Motion Without Limits®

INNOVATION is TIMELESS

DUALVEE®

ORIGINAL Vee Guide Wheels and Components

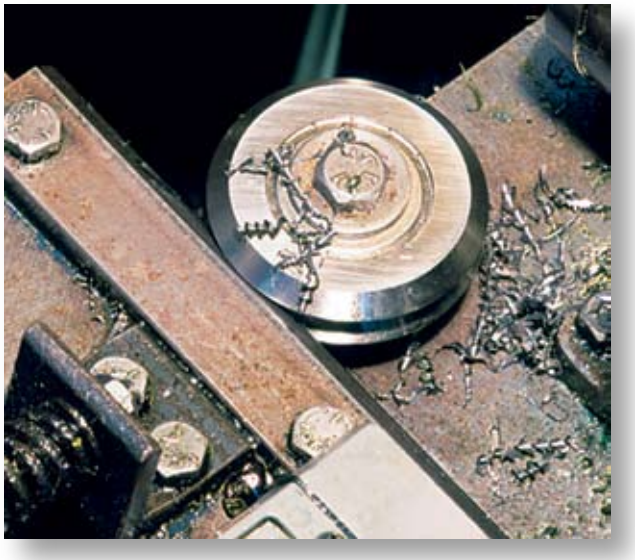
BISHOPWISECARVER®

DUALVEE Motion Technology®

Bishop-Wisecarver is recognized as the market leader for guide wheel technology. In 1967, Bud Wisecarver invented and patented DualVee Motion Technology (DMT) to provide a solution for harsh environment applications where existing technologies were ineffective. DualVee also proved excellent for long length, smooth motion and low noise requirements.

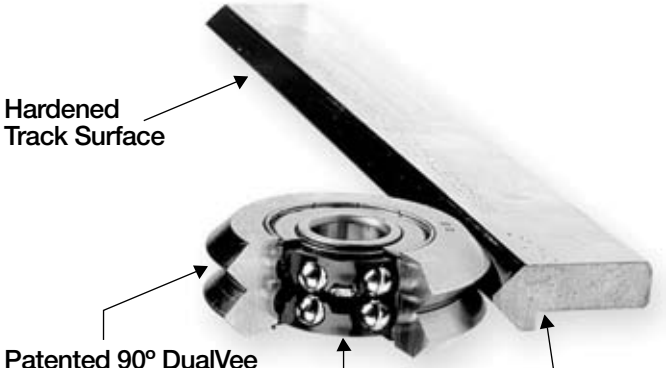
More than 40 years later, our wide range of linear motion components and systems provide time proven, economical solutions for all types of application environments. From clean room to high debris applications, Bishop-Wisecarver has the linear solution to fit your needs.

- 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



Designed for Dirty and Severe Environments

The patented 90º 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.



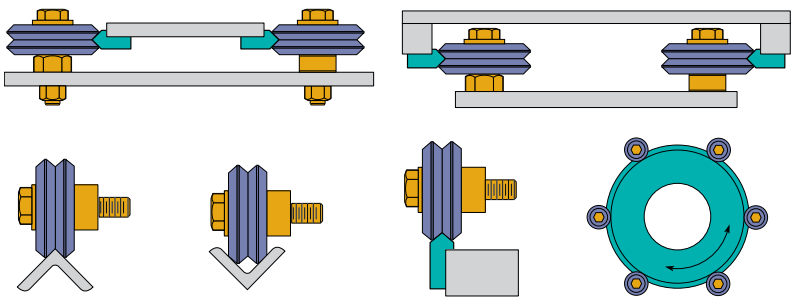
Double Row Angular Contact Bearing

- Lubed for Life
- Designed for Radial and Axial Loads

Patented Mounting Shoulder

- Quick and Accurate Installation
- Unlimited Travel Lengths
- Easily Joined Track

