

Shock Absorbers and Rate Controls



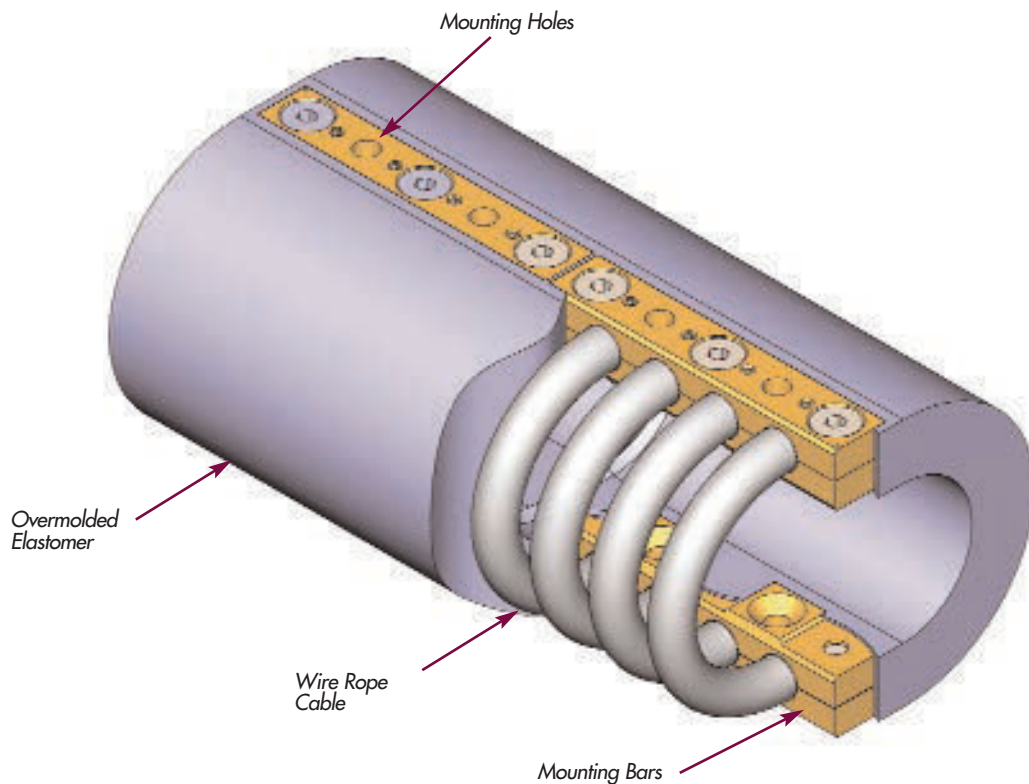
ENIDINE





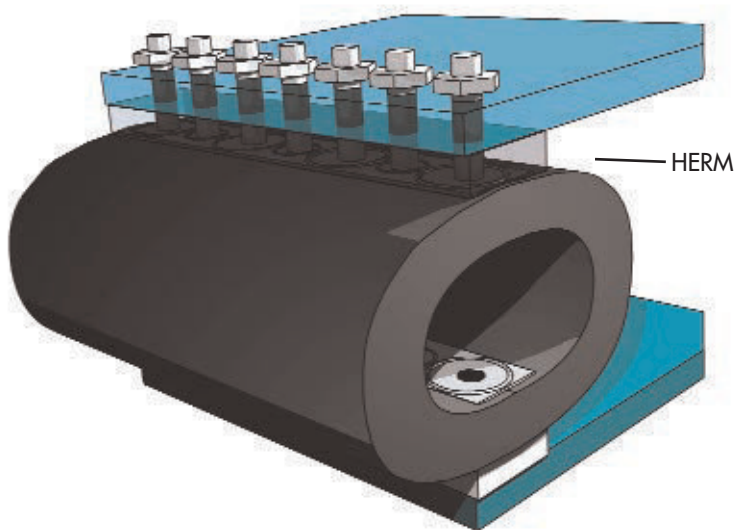
The **HERM** isolator incorporates the use of a traditional ITT Enidine helical wire rope isolator encased in a proprietary elastomeric compound. The stainless steel cable of the mount provides for a rugged construction, while the elastomer provides additional damping and stiffness. This unique design results in a fail safe mount with a higher stiffness and energy absorption capacity.

The mount is readily scalable and performance easily tuned by varying the wire diameter, loop size, number of loops and elastomeric properties. The HERM isolator has proven particularly strong in low natural frequency "soft deck" applications of 12-16 Hz, reducing output G's to below 15G's. Its sealed nature of construction also provides for easy NBC washdown. Since the mounting size of the HERM isolator is virtually identical to that of standard wire rope isolators used in many shipboard applications, equipment upgrades are both simple and seamless with drop-in replacement capability.



HERM Features:

- A variety of material combinations available
- Mounting identical to traditional Wire Rope Isolators
- Readily "tunable" to meet a wide range of natural frequencies
- Greater load carrying capability



HERM Benefits:

- Easy retrofit on fielded equipment
- Fewer mounts required to support a given load
- Smaller "footprint" than other mounts
- Compatible with NBC wash down requirements
- Improved noise attenuation compared to standard Wire Rope Isolators

Materials and Finishes:

Standard: Elastomer: Proprietary ITT Enidine Compound
 Wire Rope: 302/304 Stainless Steel
 Mount Bars: 6061-T6 Aluminum, Chemical Conversion Coated per MIL-C-5541, Class 1A (RoHS Compliant)
 Hardware: Alloy Steel per ASTM F835, Zinc Plated (HR16, HR20, HR28 and HR40)

Optional: Mount Bars: 6061-T6 Aluminum, Anodized per MIL-A-8625, Type II, Class 1 (RoHS Compliant)
 302/304 Stainless Steel per ASTM A276, Passivated
 Hardware: 302/304 Stainless Steel (when stainless steel Bars are specified)

Special: Consult ITT Enidine

Isolator Options:

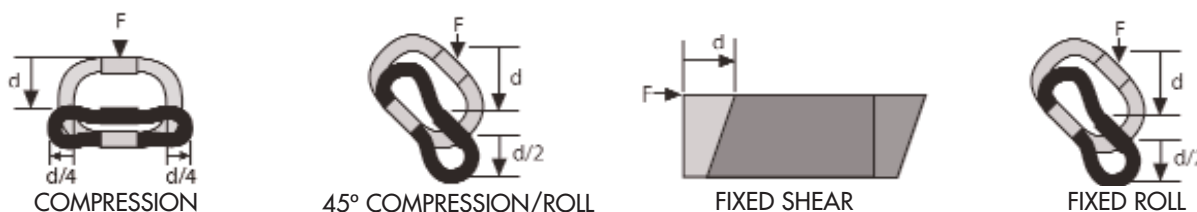
Mounting: ITT Enidine offers various mounting combinations of thru-hole, countersunk, and threaded bars depending upon the HERM model selected.
 Consult ITT Enidine if a preferred mounting configuration is not listed.

Performance:**Stiffness (Kv or Ks):**

HERM's exhibit non-linear stiffness behavior. Small deflections, usually associated with vibration isolation, will have a different spring rate than larger shock deflections. ITT Enidine publishes typical vibration stiffness values (Kv), and average shock stiffness values (Ks) within the catalog. These values can be used with the provided equations listed on Page 156 to predict system performance.

Isolator Axes:

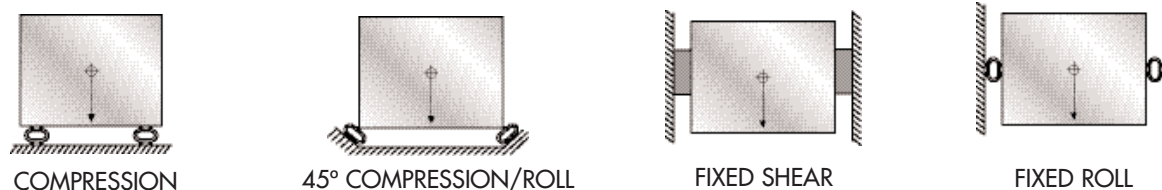
HERM are multi-axis isolators. The diagram below includes load axis definitions and deflection considerations.



Damping: Typically 15-25%, depending on size and input level. For specific damping considerations, please consult ITT Enidine.

