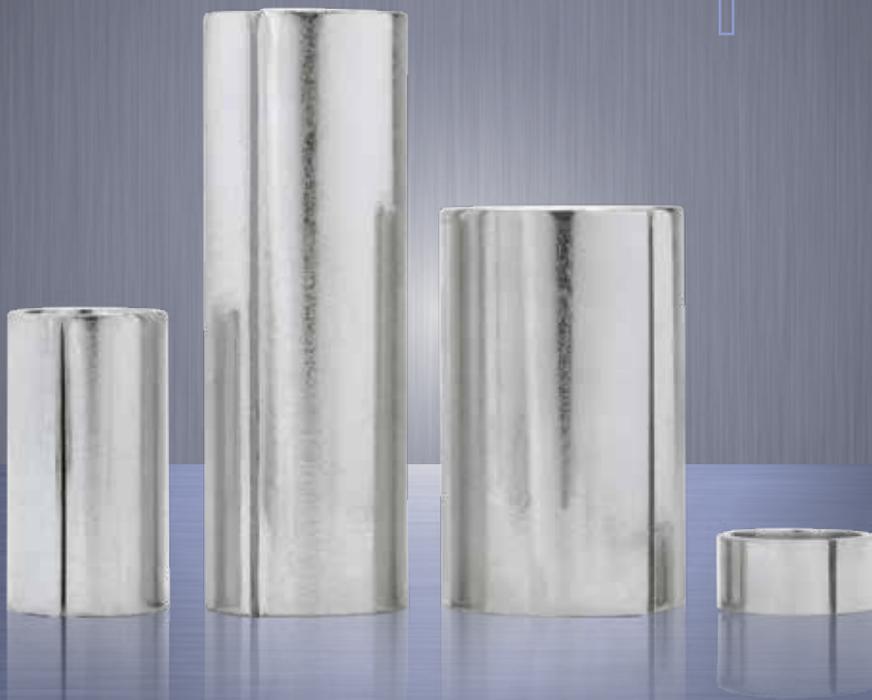
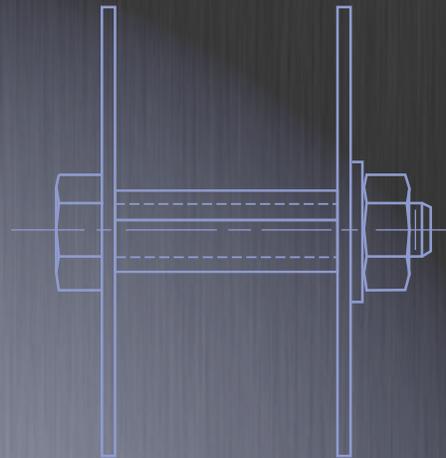
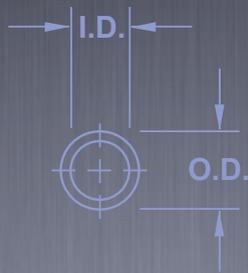
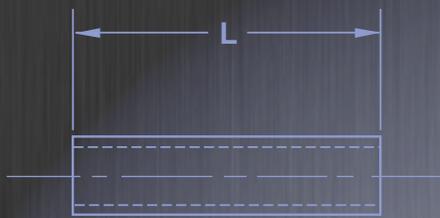


SPIROL[®]

SPACERS AND ROLLED TUBULAR COMPONENTS





Spacers and Rolled Tubular Components

Proprietary production technology and value-engineered design reduces the cost of Tubular Products.

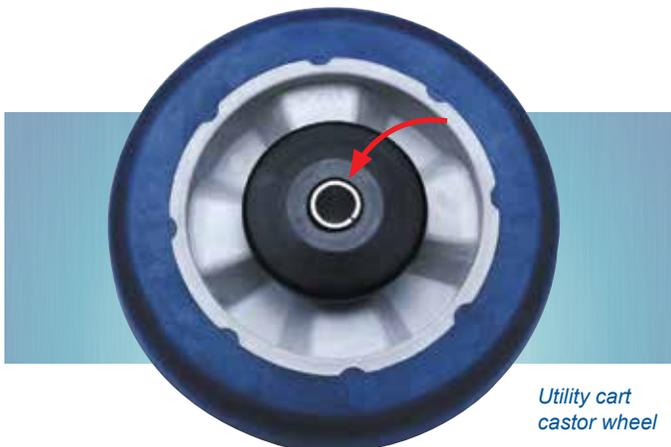
SPIROL® Spacers are formed into closed seam tubes from cold rolled strip. The component cost savings are achieved through:

- Use of SPIROL's proprietary, highly flexible and efficient production technology.
- SPIROL's roll formed Spacer design has tolerances that meet application requirements. This prevents unnecessarily close tolerances associated with manufacturing technologies required to produce more expensive alternative products such as cut tubing, machined bushings, etc.

