

Spira's Z_T Test Fixtures

Spira's Z_T Fixtures offer an inexpensive and reliable means of testing the shielding quality of EMI gaskets and gasketed joints where the testing is consistent with the SAE ARP-1705 Rev A standard. The fixtures are intended for use by: (1) gasket manufacturing companies for developing new products and to perform quality assurance testing on their products; (2) the users of gaskets for selecting gaskets and joint surfaces to comply with their system's radiated requirements; and (3) by the users' Quality Assurance departments to certify gasket products. The standard fixtures are delivered with gold plated joint surfaces (gold plated base plate and contact plate) for quality assurance testing of EMI gaskets. The base and contact plates are available in a variety of materials and finishes for engineering evaluation testing.

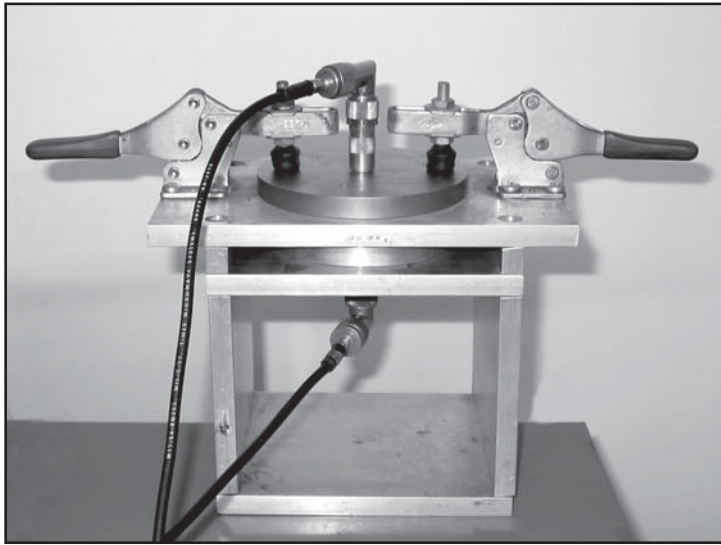
ZT-1000 Fixture This fixture is designed to test relatively small samples of a gasketed joint as illustrated. The maximum diameter of the sample is 3.5 inches (89 mm) with a maximum thickness of .25 inches (6.4 mm). The ZT-1000 fixture provides accurate shielding quality data up through 2 GHz with repeatable data to 4 GHz.

ZT-1705

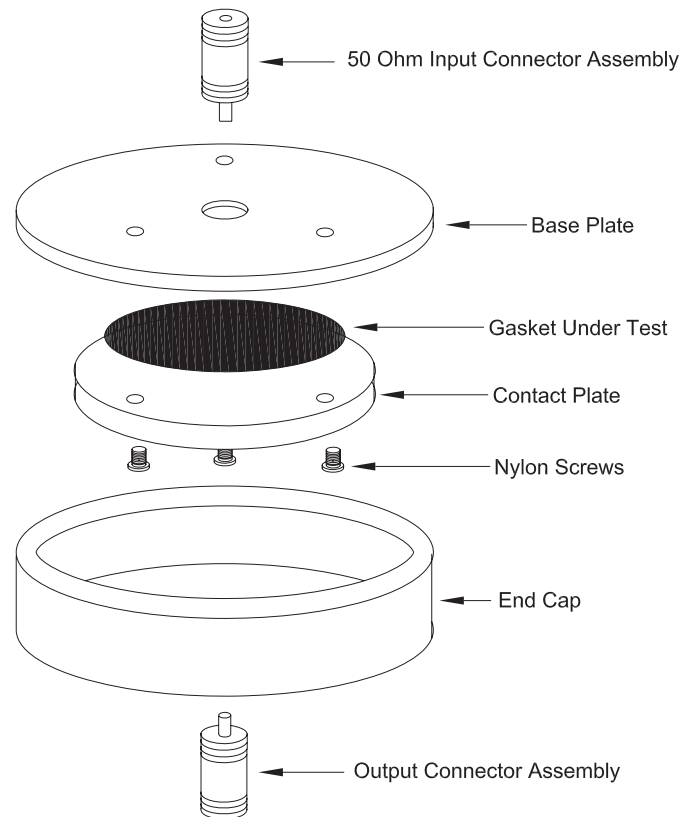
The ZT-1705 fixture is designed in compliance with the standard SAE ARP-1705 Rev A. The maximum recommended sample size for testing is 4.0 inches (101 mm) for a circular gasket, or 3.4 inches (86mm) for a square gasket. The maximum height is .5 inches (12.7 mm).

ZT-2000 Fixture

This fixture is a little larger, and is designed for circular samples up to 6.5 inches (165mm) in diameter, and square samples up to 4.5 inches (115mm) on a side, with a maximum thickness of .5 inches (12.7 mm) to better meet the needs of the commercial industry.



Typical Z_T Fixture



Theory of Operation

The basic Z_T fixtures are comprised of the components illustrated. The signal enters the fixture through the 50 ohm input connector assembly and into the gasket retaining chamber. The chamber consists of the base plate, contact plate and gasket under test. The characteristic impedance of the chamber is controlled to be 50 ohms to the greatest extent possible, which results in a controlled current across the gasket.

