

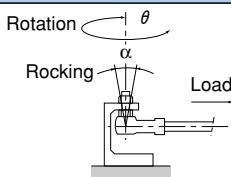
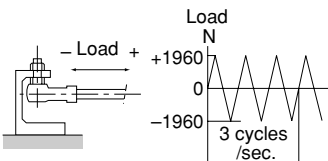
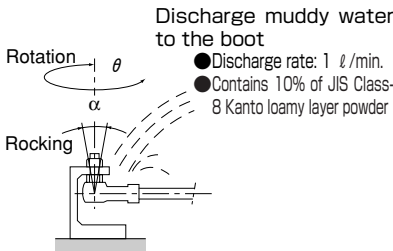
2.2. Durability Tests with Link Ball® Model AL

Purpose of the Tests

The tests were conducted to identify the durability of **THK** Link Ball model AL while assuming that it is used for automobile suspensions.

Tested Product: **THK** Link Ball model AL10D

Test Items, Test Conditions and Test Results

Test item	Test conditions						Test result	Evaluation	
	Applied load	Rotation or rocking angle	Frequency	Total number of revolutions or time	Atmosphere	Load conditions, etc.			
Rotation-and-rocking durability	1960 N Load direction: Perpendicular to the axis (one direction)	Rotation angle: $\theta = \pm 5^\circ$ Rocking angle: $\theta = \pm 10^\circ$	Rotation: 25 times/min.	500,000 cycles (rocking)	Normal temperature		Sample No.	Change in clearance (mm)	● Despite harsh test conditions where complex link motion was required under an axial load, no anomaly was observed in the samples after the test, and the abrasion loss was minimal and consistent among the samples. This indicates that the Link Ball has superb wear resistance and stable quality.
							Perpendicular to the axis	Axial direction	
			①				0.038	0.02	
			②				0.04	0.03	
			③				0.042	0.04	
④	0.038	0.03							
Fatigue durability	± 1960 N Load direction: Perpendicular to the axis (both directions)	—	180 times/min.	1 million cycles (rocking)	Normal temperature		● Appearance No anomaly was observed including fracture of the samples. ● Motion The ball shank was capable of smoothly rocking after the test, without any anomaly such as heavy and jerky motion.		● No anomaly in appearance or function was observed in the sample after the fatigue durability test involving 1 million cycles of rocking. This indicates that the product is sufficiently capable of continuously operating and has superb wear resistance.
Muddy-water rotation-and-rocking durability (identify sealability of the boot)	—	Rotation angle: $\theta = \pm 12^\circ$ Rocking angle: $\theta = \pm 12^\circ$	Rotation: 25 times/min. Rocking: 75 times/min.	500,000 cycles (rocking)	Normal temperature	 <p>Discharge muddy water to the boot</p> <ul style="list-style-type: none">● Discharge rate: 1 ℓ/min.● Contains 10% of JIS Class-8 Kanto loamy layer powder	● Motion The ball shank was capable of smoothly rocking after the test, without any anomaly such as heavy and jerky motion. ● Muddy water penetration No muddy water penetration was observed in visual inspection with the boot removed. ● Boot status No breakage of the boot or abnormal wear of the lip was observed.		● No anomaly in motion was observed in the sample, and no muddy water penetration into the boot or no grease deterioration was found after the test. This verifies that the boot has reliable sealability.
Boot weatherability	—	—	—	96 hours	-30°C	Left standing	● Boot status The boot showed no harmful ozone crack and maintained its pre-test status, including softness, after the test.		● No anomaly was observed in the sample after the test. The fact that no muddy water penetration into the boot or no grease deterioration was found in the sample after the above durability test verifies that the boot has reliable weatherability.
				96 hours	70°C	Left standing			
		Rotation angle: $\theta = \pm 10^\circ$	60 times/min.	144 hours	40°C	● Ozone concentration: 80pphm			
Salt-water spray resistance	—	—	—	200 hours	35°C	● Salt-water concentration: 5% ● Spray solution temperature: 33 to 37°C ● Spray pressure: 0.098MPa ● Following spray test, apply compressive load to measure strength	● Appearance No erosion was observed in the holder, and no other anomaly including breakage was found either. ● Appearance The ball shank was capable of smoothly rocking after the test.	● No erosion-based deterioration of the sample was observed in function and performance. This demonstrates that the A-1 alloy has superb corrosion resistance.	

Comprehensive Evaluation

The results of the durability tests indicate that **THK** Link Ball model AL has sufficient strength, wear resistance, corrosion resistance and boot sealability.

This is attributable to the superb characteristics of the newly developed alloy A-1 and the effect of **THK**'s unique manufacturing process. Thus, **THK** Link Ball model AL provides a high level of performance as a lightweight component.