Typical Mountings



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

Application and Design Assistance

888.580.8272 925.439.8272

3D Modeling and CAD Drawings

www.bwc.com/3dcad.php

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

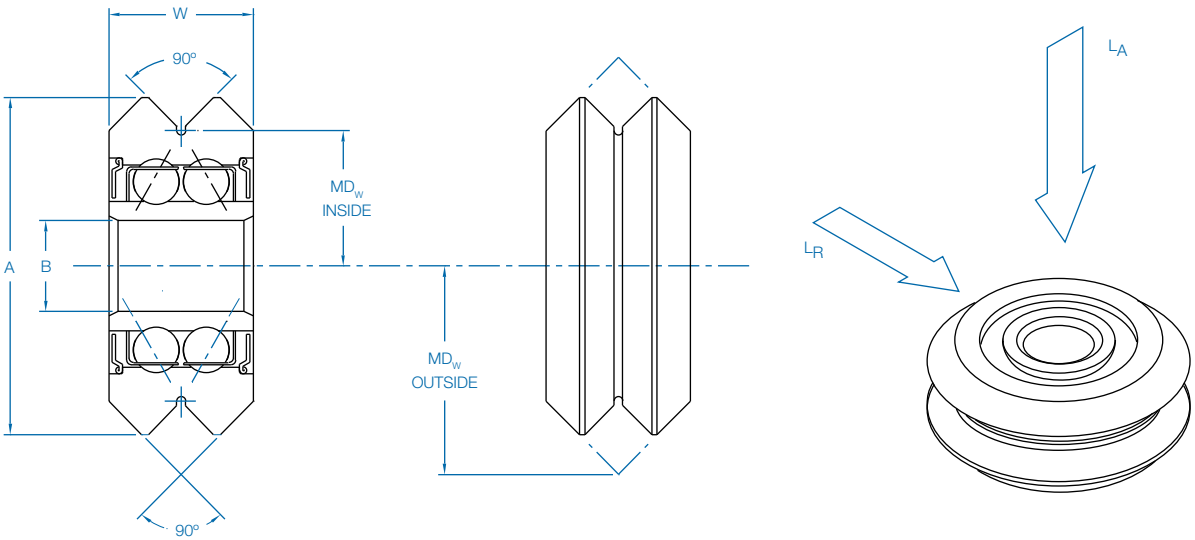
Load Capacities

Size	Part Number			Radial L_R		Axial L_A		Weight in Grams
	Shielded	Sealed	Sealed SS	N	lbf	N	lbf	
1	W1	W1X	W1SSX	1220	274	252	57	11.1
2	W2	W2X	W2SSX	2650	596	625	141	39.0
3	W3	W3X	W3SSX	5900	1326	1701	382	130.2
4	W4	W4X	W4SSX	9700	2181	4001	900	276.0
4XL	N/A	W4XXL	W4SSXXL	14300	3215	6552	1473	575.0

Dimensions

Size	Outside Diameter A	Bore Size B	Width W	Inside Vee Radius MD_W Inside	Outside Vee Radius MD_W Outside
1	.771	.1875	.310	.313	.468
2	1.210	.3750	.438	.500	.719
3	1.803	.4724	.625	.750	1.063
4	2.360	.5906	.750	1.000	1.375
4XL	2.968	.8661	1.000	1.250	1.750

All values are in inches. Guide Wheels are manufactured to ABEC 1.



Notes
Integral, swaged, clean room compatible, and size 0 wheels are also available. Please refer to the full line DualVee catalog for complete information.

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 20 feet hardened and 22 feet unhardened, easily butt-joined for longer lengths
- Patented mounting shoulder allows for accurate positioning of vee ways

