



QUALITY ASSURANCE SPECIFICATIONS™

SFI SPECIFICATION 18.1

EFFECTIVE: JUNE 17, 1999*

PRODUCT: Crankshaft Hub Harmonic Dampers

1.0 GENERAL INFORMATION

- 1.1 This SFI Specification establishes uniform test procedures and minimum standards for evaluating and determining performance capabilities for Crankshaft Hub Harmonic Dampers used by individuals engaged in competitive motorsports.
- 1.2 The procedures, test evaluations and standards contained herein, are intended only as minimum guidelines for construction and evaluation of products. Certification that products meet such minimum standards is made by the product manufacturer and products are not certified, endorsed or approved by SFI under this program.
- 1.3 Use of the "This Manufacturer Certifies That This Product Meets SFI Specification 18.1" logo/designation, the authorized artwork style, or conventional lettering by a manufacturer, on a subject product, is intended only to indicate that the manufacturer of the product has represented that they have submitted the product to the recommended tests, with positive results, in compliance with the standards established herein.
- 1.4 This SFI Specification requires a demonstration that the product of a manufacturer meets or exceeds the requirements when the manufacturer enters the program; and on a periodic basis thereafter. Any manufacturer may participate in the program by providing Crankshaft Hub Harmonic Dampers that meet or exceed the SFI Specification 18.1 test standards, by complying with the requirements of the SFI Specification 18.1 program, and by signing a licensing agreement with the SFI Foundation, Inc.

- 1.5 Compliance with this specification is entirely voluntary. However, when a manufacturer provides Crankshaft Hub Harmonic Dampers in compliance with all requirements of the SFI Specification 18.1 and enters into the licensing agreement with the SFI Foundation, Inc., they may certify that compliance with such standards is in accordance with the guidelines established herein.
- 1.6 Manufacturers wishing to participate in the program, in addition to the other requirements of this specification, must label each of their products with the manufacturer's name, trademark or symbol as well as the date of manufacture of the product.
- 1.7 No manufacturer may display the SFI logo/designation on their product unless the manufacturer has signed a licensing agreement with SFI and has successfully complied with all the requirements of this specification and the self-certification program.

2.0 DEFINITIONS

- 2.1 Crankshaft Hub Harmonic Dampers are circular assemblies that mount on the front of an internal combustion engine to absorb engine-induced vibrations. They replace stock units and are used in racing applications.
- 2.2 Any damper pertaining to this specification shall remain as constructed by the original manufacturer and not modified.

3.0 CONSTRUCTION

Shrouded inertia devices are acceptable if the material of encapsulation is acceptable and has minimum mechanical properties. A separate scatter shield is not considered acceptable encapsulation. The damper shall be constructed in such a manner that the inertia devices shall not become disengaged during use. This can be accomplished by one-piece construction or through the use of positive containment devices that prevent inertia devices from working forward or backward off the hub or from becoming disengaged during use. For inertia ring style dampers, the containment device must cover a minimum of 25 percent of the surface of the inertia ring between its measured outside diameter minus its inside diameter divided by two. For inertia disc style dampers, the containment device must cover a minimum of 50 percent of the cavity containing the disc or discs. The positive containment may be accomplished by welding, a snap ring, an additional plate or be an integral part of the ring or hub. The thickness of the containment material(s) must be a minimum of 0.062 inch steel or 0.180 inch aluminum. The pulley or crank trigger device cannot be considered part of the positive containment device.

3.1 NON-ACCEPTABLE MATERIALS

Metallurgical material tests relative to mechanical and physical properties of Crankshaft Hub Harmonic Dampers manufactured from cast (gray) iron; sand, die or permanent mold castings of aluminum or magnesium indicate marginal performance and are not acceptable.

3.2 ACCEPTABLE MATERIALS

Crankshaft Hub Harmonic Dampers manufactured from pearlitic, malleable, ductile iron; mild and cold finished steel; wrought aluminum; magnesium forgings; and titanium appear adequate for racing use provided that they exhibit acceptable mechanical properties. As new technology is developed, it will be considered for inclusion.

