

BISHOPWISECARVER[®]

DUAL  **VEE**[®]

The original single
edge slide
system



HEPCO[®]
www.HepcoMotion.com

Introducing **DUALVEE** Motion Technology®

DualVee Motion Technology® (DMT) is a simple track and guide wheel system used in the construction of antifriction, linear guidance mechanisms. This rugged yet cost effective linear system is available in four sizes to suit a wide range of applications. Light duty applications in clean rooms to rugged transport systems working in hostile conditions can all benefit from DMT technology.

- Carbon, Stainless Steel, or Polymer Components
- Speeds up to 5.5 Meters/sec
- Acceleration up to 5 g's
- High Accuracy and Repeatability
- High Temperature, Clean Room Options
- Ground Mounting Surfaces not Required
- Low Noise
- Smooth, Low Friction Motion
- Long Lengths – single piece up to 6096mm

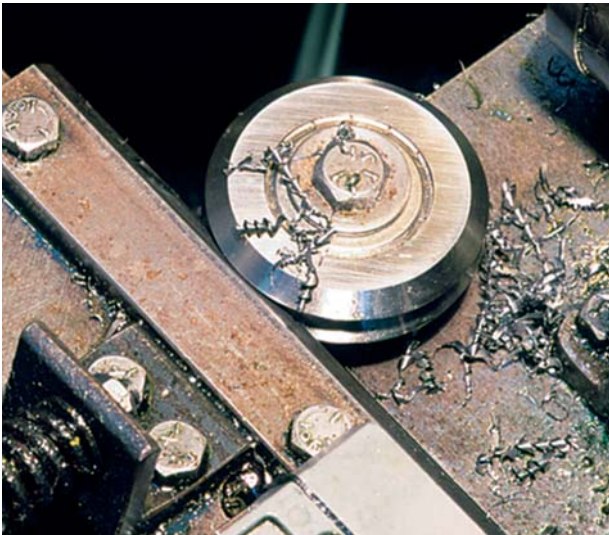
For a complete range of available options, please refer to the full DualVee® catalogue.

Specify with confidence

The DualVee® product is built on a foundation of total quality, in-service reliability, sound application knowledge and customer satisfaction, spanning over 40 years.

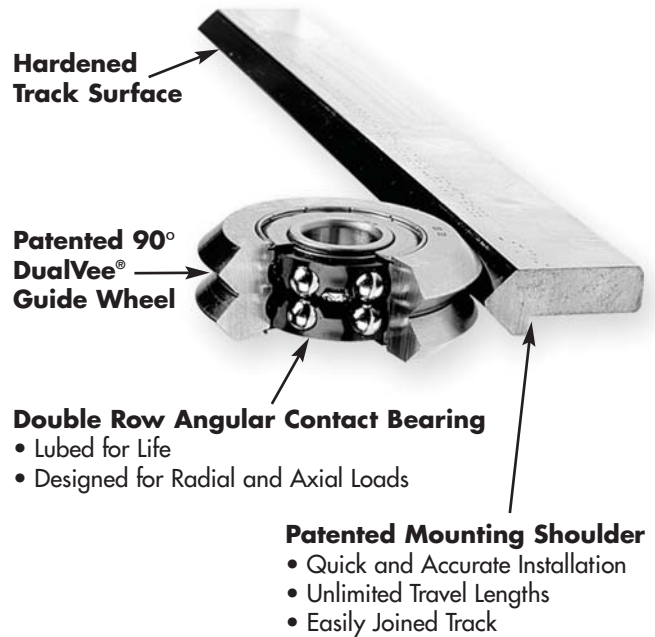
DualVee® is the original single edge slide system, having a proven track record in many thousands of applications world-wide across a broad range of industrial applications.