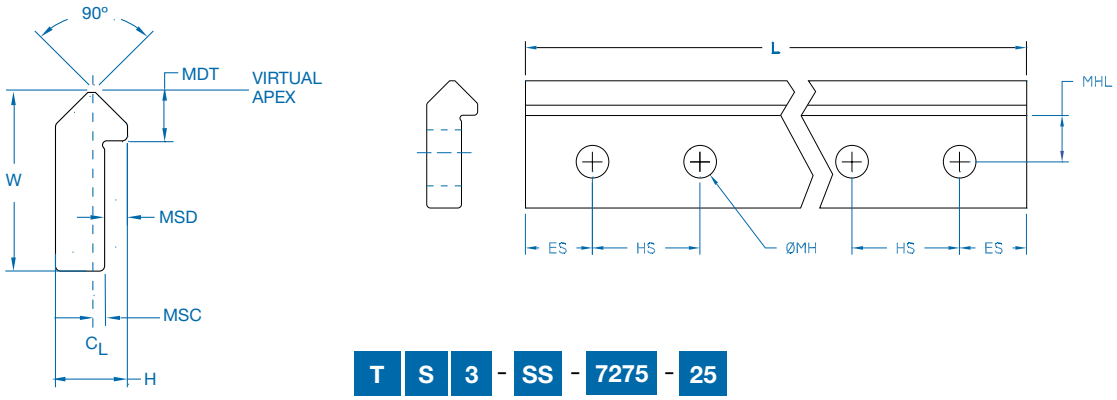
Drilled and Undrilled Dimensions

Size	Width	Height	Mounting Shoulder Location	Mounting Shoulder to Center Line	Mounting Shoulder Depth	Drilled Track Hole Dimensions				Weight
						End Hole Spacing	Hole to Hole Spacing	Hole Size Thru (Diameter)	Mounting Hole Location	
	W	H	MDT	MSC	MSD	ES	HS	MH	MHL	(lbs./ft)
1	.437	.187	.125	.031	.062	.250	2.000	.156	.156	.183
2	.625	.250	.187	.031	.094	.315	3.000	.203	.219	.343
3	.875	.343	.250	.062	.109	.375	3.000	.281	.313	.690
4	1.062	.437	.312	.093	.125	.500	4.000	.344	.375	1.100

Standard Lengths – Drilled Track

T1		T2		T3		T4	
Length	# Holes	Length	# Holes	Length	# Holes	Length	# Holes
12.50	7	12.63	5	12.75	5	13.00	4
24.50	13	24.63	9	24.75	9	25.00	7
36.50	19	36.63	13	36.75	13	37.00	10
48.50	25	48.63	17	48.75	17	49.00	13
60.50	31	60.63	21	60.75	21	61.00	16
72.50	37	72.63	25	72.75	25	73.00	19

Values are in inches



T S 3 - SS - 7275 - 25

Blank=Hardened, **S**=Unhardened

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

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

Number of Holes (Drilled Track Only)
(See table above for standard lengths)

Length - **XX** (feet) for undrilled - 1 foot increments
XXXX (inches x 100) for drilled
(See table above for standard lengths)

Examples: TS3-SS-7275-25 = Unhardened, Size 3, Stainless Steel, 72.75 inches long, 25 holes drilled along the track length
T2-SS-12 = Hardened, Size 2, Stainless Steel, 12 feet long, Undrilled
T1-20 = Hardened, Size 1, 20 feet long, Undrilled

Notes

- The overall length tolerance is ±.015 inches for drilled track and ±.0625 inches for undrilled track.
- Non-standard hole patterns can be accommodated. Non-standard track options are quoted upon request.
- For non-standard track lengths or other non-standard options, contact Bishop-Wisecarver for quotation.
- Size 0 double edge track is also available. Please refer to the full line DualVee catalog for complete information.

Support Bushings

- Material options include 303 stainless steel or nickel plated carbon steel
- Concentric and eccentric configurations allow for fit up adjustment