Typical applications use the Spacer to separate two components in an assembly joined by a bolt, rivet or rod passed through the inside diameter of the Spacer. The inside diameter of the Spacer is designed for a clearance fit.



End link for front end stabilizer.



Utility cart castor wheel

Spacers and other tubular components are also used as stand-offs, bushings, tension sleeves, compression limiters, axles and pins. They often replace cut-off tubing, ferrules, grommets, rivets and machined parts.

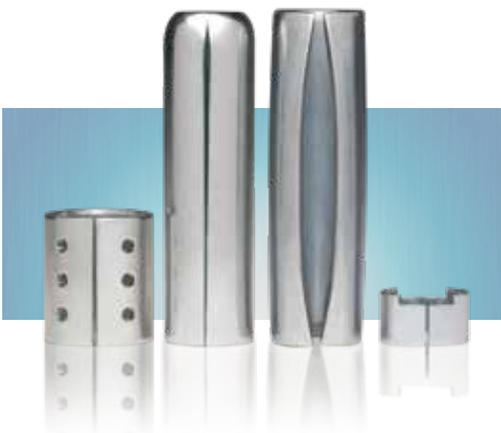


The standard range of **SPIROL** Spacers includes both metric and inch specifications in a variety of diameters and lengths. Most standard diameters are available in two wall thickness options, standard wall and heavy wall, to accommodate specific application strength and bearing requirements.

- **SP100** standard wall Spacers are typically used in static applications without excessive external forces acting on the joint.
- **SP150** heavy wall Spacers have greater compression strength and additional bearing surface. The additional bearing surface is often used to prevent witness marks or indenting when the Spacer is clamped between soft materials.

This provides an extensive range of sizes, particularly if the inch sizes are converted to metric or vice versa. The benefits of using standard Spacers are as follows:

- Reduced cost and no tooling charges — particularly in low- or medium-volume applications.
- SPIROL stock allows for just-in-time delivery and reduced inventories.
- No excess components at the end of a production run.
- SPIROL's expansive standard size range meets most application requirements and eliminates the need for custom-designed parts.

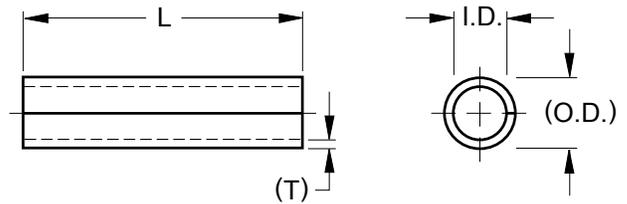


SPECIALS

If your application requirements cannot be met by a standard SPIROL Spacer, our **Application Engineering** department will assist you in designing a tubular part that meets your needs and can provide you with samples for prototype and testing purposes.

INSPECTION METHODS

I.D. - Go and No Go Plug Gauges
Length - Calipers



DIMENSIONAL DATA

NOMINAL SIZE			3	4	5	6	8	10	12	14	16	20
SP100 STD WALL	I.D.	MIN.	3.15	4.15	5.2	6.2	8.2	10.2	12.25	14.25	16.25	20.4
		MAX.	3.3	4.3	5.4	6.4	8.5	10.5	12.7	14.8	16.8	21
	WALL THICKNESS REF.		0.5	0.7	0.7	0.9	1.1	1.2	1.6	1.6	1.8	2
	O.D. REF. ONLY		4.22	5.62	6.7	8.1	10.55	12.75	15.67	17.73	20.12	24.7

