SFI FOUNDATION INC.

QUALITY ASSURANCE SPECIFICATIONS™

SFI SPECIFICATION 14.21 EFFECTIVE: JUNE 18, 2024*

PRODUCT: Screw-Type Supercharger Restraint Devices

1.0 GENERAL INFORMATION

1.1 This SFI Specification establishes uniform test procedures and minimum standards for evaluating and determining performance capabilities for Screw-Type Supercharger Restraint Devices 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 14.21" 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 Screw-Type Supercharger Restraint Devices that meet or exceed the SFI Specification 14.21 test standards, by complying with the requirements of the SFI Specification 14.21 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 Screw-Type Supercharger Restraint Devices in compliance with all requirements of the SFI Specification 14.21 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 Screw-Type Supercharger Restraint Devices are used to constrain the supercharger, injector and resultant explosive fragments in the event of an explosion or mechanical failure of a screw-type supercharger.

2.2 Screw-Type Supercharger Restraint Devices shall be inspected every two years by the manufacturer for recertification. Any strap made from material that is sensitive to ultraviolet light shall be replaced at that time.

2.3 Any restraint device pertaining to this specification shall remain as constructed by the original manufacturer and not modified.

2.4 Detachable Strap: An engine attachment strap that can be removed from the top plate (girdle) without cutting strap material or thread.

3.0 CONSTRUCTION

The restraint device shall incorporate a containment configuration to restrict the release of explosive fragments from the supercharger and the injector. This shall be called the enclosure segment(s). The restraint device shall have engine attachment straps constructed from webbing, used to constrain the supercharger enclosure in the event of detachment from the engine. The attachment straps shall be secured to the engine with each strap having its own attachment. A minimum of five attachment straps shall be used, one on each corner of the supercharger and one on the rear.

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3.1 ENGINE ATTACHMENT STRAPS

If the strap material used is subject to fire damage, the straps shall have sheathing, completely covering the otherwise exposed straps, which the manufacturer represents to be fire retardant.

3.2 ATTACHMENT STRAP ENGINE ATTACHMENTS

The bracket for each separation strap attachment shall be connected to the engine by a minimum of two 0.375 inch (10 millimeter {mm}) bolts or studs (SAE Grade 5 or Class 9.8). The strap attachments can also be integral to a one piece flange running the full length of the exhaust header. This method shall use all header bolts or studs through the flange for connection to the engine. Any strap attachment hardware shall be separate from the exhaust header. Welding of attachments to the exhaust header is not acceptable.

3.3 CONFIGURATION

The restraint shall have a second anchor plate between the lower surface of the injector body and the upper surface of the supercharger case. The enclosure segment shall be between the upper and lower anchor plates connected with the containment straps.

A. ANCHOR PLATES

The upper plate shall have a minimum of five individual attachment points for the engine attachment straps described in paragraphs 3.0 - 3.2; a minimum of three individual attachment points for the containment straps between the plates (one on each side and one in the rear). The lower plate shall have three attachment points (one on each side and one in rear) and must be applicable to an SFI 34.1 screw-type supercharger.

B. ENCLOSURE STRAPS

Enclosure straps shall be constructed from webbing and used to connect the upper and lower anchor plates.

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C. ENCLOSURE (SUPERCHARGER BLANKET)

The supercharger blanket shall be constructed of ballistic material. The ballistic material shall cover 95 percent of each side and rear of the supercharger housing and 40 percent of the front of the supercharger housing. The ballistic material shall be a continuous blanket that encompasses the supercharger and is connected at the ends. The blanket shall be permanently secured to the anchor plates at a minimum of one place on each side and a minimum of one in the rear. The blanket shall fit snugly around the supercharger to limit the release of explosive fragments.

D. SUPERCHARGER BLANKET STRAPS

The purpose of the straps is to maintain the blanket around the supercharger in the event of a failure. The blanket shall be connected to itself with a minimum of two straps. The straps shall encompass the length of the blanket around the supercharger. The strap connection device shall be capable of sustaining the load imposed on the strap.

E. INJECTOR BLANKET

For a standard-placement injector cover, the injector blanket shall consist of ballistic material and cover 95 percent of the projected opening of the top of the supercharger. The blanket shall be permanently secured to the injector strap assembly.

F. INJECTOR STRAP ASSEMBLY

For a standard-placement OR forward-placement injector cover, the injector strap assembly is used to constrain the injector body in the event of a failure. The injector strap assembly shall confine the injector by coverage across the top. There shall be a minimum of four attachment points on the upper plate.

4.0 MODEL CLASSIFICATION

Any variation of the original design, i.e. construction, anchor plate, ballistic material, straps or mounting method is considered a model change.

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5.0 TESTING

5.1 TENSILE STRENGTH

5.1.1 SAMPLES

Test samples shall be fully processed new restraint devices which are representative of restraint devices currently produced or to be produced. All necessary mounting hardware along with mounting instructions shall be supplied with the restraint device.

5.1.2 APPARATUS

A. TEST MACHINE

The test machine shall be capable of applying a minimum tensile load of 36,000 pounds {lb} (16,330kg) with an excursion travel of one to five inches per minute (2.5-12.7 cm/min) 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.

B. TEST FIXTURE

The test fixture shall duplicate the mounting method of the restraint device and be capable of withstanding the applied load.