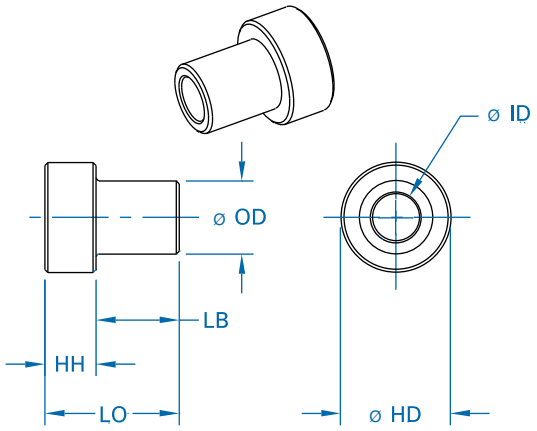
Standard Profile

DualVee Size	Part Number[1]	Recommended Fastener Size	Hex Size	Offset	Head Height	Length Body	Length Overall	Outside Diameter	Inside Diameter	Head Diameter	Weight in Grams
			HS	EC	HH	LB	LO	OD	ID	HD	
1	B1	#6	-	-	.250	.300	.550	.1873	.138	.44	4.6
	BX1	#6	7/16	.012						-	5.1
2	B2	1/4	-	-	.281	.425	.706	.3748	.250	.56	10.3
	BX2	1/4	9/16	.024						-	11.0
3	B3	5/16	-	-	.375	.615	.990	.4722	.3125	.75	25.0
	BX3	5/16	3/4	.042						-	27.1
4	B4	3/8	-	-	.437	.740	1.177	.5904	.375	.88	42.4
	BX4	3/8	7/8	.060						-	45.6
4XL	B4XL	9/16	-	-	.565	.990	1.555	.8650	.5625	1.25	112.8
	BX4XL	9/16	1 1/4	.060						-	121.4

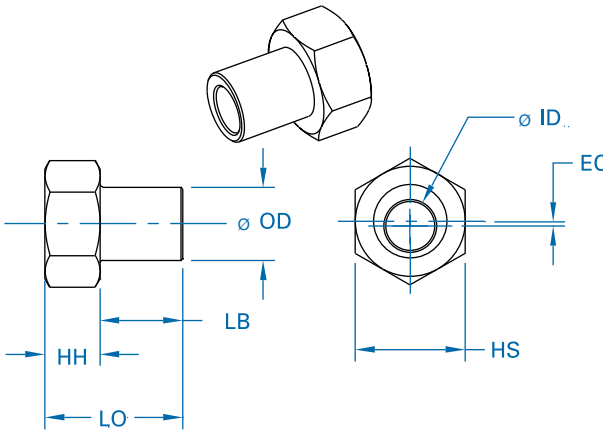
Low Profile

DualVee Size	Part Number[2]	Recommended Fastener Size	Hex Size	Offset	Head Height	Length Body	Length Overall	Outside Diameter	Inside Diameter	Head Diameter	Weight in Grams
			HS	EC	HH	LB	LO	OD	ID	HD	
1	1PWBC	M4 (Metric)	-	-	.080	.300	.380	.1873	.158	.44	1.5
	1PWBX	M4 (Metric)	7/16	.007						-	1.6
2	2PWBC	1/4	-	-	.100	.425	.525	.3748	.250	.56	5.7
	2PWBX	1/4	9/16	.024						-	6.0
3	3PWBC	5/16	-	-	.125	.615	.740	.4722	.3125	.75	13.4
	3PWBX	5/16	3/4	.042						-	14.1
4	4PWBC	3/8	-	-	.125	.740	.865	.5904	.375	.88	23.0
	4PWBX	3/8	7/8	.060						-	24.0
4XL	4XLPWBC	9/16	-	-	.188	.990	1.178	.8650	.5625	1.25	68.2
	4XLPWBX	9/16	1 1/4	.060						-	70.9

Values are in inches unless otherwise noted



Concentric[3]



Eccentric[3]

Notes

1. Standard profile support bushings are available in electroless nickel plated carbon steel or 303 stainless steel. Add "-SS" to the end of the part number for stainless steel.
2. Low profile support bushings are available in 303 stainless steel only.
3. Drawing shown above is a standard profile support bushing. Please refer to the full line DualVee catalog to view additional drawings.

