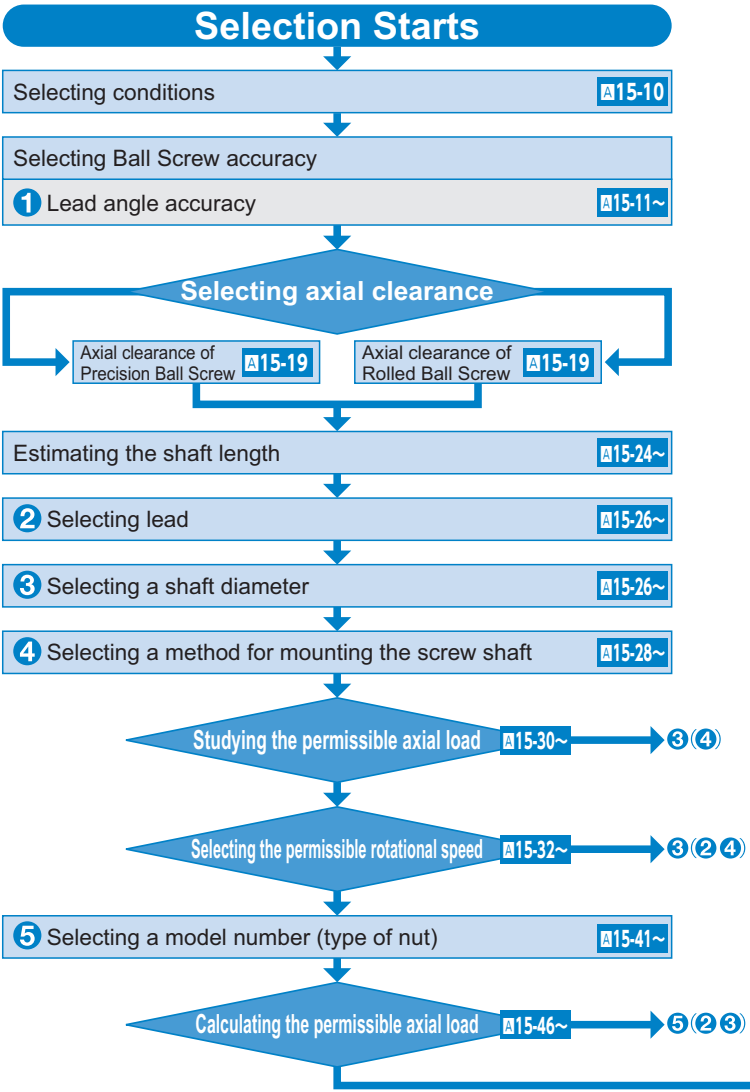
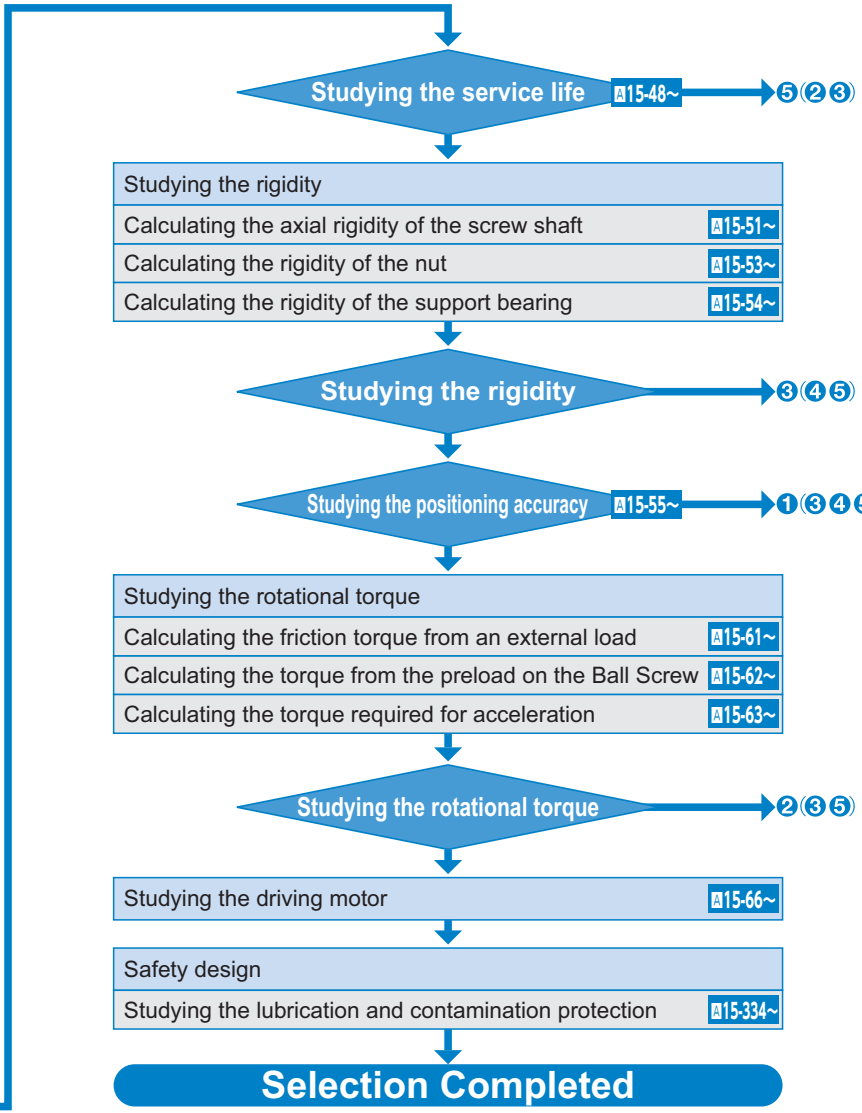
Flowchart for Selecting a Ball Screw