AVAILABLE LENGTHS

NOMINAL SIZE		3	4	5	6	8	10	12	14	16	20
LENGTH	4	*	*								
	5										
	6	*	*	*	*						
	8	*	*	*	*	*					
	10	*	*	*	*	*	*				
	12	*	*	*	*	*	*	*			
	14	*	*	*	*	*	*	*	*		
	16		*	*	*	*	*	*	*	*	
	18									*	*
	20		*	*	*	*	*	*	*	*	*
	22										
	25			*	*	*	*	*			
	28										
	30										
	35										
	40										
	45										
	50										
	55										
	60										
65											
70											
75											
80											
85											
90											
95											
100											

- * Generally stocked size
- All dimensions apply prior to the application of any supplemental finish
- Shorter, longer and intermediate lengths are available upon request
- Custom diameters will be evaluated upon request

Contact **SPIROL** for columnar strength and bearing surface requirements for your specific application.

LENGTH TOLERANCES

NOMINAL SIZE	NOMINAL LENGTH	LENGTH TOLERANCE
3 - 6	L ≤ 40	±0.15
	40 < L ≤ 100	±0.25
8 - 12	L ≤ 50	±0.25
	50 < L ≤ 100	±0.40
14 - 20	L ≤ 100	±0.40

FLANGE HINGE

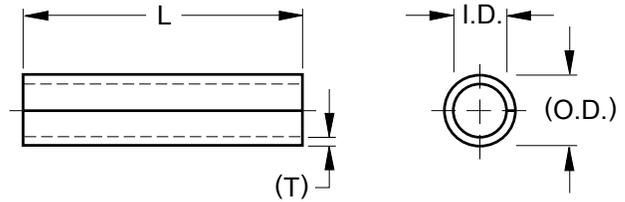


A traditional Spacer application used to eliminate flange collapse when the bolt is torqued during installation to achieve the desired friction fit.

To Order: SPCR Size x Length Material Finish Series
Example: SPCR 6 x 25 FK SP100

INSPECTION METHODS

I.D. - Go and No Go Plug Gauges
Length - Calipers



DIMENSIONAL DATA

NOMINAL SIZE			3	4	5	6	8	10	12	14	16
SP150 HEAVY WALL	I.D.	MIN.	3.1	4.1	5.1	6.1	8.1	10.1	12.15	14.2	16.15
		MAX.	3.3	4.35	5.4	6.4	8.6	10.6	13	15.1	17.1
	WALL THICKNESS REF.	0.7	1.1	1.2	1.5	1.7	2	2.2	2.4	2.6	2.6
O.D. REF. ONLY			4.6	6.42	7.65	9.25	11.75	14.35	16.97	19.5	21.82

AVAILABLE LENGTHS

NOMINAL SIZE		3	4	5	6	8	10	12	14	16	
LENGTH	4										
	5										
	6			*	*						
	8			*	*	*					
	10			*	*	*	*				
	12			*	*	*	*	*			
	14			*	*	*	*	*	*		
	16			*	*	*	*	*	*	*	
	18										*
	20				*	*	*	*			*
	22										
	25				*	*	*	*			
	28				*	*	*	*			
	30										
	35										
	40										
	45										
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	55										
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80											
85											
90											
95											
100											

- * Generally stocked size
- All dimensions apply prior to the application of any supplemental finish
- Shorter, longer and intermediate lengths are available upon request
- Custom diameters will be evaluated upon request

LENGTH TOLERANCES

NOMINAL SIZE	NOMINAL LENGTH	LENGTH TOLERANCE
3 - 6	$L \leq 40$	± 0.20
	$40 < L \leq 100$	± 0.30
8 - 12	$L \leq 50$	± 0.40
	$50 < L \leq 100$	± 0.50
14 - 16	$L \leq 100$	± 0.50



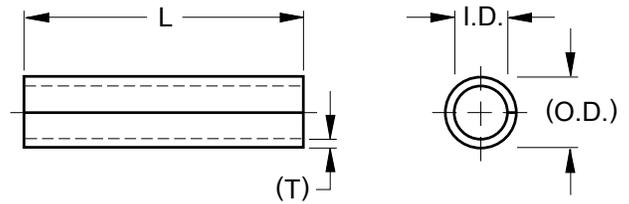
AUTOMOTIVE CHASSIS FRAME BRACKET

Reinforces hollow rectangular frame. Spacer is welded to bracket that fits into frame.