4.0 MODEL CLASSIFICATION

If all other factors remain the same, a variation of the outside diameter (with a corresponding variation in other dimensions) or a variation in size of the mounting cavity is not considered a model change.

5.0 TESTING

Test samples shall be fully processed new dampers which are representative of dampers currently produced or to be produced.

5.1 ROTATIONAL INTEGRITY

5.1.1 SAMPLES

For a given model, the damper with the largest outside diameter and the largest mounting cavity shall be tested. If the counterweight is a separate piece and not an integral part of the hub, it shall be attached to the assembly as sold.

5.1.2 APPARATUS

The test fixture shall provide an environment similar to the front crankshaft portion of an engine. A suitable containment chamber shall be used to protect test personnel. It shall incorporate the following features:

- A. A tachometer with an accuracy of $\pm 2\%$ at 12,500 revolutions per minute {rpm}.

- B. A spindle that can be driven to a rotational speed of 12,500 rpm or greater and allow attachment of the tachometer. The spindle shall accept the damper in a manner similar to actual use and allow it to be attached rigidly and concentrically.

5.1.3 PROCEDURE

- A. Mount the damper to the spindle and attach the tachometer.
- B. The damper shall be driven to a rotational speed between 12,500 and 13,500 rpm and maintained at that level for one hour.

5.2 MECHANICAL PROPERTIES

5.2.1 SAMPLES

Test bars used in determining mechanical properties shall be machined from finished products. The outside housing material and the hub material shall be tested. Use of standard test bars of a like material are not acceptable.

5.2.2 APPARATUS

A standard tensile test machine shall be used. The machine shall be capable of applying the required tensile load in accordance with ASTM E-8, and shall have adequate instrumentation to verify the test load. The test machine shall also be in calibration and traceable to the National Bureau of Standards.

5.2.3 PROCEDURE

Record the physical dimensions of the test bar. Increase the tensile load until the test bar breaks. Record the load and elongation in accordance with ASTM E-8 test procedures.

5.2.4 INTERPRET RESULTS

Determine the yield strength, tensile strength and elongation for each sample.

6.0 PROOF OF COMPLIANCE

Crankshaft Hub Harmonic Damper manufacturers are required to provide the following information to enroll in this program:

6.1 LETTER OF CERTIFICATION

For initial design validation, a letter of certification shall be submitted. It shall include the name, title and signature of a representative from the manufacturer along with the date signed. The letter shall state that all component parts incorporated into the product are new and not reconditioned or reclaimed. Previously sold assemblies rebuilt by the original manufacturer can be recertified by using new, certified replacement parts.

6.2 DESIGN

A blueprint or drawing of the damper shall be submitted.

6.3 TEST RESULTS

Test results shall be documented in a test report.

6.3.1 ROTATIONAL INTEGRITY

The test shall be considered successful if no part becomes loose or separates from the damper during the rotational test.

6.3.2 MECHANICAL PROPERTIES

For the material used, each sample shall have mechanical properties in accordance with minimums listed in Table 1.

Table 1			
Material	Minimum Yield Strength psi (kg/cm ²)	Minimum Tensile Strength psi (kg/cm ²)	Minimum Percent Elongation
Pearlitic, Malleable and Ductile Iron	40,000 (2,812)	60,000 (4,218)	10
Mild and Cold Finished Steel	40,000 (2,812)	60,000 (4,218)	10
Wrought Aluminum	35,000 (2,461)	42,000 (2,953)	8
Magnesium Forgings / AZ80A-T5 (example)	34,000 (2,390)	50,000 (3,515)	6
Titanium / Ti-6AL 4V (example)	125,000 (8,788)	135,000 (9,491)	10

7.0 TEST REPORTS

A separate test report, or set of test reports if required, shall be submitted for each product model. If more than one test facility is required to complete all necessary tests, then a separate test report shall be submitted from each one. A test report shall be submitted for each component, if tested separately. The test facility shall assign a unique number to each test report. This number along with the report date and page number shall appear on each page. Each test report shall include:

7.1 RELEVANT INFORMATION

- 7.1.1 Manufacturer's name, contact name, address and telephone number.
- 7.1.2 Name, address and telephone number of the test facility.
- 7.1.3 Name and signature of the responsible test supervisor.
- 7.1.4 Actual date of the test.
- 7.1.5 Specification number and effective date.
- 7.1.6 Product name, description and model designation.
- 7.1.7 Component name and description.

