

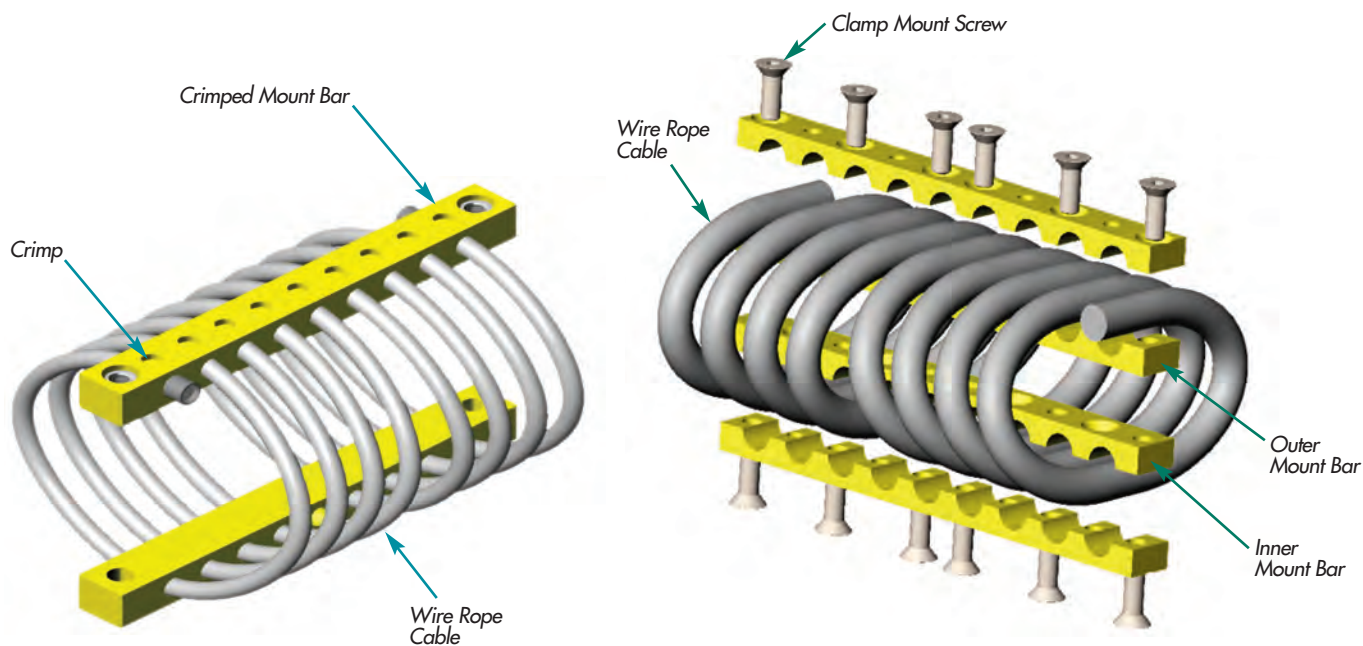


U.S. Patents 5,549,285

Wire Rope Isolators

Standard **Wire Rope Isolators** are comprised of stainless steel stranded cable threaded through aluminum alloy retaining bars that are mounted for effective shock and vibration isolation. With their corrosion resistant, all-metal construction, ITT Enidine Wire Rope Isolators are environmentally stable, high-performance shock and vibration isolators that are unaffected by temperature extremes, chemicals, oils, ozone and abrasives.

Featuring a patented crimping pattern, versatile mounting options and a variety of sizes, these helical isolator products can help ensure that your systems can effectively meet performance requirements in Commercial, Industrial, and Defense industries, including MIL-STD-810, MIL-STD-167, MIL-S-901D, MIL-E-5400, STANAG-042, BV43-44 and DEF-STND 0755. For more information, please refer to our "Wire Rope Isolator Overview and Application Worksheet" on pages 107-108 to assist you in selecting a model for your application.



Crimp Models (WR2 – WR8):

ITT Enidine's patented crimp design lowers cost by using fewer mount bars when compared to the clamp design, no assembly hardware, and reduced assembly time.

Clamp Models (WR12 – WR40):

ITT Enidine's clamp bar models are constructed by clamping the wire rope between two fastened mount bars.

