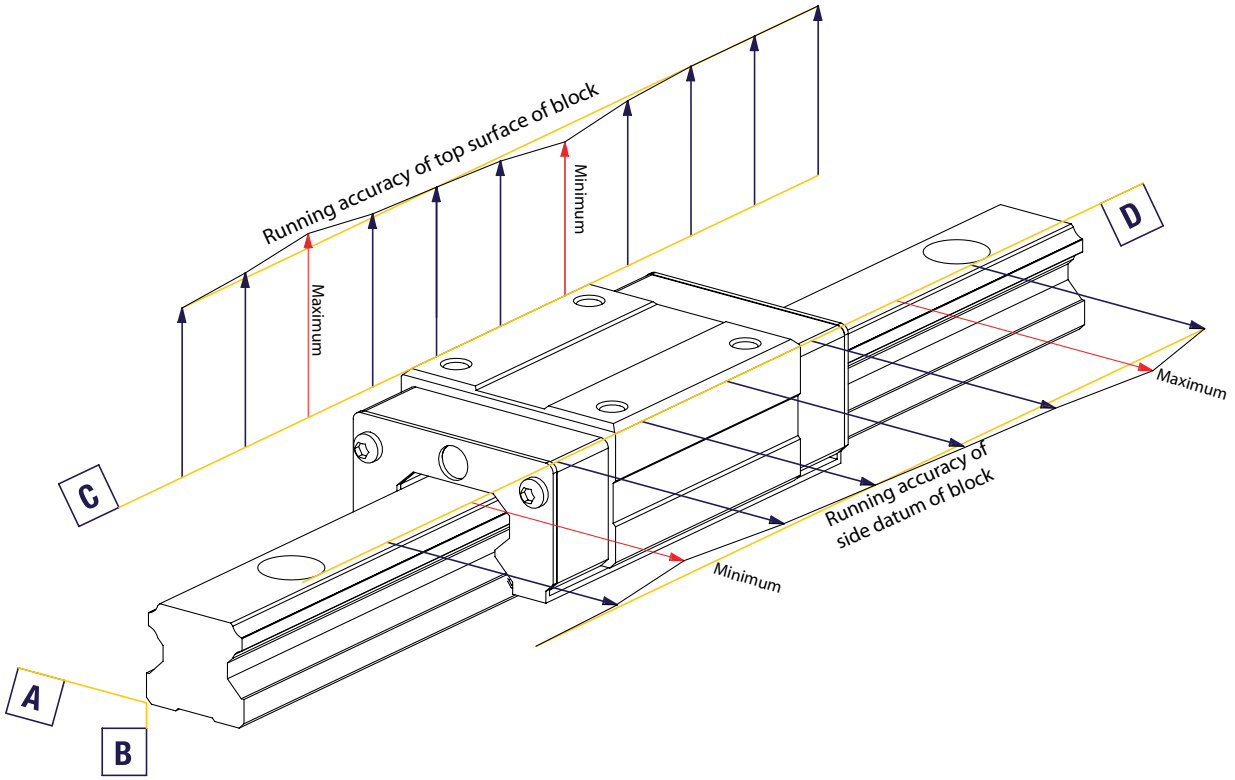


Fig. 19A Datum Surfaces



	Application	N	H	P		Application	N	H	P
Machine Tools	Machining Center			X	Robots	Cartesian Center	X	X	
	Lathe			X		Cylindrical Coordinate	X	X	
	Milling Machine			X		Gantry Root	X	X	
	EDM			X	Semi-conductor Machines	Wire Bonder			X
	Punch Press		X	X		Inserter		X	X
	Wood Working	X	X	X		Circuit Board		X	X
	Drilling/Tapping		X	X		Injection Molding	X	X	
	Pallet Changer	X			Others	Office Equipment	X	X	
	Engraving Machine	X				Transfer Equipment	X	X	
	ATC	X				XY Table		X	X
	Wire Cutter			X		Medical Equipment	X	X	X
	Small CNC Machine	X				Paint, Weld Machines	X	X	

Table 20 Accuracy Grades For Various Applications

Radial Clearance

Radial Clearance is defined as the vertical play between the block and rail as measured at the center of the block. The radial clearance is measured by lightly lifting up on the block.