5.1.3 PROCEDURES

A. ENGINE ATTACHMENT

1. The restraint device shall be mounted to the test fixture per manufacturer's instructions with the supplied attachment hardware. The side attachment straps shall be connected and subjected to the load.

2. The test fixture shall be installed into the test machine. The strap attachments shall be mounted and oriented in the same position and connected as in an actual vehicle.

3. Using an excursion rate between one to five inches per minute (2.5-12.7 cm/min) apply an increasing load to the restraint device. Continue until a load of 24,800 lb (11,250kg) is applied. Hold at that level for ten seconds, then release the load.

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B. REAR ATTACHMENT STRAP

This test is only necessary if the rear attachment strap is not identical to the side attachment straps or if it utilizes a different connection device or adjustment hardware.

1. In each head of the test machine, mount one end of the rear strap. If the strap has a connection device and/or adjustment hardware, connect and adjust per manufacturer's instructions. The strap, strap hardware and heads shall be in axial alignment.

2. Using an excursion rate between one to five inches per minute (2.5-12.7 cm/min) apply an increasing load to the strap. Continue until a load of 6,200 lb (2,800kg) is applied. Hold at that level for ten seconds, then release the load.

C. ENCLOSURE SEGMENT

1. The enclosure segment of the supercharger restraint device shall be mounted to the test fixture per manufacturer's instructions with the supplied attachment hardware.

2. The test fixture shall be installed into the test machine. The fixture shall fix either the top or bottom of the enclosure segment. The opposite end shall be connected to, or supported against, the moving head of the test machine.

3. Using an excursion rate between one to five inches per minute (2.5-12.7 cm/min) apply an increasing load to the free end of the enclosure segment. Continue until a load of 7,500 lb (3,400kg) is applied. Hold at that level for ten seconds, then release the load.

D. INJECTOR STRAP ASSEMBLY

1. The upper anchor plate shall be connected to the test fixture. The injector strap assembly shall be mounted to the upper anchor plate per manufacturer's instructions with the supplied attachment hardware.

2. The test fixture shall be installed into the test machine.

3. Using an excursion rate between one to five inches per minute (2.5-12.7 cm/min) apply an increasing load to the injector strap assembly. Continue until a load of 2,500 lb is

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applied. Hold at that level for ten seconds, then release the load.

E. BLANKET STRAP

If more than one variation of blanket strap is used, then all variations shall be tested.

1. In each head of the test machine, mount one end of the blanket strap. If the strap has a connection device and/or adjustment hardware, connect and adjust per manufacturer's instructions. The strap, strap hardware and heads shall be in axial alignment.

2. Using an excursion rate between one to five inches per minute (2.5-12.7 cm/min) apply an increasing load to the strap. Continue until a load of 2,500 lb (1,130kg) is applied. Hold at that level for ten seconds, then release the load.

5.2 PENETRATION RESISTANCE

This test is based on Military Standard 662D, "Ballistic Test for Armor" (MIL-STD-662D).

5.2.1 SAMPLES

One sample of the ballistic material used in the containment section and the injector cover, 11 by 14 ±1 inch (27.9 by 35.6 ±2.5 centimeters) shall be supplied. The sample shall have the identical construction of the supercharger restraint device that is being evaluated.

5.2.2 APPARATUS

The apparatus shall be as specified in MIL-STD-662D.

A. PROJECTILE

Caliber .22 - Type 2, fragment simulators conforming to MIL-P-46593A shall be used.

5.2.3 PROCEDURES

The sample shall be tested in accordance with MIL-STD-662D for the Ballistic Limit, V_{50} BL(P). The maximum velocity span shall be 150 feet per second {fps} (46 meters per second {mps}). The ballistic resistance of the sample shall be greater than or equal to a V_{50} BL(P) of 1385 fps.

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5.2.4 INTERPRET RESULTS

The V_{50} BL(P) shall be calculated by taking the arithmetic mean of the two highest partial, and the two lowest complete, penetration impact velocities within the allowable velocity span.

6.0 PROOF OF COMPLIANCE

Screw-Type Supercharger Restraint Device 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 TENSILE STRENGTH

The restraint device shall pass all applicable tensile strength tests to be acceptable. Each component shall pass the tensile strength test if it is able to maintain the test load for ten seconds.

6.2.1 PENETRATION RESISTANCE

The restraint device shall pass all applicable penetration resistance tests to be acceptable. Each component will be required to pass the designated test requirement.

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:

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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.

7.1.8 Photographs of the submitted assembly, pre and post-test photographs of submitted ballistic samples.

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 14.21 Program, the manufacturer must submit to SFI all information delineated in the Proof of Compliance section. This information shall be provided for each Screw-Type Supercharger Restraint Device 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.

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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 Screw-Type Supercharger Restraint Device 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 Screw-Type Supercharger Restraint Devices for sale with the representation that their product meets the SFI Specification 14.21. 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 primary conformance label is a patch. A patch shall be attached to the bag and to each strap facing outward. If the engine attachment straps are detachable from the top plate, a conformance label decal must also be placed on the top plate and be visible when the vehicle is in competition. The month and year of manufacturer shall appear on each patch or label. For recertification, the old labels shall be removed, and the foregoing procedure shall be followed using new labels.

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.

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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 14.21" 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 14.21, Screw-Type Supercharger Restraint Device, Program, must demonstrate full compliance with the requirements of this specification within ninety (90) days of the latest effective date.

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