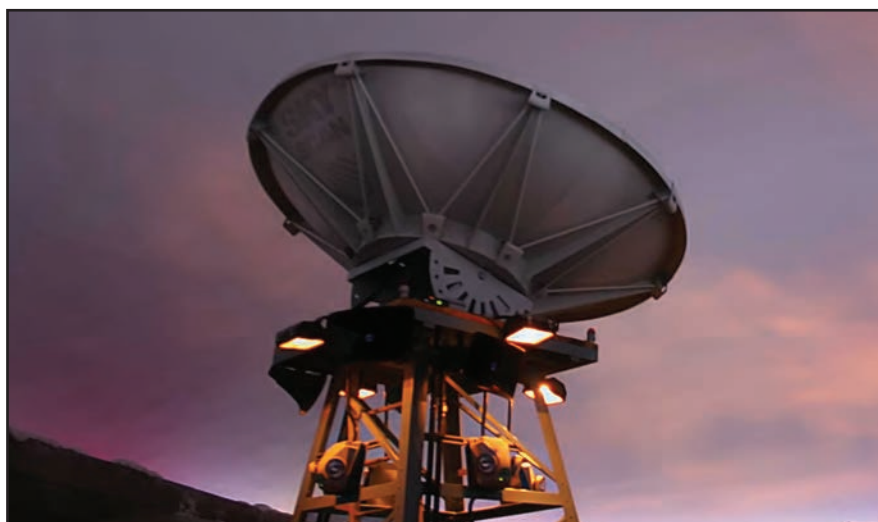
Typical Applications



Piping Systems



Cabinet Applications



Sensitive Electronics Isolation

Materials and Finishes:

Standard: 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 (WR12–WR40 Series)
 Thread: Stainless Self Clinching Insert (WR2–WR8 Series), Threaded bar (WR12–WR40 Series)

Optional: Wire Rope: Galvanized or Nylon Coated Stainless
 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) (WR12 – WR40)
 Threads: Stainless Steel Helical Inserts, Free Running or Self Locking (WR3 – WR40)
 Threaded Aluminum (WR2 – WR8)

Special: Consult ITT Enidine

Isolator Options:

Mounting: ITT Enidine offers a full range of mounting combinations of thru-hole, countersunk, and threaded bars. All configurations are available in either Imperial or Metric styles. Add an "M" after the mounting option for Metric. Some models have reduced mounting options available due to limited fastener installation space. Consult ITT Enidine if a preferred mounting configuration is not listed.

Loops: ITT Enidine's wire rope isolators can be purchased with the full number of loops, or as few as 2-Loops. The number of loops is indicated in the isolator part number. Performance is provided for full loop isolators. Performance for reduced loop isolators can be obtained by a simple ratio.

Bellmouth: ITT Enidine's wire rope isolators are available with a "bellmouth" option. The bellmouth feature includes mount bars with radii manufactured into the wire rope hole edges. This option is recommended for high fatigue applications. Add an "R" to the end of the part number.

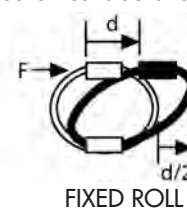
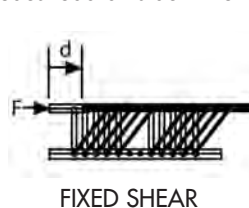
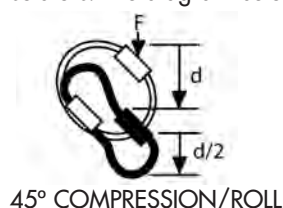
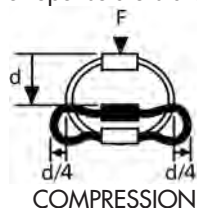
Performance:

Stiffness (Kv or Ks):

Wire rope isolators 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 108 to predict system performance. The stiffness values listed in the catalog are for full-loop versions. For reduced loop versions, ratio the stiffness by dividing the number of desired loops by the number of full loops.

