SFI FOUNDATION INC.™

QUALITY ASSURANCE SPECIFICATIONS™

SFI SPECIFICATION 40.1 EFFECTIVE: NOVEMBER 4, 1993*

PRODUCT: Abrasion Resistant Driver/Rider Suits

1.0 GENERAL INFORMATION

1.1 This SFI Specification establishes uniform test procedures and minimum standards for evaluating and determining performance capabilities for Abrasion Resistant Driver/Rider Suits 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 40.1" 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 Abrasion Resistant Driver/Rider Suits that meet or exceed the SFI Specification 40.1 test standards, by complying with the requirements of the SFI Specification 40.1 program, and by signing a licensing agreement with the SFI Foundation, Inc.

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1.5 Compliance with this specification is entirely voluntary. However, when a manufacturer provides Abrasion Resistant Driver/Rider Suits in compliance with all requirements of the SFI Specification 40.1 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 Driver/Rider Suit: A uniform made out of abrasion resistant/retardant material that is used for abrasion protection in competitive kart/motorcycle racing. Uniforms meeting this specification shall be classified as either Type I or Type II and shall be identified on the conformance label as 40.1/1 or 40.1/2 respectively. This will enable the sanctioning body to determine its specific requirements.

2.2 First-hole failure - the point during the abrasion of a fabric when a warp yarn and a filling yarn have worn away causing a small hole to appear.

2.3 Tearing Strength - The force required to propagate a tear in a specimen under specified conditions.

2.4 Peak Load - the load required to break one or more yarns in woven fabrics. It is usually expressed as an average of the number of peaks.

3.0 CONSTRUCTION

Driver/Rider Suits can either be a one piece coverall type or a two piece traditional type, consisting of a jacket and pants. A two piece suit must be joined with a zipper at the waist. All suits must have a zipper closure for the upper torso.

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4.0 MODEL CLASSIFICATION

A model is defined as any design, material and/or methods of construction used by the manufacturer. If all other factors remain the same, Driver/Rider Suit models are not a function of size or color.

5.0 TESTING

5.1 ABRASION RESISTANCE OF FABRIC - MODIFIED WYZENBEEK

This test method covers the measurement of the abrasion resistance of fabrics or sheets exposed to cyclic changes in tension and severe bending in a modified Wyzenbeek test.

5.1.1 SAMPLES

A. Test 6 specimens (Figure 1) from each direction per sample. Identify the face side of each specimen.

B. Each specimen should represent different warp and fill yarn in woven fabrics.

C. No specimen should be taken nearer the selvage than 1/10 the width of the fabric.

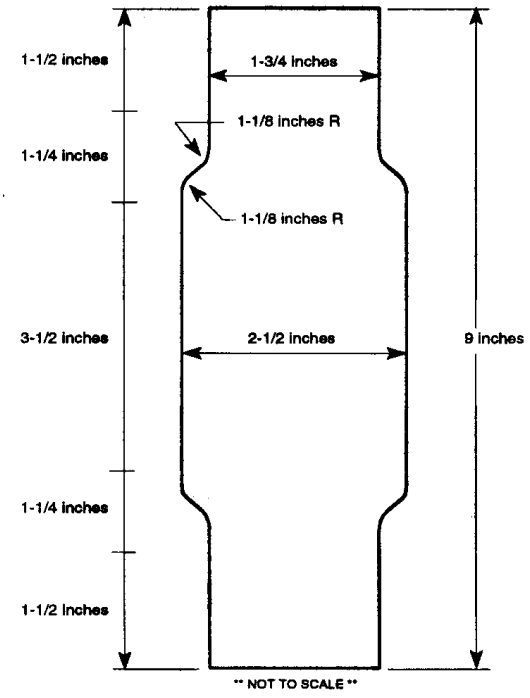

Figure 1
Wyzenbeek Die Shape

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5.1.2 APPARATUS

A. Wyzenbeek Tester - Wyco precision wear test meter

B. Abrasive - 9 in. X 11 in. sheets, grade 320J aluminum oxide cloth

C. Rods - Aluminum, 2, each 1/4 inch diameter

D. Die - shaped as per sketch in Figure 2

ARRANGEMENT OF TWO ALUMINUM BARS ON MODIFIED WYZENBEEK

Two aluminum rods, each 1/4" in diameter, are riveted to the drum of the wear tester, spaced 1-1/4" apart and parallel, as per sketch below.

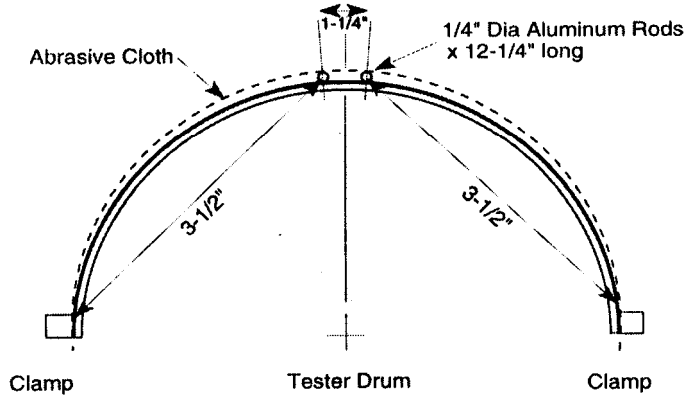

Figure 2

E. Scrub Brush

5.1.3 CALIBRATION

Calibration shall be performed as described in ASTM D 4157, Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)

5.1.4 PROCEDURE

A. Mount the abrasive sheet in the tester. (Change abrasive sheet between each set of specimens and after every 1,000 cycles on a specimen). The standard abrasive is 320J aluminum oxide cloth, unless otherwise specified.