*The components outlined in this catalogue will enable the user to specify a basic system quickly and efficiently**

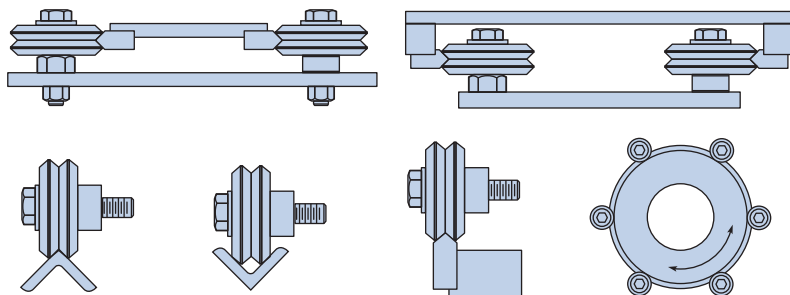


Designed for Dirty and Severe Environments

The patented 90° DualVee® design creates a velocity gradient, since the circumference of the wheel is greater at the major diameter, resulting in a constant sweeping action that cleans debris from the track.



Typical Mountings



Application and Design Assistance
+44 (0)1884 257000

3D Modelling and CAD Drawings
www.HepcoMotion.com

*For a complete range of available options, please refer to the full DualVee® catalogue.

Original DualVee® Guide Wheels

- 52100 carbon steel or 440C stainless steel from stock
- Shielded or sealed to protect against contamination
- Inside or outside Vee surface can be employed to support loads



Load Capacities

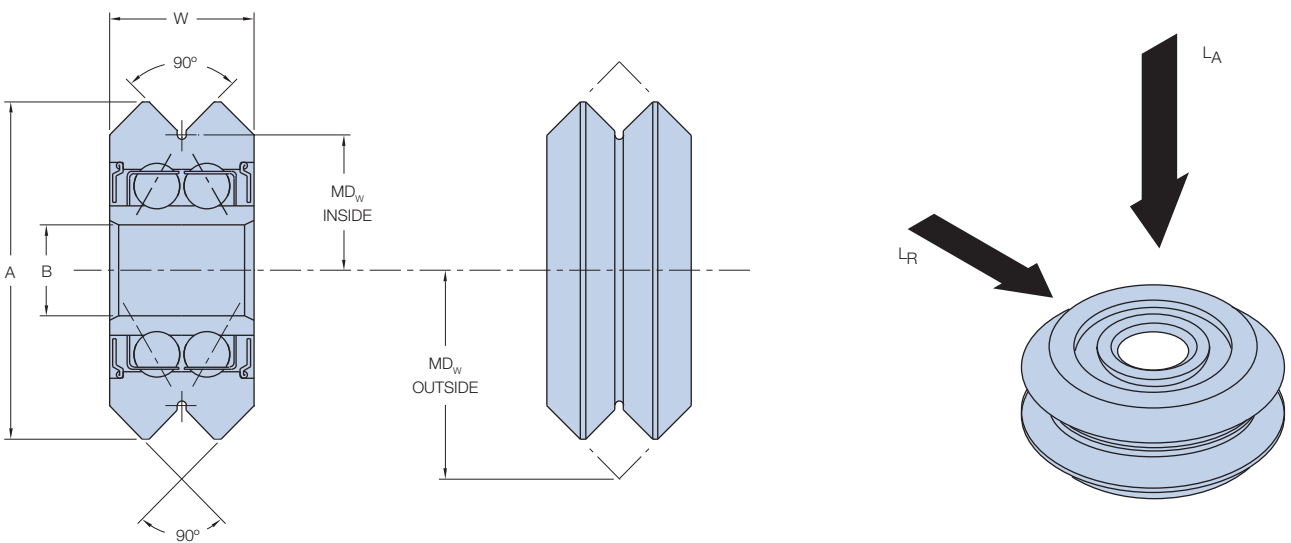
Size	Part Number			Radial L_R	Axial L_A	Weight in Grams
	Shielded	Sealed	Sealed SS	N	N	
1	W1	W1X	W1SSX	1220	252	11.1
2	W2	W2X	W2SSX	2650	625	39.0
3	W3	W3X	W3SSX	5900	1701	130.2
4	W4	W4X	W4SSX	9700	4001	276.0
4XL	N/A	W4XXL	W4SSXXL	14300	6552	575.0

SS = stainless steel

Dimensions

Size	Outside Diameter A	Bore Size B	Width W	Inside Vee Radius MD _w Inside	Outside Vee Radius MD _w Outside
1	19.58	4.76	7.87	7.95	11.89
2	30.73	9.53	11.13	12.70	18.26
3	45.80	12.00	15.88	19.05	27.00
4	59.94	15.00	19.05	25.40	34.93
4XL	75.39	22.00	25.40	31.75	44.45

All dimensions are in mm. Guide Wheels are manufactured to ABEC 1.