Isolator Axes:

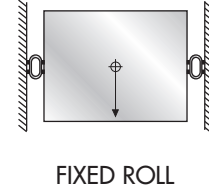
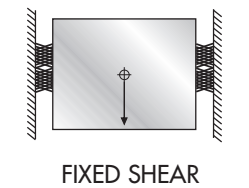
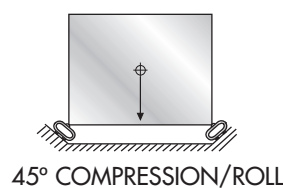
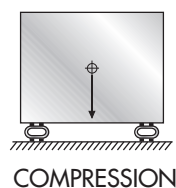
Wire rope isolators are multi-axis isolators. The diagram below includes load axis definitions and deflection considerations.



Damping: Typically 5-15%, 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. In most applications, the quantity of stabilizers required are half as many as the base isolators, and selected one size softer than the base isolators.

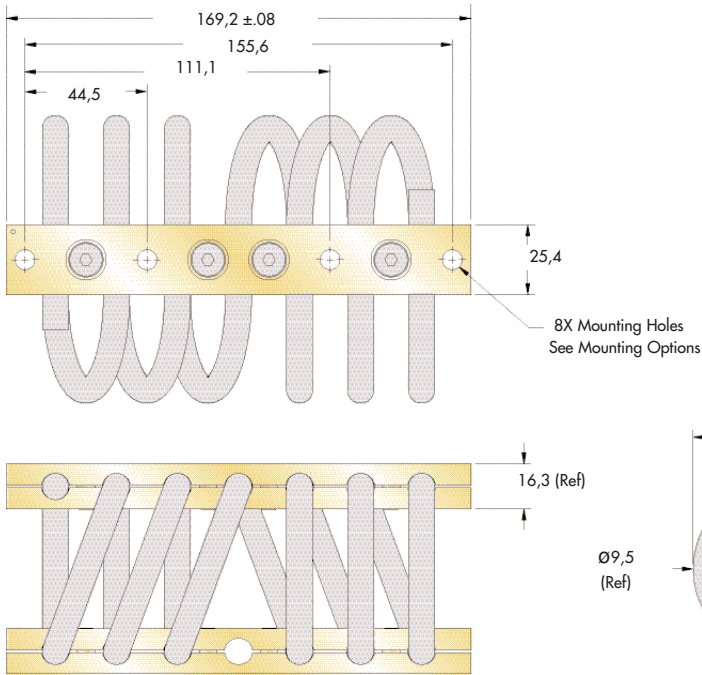
APPLICATION WORKSHEET - INPUTS METRIC

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 = _____ G's	
2. Shock Input Velocity:	V = _____ m/s	
Free Fall Impact:	$V = \sqrt{2gh}$ $g = 9,81 \text{ m/s}^2$ h = 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.		

Wire Rope Isolators

WR12 Series 6-Loop

Technical Data



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

Size	Height "H" mm	Width Ref "W" mm	Unit Weight Kg	Mounting Options	Thru Hole mm	Thread mm	C'sink
WR12-206	71	84	0,83	A, B, C, D, E, S	Ø7,1 + 0,13 - 0,38	M6 X 1,0	90°
WR12-306	74	89	0,85				
WR12-406	76	105	0,90				
WR12-506	83	108	0,95				
WR12-606	89	108	0,98				
WR12-706	105	121	1,07				
WR12-806	108	140	1,12				

Model Number Ordering Code			
WR12 - 406 - 06	D	H	M
			Add "M" for Metric For C'sink and Threaded Options
			Threaded Hole Options: [] - Tapped
			[H] - Helical Insert, Free Running
			[L] - Helical Insert, Self Locking
			Mounting Options: See Chart
			Number of Loops: 06 (Reduced Number of Loops Available)
			Isolator Size: See Sizing Table

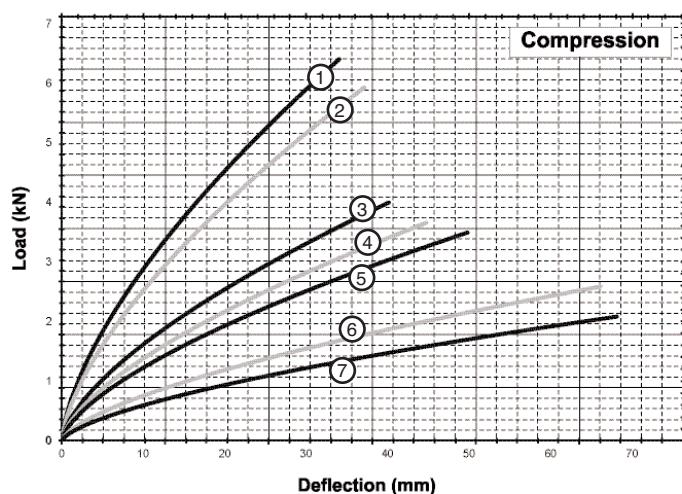
Mounting Options		

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 107.