To Order: SPCR Size x Length Material Finish Series
Example: SPCR 8 x 20 FK SP150

INSPECTION METHODS

I.D. - Go and No Go Plug Gauges
Length - Calipers



DIMENSIONAL DATA

NOMINAL SIZE			#4	#6	#8	#10	.250 1/4	.312 5/16	.375 3/8	.437 7/16	.500 1/2	.625 5/8	.750 3/4
SP100 STD WALL	I.D.	MIN.	.118	.144	.172	.198	.260	.322	.385	.449	.512	.637	.767
		MAX.	.124	.150	.180	.206	.268	.332	.395	.464	.532	.657	.792
	WALL THICKNESS REF.		.021	.021	.027	.027	.036	.042	.048	.048	.062	.072	.078
O.D. REF. ONLY			.163	.189	.230	.256	.336	.411	.486	.552	.646	.791	.935

AVAILABLE LENGTHS

NOMINAL SIZE			#4	#6	#8	#10	.250 1/4	.312 5/16	.375 3/8	.437 7/16	.500 1/2	.625 5/8	.750 3/4
LENGTH	.187	3/16											
	.250	1/4	*	*	*	*	*						
	.312	5/16	*	*	*	*	*	*					
	.375	3/8	*	*	*	*	*	*	*				
	.437	7/16	*	*	*	*	*	*	*	*			
	.500	1/2	*	*	*	*	*	*	*	*	*		
	.562	9/16											
	.625	5/8	*	*	*	*	*	*	*	*	*	*	
	.687	11/16											
	.750	3/4	*	*	*	*	*	*	*	*	*	*	
	.812	13/16											
	.875	7/8	*	*	*	*	*	*	*	*	*	*	
	.937	15/16											
	1.000	1	*	*	*	*	*	*	*	*	*	*	
	1.125	1-1/8	*	*	*	*	*	*	*	*	*	*	
	1.250	1-1/4	*	*	*	*	*	*	*	*	*	*	
	1.375	1-3/8											
	1.500	1-1/2	*	*	*	*	*	*	*	*	*	*	
	1.625	1-5/8											
	1.750	1-3/4				*	*	*	*	*	*	*	
1.875	1-7/8												
2.000	2												
2.250	2-1/4												
2.500	2-1/2												
2.750	2-3/4												
3.000	3												
3.250	3-1/4												
3.500	3-1/2												
3.750	3-3/4												
4.000	4												

- * Generally stocked size
- All dimensions apply prior to the application of any supplemental finish
- Shorter, longer and intermediate lengths are available upon request
- Custom diameters will be evaluated upon request

Contact **SPIROL** for columnar strength and bearing surface requirements for your specific application.

LENGTH TOLERANCES

NOMINAL SIZE	NOMINAL LENGTH	LENGTH TOLERANCE
#4 - .250	L ≤ 1.500	±.005
	1.500 < L ≤ 4.000	±.010
.312 - .437	L ≤ 2.000	±.010
	2.000 < L ≤ 4.000	±.015
.500 - .875	L ≤ 4.000	±.015

RAIN GUTTER SPACER

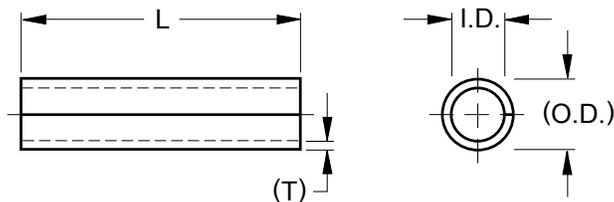
Spacers reinforce rain gutters when being installed on structure.