7.2 TESTS

Each test conducted shall be listed showing the test name, apparatus used, procedure used and test results obtained along with any other appropriate information.

7.3 AUTHENTICATION

Test reports shall be authenticated and stamped by a Professional Engineer who is registered in the state in which the testing is conducted. If necessary, SFI may allow an equivalent entity to provide authentication.

8.0 INITIAL DESIGN VALIDATION

To receive initial recognition from SFI as a participant in the SFI Specification 18.1 Program, the manufacturer must submit to SFI all information delineated in the Proof of Compliance section. This information shall be provided for each Crankshaft Hub Harmonic Damper model offered by the applicant that is to be included in the program. Any change in design, materials and/or methods of manufacturing not specifically excluded is considered a model change and, therefore, requires initial design validation.

Note: A model certification is based on a successful rotational integrity test of a damper with the largest outside diameter and the largest mounting cavity. A damper variation shall not be considered certified under this model if it is later produced with a larger outside diameter or a larger mounting cavity unless it is also successfully tested.

9.0 PERIODIC REVALIDATION

Test reports with successful test results must be submitted to SFI at least once every 24 month period following the date of the initial design validation test for each model of Crankshaft Hub Harmonic Damper manufactured by the participant. If multiple test reports are required to obtain all test results, then the earliest test date shall be used to determine when the periodic revalidation reports are due. Also, SFI shall retain the option to conduct random audit reviews. SFI shall purchase the product on a commercial basis and test for compliance to the specification. The submitting manufacturer shall reimburse SFI for all audit costs.

10.0 CERTIFICATION OF COMPLIANCE

Upon demonstration of successful compliance with all the requirements of the specification and the self-certification program and upon entering the licensing agreement with SFI, the manufacturer may advertise, present and offer the Crankshaft Hub Harmonic Dampers for sale with the representation that their product meets the SFI Specification 18.1. Continuing certification is contingent upon the following additional considerations: (1) the product shall be resubmitted for testing following any change in design, materials and/or methods of manufacturing not specifically excluded, and (2) periodic revalidation test reports are submitted when due to SFI.

11.0 CONFORMANCE LABELS

The conformance label is a sticker which shall be placed on the damper. Besides placing the label on the part, the serial number of the label shall be permanently marked on the part. The permanently marked number should be on the face opposite to the engine. The serial number should appear on the customer invoice to aid in identification and tracking.

12.0 DECERTIFICATION

Participating manufacturers are subject to decertification when not in compliance with the requirements of this program or when their products are not in compliance with the requirements of this specification. Decertification will provide SFI the right to effect any and all remedies which are available to SFI in the licensing agreement.

13.0 APPEAL PROCEDURE

In the event of decertification, the manufacturer is entitled to an appeal of the decision of SFI. Requests for appeal must be received by SFI no later than thirty days following receipt of the notice of decertification. Appeals of such decisions will be heard at the next meeting of the Board of Directors of SFI.

14.0 STATEMENT OF LIMITATIONS

Testing procedures and/or standards contained in this specification are intended for use only as a guide in determining compliance with the minimum performance requirements as defined herein. The granting and assignment of the "This Manufacturer Certifies That This Product Meets SFI Specification 18.1" logo/designation is in no way an endorsement or certification of product performance or reliability by SFI. SFI, its officers, directors and/or members assume no responsibility, legal or otherwise, for failure or malfunctions of a product under this program.

15.0 COSTS

All costs involved in this program will be absorbed by the submitting manufacturer.

16.0 COMPLIANCE PERIOD

As this specification is revised to reflect changes in technology and/or field conditions, to remain current, participating manufacturers in the SFI Specification 18.1, Crankshaft Hub Harmonic Damper, Program, must demonstrate full compliance with the requirements of this specification within ninety (90) days of the latest effective date.

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