

**Kerk<sup>®</sup> SS and SZ Series  
 Spline Shafts**



The Kerk<sup>®</sup> Spline Shaft (SS/SZ) series spline shaft system has been designed for light to moderate load applications, where low cost, low friction, and long life are primary design considerations.

Kerk Spline Shafts provide anti-rotation for one axis motion or a drive mechanism with rotation for two axes of motion. They are excellent alternatives for applications where hex shafts, square shafts and high-cost ball splines are typically used.

The assembly consists of a stainless steel spline shaft treated with Haydon Kerk Motion Solutions, Inc. proprietary low friction Kerkote<sup>®</sup> TFE coating, mated with a Kerkite<sup>®</sup> composite polymer bushing. The bushing is supplied with an integral brass collar to facilitate various mounting configurations without nut distortion.

Standard shaft straightness is .003-in (.08mm/30cm) per foot. Typical radial and torsional clearance between shaft and bushing for a basic assembly (SSA) is .002-in to .003-in (.05-.08mm). An anti-backlash assembly (SZA) is available for applications requiring minimum torsional play.

As with other Kerk<sup>®</sup> assemblies, special bushing configurations and end machining configurations are available upon request. Aluminum or carbon steel spline shafts are also available upon request.

**Kerk<sup>®</sup> GR Series Linear Rails  
 and Bushings**



The GR Series linear rail system has been designed for light load applications where low cost, minimum frictional drag and long wear life are primary design considerations.

The assembly consists of a centerless ground and bur-nished stainless steel shaft mated with a Kerkite<sup>®</sup> composite polymer bushing. The material combinations have been selected so that thermal fluctuations have minimal effect on system performance. Additional lubricity and extended life can be obtained by using a low friction Kerkote<sup>®</sup> TFE coating on support shafts available in both stainless and alloy steel.

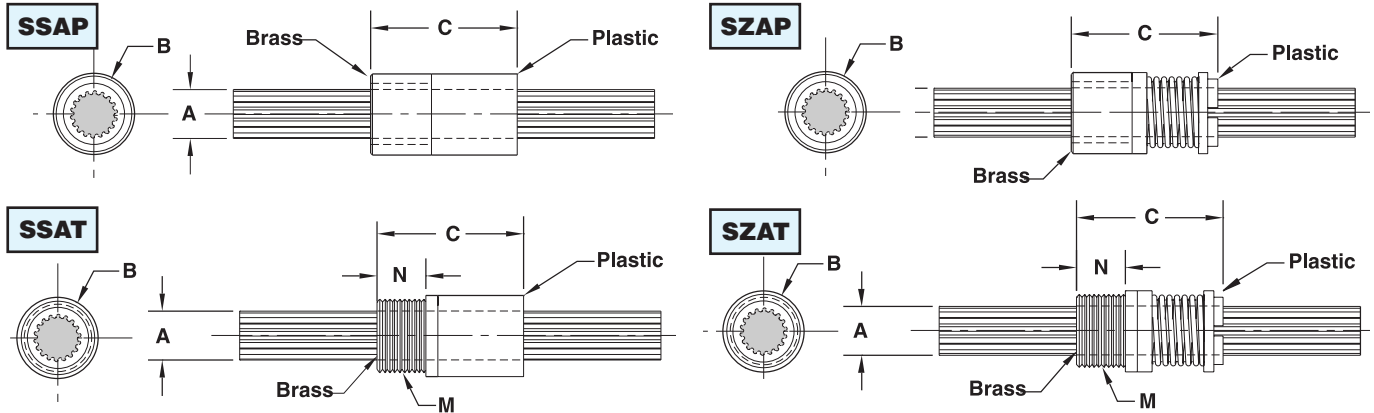
Standard shaft straightness is .002-in (0.05mm) per foot and typical radial clearance between shaft and bushing is .0005-in (.013mm) on non-coated assemblies and .001-in (.025mm) on Kerkote TFE coated assemblies.

Bushings are manufactured with standard retaining ring grooves.

**Identifying the Kerk<sup>®</sup> Spline Shafts and Guide Rails part number codes**

<b>SZ</b>	<b>A</b>	<b>P</b>	<b>04</b>	<b>1</b>	<b>K</b>	<b>08</b>	<b>XXX</b>
<b>Prefix</b>	<b>Nut Style</b>	<b>Mounting</b>	<b>Rail Diameter</b>	<b>Number of Bushings per Rail</b>	<b>Coating</b>	<b>Length in Inches (Rounded up)</b>	<b>Unique Identifier</b>
<b>SS</b> = Spline Shaft <b>SZ</b> = Anti-Backlash Spline Shaft <b>GR</b> = Guide Rail	<b>A</b> = Assembly only <b>B</b> = Bushing only <b>S</b> = Shaft only	<b>T</b> = Threaded (for <i>Spline Shafts</i> only) <b>G</b> = Snap ring groove (for <i>Guide Rails</i> only) <b>P</b> = Plain (no features) <b>S</b> = Shaft only <b>X</b> = Custom	<b>02</b> = 1/8-in <b>04</b> = 1/4-in <b>06</b> = 3/8-in <b>08</b> = 1/2-in <b>12</b> = 3/4-in	<b>0</b> <b>1</b> <b>2</b> <b>3</b> <b>4</b> <b>5</b> Use "0" for Shaft only and "1" if Bushing only	<b>S</b> = Uncoated <b>K</b> = Kerkote <sup>®</sup> <b>B</b> = Black Ice™ <b>N</b> = Bushing only	<b>Example:</b> <b>06</b> = 6-in <b>08</b> = 8-in <b>00</b> = Bushing only	Proprietary suffix assigned to a specific customer application. The identifier can apply to either a standard or custom part.
<b>NOTE:</b> Dashes must be included in Part Number (-) as shown above. For assistance or order entry, call our engineering team at 603 213 6290.							