Notes:

1. Integral, swaged, clean room compatible, and size 0 wheels are also available. Please refer to the full DualVee® catalogue for complete information.
2. Size 4XL wheel is used with T4 track.

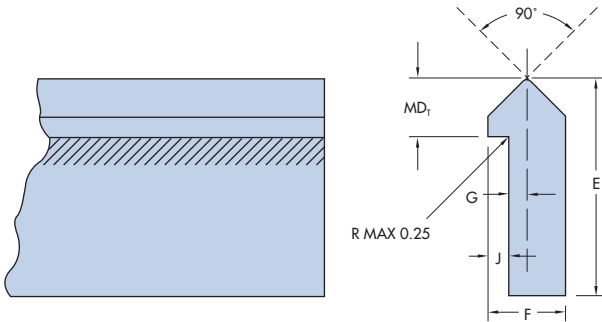
Single Edge Track - Drilled

Single Edge Track

- AISI 1045 carbon steel hardened to a minimum of 53 HRC, polished and oiled, or unhardened (22-25 HRC), as formed, oiled
- AISI 420 stainless steel hardened to a minimum of 40 HRC, polished and oiled, or unhardened (20-23 HRC), as formed, oiled
- Maximum single piece lengths up to 6096mm (T4SS maximum length 5790mm) easily butt-joined for longer lengths
- Patented mounting shoulder allows for accurate positioning of Vee ways



Single Edge Track - Undrilled



Size	E	F	G	J	MD _T	Kg/m
1	11.09	4.74	0.78	1.57	3.17	0.272
2	15.87	6.35	0.78	2.36	4.75	0.509
3	22.22	8.71	1.57	2.76	6.35	1.02
4	26.97	11.09	2.36	3.17	7.92	1.63

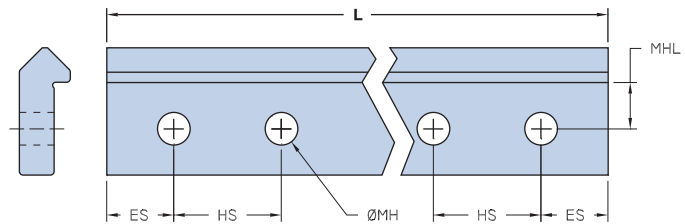
To order: Specify number of lengths, type of track, size, length.
Example: 5 ea., T4 1500mm (5 pieces, hardened track, size #4, 1.5m long).

Standard Lengths - Drilled Track

T1		T2		T3		T4	
Length	# Holes	Length	# Holes	Length	# Holes	Length	# Holes
311	7	446	5	446	5	446	5
581	13	806	9	806	9	806	9
851	19	1166	13	1166	13	1166	13
1121	25	1526	17	1526	17	1526	17
1391	31	1886	21	1886	21	1886	21
1661	37	2246	25	2246	25	2246	25

* All dimensions are in mm.

Size	Drilled Track Hole Dimensions				Weight Kg/m
	End Hole Spacing ES	Hole to Hole Spacing HS	Hole Size Thru (Diameter) MH	Mounting Hole Location MHL	
1	20.5	45	4.5	4.0	0.272
2	43	90	6.0	5.6	0.509
3	43	90	8.0	8.0	1.02
4	43	90	9.5	9.5	1.63



* All dimensions are in mm. See notes.

Ordering details:

T S 3 - SS - 2246 - 25

Blank = Hardened, **S** = Unhardened

Size: **1, 2, 3, or 4**

Material: **Blank** = 1045 Carbon Steel
SS = 420 Stainless Steel

Number of Holes (along the track length)
 (See table above for standard lengths)

Length - mm

Examples: T3 - 2246-25 = size 3 track carbon steel, 2246mm long, with 25 holes along the length.