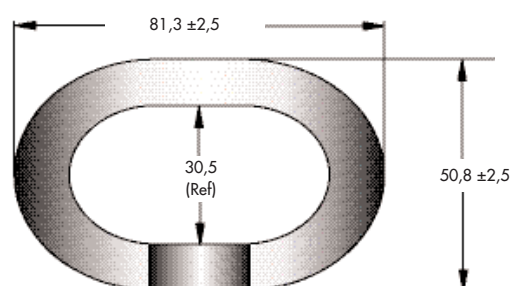
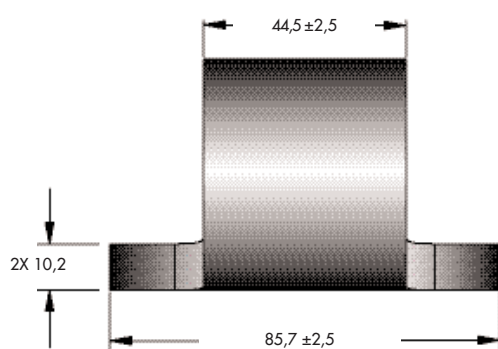
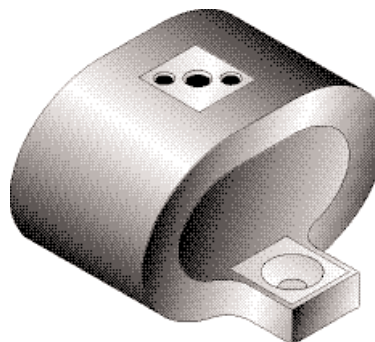
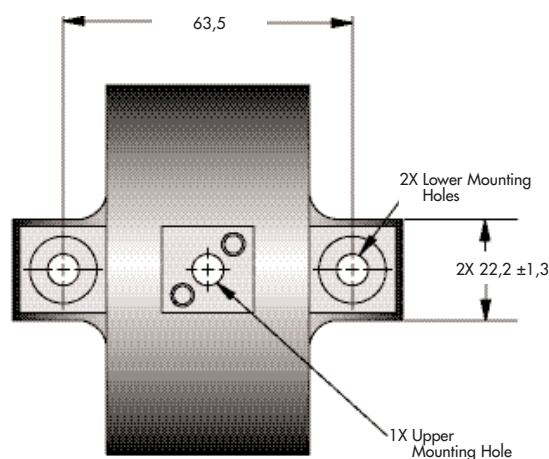
Mounting Orientation:

The diagrams below illustrate typical mounting orientations.

**Stabilizers:**

Stabilizers are used to control deflections of tall supported masses. Stabilizers are typically recommended when the height equals 2-times the width or depth dimension.

APPLICATION WORKSHEET - INPUTS METRIC		METRIC
PART I: SYSTEM DATA:		
1. Total Supported Load (W _T):	$W_T = \text{_____ Kg} \times 9,81 = \text{_____ N}$	
2. Number of Isolators (n):	$n = \text{_____}$	
3. Static Load per Isolator (W):	$W = \frac{W_T}{n}$	W = _____ N*
* Assumes a central CG		
4. Load Axis: Compression Shear or Roll 45° Compression/Roll		Load Axis _____
PART II: VIBRATION SIZING:		
1. Input Excitation Frequency	$f_i = \text{_____ Hz} \left(= \frac{\text{rpm}}{60} \right)$	
2. System Response Natural Frequency for 80% isolation:	$f_n = \frac{f_i}{3,0} = \text{_____ Hz}$	
3. Maximum Isolator Vibration Stiffness: (K _v)	$K_v = \frac{W (2\pi f_n)^2}{g}$ $g = 9,81 \text{ m/s}^2$	K _v = _____ N/m
4. Select an isolator by comparing calculated values with technical data for the desired load axis provided in tables for each isolator. a.) Calculated "W" must be less than the isolator's max static load and b.) Isolator's vibration stiffness must be less than the calculated maximum K _v		
PART III: SHOCK SIZING:		
1. Maximum Allowable Transmitted Acceleration:	$A_T = \text{_____ G's}$	
2. Shock Input Velocity: Free Fall Impact:	$V = \text{_____ m/s}$ $V = \sqrt{2gh}$ $g = 9,81 \text{ m/s}^2$ $h = \text{Drop Height (m)}$	
3. Min. Isolator Response Deflection:	$D_{min} = \frac{V^2}{g(A_T)}$	D _{min} = _____ m
4. Maximum Isolator Shock Stiffness:	$K_s = \frac{W(V/D_{min})^2}{g}$	K _s = _____ N/m
5. Select an isolator by comparing calculated values with technical data for the desired load axis provided in tables for each isolator. a.) Calculated "W" must be less than the isolator's max static load and b.) Calculated D _{min} must be less than the isolator's max deflection Note: Metric deflections are calculated in meters (m) and technical data is in millimeters (mm). and c.) Isolator's shock stiffness must be less than calculated maximum "K _s "		
6. Check actual deflection using "K _s " from technical data to ensure that the isolator's max deflection is not exceeded.	$D_{actual} = \frac{V}{\sqrt{K_s(\text{Isolator})g}}$	D _{actual} = _____ m
7. If isolator's max deflection is exceeded, select another isolator and repeat steps 5 and 6.		



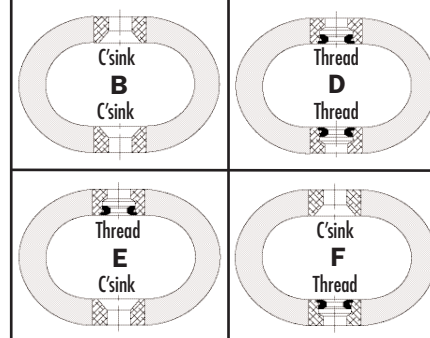
Note: Dimensions are in mm Tolerances are ± 0,25mm

Size	Unit Weight Kg	Mounting Options	Thru Hole mm	Thread mm	C'sink
HR6-600	0,2	B, D, E, F	Ø6,9	M6 X 1,0	90°
HR6-400	0,2				
HR6-200	0,2				

Model Number Ordering Code

HR6 - 200 - B L M	
HR6	Isolator Model: See Sizing Table
200	Mounting Options: See Chart
B	Threaded Hole Options: [L] - Helical, Locking, Dry Film Lubricated [H] - Helical, Free Running
L	Add "M" for Metric All Mounting Options
M	

Mounting Options

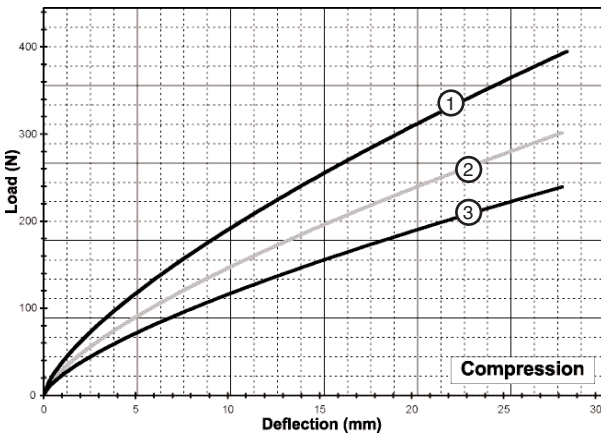


Wire Rope Special Options

Optional materials for the wire rope and mount bars are available upon request. Possibilities include galvanized rope, bell mouth mount bars or stainless steel rope and mount bars. Please contact ITT Enidine to discuss in more detail. Minimum purchase quantities may apply. See page 155.

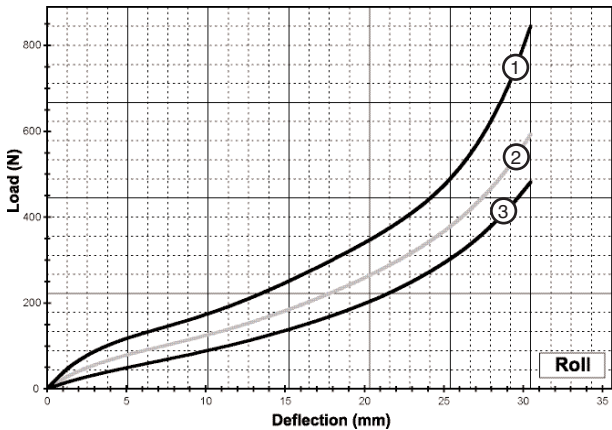
• Meets environmental requirements of MIL-M-17185A