[Ball Screw Selection Procedure]

When selecting a Ball Screw, it is necessary to make a selection while considering various parameters. The following is a flowchart for selecting a Ball Screw.




Studying the service life
A15-48~
⑤②③
Studying the rigidity
Calculating the axial rigidity of the screw shaft
A15-51~
Calculating the rigidity of the nut
A15-53~
Calculating the rigidity of the support bearing
A15-54~
Studying the rigidity
③④⑤
Studying the positioning accuracy
A15-55~
①③④⑤
Studying the rotational torque
Calculating the friction torque from an external load
A15-61~
Calculating the torque from the preload on the Ball Screw
A15-62~
Calculating the torque required for acceleration
A15-63~
Studying the rotational torque
②③⑤
Studying the driving motor
A15-66~
Safety design
Studying the lubrication and contamination protection
A15-334~
Selection Completed

[Conditions of the Ball Screw]

The following conditions are required when selecting a Ball Screw.

Transfer orientation (horizontal, vertical, etc.)
Transferred mass m (kg)
Table guide method (sliding, rolling)
Frictional coefficient of the guide surface μ (—)
Guide surface resistance f (N)
External load in the axial direction F (N)
Desired service life time L_h (h)

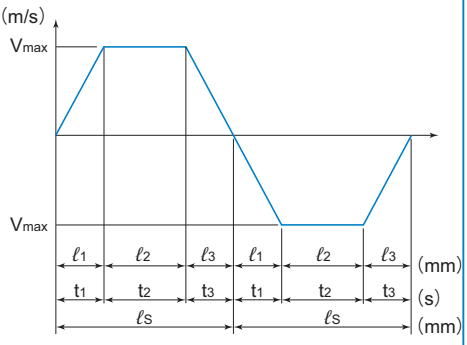
Stroke length ℓ_S (mm)
Operating speed V_{max} (m/s)
Acceleration time t_1 (s)
Even speed time t_2 (s)
Deceleration time t_3 (s)

Acceleration $\alpha = \frac{V_{max}}{t_1}$ (m/s²)

Acceleration distance $\ell_1 = V_{max} \times t_1 \times 1000/2$ (mm)
Even speed distance $\ell_2 = V_{max} \times t_2 \times 1000$ (mm)
Deceleration distance $\ell_3 = V_{max} \times t_3 \times 1000/2$ (mm)
Number of reciprocations per minute n (min^{-1})

Positioning accuracy (mm)
Positioning accuracy repeatability (mm)
Backlash (mm)
Minimum feed amount s (mm/pulse)

Driving motor (AC servomotor, stepping motor, etc.)
The rated rotation speed of the motor N_{MO} (min^{-1})
Inertial moment of the motor J_M ($kg \cdot m^2$)
Motor resolution (pulse/rev)
Reduction ratio A (—)



Velocity diagram