Notes:

1. Available coating/plating - block oxide, thin dense chrome, or SS with Pristinox™ process.
2. Non-standard lengths and hole patterns available on request.
3. HS dimension hole spacing tolerance ± 0.2 non-cumulative. ES end hole tolerance ± 0.5
4. MH Hole diameter tolerance ± 0.1 . MHL mounting hole location tolerance ± 0.050
5. Maximum single piece track length: 6026mm (5756mm for T4SS)

Support Bushings

- Material options include 303 stainless steel or nickel plated² carbon steel
- Concentric and eccentric configurations allow for system adjustment^{4,5 & 6}



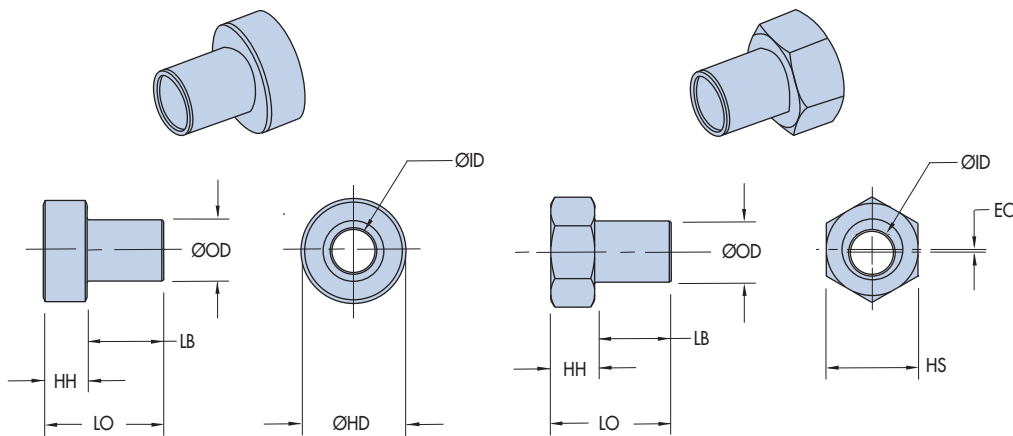
Standard Profile

SUPPORT BUSHINGS STANDARD PROFILE DIMENSIONS ¹										
DualVee [®] Size	Part Number	Recommended Fastener Size	Hex Size HS	Offset EC ⁵	Head Height HH ⁷	Length Body LB	Length Overall LO	Outside Diameter OD ³	Inside Diameter ID	Head Diameter HD
1	MB1	M4	-	-	6.22	7.6	13.8	4.76	4.0	11.2
1	MBX1	M4	12	0.25	6.22	7.6	13.8	4.76	4.0	-
2	MB2	M6	-	-	6.65	10.8	17.4	9.52	6.0	14.2
2	MBX2	M6	14	0.61	6.65	10.8	17.4	9.52	6.0	-
3	MB3	M8	-	-	9.47	15.6	25.1	11.99	8.0	19.1
3	MBX3	M8	19	1.07	9.47	15.6	25.1	11.99	8.0	-
4	MB4	M10	-	-	11.10	18.8	29.9	15.00	10.0	22.4
4	MBX4	M10	22	1.52	11.10	18.8	29.9	15.00	10.0	-
4XL	MB4XL	M14	-	-	14.35	25.1	39.5	21.97	14.0	31.8
4XL	MBX4XL	M14	30	1.52	14.35	25.1	39.5	21.97	14.0	-

Low Profile

SUPPORT BUSHINGS LOW PROFILE DIMENSIONS ¹										
DualVee [®] Size	Part Number	Recommended Fastener Size	Hex Size HS	Offset ⁵ EC	Head Height HH ⁷	Length Body LB	Length Overall LO	Outside Diameter OD ³	Inside Diameter ID	Head Diameter HD
1	M1PWBC	M4	-	-	2.11	7.6	9.7	4.76	4.0	11.2
1	M1PWBX	M4	12	0.18	2.11	7.6	9.7	4.76	4.0	-
2	M2PWBC	M6	-	-	2.64	10.8	13.4	9.52	6.0	14.2
2	M2PWBX	M6	14	0.61	2.64	10.8	13.4	9.52	6.0	-
3	M3PWBC	M8	-	-	3.48	15.6	19.1	11.99	8.0	19.1
3	M3PWBX	M8	19	1.07	3.48	15.6	19.1	11.99	8.0	-
4	M4PWBC	M10	-	-	3.10	18.8	21.9	15.00	10.0	22.4
4	M4PWBX	M10	22	1.52	3.10	18.8	21.9	15.00	10.0	-
4XL	M4XLPWBC	M14	-	-	5.10	25.1	30.3	21.97	14.0	31.8
4XL	M4XLPWBX	M14	30	1.52	5.10	25.1	30.3	21.97	14.0	-

* All values are in mm.