**Static
Load vs. Deflection**



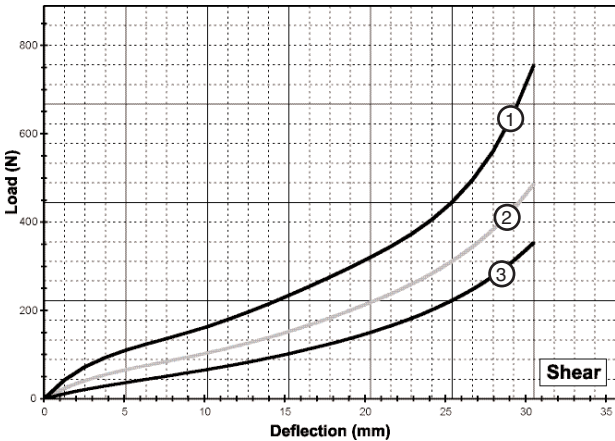
Compression

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR6-600	107	28,4	38	25
2	HR6-400	80	28,4	29	19
3	HR6-200	62	28,4	23	15



Roll

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR6-600	160	30,5	40	29
2	HR6-400	116	30,5	25	22
3	HR6-200	80	30,5	14	17



Shear

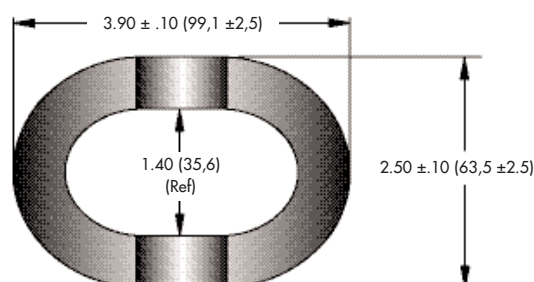
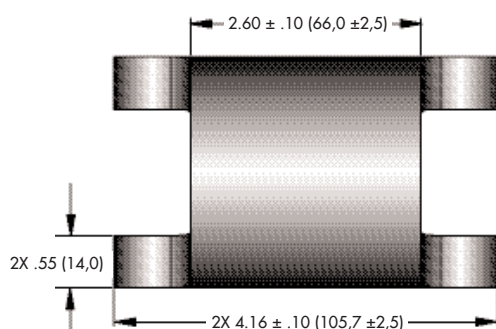
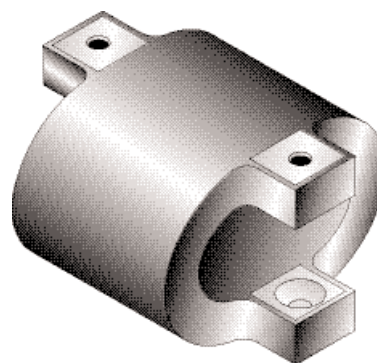
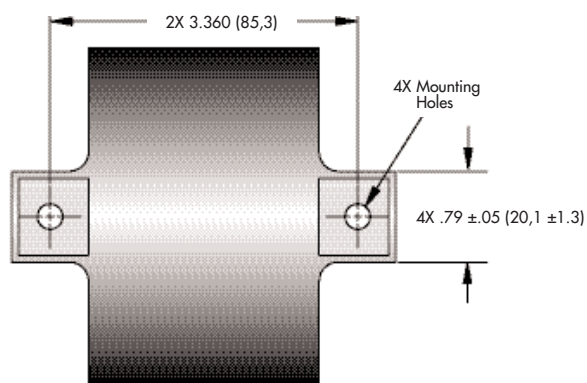
Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR6-600	151	30,5	37	26
2	HR6-400	89	30,5	21	18
3	HR6-200	58	30,5	11	12

Note: Do not extrapolate plotted curves.

HERM (High Energy Rope Mount)

HR8 Series

Technical Data



Note: Dimensions are in inches (mm) Tolerances are $\pm 0,010$ ($\pm 0,25$ mm)

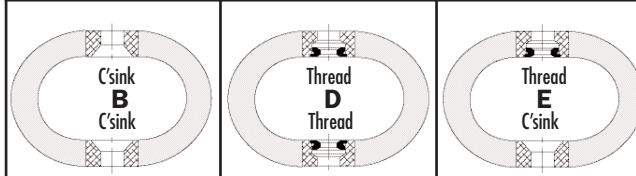
Size	Unit Weight lbs. (Kg)	Mounting Options	Thru Hole mm	Thread mm	C'sink
HR8-600	0,4	B, D, E	6,9 $\pm 0,13$	M6 X 1,0	90°
HR8-400	0,4				
HR8-200	0,4				

Model Number Ordering Code

HR8 - 200 - B L M

- Add "M" for Metric All Mounting Options
- Threaded Hole Options: [L] - Helical, Locking, Dry Film Lubricated
[H] - Helical, Free Running
- Mounting Options: See Chart
- Isolator Model: See Sizing Table

Mounting Options



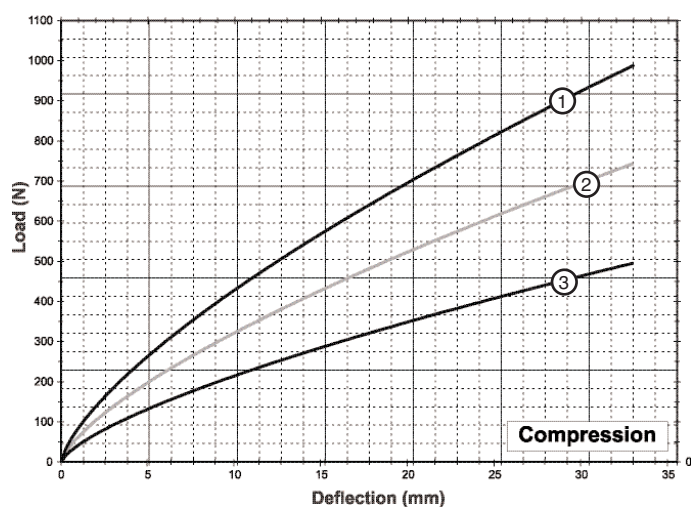
- Meets environmental requirements of MIL-M-17185A

Wire Rope Special Options

Optional materials for the wire rope and mount bars are available upon request. Possibilities include galvanized rope, bell mouth mount bars or stainless steel rope and mount bars. Please contact ITT Enidine to discuss in more detail. Minimum purchase quantities may apply. See page 155.

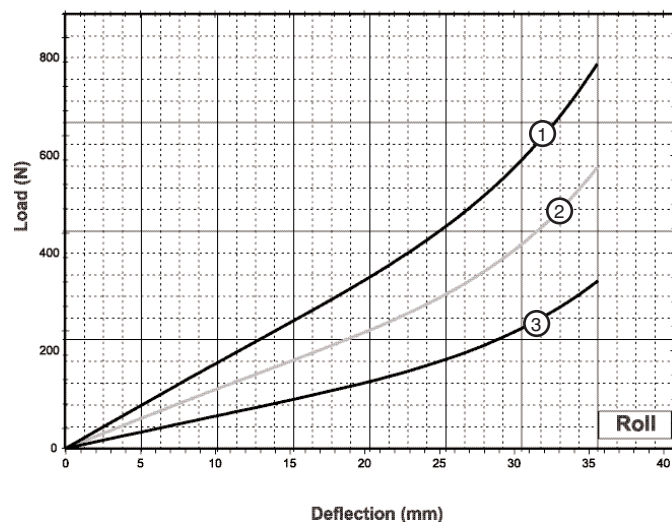
Technical Data

Static Load vs. Deflection



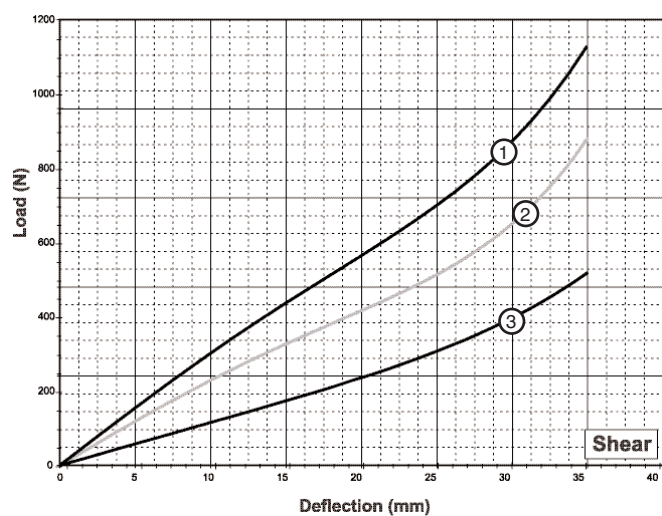
Compression

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR8-600	267	33,1	84	53
2	HR8-400	191	33,1	61	39
3	HR8-200	133	33,1	41	26



Roll

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR8-600	178	35,6	23	28
2	HR8-400	120	35,6	16	19
3	HR8-200	67	35,6	9	11