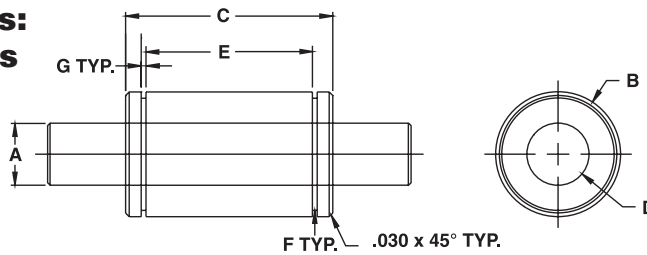
**Dimensional Drawings: SRA Standard ScrewRail® Linear Actuators**



	Rail Diameter Code	Shaft A in ± .002 (mm ± 0.05)	Root Diameter in ± .002 (mm ± 0.05)	Tube I.D. in ± .002 (mm ± 0.05)	Bushing Diameter B in ± .001 (mm ± 0.025)	Bushing Length C in ± .01 (mm ± 0.25)	Thread M	Thread Length N in ± .002 (mm ± 0.05)	Equivalent Diameter** inch (mm)
<b>SS/SZ</b>	<b>02</b>	0.125 (3.18)	0.095 (2.41)	NA	0.375 (9.53)	0.500 (12.70)	3/8-24	0.250 (6.35)	0.110 (2.79)
	<b>04</b>	0.250 (6.35)	0.202 (5.13)	NA	0.500 (12.70)	0.75 (19.1)	7/16-20	0.250 (6.35)	0.226 (5.74)
	<b>06</b>	0.375 (9.53)	0.306 (7.77)	NA	0.625 (15.88)	1.00 (25.4)	9/16-20	0.375 (9.53)	0.341 (8.65)
	<b>08</b>	0.500 (12.70)	0.419 (10.64)	NA	0.813 (20.65)	1.50 (38.1)	3/4-20	0.500 (12.70)	0.458 (11.63)
	<b>12</b>	0.750 (19.05)	0.630 (16.00)	NA	1.125 (28.58)	2.25 (57.2)	1-16	0.750 (19.05)	0.690 (17.53)

Maximum Twist: 3°/ft about Spline Shaft axis  
 Torsional Clearance (SSA): 3° Bushing to Shaft  
 Spline Shaft stiffness may be modeled as a round rod with diameters given.  
 0.125-in rail size only available in SSAP and SSAT styles.

**Dimensional Drawings:  
 GR Series Linear Rails  
 and Bushings**



	Rail Diameter Code	Standard Part Lengths	Rail Diameter A in ± .0006 (mm ± 0.015)	Rail Diameter w/TFE A in ± .0006 (mm ± 0.015)	Bushing Outside Diam. B in ± .0006 (mm ± 0.015)	Bushing Length C in ± .010 (mm ± 0.25)	Bushing Inside Diam. D in ± .0005 (mm ± 0.013)	Snap Ring Groove Location E in +.010 -.000 +.025 -.000	Snap Ring Groove Diam. F in ± .004 (mm ± 0.100)	Snap Ring Groove Width G in ± .0003 (mm ± 0.008)	Rail Chamfer H in (mm)	Radial Load lbs (Kg)
<b>GR</b>	<b>04</b>	6/8 10/12	.2475 (6.287)	.2472 (6.279)	.5000 (12.700)	.765 (19.43)	.2485 (6.311)	.535 (13.59)	.450 (11.43)	.040 (1.02)	.020 (.51)	5 (2.3)
	<b>06</b>	6/12 15/18	.3715 (9.436)	.3712 (9.428)	.7500 (19.050)	1.275 (32.39)	.3725 (9.462)	.995 (25.27)	.676 (17.17)	.046 (1.17)	.020 (.51)	10 (4.5)
	<b>08</b>	12/15 18/24	.4965 (12.611)	.4962 (12.603)	1.0000 (25.400)	1.660 (42.16)	.4975 (12.637)	1.330 (33.78)	.900 (22.86)	.046 (1.17)	.020 (.51)	15 (6.8)
	<b>12</b>	18/24 36	.7415 (18.834)	.7412 (18.826)	1.2500 (31.750)	2.036 (51.72)	.7425 (18.860)	1.620 (41.15)	1.125 (28.60)	.058 (1.47)	.030 (.76)	25 (11.4)

## **Kerkite<sup>®</sup> Composite Polymer Nuts**

In addition to the Kerk<sup>®</sup> self-lubricating acetal nut material, Haydon Kerk Motion Solutions offers a variety of custom compounded Kerkite composite polymers. Kerkite polymers are a family of high performance materials that offer exceptional wear properties with the cost and design advantages afforded through injection molding. Kerkite polymers offer a variety of mechanical, thermal and electrical properties and are compatible with many chemicals and environmental conditions.