The voltage across the gasket is measured by a receiver pin connected to the output connector assembly. The current path through the fixture from the gasket to the output connector results in a complex impedance. As long as the complex impedance is small compared to the 50 ohm impedance of the receiver, the measured voltage is approximately the same as the voltage across the gasket. As the impedance approaches 50 ohms, a correction factor must be applied to obtain an actual voltage across the gasket.

Shielding Quality Test Results

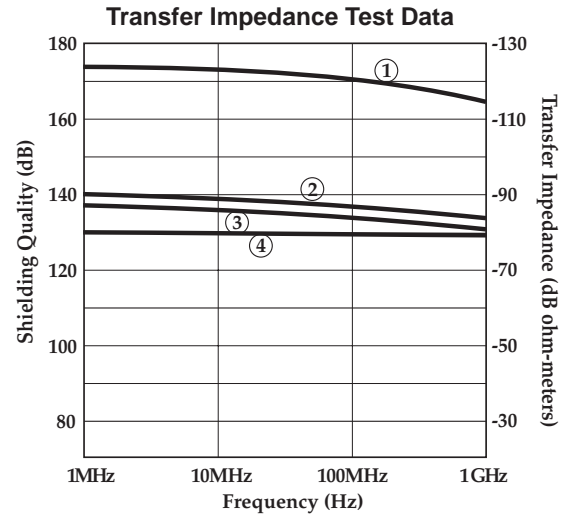
The shielding quality of a gasket is as defined in SAE ARP-1705 Rev A and is the ratio of the impedance of the incident wave divided by the Transfer Impedance of the gasketed joint as follows:

$$SQ = 20 \log Z_W / Z_T$$

where Z_W = Impedance of the wave
 Z_T = Impedance of gasketed joint

This ratio is a good approximation of the shielding effectiveness of a gasketed joint when using the constraints and conditions consistent with electromagnetic theory and MIL-STD-285. Assuming a wave impedance of 377 ohms greatly simplifies the calculations.

i.e., shielding quality of a gasket having $Z_T = 10^{-3} = 20 \log 377 / 10^{-3} = 111$ dB.



1. Tin Plated Spira-Shield Against **Tin** Plated Joint Surfaces
2. Tin Plated Spira-Shield Against **Zinc** Plated Joint Surfaces
3. Tin Plated Spira-Shield Against **Nickel** Plated Joint Surfaces
4. Tin Plated Spira-Shield Against **Aluminum** Joint Surfaces

This data is representative of the test data we have obtained. Your results will vary depending on the applicable variables.

The chart above illustrates the shielding quality of gasketed joints assuming a plane wave (i.e., 377 ohms) as the incident field. As is illustrated, the shielding quality is greatly affected by the joint surface material finish. Oxidation and other aging phenomena can cause equal degradation to the shielding quality of the joint. This information is essential when selecting EMI gaskets and joint surfaces for use on electrical/electronic equipment requiring electromagnetic compliance.

Required Z_T Test Equipment

Minimum System Requirements

- Z_T Fixture. Consists of the contents shown on the previous page, and a stand used to house the fixture.
- Signal generator and receiver.
- Semi-rigid cables and compatible connectors.

Recommended System Support

The following additional equipment is recommended to provide reliability and efficiency in obtaining shielding quality data.

- Spectrum analyzer (or network analyzer) with tracking generator. (Preamps and narrow bandwidth capability significantly improve the dynamic range of the test capability)
- Microwave switch network. (Provides a method of observing the output of the tracking generator without disconnecting the Z_T Fixture)
- Printer or Plotter
- Amplifier or Preamplifier

Ordering Information

The Basic System

- Z_T Fixture with gold plated 6061-T6 aluminum base and contact plates
- Holding frame with clamps
- EMI gasket test procedure
- Gasket sample kit

Part Number	Base Plate	Contact Plate	Sample Thickness	Maximum Frequency
ZT-1000	5" Diameter	4" Diameter	3/16"	1 GHz
ZT-1705	6" Diameter	5" Diameter	1/2"	1 GHz
ZT-2000	8" Diameter	7" Diameter	1/2"	1 GHz

Additional Components

These components are not required for your test system, but increase the flexibility and range of information you can achieve.

Description	Part Number
Microwave Switch Assembly with Power Supply	ZT-MSA
Type C Semi-Rigid Coaxial Cable	ZT-SRC6-X*
Type N to Type C Connectors	ZT-NTC

** The semi-rigid coaxial cables come in 6" (150mm) increments. The dash number (-X) indicates how many 6" increments you want. Example: -1 is 6" long; -3 is 18" long.*

Additional Joint Surfaces

Each fixture comes with gold plated 6061-T6 aluminum joint surfaces for quality assurance testing purposes.

Gasketed joint testing (testing using other joint metals and plating) is used to test the shielding quality of gaskets using the joint materials and surface preparation under consideration.

Base and contact plates made from other base material with surface preparation (other than gold) can be provided upon request.

Engineering Evaluation Testing

Spira has a complete transfer impedance test facility for performing engineering evaluation testing to your specifications and requirements. For further information, please contact us.