

### 3. Classification of Ball Splines

There are three types of the Ball Spline: high-torque type, medium-torque type and rotary type. You can choose a type according to the intended use. In addition, wide arrays of spline nut shapes are available for each type, enabling the user to choose a desired shape according to the mounting or service requirements.

Classification	Type	Shape	Shaft diameter	Description page*	Structure and features	Major application
High-torque type	Type LBS Type LBST		Nominal shaft diameter: 6 to 150 mm	<b>b-30</b>	<ul style="list-style-type: none"> <li>● The spline shaft has three crests equidistantly formed at angles of 120°. On both sides of each crest, two rows (six rows in total) of balls are arranged to hold the crest from both sides. The angular-contact design of the ball contact areas allows an appropriate preload to be evenly applied.</li> <li>● Since the balls circulate inside the spline nut, the outer dimensions of the spline nut are compactly designed.</li> <li>● Even under a large preload, smooth linear motion is achieved.</li> <li>● Since the contact angle is large (45°) and the displacement is minimal, high rigidity is achieved.</li> <li>● No angular backlash occurs.</li> <li>● Capable of transmitting a large torque.</li> </ul>	<ul style="list-style-type: none"> <li>● Column and arm of industrial robot</li> <li>● Automatic loader</li> <li>● Transfer machine</li> <li>● Automatic conveyance system</li> <li>● Tire molding machine</li> <li>● Spindle of spot-welding machine</li> <li>● Guide shaft of high-speed automatic coating machine</li> <li>● Riveting machine</li> <li>● Wire winder</li> <li>● Work head of electric discharge machine</li> <li>● Spindle drive shaft of grinding machine</li> <li>● Speed gears</li> <li>● Precision indexing machine</li> </ul>
	Type LBF		Nominal shaft diameter: 15 to 100 mm	<b>b-36</b>		
	Type LBR		Nominal shaft diameter: 15 to 100 mm	<b>b-38</b>		
	Type LBH		Nominal shaft diameter: 15 to 50 mm	<b>b-40</b>		
Medium-torque type	Type LT		Nominal shaft diameter: 4 to 100 mm	<b>b-52</b>	<ul style="list-style-type: none"> <li>● The spline shaft has two to three crests. On both sides of each crest, two rows (four to six rows in total) of balls are arranged to hold the crest from both sides. This design allows an appropriate preload to be evenly applied.</li> <li>● The contact angle of 20° and an appropriate preload level eliminate angular backlash, providing high-torque moment rigidity.</li> </ul>	<ul style="list-style-type: none"> <li>● Die-set shaft and similar applications requiring linear motion under a heavy load</li> <li>● Loading system and similar applications requiring rotation to a given angle at a fixed position</li> <li>● Automatic gas-welding machine spindle and similar applications requiring a whirl-stop on one shaft</li> <li>● Column and arm of industrial robot</li> <li>● Spot-welding machine</li> <li>● Riveting machine</li> <li>● Book-binding machine</li> <li>● Automatic filler</li> <li>● XY recorders</li> <li>● Automatic spinner</li> <li>● Optical measuring instrument</li> </ul>
	Type LF		Nominal shaft diameter: 6 to 50 mm	<b>b-54</b>		
Rotary type	Type LBG Type LBGT		Nominal shaft diameter: 20 to 85 mm	<b>b-62</b>	<ul style="list-style-type: none"> <li>● A unit type that has the same contract structure as model LBS. The flange circumference on the spline nut is machined to have gear teeth, and radial and thrust needle bearings are compactly combined on the circumference of the spline nut.</li> </ul>	<ul style="list-style-type: none"> <li>● Speed gears for high-torque transmission</li> </ul>
	Type LTR-A Type LTR		Nominal shaft diameter: 8 to 60 mm	<b>b-72</b>	<ul style="list-style-type: none"> <li>● A lightweight, compact type based on model LT, but has a spline nut circumference machined to have angular-contact type ball raceways to accommodate support bearings.</li> </ul>	<ul style="list-style-type: none"> <li>● Z axis of scalar robot</li> <li>● Wire winder</li> </ul>

\* These symbols indicate the corresponding reference page numbers of the "THK General Catalog - Product Specifications," provided separately.