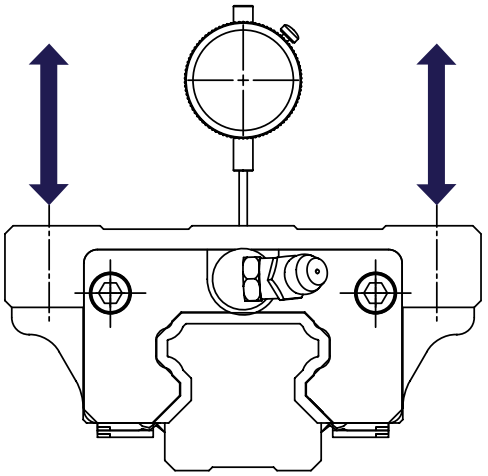


Fig. 21A Radial Clearance

Preload

Preload is a precise mechanical load applied to the rolling elements (balls) in order to increase the systemic rigidity and eliminate radial clearance. Four way equal loading of RPG blocks resists normal, transverse, and moment loading. Mounting Accuracy may dictate the allowable Preload (*See Tables 22A and 22B*). The blocks are shipped with the specified preload and no further adjustment is necessary.

	Grade F Light Clearance		Grade 0 No Preload		Grade 1 Light Preload		Grade 2 Medium Preload	
	Radial Clearance	Preload Force	Radial Clearance	Preload Force	Radial Clearance	Preload Force	Radial Clearance	Preload Force
RPG15	+4~+14	0	-4~+4	0	-12~-4	.02 x C_0	-20~-12	.05 x C_0
RPG20	+5~+15	0	-5~+5	0	-14~-5	.02 x C_0	-23~-14	.05 x C_0
RPG25	+6~+16	0	-6~+6	0	-16~-6	.02 x C_0	-26~-16	.05 x C_0
RPG30	+7~+17	0	-7~+7	0	-19~-7	.02 x C_0	-31~-19	.05 x C_0
RPG35	+8~+18	0	-8~+8	0	-22~-8	.02 x C_0	-35~-22	.05 x C_0
RPG45	+10~+20	0	-10~+10	0	-25~-10	.02 x C_0	-40~-25	.05 x C_0

Table 21A Preload & Rigidity Radial Clearance units in μm

Grade	Preload	Application Requirements	Examples of Application
F & 0	Clearance to Preloaded	High translation speeds, low impact loads, good precision, low friction requirements, multiple rail systems	X & Y axes of material handling machines, welders, general industrial machines, etc.
1	Light Preload	Overhanging loads, twisting loads, single rail applications, and greater rigidity than F or 0	Industrial robots, material feeders, semiconductor machinery, EDM machines and Precision XY tables, etc.
2	Medium Preload	Applications requiring high rigidity, exposed to vibrations or impacts, heavy cutting forces for machine tools	Machine Centers, CNC lathes, Medical devices, etc.

Table 21B Effect of Preload & Rigidity

Rigidity

The rigidity of the guide assembly can be increased depending on the magnitude of the preload. (*Fig. 21B*)

$$\text{Rigidity} = \frac{P}{\delta}$$

δ = Displacement (μm)
P = Calculated Load (N)