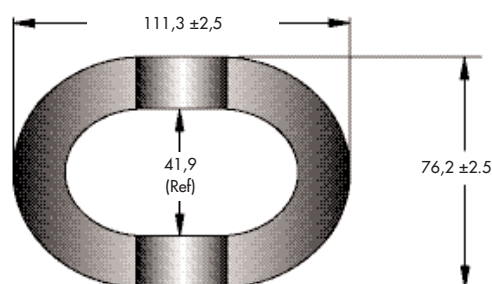
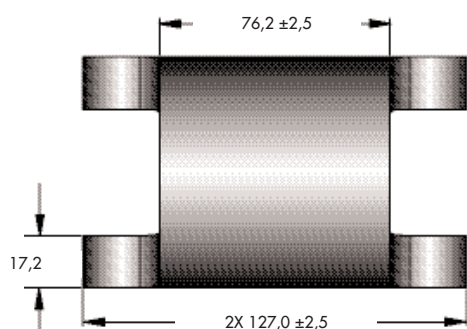
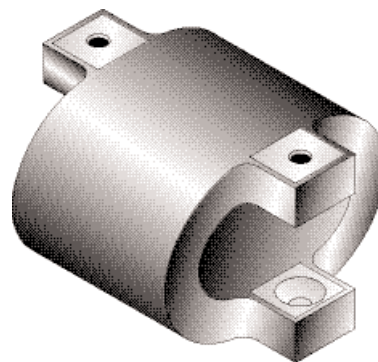
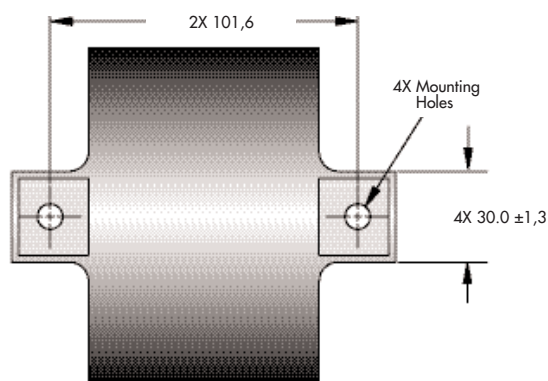
Shear

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR8-600	302	35,6	40	43
2	HR8-400	214	35,6	28	30
3	HR8-200	107	35,6	14	17

Note: Do not extrapolate plotted curves.

HERM (High Energy Rope Mount) HR12 Series

Technical Data



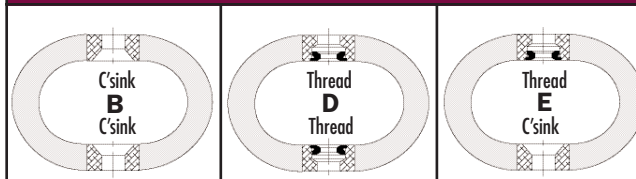
Note: Dimensions are in mm Tolerances are $\pm 0,25\text{mm}$

Size	Unit Weight Kg	Mounting Options	Thru Hole mm	Thread mm	C'sink
HR12-600	0,8	B, D, E	$\varnothing 9,0 \pm 0,13$	M8 X 1,25	90°
HR12-400	0,8				
HR12-200	0,8				

Model Number Ordering Code

HR12-200 - B L M	
B	Isolator Model: See Sizing Table
L	Threaded Hole Options: [L] - Helical, Locking, Dry Film Lubricated [H] - Helical, Free Running
M	Add "M" for Metric All Mounting Options
	Mounting Options: See Chart

Mounting Options

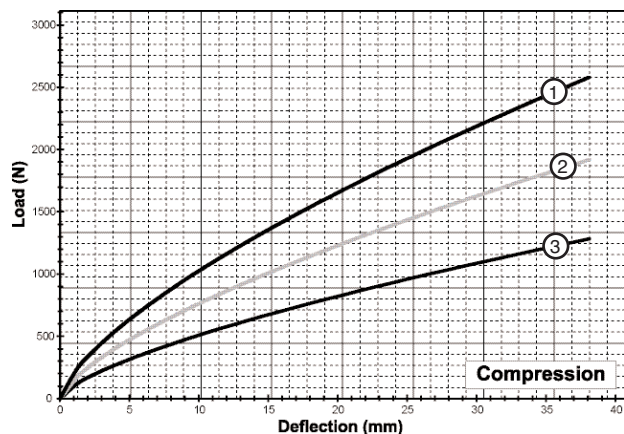


• Meets environmental requirements of MIL-M-17185A

Wire Rope Special Options

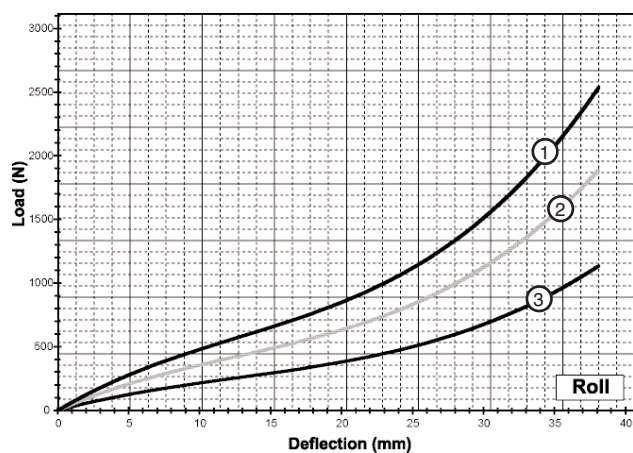
Optional materials for the wire rope and mount bars are available upon request. Possibilities include galvanized rope, bell mouth mount bars or stainless steel rope and mount bars. Please contact ITT Enidine to discuss in more detail. Minimum purchase quantities may apply. See page 155.

Static Load vs. Deflection



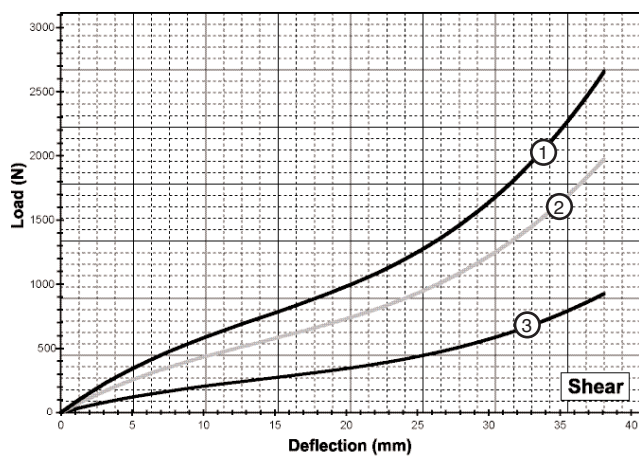
Compression

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR12-600	689	38,1	204	121
2	HR12-400	512	38,1	151	89
3	HR12-200	356	38,1	102	60



Roll

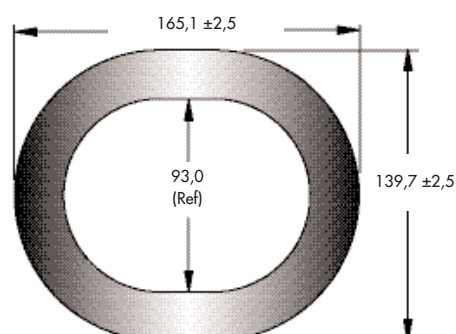
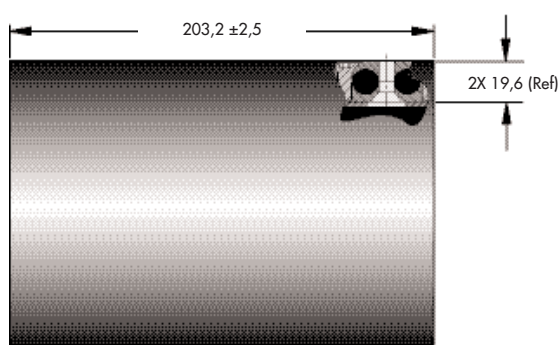
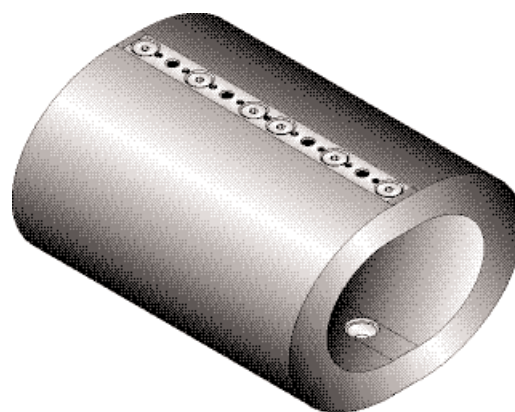
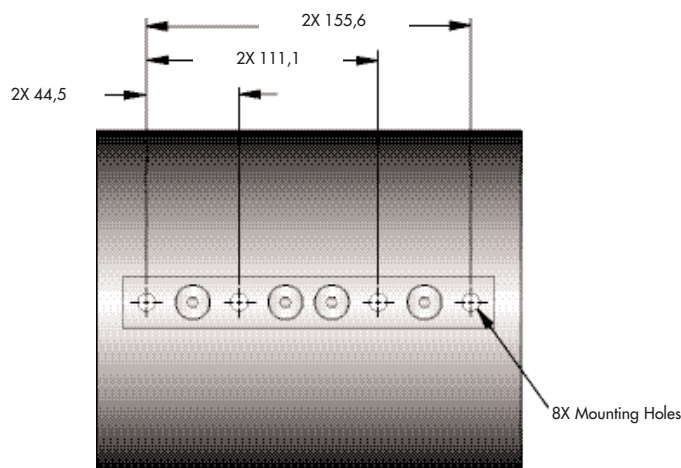
Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR12-600	534	38,1	79	75
2	HR12-400	400	38,1	59	57
3	HR12-200	245	38,1	35	34