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 centers for wheel plate

Mounting Constants

DualVee Size	X		Y	
	inch	mm	inch	mm
1	.874	22.20	.934	23.72
2	1.374	34.90	1.436	36.47
3	2.000	50.80	2.124	53.95
4	2.624	66.60	2.750	69.85
4XL	3.124	79.35	3.500	88.90

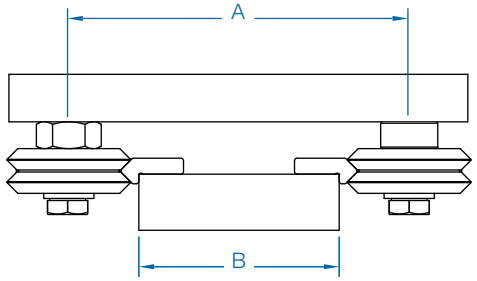


Figure 1 Inboard Mounting

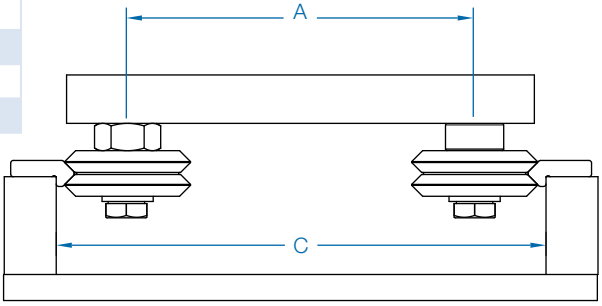
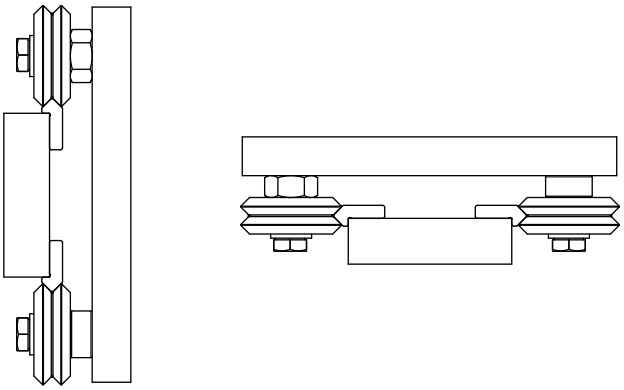


Figure 2 Outboard Mounting



Suitable for Radial or Axial Mounting

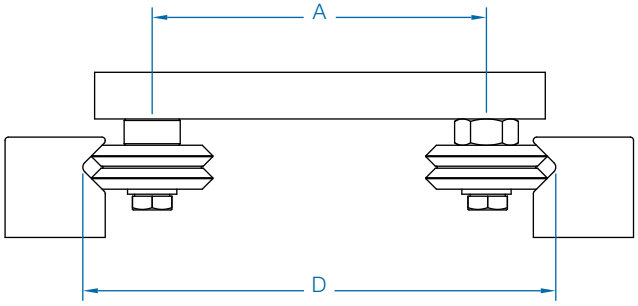


Figure 3 Exterior Mounting

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.bwc.com.

Load/Life Equation – Sizing and Selection

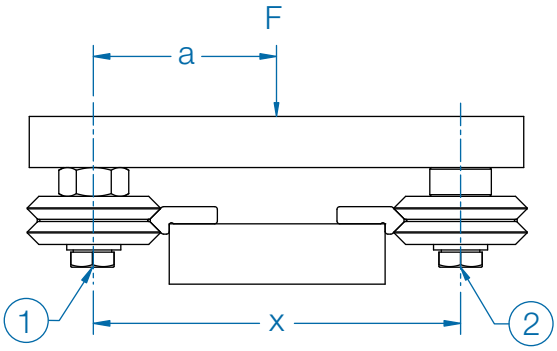
Step 1: Calculate loads on each bearing
Given below are force equations for some common configurations.