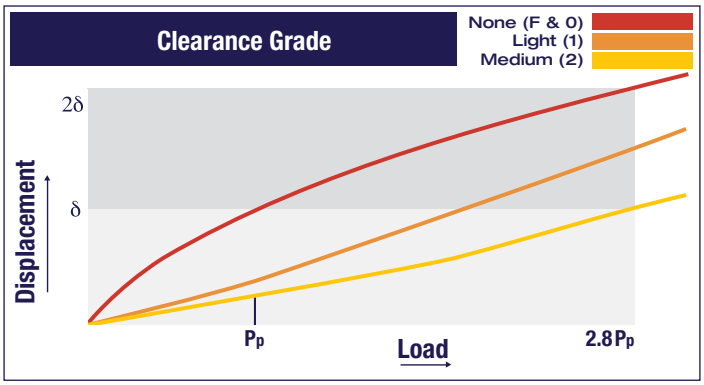


Fig. 21B Effect of Preload on Rigidity where Pp equals Preload Force

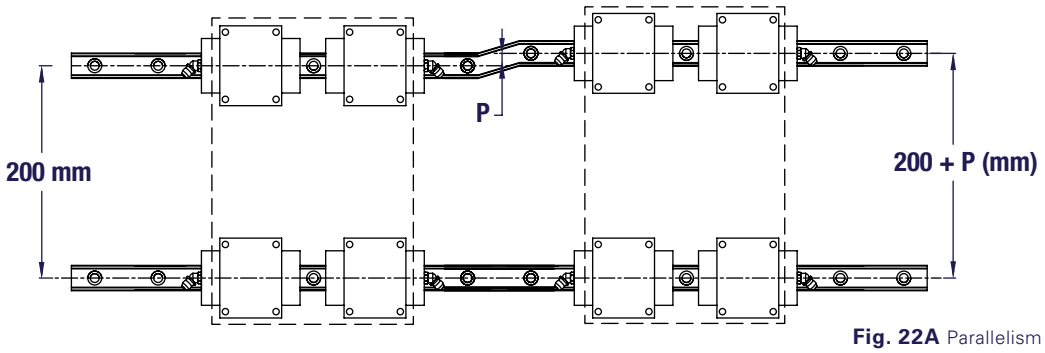


Fig. 22A Parallelism Drawing

Permissible Tolerance for Parallelism of Two Rails

RPG Guides have self-aligning characteristics and therefore can accommodate some mounting surface errors while achieving smooth motion. The chart to the right indicates the maximum permissible tolerance specification for parallelism error (P) (based on preload selection).

	Preload Class			
Model	**F**	**0**	**1**	**2**
RPG15	35	25	18	—
RPG20	35	25	20	18
RPG25	42	30	22	20
RPG30	55	40	30	27
RPG35	68	50	35	30
RPG45	85	60	40	35

Table 22A Permissible Parallelism Tolerance (P) units in µm

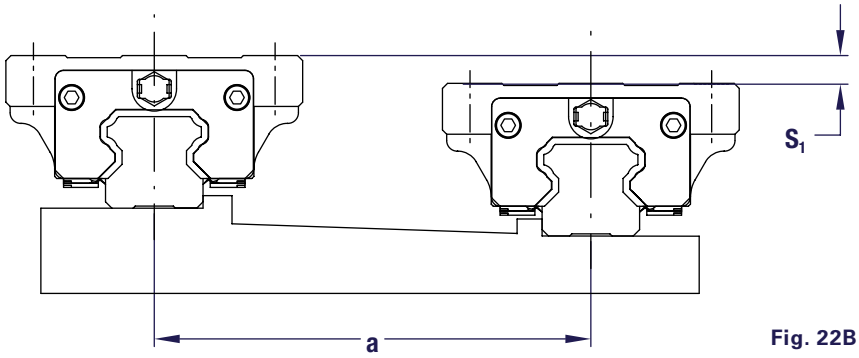


Fig. 22B Coplanarity Drawing

Permissible Tolerance for Coplanarity (two level offset) of Two Rails

The values for permissible coplanarity mismatch (S_1) as shown below apply when the rail to rail distance is 500mm (Dim “a”). The permissible offset values are proportionate to the distance between the rails and therefore vary as the “a” dimension deviates from the 500mm.

	Preload Class			
Model	**F**	**0**	**1**	**2**
RPG15	190	130	85	—
RPG20	190	130	85	50
RPG25	195	130	85	70
RPG30	250	170	110	90
RPG35	290	210	150	120
RPG45	350	250	170	140

Table 22B Coplanarity Tolerance (S_1) units in µm

The frictional characteristics of rolling element guideway systems are substantially superior to those based on sliding element principles. In order to minimize frictional losses, the RPG product offering, as described in this catalog, has been designed with four rows of rolling elements.