Shear

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR12-600	645	38,1	97	84
2	HR12-400	467	38,1	72	63
3	HR12-200	222	38,1	34	30

Note: Do not extrapolate plotted curves.



Note: Dimensions are in mm Tolerances are ± 0,25mm

Size	Unit Weight Kg	Mounting Option	Thru Hole mm	C'sink
HR16-606	4,0	B	Ø8,3 ±0,13 ±0,38	82°
HR16-406	3,4			
HR16-206	2,7			

Model Number Ordering Code

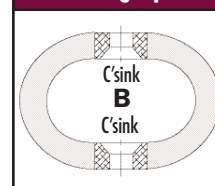
HR16 - 206 - B P

Mount Bar Options: * [] - 6061-T6 Aluminum (or Equiv.)
Chem Conv. Coated
[Y] - 6061-T6 Aluminum (or Equiv.)
Anodized
[P] - 302/304 Stainless Steel (or Equiv.)
Passivated

Mounting Option: See Chart

Isolator Model: See Sizing Table

Mounting Option

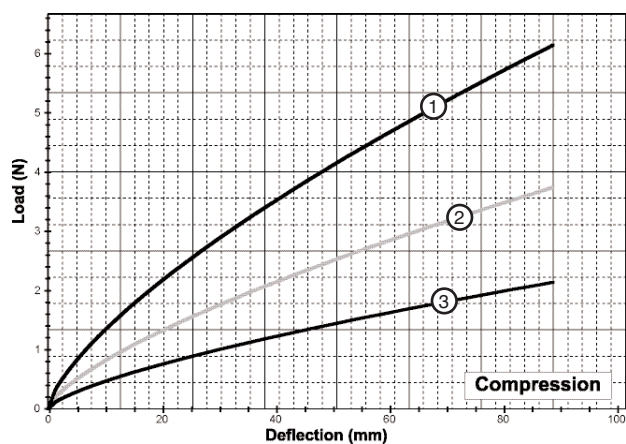


• Meets environmental requirements of MIL-M-17185A

* Standard features. Any non-standard items may require longer lead times. Call for quotation.

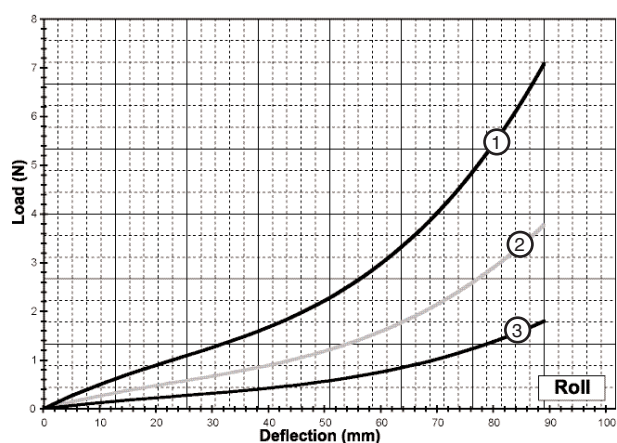
Technical Data

Static Load vs. Deflection



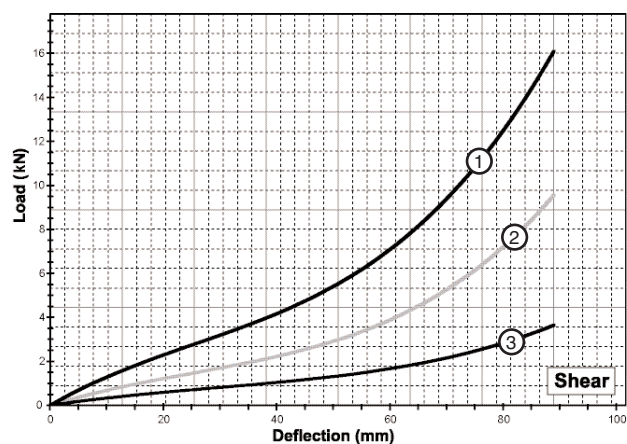
Compression

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR16-606	1 624	88,9	261	123
2	HR16-406	1 001	88,9	159	74
3	HR16-206	556	88,9	91	43



Roll

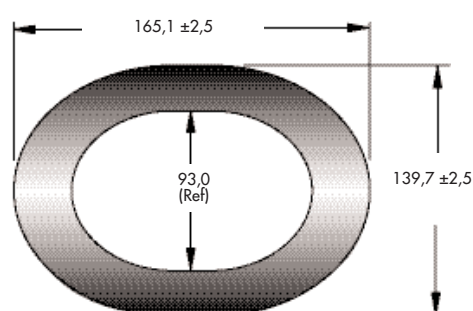
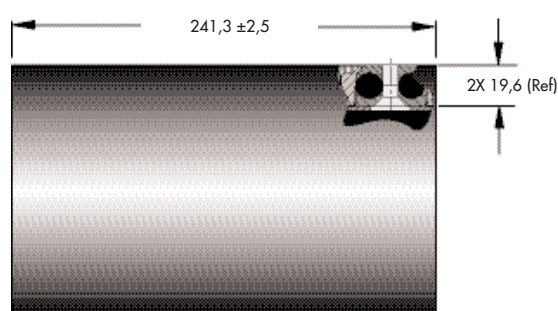
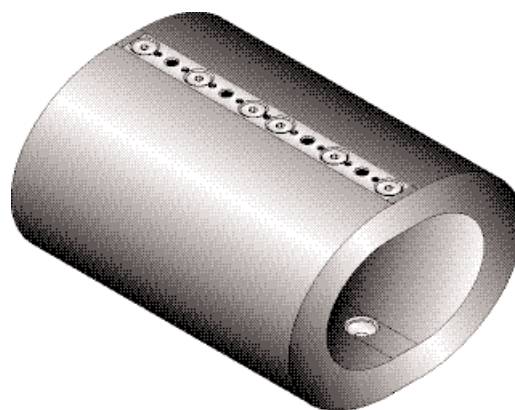
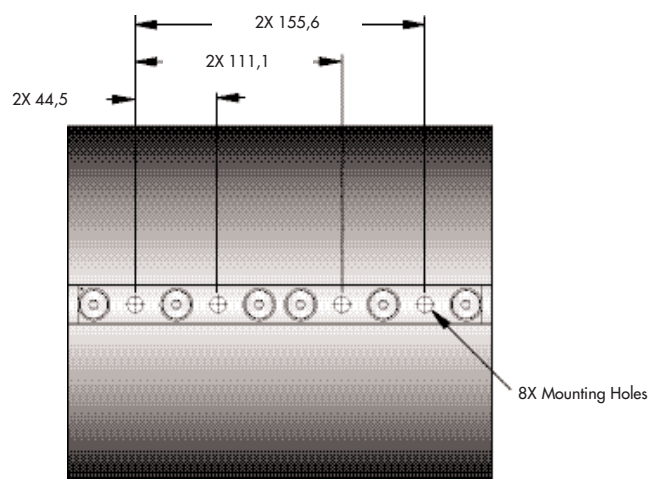
Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR16-606	1 134	88,9	73	83
2	HR16-406	601	88,9	39	44
3	HR16-206	289	88,9	18	21



Shear

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR16-606	2 891	88,9	1 065 187	195
2	HR16-406	1 535	88,9	565 99	121
3	HR16-206	734	88,9	275 48	45

Note: Do not extrapolate plotted curves.