C = Concentric

X = Eccentric

Notes:

- All dimensions are in mm.
- Standard materials are electroless nickel plated carbon steel or 303 stainless steel – add “SS” to part number.
- The bushing’s outside diameter is designed to fit the corresponding size DualVee[®] guide wheel.
- Part #MBX_/M_PWBX indicates eccentric (adjustable) bushing; rotation of eccentric allows adjustment between track and guide wheels.
- All mounting information within this catalogue assumes a central position of the eccentric bushing, thus allowing wheel position adjustment from “+EC” to “-EC”.
- Part #MB_/M_PWBC indicates concentric (stationary) bushing; Since concentrically mounted wheels have a fixed position, these bushings set the alignment of the carriage assembly to the rail. Concentrically mounted wheels should be configured to carry the majority of the load whenever possible.
- Head Height (HH) Tolerance is $\pm 0.05\text{mm}$.

Mounting Dimensions/Formula

DualVee®-based Wheel Plate and Track Plate Assemblies

When fabricating a DualVee® linear guide from componentry, the following (formulae) are applicable for mating carriage plate and track plate designs:

Size 1 to 4XL

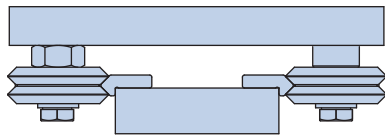
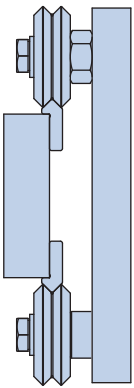
For sizes 1 through 4 DualVee® single edge track with equivalent sized guide wheels:

- Inboard Mounting (See Figure 1): $A = B + X$
- Outboard Mounting (See Figure 2): $A = C - X$
- Exterior Mounting (See Figure 3): $A = D - Y$

A = hole centres for wheel plate

Mounting Constants

DualVee® Size	X	Y
	mm	mm
1	22.20	23.72
2	34.90	36.47
3	50.80	53.95
4	66.60	69.85
4XL	79.35	88.90