Although frictional losses in a linear guideway system are often minimal, they develop as a result of many variables such as differential ball slip, loading factors, lubrication viscosity, seal friction, and others. In general, the force required to overcome the frictional resistance of a linear guideway system can be calculated as follows:

$$F = \mu * P + (s * b)$$

F = Frictional Resistance
P = Load (m * g)
μ = Coefficient of Friction
(.002-.003 for RPG Guide Blocks)
s = Seal Resistance (per block)
b = Number of blocks per system
C_{50} = Basic Dynamic Load Rating

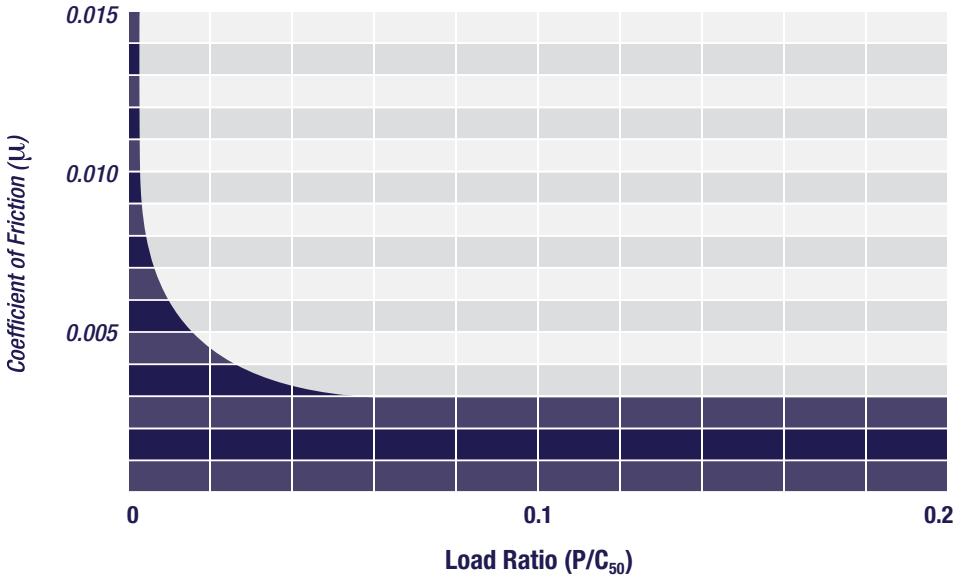


Table 23A Frictional Resistance

The stated seal resistance is based per block and assumes using the proper type and amount of lubricant.

Seal Resistance		Unit: N	
Rail Size	Seal Resistance	Rail Size	Seal Resistance
RPG15	3	RPG30	5
RPG20	4	RPG35	7
RPG25	4	RPG45	9

Table 23B Seal Resistance

Selecting the proper lubrication is critical to maximize the performance and the life of RPG guide assemblies. Therefore, the types of lubricant and lubrication methods should be carefully determined based on operating parameters and conditions.

All Rockford Ball Screw RPG blocks need to be lubricated with a NLGI Grade 2 bearing grease KP2K-20 to Din 51825. This is a high-performance lithium complex grease capable of operating at high speeds, heavy loads, and at temperatures beyond the limits of conventional lithium bearing greases.
RLM recommends grease as the preferred lubricant unless speeds are in excess of 60 m/min, in which case oil should be used.

Note: Any selected lubricant must meet or exceed the stated factory bearing grease specifications.

When using oil as the lubricant, it is imperative to choose a product with the correct viscosity to meet the demands of the application (CLP; viscosities of ISO VG 32 to 680 per Din 51519). Oil mist lubrication systems can be utilized with a small positive pressure cavity to help keep the guide blocks clean. These misting systems will require oils with a viscosity that has high atomizing rates. The same factors that influence the choice of a grease should also be considered when choosing an oil; such as loading, speed, temperature, vibrations, humidity, and others.

Lubrication Procedure

For best lubrication dispersal, the block should be lubricated through the supplied lube port while the block is in motion. This will ensure circulation to all internal bearing surfaces. When a guide system is oriented vertically, the uppermost lubrication port should be utilized to ensure gravity assisted lubrication dispersal. Excessive lubrication will result in lubricant escaping through the block seals.

In the instance of short stroke assemblies (≤*2x block length* (L_1)), the block should be lubricated from both ends to ensure adequate lubrication to the entire ball track.

Lubrication Interval

The Lubrication Interval is often times dependent on operational and environmental criteria such as loading, speed, stroke travel, and ambient conditions. Lubricating blocks with a lubrication reservoir 2-5 times at equal intervals during the calculated life of the guide block should be sufficient. Blocks that do not have a reservoir should be lubricated more frequently.