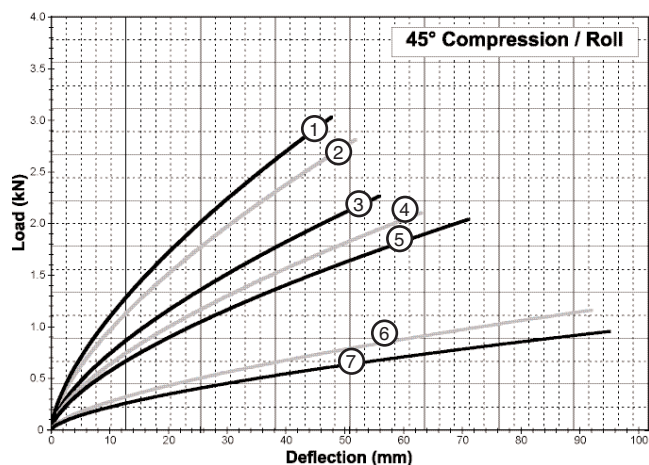
- Maximum recommended torque for threaded bar 10 Nm
- Operating Temperature Range: -100°C to 260°C

Static Load vs. Deflection



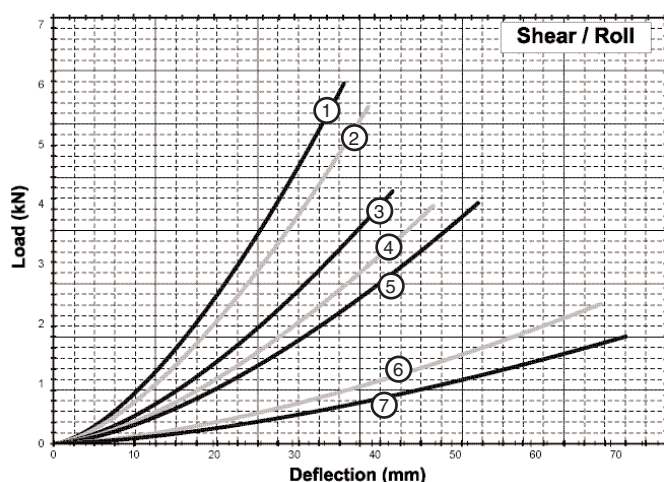
Compression

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	WR12-206-06	1 090	34,0	275	135
2	WR12-306-06	1 023	37,1	240	114
3	WR12-406-06	801	40,1	180	84
4	WR12-506-06	734	44,7	154	68
5	WR12-606-06	712	49,8	137	60
6	WR12-706-06	396	66,0	65	25
7	WR12-806-06	320	68,1	51	19