To Order: SPCR Size x Length Material Finish Series
Example: SPCR .250 x 1.125 FK SP100

INSPECTION METHODS

I.D. - Go and No Go Plug Gauges
Length - Calipers



DIMENSIONAL DATA

NOMINAL SIZE		#4	#6	#8	#10	.250 1/4	.312 5/16	.375 3/8	.437 7/16	.500 1/2	.625 5/8	.750 3/4	
SP150 HEAVY WALL	I.D.	MIN.	.116	.142	.168	.194	.254	.318	.381	.445	.508	.632	.758
		MAX.	.124	.152	.180	.206	.268	.338	.401	.475	.538	.672	.798
	WALL THICKNESS REF.	.027	.036	.042	.048	.058	.067	.078	.087	.094	.102	.110	
O.D. REF. ONLY		.174	.219	.258	.296	.377	.462	.547	.638	.711	.856	.998	

AVAILABLE LENGTHS

NOMINAL SIZE		#4	#6	#8	#10	.250 1/4	.312 5/16	.375 3/8	.437 7/16	.500 1/2	.625 5/8	.750 3/4
LENGTH	.187 3/16											
	.250 1/4											
	.312 5/16				*	*	*					
	.375 3/8				*	*	*	*				
	.437 7/16				*	*	*	*				
	.500 1/2				*	*	*	*		*		
	.562 9/16											
	.625 5/8				*	*	*	*		*	*	
	.687 11/16											
	.750 3/4				*	*	*	*		*	*	
	.812 13/16											
	.875 7/8				*	*	*	*		*	*	
	.937 15/16											
	1.000 1				*	*	*	*		*	*	
	1.125 1-1/8				*	*	*	*		*	*	
	1.250 1-1/4				*	*	*	*		*	*	
	1.375 1-3/8											
	1.500 1-1/2				*	*	*	*		*	*	
	1.625 1-5/8											
	1.750 1-3/4											
1.875 1-7/8												
2.000 2												
2.250 2-1/4												
2.500 2-1/2												
2.750 2-3/4												
3.000 3												
3.250 3-1/4												
3.500 3-1/2												
3.750 3-3/4												
4.000 4												

- * Generally stocked size
- All dimensions apply prior to the application of any supplemental finish
- Shorter, longer and intermediate lengths are available upon request
- Custom diameters will be evaluated upon request

LENGTH TOLERANCES

NOMINAL SIZE	NOMINAL LENGTH	LENGTH TOLERANCE
#4 - .250	L ≤ 1.500	±.008
	1.500 < L ≤ 4.000	±.012
.312 - .437	L ≤ 2.000	±.015
	2.000 < L ≤ 4.000	±.020
.500 - .875	L ≤ 4.000	±.020

SCISSOR JACK

Eight Spacers (welded into place) are used as distance bushings and reinforcements in the pivot joints.

To Order: SPCR Size x Length Material Finish Series
Example: SPCR .312 x 1.250 FK SP150



STANDARD MATERIAL

Low Carbon Steel (F)

Low carbon steel is the most economical material to manufacture roll formed Spacers from in the absence of any plating or coating. Additional coatings and finishes can be applied to low carbon steel to improve corrosion resistance.

STANDARD FINISH

Plain, Oiled (K)

This finish is a thin coating of oil that provides corrosion resistance during storage and shipping.

MATERIAL		FINISH
TYPE	GRADE	
F - Low Carbon Steel	UNS G10060 / UNS G10080 / UNS G10100	K - Plain/Oiled
	DC04 (1.0338) / DC03 (1.0347) / DC01 (1.0330)	

SPECIAL MATERIALS

Austenitic (Nickel) Stainless Steel (D)

Austenitic stainless steel provides excellent corrosion protection against normal environmental conditions. It withstands fresh water and atmospheric marine conditions very well, and is suitable for many other industrial conditions including acidic environments.

Aluminum (A)

Aluminum is lightweight, lead free, and has sufficient columnar strength for many non-critical applications. Aluminum is 1/3 the weight of steel, and does not require any supplemental coatings or platings to provide the necessary corrosion protection in most environments.

SPECIAL FINISHES

Electroplated Zinc (T)

This finish consists of a minimum of 5µm (.0002") thick electrodeposited zinc with a clear trivalent passivation topcoat. Zinc plate is primarily used for cosmetic purposes as this finish yields a bright, silvery appearance on the outside surfaces of the Spacer. Zinc plating is also commonly used to prevent galvanic corrosion. The major drawback to electroplated zinc on Spacers is that coverage on the inner diameter is limited to one diameter's length of "throw" of the plating. If atmospheric corrosion protection is required throughout the entirety of the part, ArmorGalv® should be considered instead of zinc plate.

