

# Commercial Off-The-Shelf Slip Rings

*For aerospace and defense, tested to military specifications*

## Description

In today's military market, there are many applications where rugged industrial products are utilized to provide the functionality and reliability needed to meet or exceed the requirements of the weapon system. For those applications, the term Commercial Off-The-Shelf (COTS) is an industry standard but, unfortunately, test data is often not available to provide the end-user with documented results. To support the widest application of markets, Moog subjected several of its industrial slip ring products to a military standard test plan to document the suitability of these products to meet the environmental requirements for many military applications.



The test plan outlines the specific tests that were conducted in accordance with per MIL-STD-810F and how these products performed under those conditions. For vibration, Moog performed several tests to ensure an understanding of the hardware's capabilities. To establish baseline criteria, Moog used functional requirements of a new product and provides the results in this data sheet. Based on these tests, Moog confirms that its industrial products will indeed meet or exceed many of the MIL-STD-810F requirements.



U.S. Department of Defense

## Test Features

- Per MIL-STD-810F or as noted in the test criteria and performance
- Performed on calibrated test equipment per ISO 10012-2 (meets MIL-STD-45662)
- Utilized maximum length hardware configuration to ensure worst case shock and vibration test scenario

## Functional Acceptance Test

- Circuit resistance
- Dielectric strength (500 VAC) – failure equals greater than 1 mA leakage
- Insulation resistance (100 milliohms minimum at 500 VDC)
- Electrical noise (33 milliohms with bandwidth from DC to 1 KHz at 250 RPM)
- Starting torque
- Running torque (at 250 RPM for 15 minutes minimum or duration of noise test looking for variation)

## Typical Applications

- Radar platforms
- Shipboard EO / IR systems
- Militarized robotics

## Benefits

- Utilizes standard designs
- Lower hardware costs
- Quicker delivery
- Documented results define hardware's environmental capabilities
- Lowers risk and helps assure reliability
- Eliminates ITAR requirements

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## Performance Data

Model	Temperature						Vibration				Shock	
	+80° C			-40° C								
	Torque		Noise	Torque		Noise	G (rms)					(20 G's)
	Max Start	Max Run		Max Start	Max Run			3	6	9	12	
AC6355-56	12 in-oz	10 in-oz	P	12 in-oz	12 in-oz	P	P	P	P	P	P	P
AC6419-24	102 in-oz	94 in-oz	P	320 in-oz	272 in-oz	P	P	P	P	P	P	P
AC6275-24	118 in-oz	102 in-oz	P	324 in-oz	308 in-oz	P	P	P	P	P	P	P
AC6098-24	144 in-oz	112 in-oz	P	336 in-oz	312 in-oz	P	P	P	P	P	P	P
AC6349-24	22 in-oz	18 in-oz	P	26 in-oz	20 in-oz	P	P	P	P	P	P	P

**P = Pass**  
**F = Fail**

Note: Sealed slip ring models are available for humid environments.

## Temperature Test

The temperatures test is:

- Baseline test of noise, starting and running torque
- Cycle 1: ambient to +80° C monitoring torque and group series noise using a 50 mA current at 250 RPM. Dwell time is 2 hours at extremes, transitioning 1° per minute to -40° C
- Cycle 2 is non-functional during temperature transitions, testing after 2-hour soak for torque and noise at temperature extremes
- Cycle 3 – 7 is non-functional
- Cycle 8 is tested as Cycle 1

## Random Vibration Test

The random vibration test is:

- 15 minute duration on each of three perpendicular axes
- Test accelerations: from 20 Hz, to 2,000 Hz at 3 G (rms), 6 G (rms), 12 G (rms)
- A sine resonance survey from 10 Hz to 2,000 Hz before and after each acceleration level
- Monitored for open circuits of 100 uS or greater at 1.8 VDC; 50 mA
- Performed functional tests except for dielectric strength

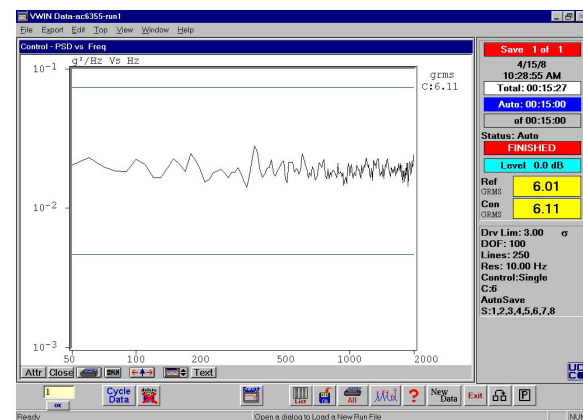
## Shock Test

The shock test is:

- Shock the unit on each of three perpendicular axes
- Shock levels: 20 gPk half sine for 11 ms, 3 positive and 3 negative in each axis
- Monitored for open circuits for 100 uS or greater at 1.8 VDC; 50 mA
- Performed functional tests as noted, except for dielectric strength



Temperature Chamber



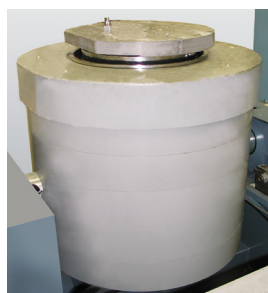
Vibration Plot

## Summary

MIL-STD-810F testing has demonstrated that Moog's industrial COTS products are suitable for many military applications. Contact an Applications Engineer to discuss ways to add low cost, effective solutions into your next application.



Vibration Test Fixture



Shock Test Fixture

Specifications and information are subject to change without prior notice.  
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