SFI FOUNDATION INC.

QUALITY ASSURANCE SPECIFICATIONS™

SFI SPECIFICATION 43.1 EFFECTIVE: AUGUST 25, 2017*

PRODUCT: Drive Shafts

1.0 GENERAL INFORMATION

1.1 This SFI Specification establishes uniform test procedures and minimum standards for evaluating and determining performance capabilities for Drive Shafts 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 43.1" 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 Drive Shafts that meet or exceed the SFI Specification 43.1 test standards, by complying with the requirements of the SFI Specification 43.1 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 Drive Shafts in compliance with all requirements of the SFI Specification 43.1 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 A Drive Shaft is a device which connects and transmits the transmission output torque into the differential of a race vehicle to produce rear wheel rotation.

2.2 A yoke is the device on both ends of a drive shaft which attaches through universal (“U”) or constant-velocity (“CV”) joints to transmit torque from the transmission in paragraph 2.1 above.

2.3 The material Metal Matrix Composite (MMC) discussed in paragraph 3.0 below is a compound of 6061 Aluminum with the supplementary addition of alumina oxide or other types of stiffeners. This addition ostensibly improves stiffness and strength of the base material. Not all manufacturers utilize this material.

2.4 Any Drive Shaft pertaining to this specification shall remain as constructed by the original manufacturer and not modified.

3.0 CONSTRUCTION

3.1 MATERIALS

The materials used in the construction of Drive Shafts covered in this specification are not specifically identified as a requirement. However since the present products are made of 4130 Steel, 1020 Mild Steel, 6061 Aluminum, Metal Matrix Composite (MMC) 6061 Aluminum, or Carbon Fiber, the proposed use of different materials shall be presented to SFI for approval.

4.0 MODEL CLASSIFICATION

Any variation in materials, shell dimensions or contour or construction method shall be considered a model change.

5.0 TESTING

5.1 STATIC TORQUE TEST

5.1.1 SAMPLES

Test sample(s) shall be fully processed new Drive Shaft(s) that are representative of devices currently being produced or to be produced. All necessary attachment and adjustment hardware including the transmission yoke along with instructions shall be supplied by the certifying manufacturer.

5.1.2 APPARATUS

A. Torsion testing machine capable of applying a maximum torque value of 20,000 ft. lb. static torque to a test drive shaft either clockwise (CW) or counterclockwise (CCW) and of holding the required torque for a specified time period before releasing the torque load(s).

B. The test equipment shall incorporate instrumentation capable of measuring and recording applied torque in ft. lb. (± 100 ft. lb.) and measuring and recording torsional rotation in degrees (±0.10 degrees) both during and after test is complete.

5.1.3 TEST SET UP

A. Before installing the test Drive Shaft into the torque tester, an accurate dimensional inspection of mounting surfaces and features from end to end (twist), of both end yoke ears integrity and shape, and a visual inspection for cracks, buckling damage, shall be performed and recorded.

B. Install the test drive shaft in the torsion testing machine per manufacturer instructions using all hardware supplied by the manufacturer.

5.1.4 PROCEDURE

A. Apply a static torque to the test Drive Shaft at a rate of at least 500 ft. lb. per minute until a value of 2800 ± 100 ft. lb. is reached. Record torque value (ft. lb.), elastic torsional deflection (degrees ±0.10 degree) and hold torque load for 10 seconds.

B. Release torque load and measure and record residual torsional deflection (if any) in degrees (±0.10 degree)

C. Remove test Drive Shaft from the machine and perform an inspection per paragraph 5.1.3A. Record all observations.

5.2 CYCLIC TORQUE TEST

5.2.1 SAMPLES

The same drive shaft previously used in paragraph 5.1 above shall be used in this test with no attempt to repair or modify any observed defects or damage before this testing.

5.2.2 APPARATUS

A. Torque testing machine capable of applying reversing cyclic torque values of 2500 ± 100 ft. lb. in one direction (CW) and reversing to a value of 1000 ± 50 ft. lb. in the opposite direction (CCW) at a rate of at least 3 to 5 cycles per minute for a minimum of 25 cycles.

5.2.3 TEST SET UP

A. Install the test drive shaft from paragraph 5.1 above in the test machine per manufacturer instructions using all original hardware supplied by the manufacturer.

5.2.4 PROCEDURE

A. Apply the cyclic reversing torsional loads of 2500 ± 100 ft. lb. (CW) and 1000 ± 50 ft. lb. (CCW) at a rate of at least 3 to 5 cycles per minute for a total of 25 cycles.

B. Remove test drive shaft from the machine and perform an inspection per paragraph 5.1.3A. Record all observations.

6.0 PROOF OF COMPLIANCE

Drive shaft certifying manufacturers are required to provide the following information to enroll in this program.

6.1 TEST RESULTS

Test results shall be documented in a test report.

6.1.1 STATIC TORQUE TEST

A. No torsional angular deformation measured from one end to the other of the test drive shaft including yokes is allowed.

B. No buckling or deformation along the entire length of the test drive shaft is allowed.

C. No cracks or signs of failure or imminent failure are allowed in the end joints (welded or bonded) between yokes and shaft body.

D. No yielding or distortion of end yoke assemblies is allowed.

E. If any of the above measurements are more than zero (0) and not within the allowable tolerance of the test equipment per Paragraph 5.1.2.B of this specification, then the drive shaft cannot be certified.

6.2.1 CYCLIC TORQUE TEST

A. No torsional angular deformation measured from one end to the other of the test drive shaft including yokes is allowed.

B. No buckling or deformation along the entire length of the test drive shaft is allowed.

C. No cracks or signs of failure or imminent failure are allowed in the end joints (welded or bonded) between yokes and shaft body.

D. No yielding or distortion of end yoke assemblies is allowed.

E. If any of the above measurements are more than zero (0) and not within the allowable tolerance of the test equipment per Paragraph 5.1.2.B of this specification, then the drive shaft cannot be certified.

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 43.1 Program, the manufacturer must submit to SFI all information delineated in the Proof of Compliance section. This information shall be provided for each Drive Shaft 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.

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 Drive Shaft 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.

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 Drive Shaft for sale with the representation that their product meets the SFI Specification 43.1. 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 “punch-out” sticker for the Drive Shaft. On all types, the label shall be punched with the month and year of manufacture and be placed on the outside surface. The month and year of manufacture shall be punched in each label with a 1/8" hole punch. Besides placing the sticker on the part, the serial number of the sticker along with the date shall be permanently marked on the outside of the part. The serial number of should also 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 43.1" 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 43.1 Drive Shaft Program must demonstrate full compliance with the requirements of this specification within ninety (90) days of the latest effective date.

---

*Original Issue:	February 9, 2006
Edited:	March 27, 2008
Reviewed:	December 13, 2008
Revised:	March 24, 2009
Reviewed:	December 10, 2010
Reviewed:	November 29, 2012
Reviewed:	December 11, 2014
Reviewed:	December 8, 2016
Revised:	August 25, 2017
Reviewed:	December 6, 2018