45° Compression/Roll

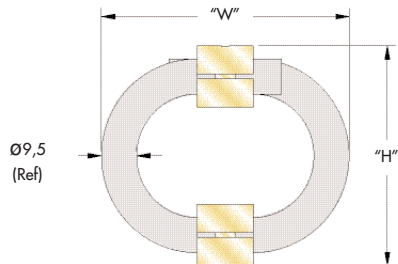
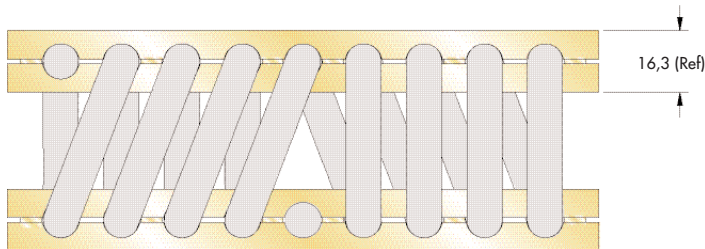
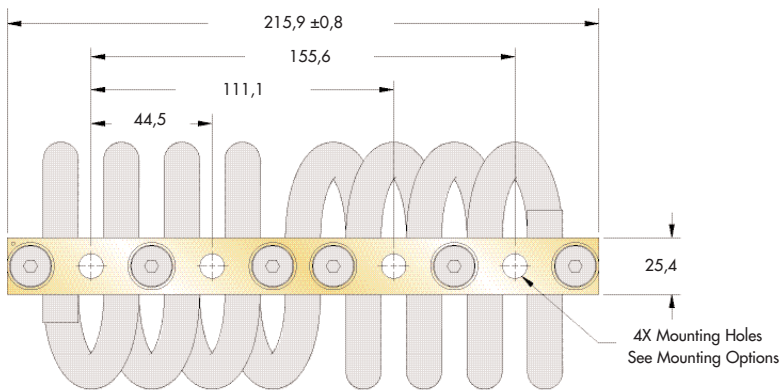
Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	WR12-206-06	890	47,8	177	77
2	WR12-306-06	823	51,8	156	67
3	WR12-406-06	667	55,9	120	49
4	WR12-506-06	623	63,0	103	40
5	WR12-606-06	601	71,1	92	35
6	WR12-706-06	341	91,9	44	16
7	WR12-806-06	280	95,0	36	12



Shear/Roll

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	WR12-206-06	689	36,1	98	132
2	WR12-306-06	645	39,1	84	113
3	WR12-406-06	489	42,2	58	78
4	WR12-506-06	467	47,2	49	66
5	WR12-606-06	445	52,8	44	59
6	WR12-706-06	200	68,1	20	27
7	WR12-806-06	156	71,1	15	20

Notes: Performance provided for full loop models with standard (302/304) stainless steel cable.
Consult ITT Enidine for other options. Do not extrapolate curves.



Size	Height "H" mm	Width Ref "W" mm	Unit Weight Kg	Mounting Options	Thru Hole mm	Thread mm	C'sink
WR12-200	71	84	1,10	A, B, C, D, E, S	$\varnothing 9,0 \begin{smallmatrix} +0,13 \\ -0,38 \end{smallmatrix}$	*M8 X 1,25	90°
WR12-300	74	89	1,13				
WR12-400	76	105	1,20				
WR12-500	83	108	1,26				
WR12-600	89	108	1,30				
WR12-700	105	121	1,43				
WR12-800	108	140	1,50				

* Tapped M8 x 1.25, Inserts M6 x 1.0

Model Number Ordering Code

WR12 - 400 - 08 **D H M**

— Add "M" for Metric All Mounting Options

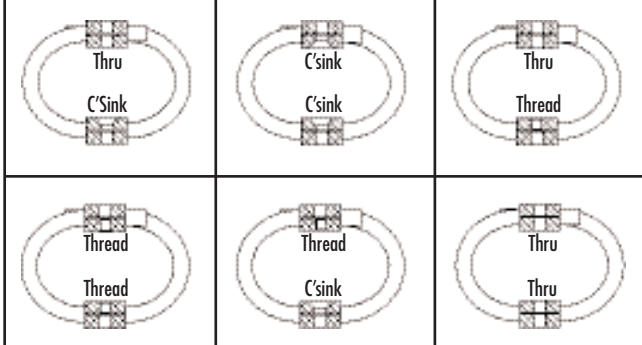
— Threaded Hole Options: [] - Tapped
[H] - Helical Insert, Free Running
[L] - Helical Insert, Self Locking

— Mounting Options: See Chart

— Number of Loops: 08 (Reduced Number of Loops Available)

— Isolator Size: See Sizing Table

Mounting Options

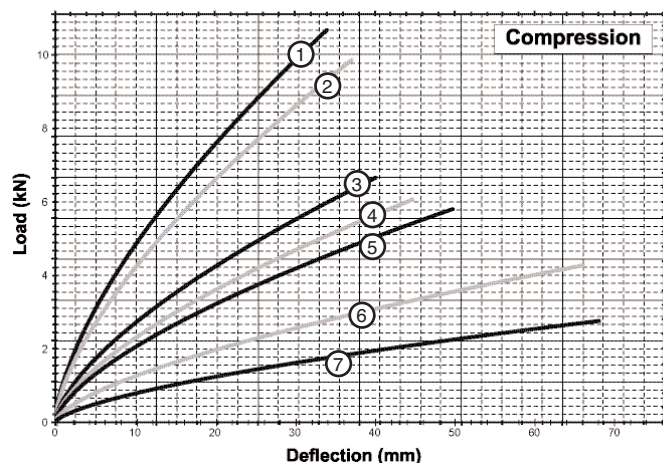


Wire Rope Special Options

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 107.