Environments

Special environments such as vacuums, clean rooms and the food industry will require specialized grease or oils. Please consult the factory for recommendations.

A Lubrication Reservoir is standard on RPG blocks sizes 15 through 30. The reservoir and block are not filled with grease at the factory and will need to be lubricated prior to operating. The amount of lubrication required is shown in *Tables 24A and 24B*.

	Block Equipped with Lubrication Reservoir	
Block Size	**Initial Fill Grease (cm^3)**	**Re-Grease**
RPG15	1.3	1.1
RPG20	2.3	2
RPG25	2.8	2.5
RPG30	3.5	3

Table 24A Equipped Reservoir Re-lubrication Required

	Blocks NOT Equipped with Lubrication Reservoir	
Block Size	**Initial Fill Grease (cm^3)**	**Re-Grease**
RPG35	7	4
RPG45	8.5	5

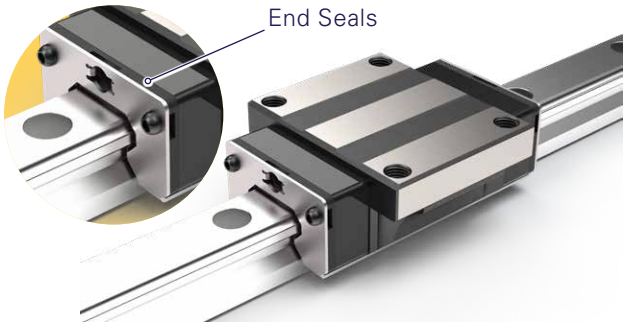
Table 24B Non-equipped Reservoir Re-lubrication Required

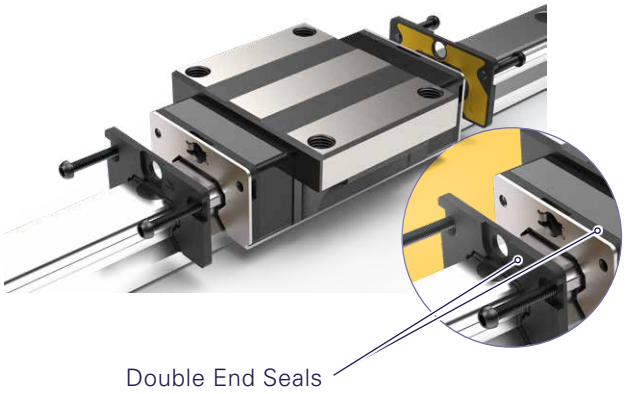
CONTAMINATION PROTECTION

Contamination due to dust and other foreign particulates can cause premature wear or failure to RPG guides. To protect the RPG guides, effective sealing or contamination protection measures should be carefully selected based on the operating environment.

End Seals

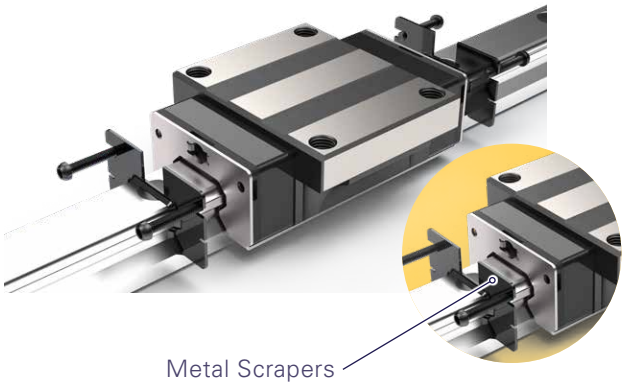
End Seals made from synthetic rubber are designed to have anti-wear properties while providing bidirectional dust protection with little increase in frictional resistance.