ArmorGalv® (H)

ArmorGalv® is a zinc alloy thermal diffusion coating covered by ASTM A1059M-08(2013). SPIROL recommends ArmorGalv® for Spacers for many reasons; chief among them being uniform deposition of coating on all surfaces of the part. There are no insignificant surfaces and the entire inner diameter receives full coating and protection. ArmorGalv® offers a minimum of 1,000 hours corrosion resistance to red rust, and due to its slightly porous surface, it will retain paint and other coatings in the event that the complete assembly requires subsequent painting, power coating, etc. Compared to some stainless steels, ArmorGalv® is an ideal coating for some of the most aggressive environments such as marine, automotive, mining and industrial manufacturing.



Zinc Plated



ArmorGalv® Coated



Special Spacers and Rolled Tubular Components

SPECIALS – CUSTOMIZED TO MEET YOUR SPECIFIC REQUIREMENTS

SPIROL specializes in replacing costly machined and cold-formed components with less expensive roll-formed product. SPIROL's proprietary manufacturing technology enables the cost-effective production of special tubular products that meet the performance requirements of the comparatively more expensive alternatives.

SPECIAL LENGTHS

Any length from 2.5mm to 150mm (.094" to 6") subject to some limitations relative to diameter and wall thickness.

SPECIAL INSIDE DIAMETERS

Any diameter between \varnothing 2mm to \varnothing 26mm (\varnothing .078" to \varnothing 1"). Reduced tolerances are also available.

SPECIFIED OUTSIDE DIAMETERS

The outside diameter can be specified with minimum and maximum tolerances, but it is then suggested to specify the inside diameter with only a reference dimension or only a minimum dimension rather than a minimum/maximum tolerance to reduce cost.

BOTH DIAMETERS SPECIFIED

In situations that require both the inside and outside diameters to be specified with toleranced dimensions, a decision needs to be made as to which dimension should have the tighter tolerance so that the raw material tolerance can be properly allocated.

GAP

Spacers are usually butted with minimal or no gap. The gap can be specified from "no gap" to a toleranced or maximum specified gap.

SPECIAL WALL THICKNESS

The ideal thickness is 15% of the mean inside diameter up to a maximum of 3.5mm (.140"). A range of 10% to 25% of the mean inside diameter is possible depending on material type and tolerance requirements.

SPECIAL LENGTH TOLERANCES

Standard Spacers have a generous length tolerance to keep the cost down. Reduced tolerances can be provided to 0.05mm (.004"), and in some instances even these tolerances can be further reduced. Since tight tolerances increase costs, tolerances should be tailored to the needs of the application to eliminate unnecessary expense.

INCREASED COLUMNAR STRENGTH

Can be achieved through increased wall thickness, higher strength material, or by using materials that can be heat treated. Given that columnar strength is application dependent, SPIROL's Applications Engineering team should be consulted whenever the Spacer will be used in a critical load bearing path.





SPECIAL MATERIALS

Virtually any material available in cold rolled strip form can be used. Some of the more frequently specified materials are aluminum, stainless steel, brass, galvanized steel and high carbon steel.

SPECIAL FINISHES

Finishes are only limited by market availability. Finishes are specified for corrosion protection, color coding, and appearance. Aluminum, stainless steel, galvanized steel, or brass should be considered in place of finishes, since these can result in a better product at a lower cost.



HEADED SPACERS/TUBULAR RIVETS

This economical method of manufacturing, combined with the Headed Spacer's/Tubular Rivet's hollow construction, reduces costs and permits lower prices. They have straighter shanks than conventional Rivets for faster, easier assembly. **SPIROL** Engineering can provide recommended heading tool dimensions for clinching the non-headed side of the part.



SHOULDER RIVETS

Shoulder Rivets are produced to meet specific customer requirements. The clinch allowance can be varied according to the thickness of the panel to which the Shoulder Rivet is to be attached. The inside diameter can be designed to allow for the passage of rivets, screws, or shafts. The wall thickness can be varied to achieve the desired inside/outside diameter relationship. These are often used to replace expensive long Semi-Tubular Rivets.

APPLICATION-SPECIFIC SPECIALS

Lightweight and durable **Conveyor Spacers** are used to separate the skate wheel rollers from each other and the conveyor walls. Corrosion-resistant **Garage Door Spacers** for hinges cost less than cut-off tubing and plated parts.