Note: Dimensions are in mm Tolerances are ± 0,25mm

Size	Unit Weight Kg	Mounting Option	Thru Hole mm	C'sink
HR16-600	4,8	B	Ø8,3 ±0,13 ±0,38	82°
HR16-400	4,1			
HR16-200	3,4			

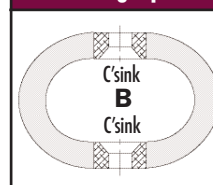
Model Number Ordering Code

HR16 - 200 - B

Mounting Option: See Chart

Isolator Model: See Sizing Table

Mounting Option

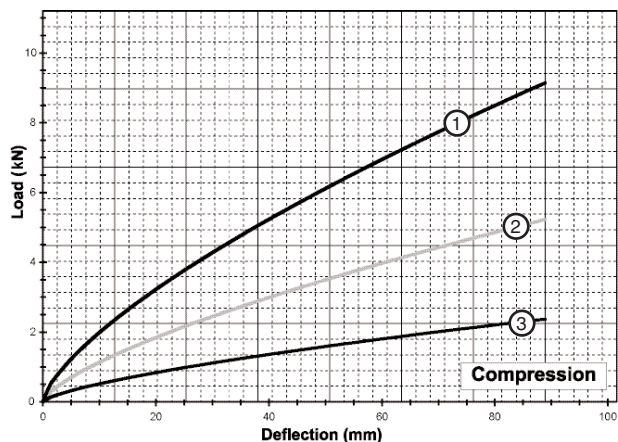


Wire Rope Special Options

- Meets environmental requirements of MIL-M-17185A

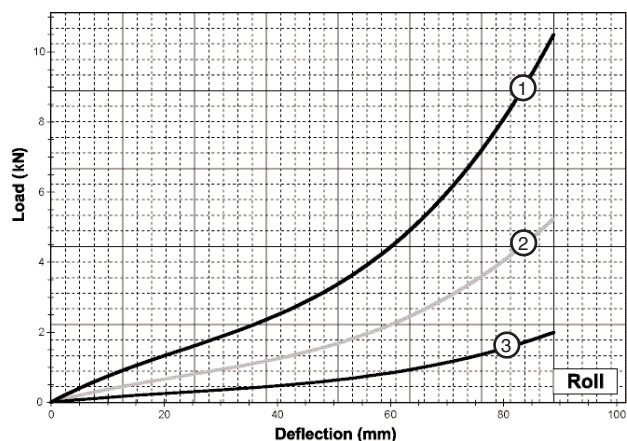
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Static Load vs. Deflection



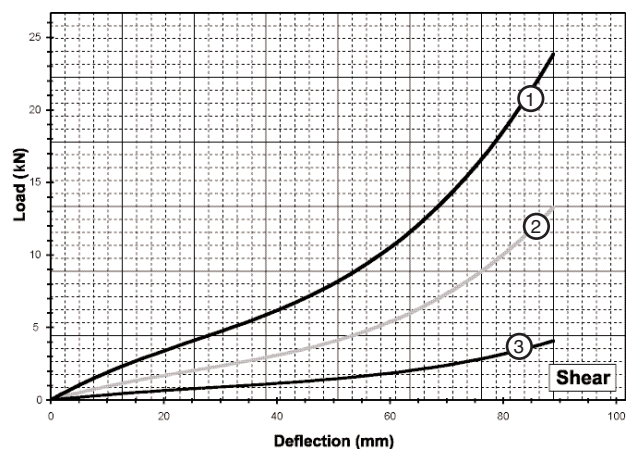
Compression

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR16-600	2 424	88,9	389	181
2	HR16-400	1 379	88,9	221	103
3	HR16-200	623	88,9	100	47



Roll

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR16-600	1 668	88,9	108	123
2	HR16-400	823	88,9	53	61
3	HR16-200	311	88,9	20	24



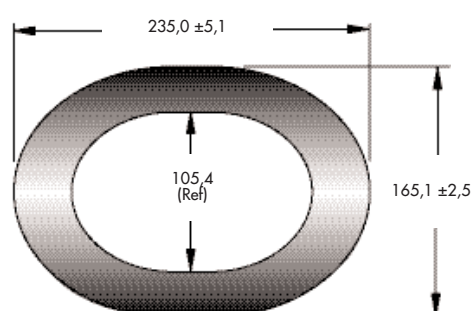
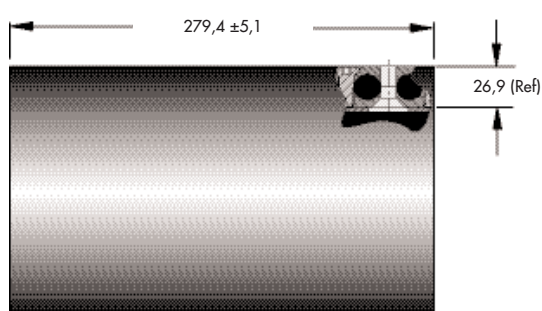
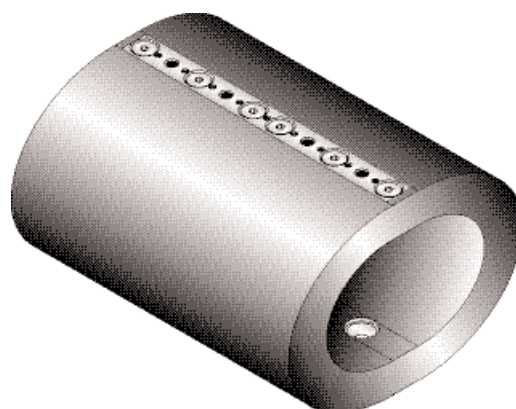
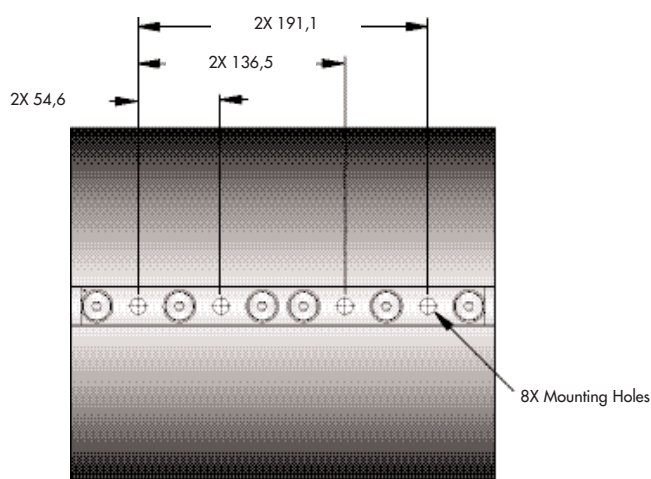
Shear

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR16-600	4 270	88,9	276	290
2	HR16-400	2 135	88,9	138	152
3	HR16-200	823	88,9	53	52

Note: Do not extrapolate plotted curves.

HERM (High Energy Rope Mount) HR20 Series

Technical Data



Note: Dimensions are in mm Tolerances are ± 0,25mm

Size	Unit Weight Kg	Mounting Option	Thru Hole mm	C'sink
HR20-600	9,5	B	$\varnothing 10,3^{+0,13}_{-0,38}$	82°
HR20-400	8,2			
HR20-200	6,4			

Model Number Ordering Code

HR20 - 200 - B

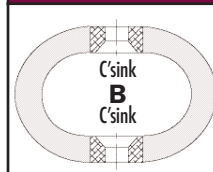
Mounting Option:

See Chart

Isolator Model:

See Sizing Table

Mounting Option

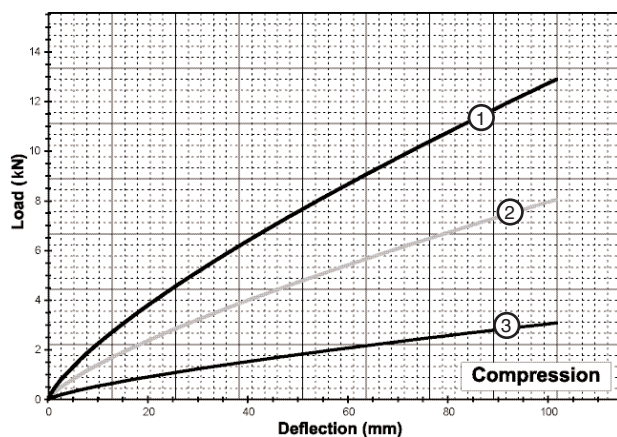


Wire Rope Special Options

Optional materials for the wire rope and mount bars are available upon request. Possibilities include galvanized rope, bell mouth mount bars or stainless steel rope and mount bars. Please contact ITT Enidine to discuss in more detail. Minimum purchase quantities may apply. See page 155.