Suitable for Radial or Axial Mounting

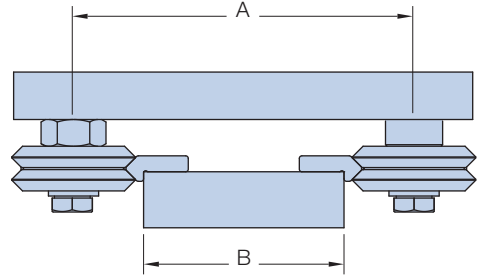


Figure 1 Inboard Mounting

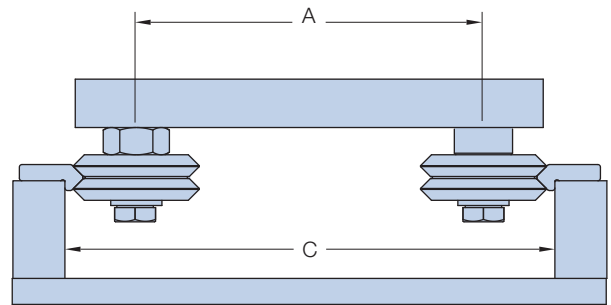


Figure 2 Outboard Mounting

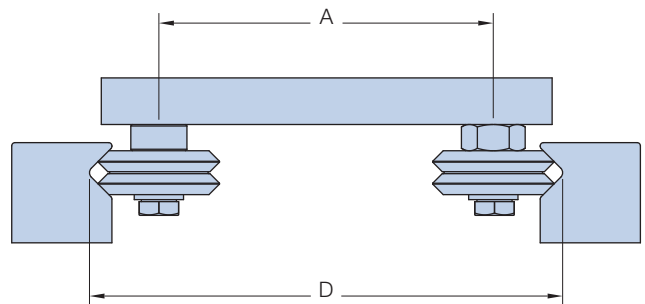


Figure 3 Exterior Mounting

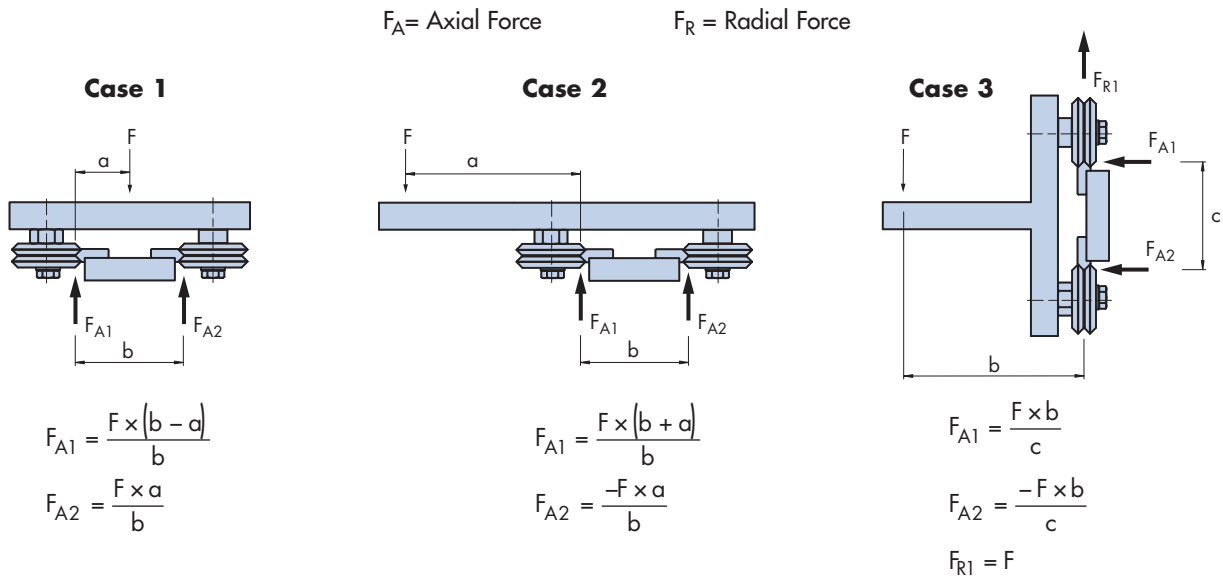
Notes:

- Information above uses the same size DualVee® track and wheel except for size 4XL which uses W4XXL guide wheel with size T4 track.
- Side views shown only, length of wheel plates can be any length required.
- It is recommended that wheel plates be constructed with concentric bushings on one side of the plate and eccentric bushings on the opposing side.
- "D" dimension is to the theoretical sharp of the 90° angle.
- For complete technical reference details, please visit our website at www.HepcoMotion.com or contact HepcoMotion's technical department.

Load Life Information

The life of a DualVee® system will be limited to the life of the most heavily loaded guide wheel within that system.

Step 1: Calculate the resultant radial and axial loads applied to each bearing element in the linear system. Below are a number of common configurations.



Note:

Since carriages use 4 guide wheels, 2 guide wheels will carry the load at both points 1 & 2, therefore divide the calculated force by 2 to obtain the force on each guide wheel.

Step 2: Calculate the load factor LF for the most heavily loaded guide wheel.

$$L_F = \frac{F_A}{F_{A(max)}} + \frac{F_R}{F_{R(max)}}$$

Where:

- L_F = Load Factor
- L_A = Resultant axial force on the guide wheel
- $L_{A(max)}$ = The maximum axial load capacity of the guide wheel see page 1
- L_R = Resultant radial force on the guide wheel
- $L_{R(max)}$ = The maximum radial load capacity of the guide wheel see page 1

Guide wheel should be sized such that $L_F \leq 1$.

Step 3: Calculate the estimated life for the most heavily loaded guide wheel.

$$\text{Life (km)} = \frac{L_C}{(L_F^3)}$$

Where:

- L_F = Load Factor
 - L_C = Life Constant
- Life constants are provided in the table.

Life Constants	
DualVee® size	LC
1	55
2	87
3	130
4	171
4XL	215

Example: The following example is based on Case 3, above using W4X guide wheels.