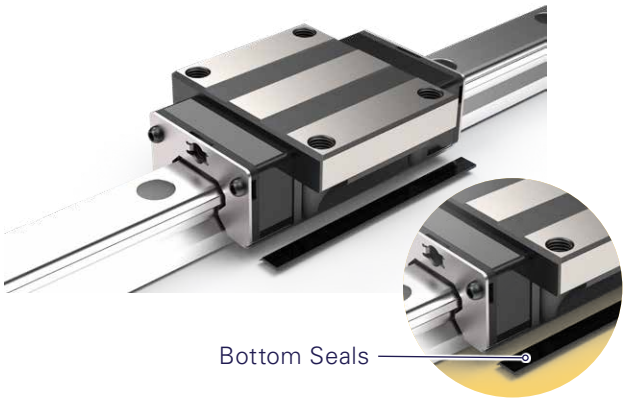
Metal Scrapers

Metal Scrapers are used for keeping larger particulates such as weld splatter, metal chips, and ice from entering the guide block.



Bottom Seals

Bottom Seals are provided on all standard length RPG guide blocks and are designed to seal the underside of the block from contaminates.

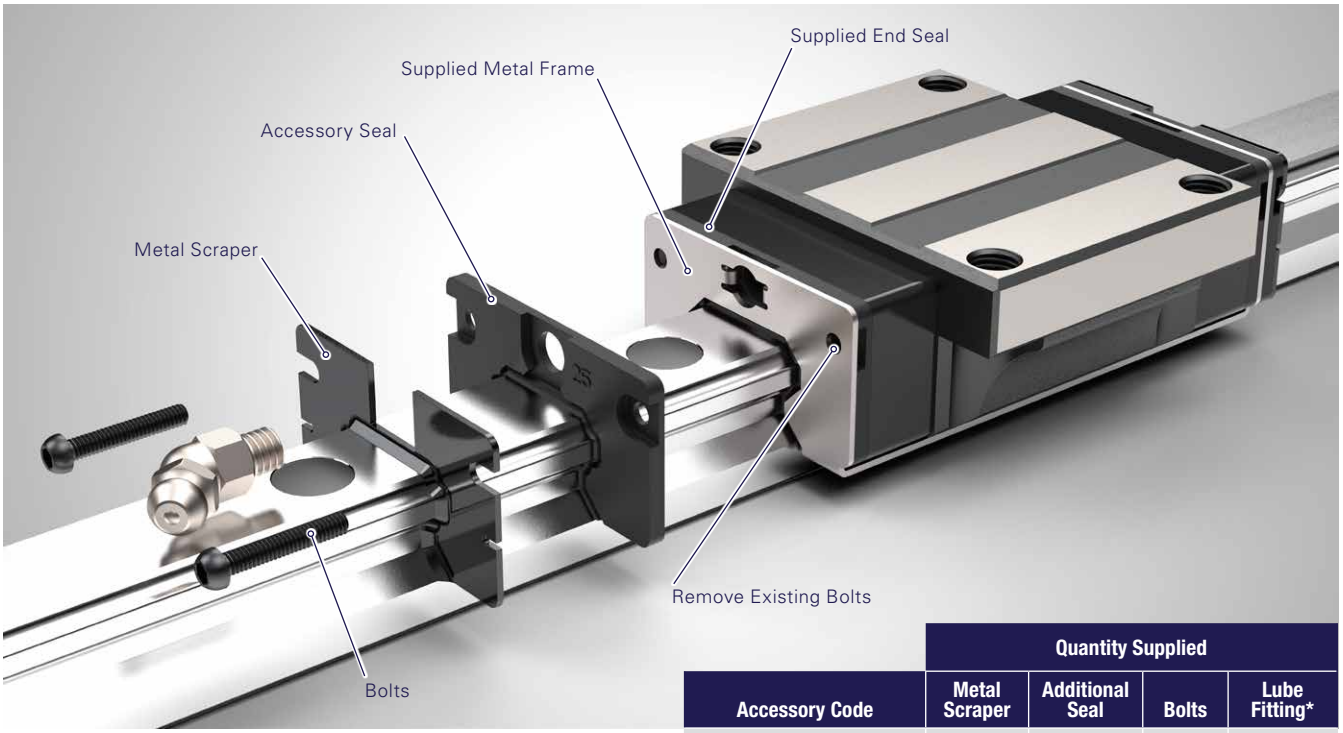


Hole Cap Plugs

Hole Cap Plugs are included with all rail shipments. The plastic cap is designed to keep contaminates out of the rail bolt holes which could then migrate into the block.

Bellows

Bellows, or telescopic covers, may be required to keep out the most difficult contaminates such as machining chips and coolants.