F_A = Axial Force, F_R = Radial Force

Scenario 1

$$F_{A1} = \frac{F(x-a)}{x}$$

$$F_{A2} = \frac{Fa}{x}$$



Scenario 1

Scenario 2

$$F_{A1} = \frac{F(x+a)}{x}$$

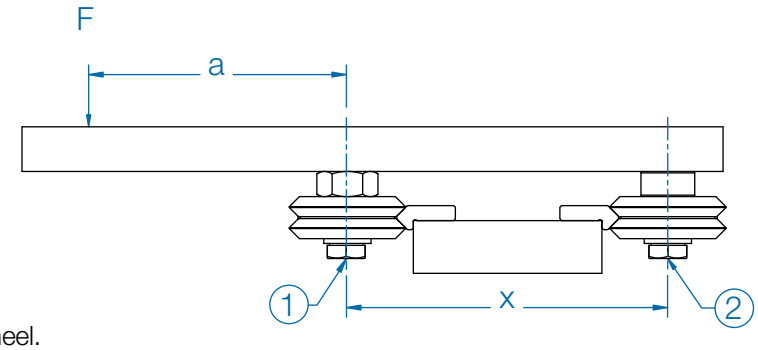
$$F_{A2} = \frac{-Fa}{x}$$

Scenario 3

$$F_{A1} = \frac{Fx}{y}$$

$$F_{A2} = \frac{-Fx}{y}$$

$$F_{R1} = F$$



Scenario 2

*Note: Since carriages use 4 wheels, 2 wheels absorb the load at both points 1 & 2, divide the calculated load by 2 to obtain the load on each wheel.

Example: Scenario 3

F = 200 lbs

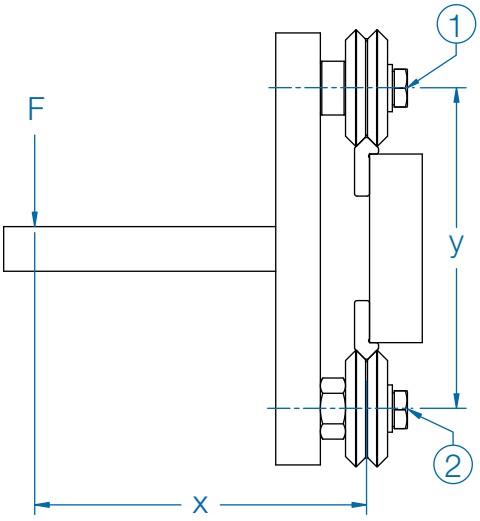
x = 15 inches

y = 5 inches

$$F_{A1} = \frac{200(15)}{5} = 600 \text{ lbs, or } 300 \text{ lbs per wheel}$$

$$F_{A2} = \frac{-200(15)}{5} = -600 \text{ lbs, or } -300 \text{ lbs per wheel}$$

F_{R1} = 200 lbs, or 100 lbs per wheel



Scenario 3

Step 2: Calculate the load factor L_F for the most heavily loaded bearing using the above example with size W4X guide wheel, $F_{A(max)}$ and $F_{R(max)}$ from load rating chart pg 1.

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

$L_F = 300 / 900 + 100 / 2181 = 0.38$

Step 3: Calculate life estimate

A_F assumed at 1

Life = $[L_C / (L_F)^3] A_F = [6.84 \times 10^6 / (0.38)^3] \times 1 = 124.7 \times 10^6$ inches

For further discussion on load/life relationship, please refer to the full line DualVee catalog.

Complete DualVee product information, including new integral wheels, studded wheel assemblies, journal assemblies, size 0 wheels and track, clean room, high temperature, and custom options are available in the full line DualVee catalog. Visit www.bwc.com/products/dual-vee.html or call for more information.

3D CAD DRAWINGS
Download 3D CAD files for our complete product line at www.bwc.com/3dcad.php.

GOT A TOUGH APPLICATION CHALLENGE?
Ask Bud at www.bwc.com/blog/?cat=11.