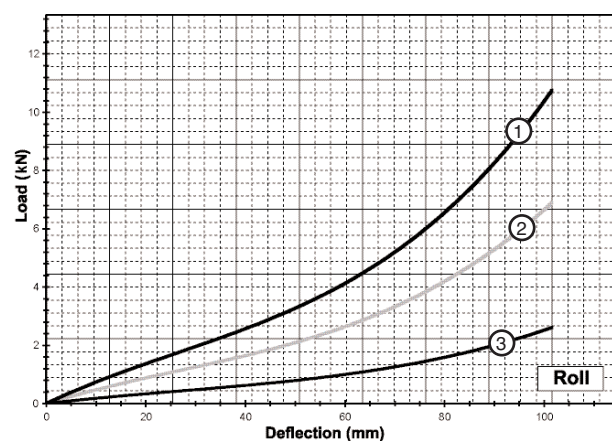
- Meets environmental requirements of MIL-M-17185A

Static Load vs. Deflection



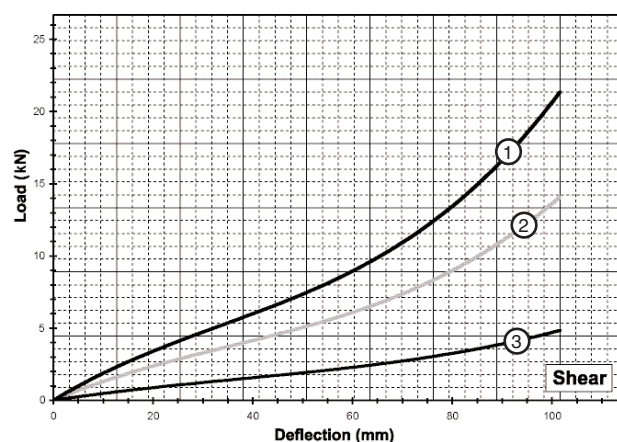
Compression

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR20-600	3 114	101,6	415	218
2	HR20-400	1 935	101,6	259	136
3	HR20-200	734	101,6	99	52



Roll

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR20-600	1 601	101,6	103	118
2	HR20-400	1 023	101,6	67	76
3	HR20-200	400	101,6	25	29



Shear

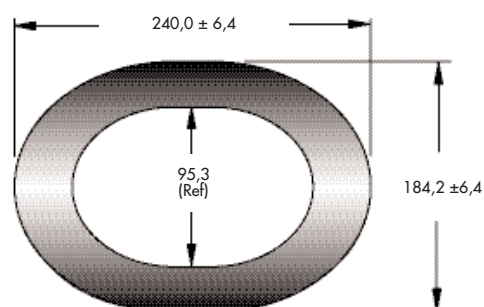
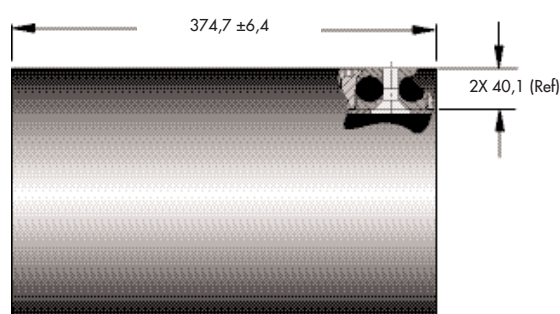
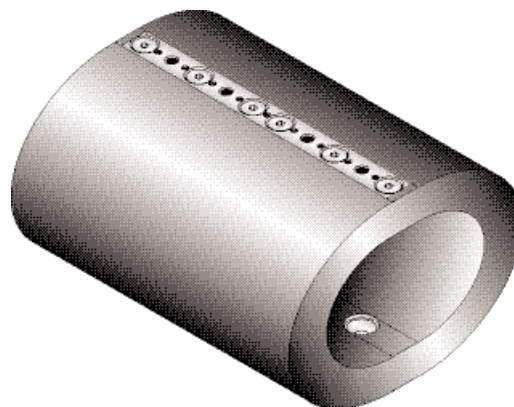
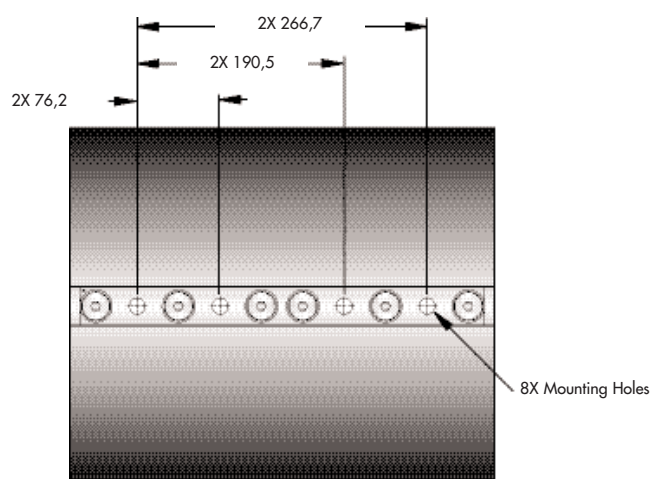
Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR20-600	4 115	101,6	265	252
2	HR20-400	2 869	101,6	186	170
3	HR20-200	1 023	101,6	67	62

Note: Do not extrapolate plotted curves.

HERM (High Energy Rope Mount)

HR28 Series

Technical Data



Note: Dimensions are in mm Tolerances are ± 0,25mm

Size	Unit Weight Kg	Mounting Option	Thru Hole mm	C'sink
HR28-600	23	B	Ø13,5 ±0,13 ±0,38	82°
HR28-400	18			
HR28-200	14			

Model Number Ordering Code

HR28 - 200 - B

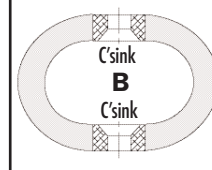
Mounting Option: See Chart

Isolator Model: See Sizing Table

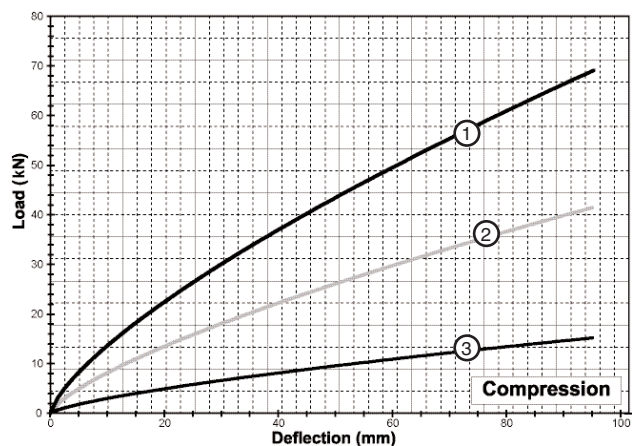
Wire Rope Special Options

Optional materials for the wire rope and mount bars are available upon request. Possibilities include galvanized rope, bell mouth mount bars or stainless steel rope and mount bars. Please contact ITT Enidine to discuss in more detail. Minimum purchase quantities may apply. See page 155.