OTHER SPECIALS

- Stamped with identification numbers or letters, indentations and protrusions
- Holes and perforations
- Chevron or dovetail seams
- Outside diameter diamond knurls
- Serrated ends
- Inside diameter lead-ins or outside diameter chamfers
- Oval and C-shaped configurations





Spacer and Tubular Components Applications

GARAGE DOOR HINGE

Corrosion-resistant, galvanized steel Spacers cost less than cut-off tubing and plated parts.



LEAF SPRING

Hardened Spacers are force fit into the inside diameters of rubber absorption grommets. They absorb bolt compression force and isolate bolt pressure from the rubber grommet.



EXPANSION BOLT

A Spacer is used to vary the distance between the expansion sleeve and the bolt head.



CASTOR WHEEL SOCKET (CASTOR NIB)

The rolled Spacer is welded to the leg. Socket stem with locking ring is press fit into the inside diameter of the Spacer.



UTILITY CART WHEEL ASSEMBLY

Headed Spacer is clinched into place to replace a bolt or rivet.



WHEEL CHAIR

Spacers that replace cut-off tubing are used to separate the handrail from the rear wheel.



CONVEYOR SYSTEMS

Conveyor Spacers separate the skate wheel rollers from each other and the conveyor walls.





**Innovative fastening solutions.
Lower assembly costs.**



Technical Centers

Americas

SPIROL International Corporation
30 Rock Avenue
Danielson, Connecticut 06239 U.S.A.
Tel. +1 860 774 8571
Fax. +1 860 774 2048

SPIROL Shim Division
321 Remington Road
Stow, Ohio 44224 U.S.A.
Tel. +1 330 920 3655
Fax. +1 330 920 3659

SPIROL Canada
3103 St. Etienne Boulevard
Windsor, Ontario N8W 5B1 Canada
Tel. +1 519 974 3334
Fax. +1 519 974 6550

SPIROL Mexico
Avenida Avante #250
Parque Industrial Avante Apodaca
Apodaca, N.L. 66607 Mexico
Tel. +52 81 8385 4390
Fax. +52 81 8385 4391

SPIROL Brazil
Rua Mafalda Barnabé Soliane, 134
Comercial Vitória Martini, Distrito Industrial
CEP 13347-610, Indaiatuba, SP, Brazil
Tel. +55 19 3936 2701
Fax. +55 19 3936 7121

Europe

SPIROL France
Cité de l'Automobile ZAC Croix Blandin
18 Rue Léna Bernstein
51100 Reims, France
Tel. +33 3 26 36 31 42
Fax. +33 3 26 09 19 76

SPIROL United Kingdom
17 Princewood Road
Corby, Northants
NN17 4ET United Kingdom
Tel. +44 1536 444800
Fax. +44 1536 203415

SPIROL Germany
Ottostr. 4
80333 Munich, Germany
Tel. +49 89 4 111 905 71
Fax. +49 89 4 111 905 72

SPIROL Spain
08940 Cornellà de Llobregat
Barcelona, Spain
Tel. +34 93 193 05 32
Fax. +34 93 193 25 43

SPIROL Czech Republic
Sokola Tůmy 743/16
Ostrava-Mariánské Hory 70900
Czech Republic
Tel/Fax. +420 417 537 979

SPIROL Poland
ul. Solec 38 lok. 10
00-394, Warszawa, Poland
Tel. +48 71 399 44 55

Asia Pacific

SPIROL Asia Headquarters
1st Floor, Building 22, Plot D9, District D
No. 122 HeDan Road
Wai Gao Qiao Free Trade Zone
Shanghai, China 200131
Tel. +86 21 5046 1451
Fax. +86 21 5046 1540

SPIROL Korea
160-5 Seokchon-Dong
Songpa-gu, Seoul, 138-844, Korea
Tel. +86 (0) 21 5046-1451
Fax. +86 (0) 21 5046-1540

e-mail: info@spirol.com

SPIROL.com

Please refer to www.SPIROL.com for current specifications and standard product offerings.

SPIROL Application Engineers will review your application needs and work with you to recommend the optimum solution. One way to start the process is to visit our **Optimal Application Engineering** portal at **SPIROL.com**.