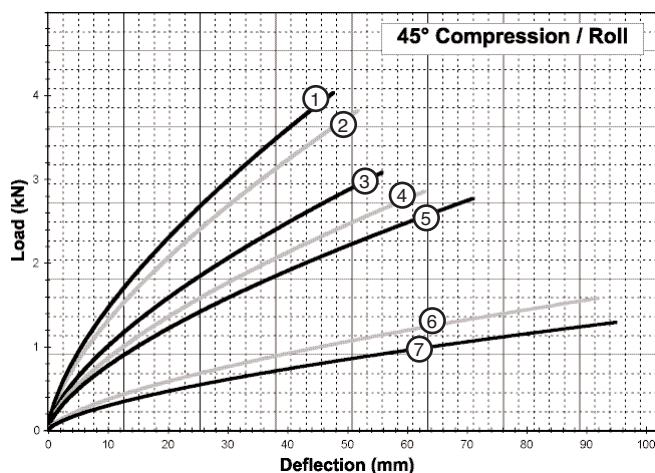
- Maximum recommended torque for threaded bar is 20 Nm
- Operating Temperature Range: -100°C to 260°C

Static Load vs. Deflection



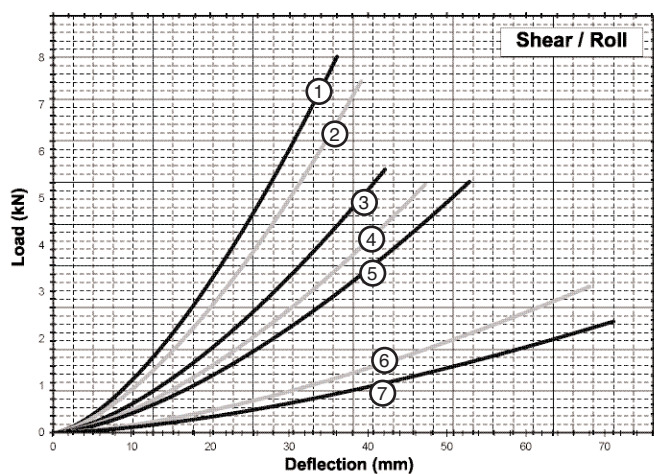
Compression

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	WR12-200-08	1 468	34,0	366	179
2	WR12-300-08	1 357	37,1	320	152
3	WR12-400-08	1 068	40,1	242	110
4	WR12-500-08	979	44,7	205	91
5	WR12-600-08	934	49,8	182	79
6	WR12-700-08	534	66,0	86	33
7	WR12-800-08	423	68,1	67	26



45° Compression/Roll

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	WR12-200-08	1 179	47,8	236	103
2	WR12-300-08	1 090	51,8	208	88
3	WR12-400-08	890	55,9	159	65
4	WR12-500-08	823	63,0	137	54
5	WR12-600-08	778	71,1	123	47
6	WR12-700-08	467	91,9	60	21
7	WR12-800-08	373	95,0	47	16



Shear/Roll

Curve	Model	Max Static Load N	Max Deflection mm	Kv (vibration) kN/m	Ks (shock) kN/m
1	WR12-200-08	912	36,1	130	130
2	WR12-300-08	867	39,1	112	112
3	WR12-400-08	667	42,2	77	77
4	WR12-500-08	623	47,2	65	65
5	WR12-600-08	601	52,8	60	60
6	WR12-700-08	267	68,1	27	27
7	WR12-800-08	200	71,1	19	19

Notes: Performance provided for full loop models with standard (302/304) stainless steel cable.
Consult ITT Enidine for other options. Do not extrapolate curves.