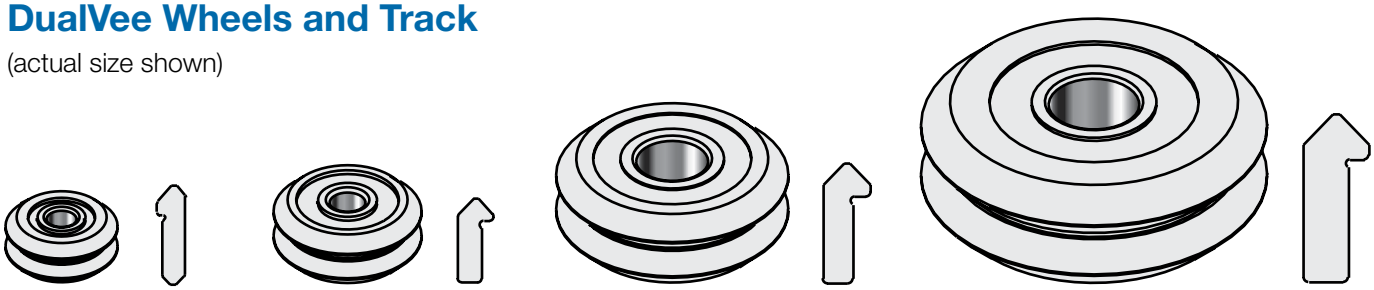
PRODUCT ORDERS
Please call Bishop-Wisecarver with your specific application requirements. Our technical staff is available to assist with your custom solution.

Bishop-Wisecarver provides a written three year limited warranty on our Swiss bearings and a written one year limited warrantly on all other products, assuring the customer that its products conform to published specifications and are free from defects in material or workmanship.

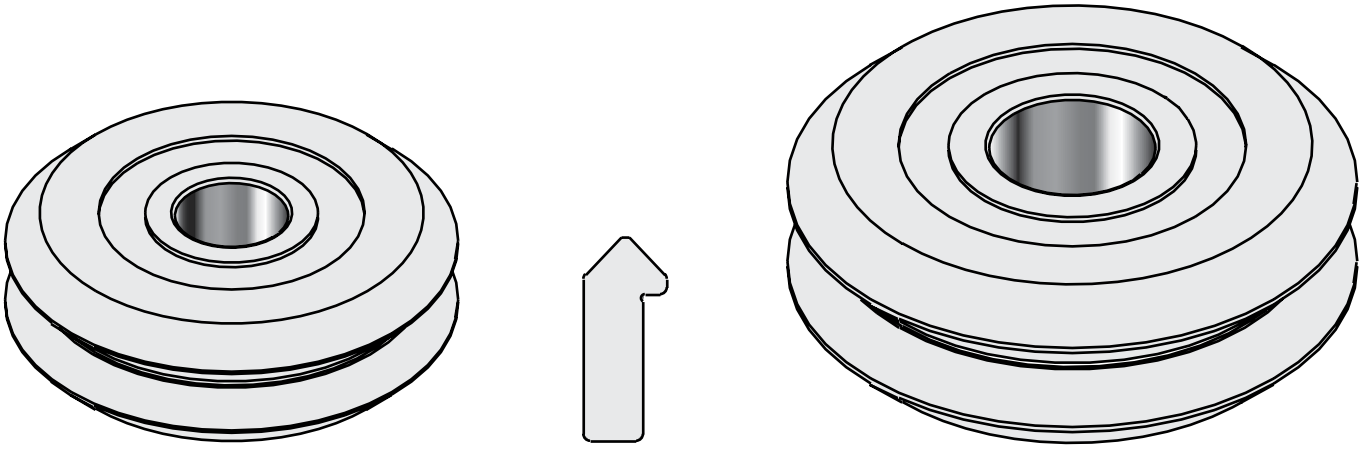
Complete terms and conditions and warranty information is available at www.bwc.com/about_conditions.vp.html.

DualVee Wheels and Track

(actual size shown)



Size 0 Wheel & Track ***Size 1 Wheel & Track*** ***Size 2 Wheel & Track*** ***Size 3 Wheel & Track***



Size 4 Wheel ***Size 4 Track*** ***Size 4XL Wheel***

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Part # CAT-DVO January 2008