B. Install specimens on positions 1, 2, and 3.

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C. Adjust the tension applied to the sample.

D. Adjust the loading on the pressure pad.

E. Set the cycle counter to 0.

F. Switch tester motor ON.

G. Observe specimens at 500 cycle intervals during testing, unless initial specimen indicates that more or less frequent inspections are necessary.

H. Record the number of cycles needed reach required minimums or to obtain "first-hole failure" on each specimen.

I. Follow "G" and "H" until the samples reach the required minimums or until the specimens fail.

J. Remove and save all tested specimens. Place tester arms in horizontal position when not testing.

5.1.5 INSPECTION

Note severely worn areas as potential failure points.

5.1.6 INTERPRET RESULTS

Report individual required minimum cycles or "first-hole failure" for each sample. Average the number of cycles to obtain "first-hole failure" in each direction. Note abradant, pressure and tension used.

5.2 TONGUE TEAR STRENGTH

This test method covers a procedure for the determination of the force required to continue a tear in woven or nonwoven fabrics.

5.2.1 SAMPLES

A. Select the specimens so that no two contain the same warp yarns or machine area, nor filling yarns or cross direction area. No specimens should be taken nearer the selvage than 1/10 the width of the sample.

B. Cut five specimens in each direction 3 inches X 8 inches.

C. Cut the specimens so that five have their long dimension parallel to the warp yarns or in the machine direction, and five have their long

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dimension parallel to the filling yarns or in the cross direction. Identify the long dimension.

D. Cut a 3 inch (± 1/8 inch) slit lengthwise in each specimen, starting in the center of one of the short edges.

5.2.2 APPARATUS

A. Instron Tensile Tester

B. Load cell C, CT or D.

C. Jaws, 1 inch x 3 inches with Adiprene(R) faces.

5.2.3 CALIBRATION

A. Calibrate the Instron as directed in the F&CDC Standard Practice 901.

B. Crosshead speed shall be 12 inches/minute.

C. Chart speed shall be 12 inches/minute.

5.2.4 PROCEDURE

A. Place one tongue of the specimen between the jaw faces of the upper clamp, taking care to align the specimen perpendicular to the clamp.

B. Repeat for the other tongue and ensure that the end of the slit is midway between the two jaws.

C. Turn on the pen and chart switches and begin tear.

5.2.5 INSPECTION

If tear is acceptable continue until all specimens have been tested.

5.2.6 INTERPRET RESULTS

Calculate the average peak load for a 3 inches X 8 inches sample to the first decimal place using the following procedures.

A. On the chart, mark off a 2-inch distance starting 1/2 inch after the initial peak.

B. Lay a transparent straightedge across the 2-inches section parallel to the extension axis.

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C. Adjust the straightedge so that a line can be drawn through the average distance between the peaks.

D. Record the number of chart divisions between the 0 line and the line drawn in "C".

E. Calculate the specimen tearing strength, lbs. to the first decimal place using the following equation:

$$A = \frac{B \, x \, C}{100}$$

Where: A = specimen tearing strength, lb
B = Full-scale load, lb
C = load, in chart divisions (from reference "D")
100 = number of divisions/chart width

F. Calculate the average sample tearing strength to the first decimal place for the warp and filling direction.

6.0 PROOF OF COMPLIANCE

Abrasion Resistant Driver/Rider Suit 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 ABRASION RESISTANCE OF FABRIC - MODIFIED WYZENBEEK

Minimum average number of cycles shall be:

Type I $\geq$ 2,500
Type II $\geq$ 4,500

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6.1.2 TONGUE TEAR STRENGTH

Minimum Tongue Tear Strength shall be:

Type I $\geq$ 5 pounds
Type II $\geq$ 8 pounds

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.

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8.0 INITIAL DESIGN VALIDATION

To receive initial recognition from SFI as a participant in the SFI Specification 40.1 Program, the manufacturer must submit to SFI all information delineated in the Proof of Compliance section. This information shall be provided for each Abrasion Resistant Driver/Rider Suit 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 12 month period following the date of the initial design validation test for each model of Abrasion Resistant Driver/Rider Suit 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 Abrasion Resistant Driver/Rider Suits for sale with the representation that their product meets the SFI Specification 40.1. 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 (40.1/1 and 40.1/2) is a patch which, on a one piece suit or jacket, shall be sewn to the left sleeve facing outward, between the elbow and the shoulder seam or corner. On pants (two piece suit), the patch shall be sewn on the left side at the belt line. The serial numbers 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.

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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 40.1" 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 40.1, Abrasion Resistant Driver/Rider Suits, Program, must demonstrate full compliance with the requirements of this specification within ninety (90) days of the latest effective date.

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	Reviewed:	December 2, 1995
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	Reviewed:	December 13, 2008
	Reviewed:	December 11, 2010
	Reviewed:	November 29, 2012

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