Accessory Code	Quantity Supplied			
	Metal Scraper	Additional Seal	Bolts	Lube Fitting*
"A" Metal Scraper Kit	2	0	4	1
"B" End Seal Kit	0	2	4	1
"C" Scraper & End Seal Kit	2	2	4	1

Table 26A Available Accessory Kits

*if required

Installation Instructions

Note: The RPG Block(s) should be installed on the rail before proceeding with the accessory installation. Complete installation on one end of the block before beginning the other end.

1. Remove the existing bolts from the end of the block assembly.
2. Gently slide the accessories onto the rail and up against the block. Depending on the model, the additional accessories will either be installed flush to the existing end seal or the metal frame of the block. The scraper plate, if applicable, should always be mounted last.
3. Insert the proper bolts into the bolt holes of the block and tighten. Note: When additional end seals and/or scrapers are installed on the RPG blocks, the overall length (L dimension) will increase (See *Table 26B* for scraper and seal thickness). If required, a longer lube fitting and bolts will be provided with the accessory kit and should be used in place of the original. If an additional lube fitting and/or bolts are not supplied as part of the kit, the original parts should be used.

Block Series Accessory	Metal Scraper Thickness		Seal Thickness	
RPG15	1 mm	0.039 in.	2.5 mm	0.098 in.
RPG20	1 mm	0.039 in.	2.5 mm	0.098 in.
RPG25	1.5 mm	0.059 in.	2.5 mm	0.098 in.
RPG30	1 mm	0.039 in.	3.3 mm	0.130 in.
RPG35	1 mm	0.039 in.	3.7 mm	0.146 in.
RPG45	1 mm	0.039 in.	3.7 mm	0.146 in.

Table 26B Scraper and Seal Thickness Chart

BALL SCREWS

For over 50 years Rockford Ball Screw has been manufacturing standard (inch) and metric ball screws, built to the highest performance design standards. Our extensive engineering expertise and state-of-the-art manufacturing facility ensures top performance and reliability in our products.

We offer one of the largest inventories of linear motion product lines in the industry.

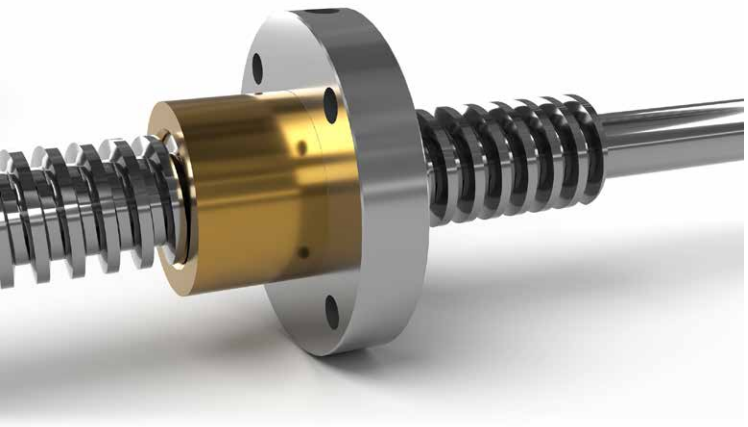
If you don't see what you're looking for, just ask, we're here to help!

FREE-WHEELING BALL SCREWS

Our free-wheeling screw (also referred to as planetary or epicyclic ball screws) is different from a standard ball screw in that it utilizes a ball cage (retainer) inside the nut. As the cage contacts a stop in the screw at the end of the stroke, the ball nut will stop linear motion but the screw will continue to rotate (free-wheel). When the screw rotation reverses, linear motion will continue in the opposite direction until the cage contacts the pin at the other end of the stroke.

Limit switches or other types of expensive stops are not necessary. These are used in many applications such as adjustable bed or lift chair actuations, marine trim tab actuators and electrical switching devices. Perfect for applications that do not require complex logic and switches.

Check us out and give us a call to see how we can meet your design needs.



ACME SCREWS

The RBS line of ACME screw products has been designed and manufactured to provide an economical means to convert rotational to linear motion without internal moving components. Our standard line of ACME screws is produced to General Purpose-2G tolerances from excellent quality materials. The trapezoidal thread is a very effective at preventing back driving which will reduce the need for additional braking or motor holding. These perform well in many different applications including dirty harsh environments. Check out our offerings and contact our team and experience what we can do for you.