Mounting Option

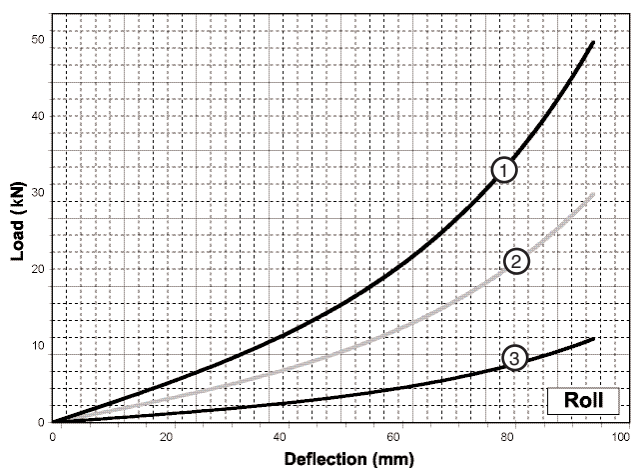


Static Load vs. Deflection



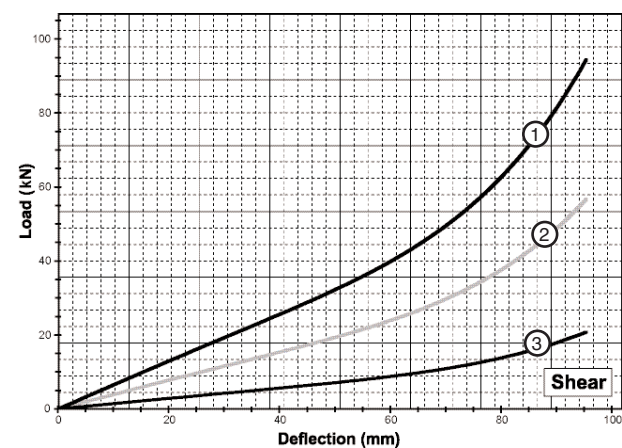
Compression

Curve	Model	Max Static Load kN	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR28-600	17,79	95,3	2 603	1 266
2	HR28-400	10,56	95,3	1 562	759
3	HR28-200	3,87	95,3	573	278



Roll

Curve	Model	Max Static Load kN	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR28-600	4,94	95,3	319	549
2	HR28-400	2,98	95,3	192	329
3	HR28-200	1,09	95,3	70	121



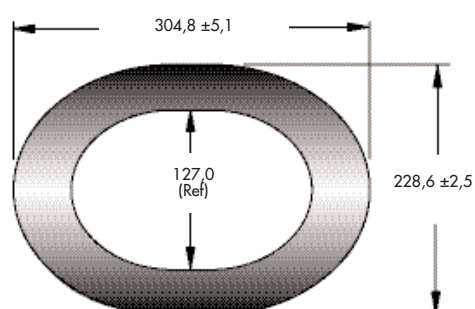
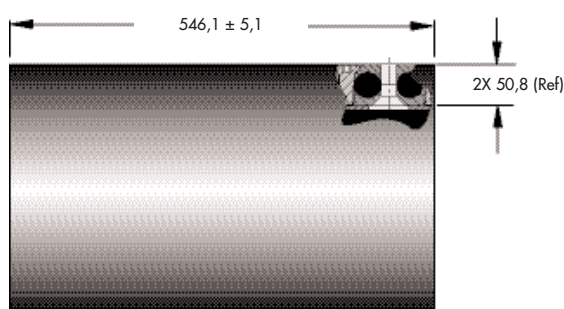
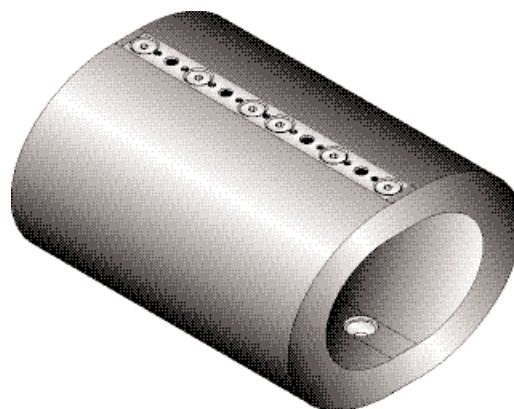
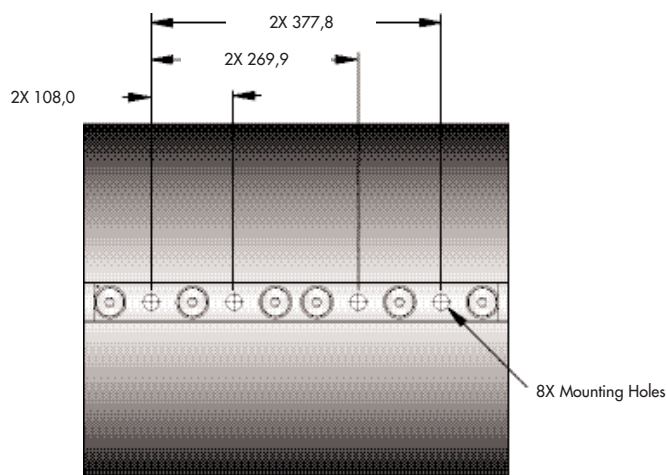
Shear

Curve	Model	Max Static Load kN	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR28-600	13,26	95,3	854	1 106
2	HR28-400	7,96	95,3	512	664
3	HR28-200	2,91	95,3	187	244

Note: Do not extrapolate plotted curves.

HERM (High Energy Rope Mount) HR40 Series

Technical Data



Note: Dimensions are in mm Tolerances are ± 0,25mm

Size	Unit Weight Kg	Mounting Option	Thru Hole mm	C'sink
HR40-600	45	B	Ø19,8 ±0,13 ±0,38	82°
HR40-400	38			
HR40-200	30			

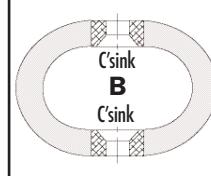
Model Number Ordering Code

HR40 - 200 - B

Mounting Option: See Chart

Isolator Model: See Sizing Table

Mounting Option



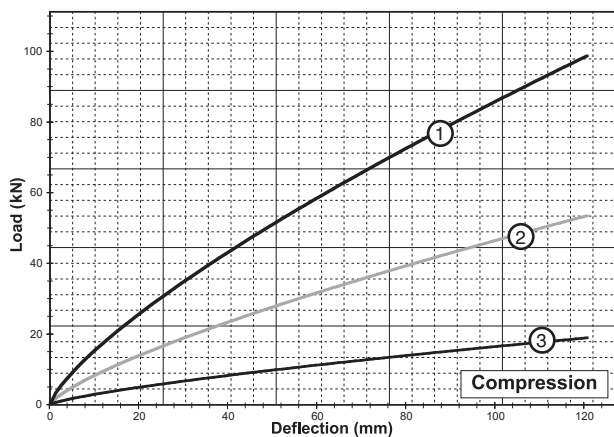
Wire Rope Special Options

Optional materials for the wire rope and mount bars are available upon request. Possibilities include galvanized rope, bell mouth mount bars or stainless steel rope and mount bars. Please contact ITT Enidine to discuss in more detail. Minimum purchase quantities may apply. See page 155.

- Meets environmental requirements of MIL-M-17185A

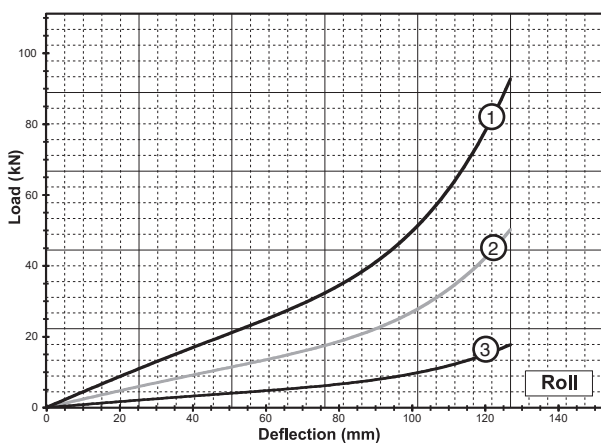
Technical Data

Static Load vs. Deflection



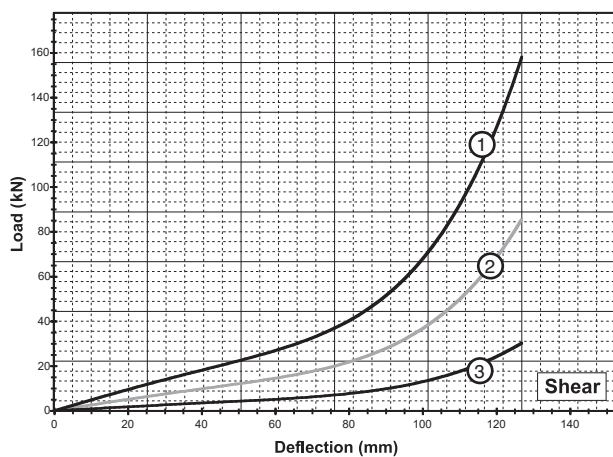
Compression

Curve	Model	Max Static Load kN	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR40-600	23,80	120,7	2 793	1 403
2	HR40-400	12,90	120,7	1 513	760
3	HR40-200	4,56	120,7	535	269



Roll

Curve	Model	Max Static Load kN	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR40-600	8,90	127	574	758
2	HR40-400	4,83	127	311	427
3	HR40-200	1,71	127	110	149



Shear

Curve	Model	Max Static Load kN	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	HR40-600	9,74	127	628	1 012
2	HR40-400	5,29	127	341	551
3	HR40-200	1,87	127	120	189

Note: Do not extrapolate plotted curves.



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