Where: $F = 900 \text{ N}$, $b = 0.4 \text{ m}$, $c = 0.125 \text{ m}$

$$F_{A1} = \frac{F \times b}{c} = \frac{900\text{N} \times 0.4\text{m}}{0.125\text{m}} = 2880\text{N} \text{ or } 1440\text{N per guide wheel}$$

$$F_{A2} = \frac{-F \times b}{c} = \frac{-900\text{N} \times 0.4\text{m}}{0.125\text{m}} = -2880\text{N} \text{ or } -1440\text{N per guide wheel}$$

$$F_{R1} = F = 900\text{N} \text{ or } 450\text{N per guide wheel}$$

To calculate the load factor L_F

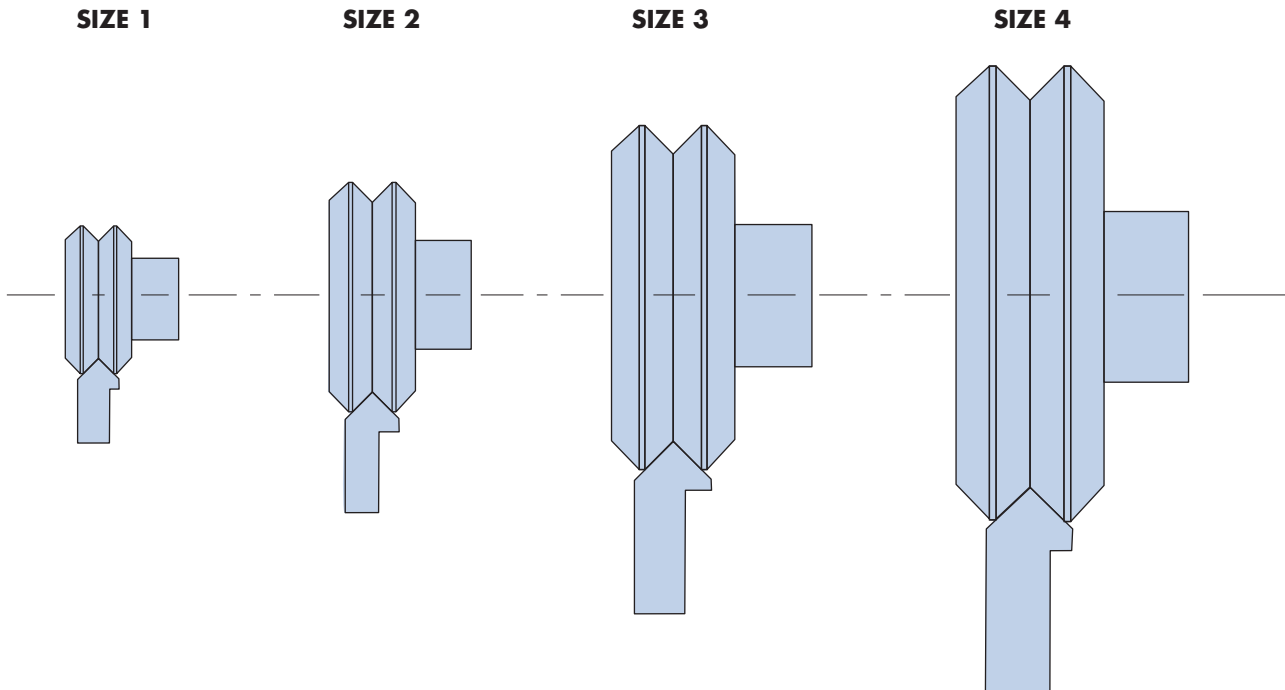
$$L_F = \frac{F_A}{F_{A(max)}} + \frac{F_R}{F_{R(max)}} = \frac{1440\text{N}}{4001\text{N}} + \frac{450}{9700} = 0.406$$

To calculate the estimated life (km)

$$\text{Life (km)} = \frac{L_C}{(L_F^3)} = \frac{171}{0.406^3} = 2550\text{km}$$

For further details on the load / life relationship, please refer to the full DualVee® catalogue.

Full Size Drawings



Selection of the appropriate size wheel/track for a given application is often made initially by reference to the physical size of the product as opposed to load capacity.

These full size sections will help with the selection process prior to checking the load/life which can be checked on pages 4 & 5.

Full size drawing for size '4XL' wheel available on request.

**Please refer to the full DualVee® catalogue for other size options,
accessories & Load/Life details**

**For further information on HepcoMotion® products please request our leaflet
'FPL' or visit www.HepcoMotion.com**

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