Custom Solutions

In addition to our standard catalog items, Rockford Ball Screw's experienced team can work with you to create a unique solution for your specific application. With 50 years of making ball screws, we have seen and done a lot for many different industries, including:

- Medical (exam tables, dental chairs, etc.)
- Marine (boat trim tabs, hatch lifts, etc.)
- Recreational Vehicles (jacks, slide outs, etc.)
- Aerospace (jet bridges, terminal gates, etc.)
- Energy Oil & Gas (gate valves, completions, etc.)
- Heavy Lifting (screw jacks, lifts, etc.)
- Heat Treat & Glass (door lifts, burner actuation, etc.)
- Agriculture, Automation, Military, Trailers and more.

Our team of Engineers can rapidly bring custom linear motion solutions to life. We welcome the opportunity to work with your team to develop design concepts and prototypes, performing trial runs and achieving full production release. We can also do reverse engineering of existing linear motion systems to help speed the design cycle, minimize development costs and achieve the robust custom solution your design needs.

We machine the journals on your screws to suit your needs, add threads for lock nuts, keyways, splines, cross drilled holes, extended journals for bearings and gears and many other features. We can also modify the ball nuts we make by adding special mounting threads, Trunnion mounts, flanges and/or adaptors to interface with your design.

Assembly

Rockford Ball Screw's strong and comprehensive product knowledge combined with our engineering expertise is revolutionizing the value-added assembly services we provide our customers.

We utilize specialized assembly equipment and fixturing that can provide ready-to-use linear motion assemblies for rapid insertion into your products, including:

- Actuator sub-assemblies with bushings, bearings, gears, sprockets, and/or couplers
- Bearing mount (bearing supports / end supports) installation on screw journals
- Epoxy sealing of components for moisture and/dust egress prevention
- Ball nut grease injection and screw assembly greasing
- Bellows installation

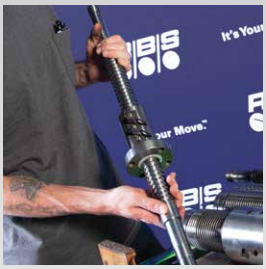
SERVICE & REPAIR

KEEPING INDUSTRY ON THE MOVE

We've provided the solutions to keep industry moving for 50 years and we know how important it is to your productivity and bottom line to keep your ball screws operating efficiently. When you need a ball screw repair, timing and service is of the essence. Our sales and service team stands by with free, comprehensive evaluations, supported by reverse engineering and failure mode analysis. Our repair team offers one of the fastest turnaround times in the industry, reducing machine down time and saving up to 70% of the cost to replace with new product.

SERVICES PROVIDED

- Design Optimization
- Reverse Engineering
- Inspection for wear and damage
- Ball Screw Repair -
  - Machined end journals
  - Threaded ends
  - Key Ways in ends
- Failure Mode Analysis
- Technical Drawings
- Refurbish Bearing Mounts
- Replace Bearings in Ball Nuts



We service all brands/manufacturers (including American Ball Screw, Beaver Precision Products, Century, Cincinnati, Nook, NSK, Rockford Ball Screw, THK, Thomson/Saginaw, Tsubaki, Twentieth, Warner Electric)

- Foreign and domestic
- Diameters up to 6 inches
- Lengths up to 40 feet
- Rolled and precision ground screws
- Standard (inch) and metric sizes/dimensions
- Carbon steel & stainless steel
- Wide range of ball bearings (steel, ceramic & plastic)
- Customized backlash and preloads
- Internal and external return
- Repair External Tubes

PUT OUR EXPERTISE TO WORK

- Experts in ball screws and linear rails
- Quick turnaround
- Expedited services on request
- Large inventory of raw materials & components
- Extensive range of screw diameters & lengths
- New replacement ball screws if more cost-effective

50 YEARS OF MAINTAINING PRODUCTIVITY.

rockfordballscrew.com

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Rockford, IL 61102
800-475-9532

Linear Guide Solutions
815.961.7900
Ball Screw Solutions
815.961.7700

It's Your Move.™

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