Kerkite Composite Polymers are available options for most Kerk Lead-screw Nuts and are standard materials for Linear Rail and Spline Shaft bushings, RGS<sup>®</sup> Carriages and Screwrail<sup>®</sup> Bushings and End Supports. Each member of the Kerkite family is compounded with lubricants, reinforcements and thermoplastic polymers formulated to provide optimum performance in its target conditions and applications, resulting in superior performance and extended life.

A cornerstone of the Haydon Kerk Motion Solutions advantage is design flexibility. Kerkite Composite Polymers, along with our injection molding and mold making capabilities, offer huge design advantages and cost savings compared with non-moldable materials. Kerkite high performance polymers outperform other plastics and outlast metal bushings and bearings. When combined with Kerkote<sup>®</sup> or Black Ice<sup>®</sup> TFE coatings, Kerkite Composite Polymers have been shown to provide hundreds of millions of inches of travel in customer applications while continuing to maintain precise, accurate motion and positioning.

## **Special Materials**

In addition to the Kerk standard material – 303 stainless steel, self lubricating acetal and Kerkite high performance composite polymers – we also work with a vast array of custom materials. Kerk has rolled screws in many other materials, including 316 stainless, 400 series stainless, precipitate hardening materials, carbon steel, aluminum, and titanium. Kerk nuts had been produced in many alternative plastics including PEEK, polyester, Torlon<sup>®</sup>, Vespel<sup>®</sup>, PVDF, UHMW, Ertalyte<sup>®</sup> and customer-supplied specialty materials. We have also provided metal nuts made from bronze, brass, and stainless steel.

With so much flexibility in our manufacturing process, if the material can be molded, machined, ground, or rolled, Haydon Kerk Motion Solutions can likely process it using state of the art machine tools, injection molding and mold making, grinding and thread rolling equipment. Haydon Kerk Motion Solutions excels at supplying the best overall solution to meet our customers' requirements. Contact Haydon Kerk Motion Solutions to find out how you can benefit from these choices.

## **Kerkote<sup>®</sup> TFE Coating**

Kerkote TFE coating covering the entire screw surface results in an extremely even lubrication distribution. Test results indicate system torque requirements are consistently low with little or no change in required frictional driving torque, even with changes in motor R.P.M. Haydon Kerk Motion Solutions has developed a custom composition Kerkote TFE specifically for our lead screw and nut materials. It is applied using an automated process and provides extended nut life and smooth operation with little additional cost.

Kerkote TFE is a soft coating, a long-term dry lubricant that is optimized for softer plastics like acetals and nylons, with or without mechanical reinforcement. Lubrication to the nut/screw interface occurs by the nut picking up Kerkote TFE particles from the coating as well as from the migration of the internal lubricant within the plastic nut. Although care is taken to ensure that chips and voids do not occur in the coating, small voids have been shown to have no effect on system performance. The transfer of TFE to the nut continues throughout the operating life of the assembly as long as the nut periodically travels over areas with Kerkote TFE coating. The lubricant, although solid, also has some "spreading" ability as in fluid lubricants. Kerkote TFE coated screws provide the maximum level of self-lubrication and should not be additionally lubricated or used in environments where oils or other lubricant contamination is possible.

## **Black Ice<sup>®</sup> TFE Coating**

Black Ice TFE coating shares many of the benefits of Kerkote TFE but, in contrast, is a hard coating that offers exceptional durability in all types of environments, with virtually any type of polymer nut. Black Ice TFE coating remains on the screw, offering a low friction surface upon which the nut travels. Rather than acting as a dry lubricant, Black Ice TFE is an anti-friction coating whose surface properties displace the metal to which it is applied. Though it is not intended for use with metal or glass fiber reinforced nuts, Black Ice TFE is bonded securely to the screw's surface and can withstand abrasion from contamination, rigid polymer systems, fluid impingement and wash down applications. Black Ice TFE can be used in the presence of more aggressive environment conditions, or anywhere reduced friction and a permanent coating is desired.

Both Kerkote and Black Ice TFE coatings offer the advantages of dry lubrication. These are maintenance-free coatings that are designed to last the life of the product. They are intended to be used without additional lubricants, thereby further increasing the value of Kerk lead-screw assemblies through elimination of the most common failure of screw driven drives, lubrication failure.

There are certain applications where external lubrication may be desired. These include the use of nut materials such as glass reinforced plastic or metal. Greases, when used properly can provide unique capabilities and Haydon Kerk Motion Solutions does offer a selection of greases developed specifically for these applications. Please contact a sales engineer for assistance selecting the best lubricant for your requirements.