



# QUALITY ASSURANCE SPECIFICATIONS™

SFI SPECIFICATION 49.2

EFFECTIVE: MARCH 22, 2011\*

PRODUCT: Top Fuel Front Wing Assemblies

## 1.0 GENERAL INFORMATION

- 1.1 This SFI Specification establishes uniform test procedures and minimum standards for evaluating and determining performance capabilities for Top Fuel Front Wing Assemblies 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 49.2" 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 Top Fuel Front Wing Assemblies that meet or exceed the SFI Specification 49.2 test standards, by complying with the requirements of the SFI Specification 49.2 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 Top Fuel Front Wing Assemblies in compliance with all requirements of the SFI Specification 49.2 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 Top Fuel Front Wing Assembly is an aerodynamic device mounted in front of the race to produce down force on the front wheels to improve stability, control, tire bite, etc. during drag race competition.
- 2.2 Any Top Fuel Front Wing Assembly pertaining to this specification shall remain as constructed by the original manufacturer and not modified.
- 2.3 The Top Fuel Front Wing Assembly can consist of a single element or multiple elements but only the main large element is to be tested.
- 2.4 "Air Bags" refer to pneumatic fabric and rubberized bags normally used for lifting which can be used to apply loads to wing surface while conforming to the wing contour.
- 2.5 Canard type wings shall not be covered by this specification. For possible separate Canard testing requirements, SFI must be contacted on a case by case basis.
- 2.6 Top Fuel Rear Wing Assemblies shall be inspected by the original manufacturer, or their approved agent, for recertification every year from the date of original certification. When a wing assembly is determined to be acceptable for continued service, a new conformance label marked with the inspection date shall be used.

### 3.0 CONSTRUCTION

- 3.1 The Top Fuel Front Wing Assembly may be constructed of any appropriate material and manufacturing method as long as size, shape, and mounting provisions are commensurate with current rule book requirements and as long as all requirements of this spec are met.
- 3.2 Mounting hardware and mounting instructions must be supplied by the manufacturer with the test product.

### 4.0 MODEL CLASSIFICATION

Any variation of the original design, i.e. construction, mounting method or hardware is considered a model change.

### 5.0 TESTING

#### 5.1 LOAD TESTING OF WING ASSEMBLY

##### 5.1.1 SAMPLES

Test sample shall be a fully processed new Top Fuel Front Wing Assembly which is representative of Top Fuel Front Wing Assemblies currently produced or to be produced. All necessary mounting hardware along with mounting instructions shall be supplied with the sample. Only the main wing element with the mounting provision permanently installed shall be tested with no supplementary elements attached (if any). Wicker attachments shall be removed.

##### 5.1.2 APPARATUS

###### A. TEST MACHINE

The test machine shall be capable of applying a minimum force of 10,000 lbs. (4,536 kg) at a rate of 1.0 – 2.0 inches per minute with accompanying instrumentation capable of measuring and recording loads within  $\pm 50$  lbs. (22.3 kg). Adapters to accommodate wing mounting configurations must be manufactured to allow application of load in a vertical direction perpendicular to the horizontal axis of the wing when lying upside down in the fixture (compared to normal position on a race car).

## B. TEST FIXTURE

A fixture to contain the test wing sample (main element only) during load application should be a rectangular, open top shaped box with sides and ends deep enough to match thickness of wing, air bags, and instrumentation and with dimensions to closely control any possible air bag mushrooming at the sides or ends.

## C. AIR BAGS

A combination of air bags of sufficient size to approximately cover the size of the main wing element and bottom of the fixture box shall be installed in the box under the test wing to approximate the aerodynamic load.

## D. INSTRUMENTATION

Deflection sensors (linear variable displacement transducers or similar) shall be mounted between 0.5 inch and 1.5 inches from both wing tips approximately mid span front to back, and a sensor shall be mounted as close as possible to the middle of the wing span (if not available on the loading device) to measure and record deflection within  $\pm 0.010$  inch versus loads. Air bag pressure must be capable of being measured and controlled.

### 5.1.3 PROCEDURE

- A. Install the air bags and instrumentation (Paragraphs 5.1.2.C & 5.1.2.D) into the fixture box in a location to allow measurement of the deflection of the center and both ends of the wing sample when an external down load is applied.
- B. Install the wing sample on top of the air bags and instrumentation into the fixture box with the "top" of the wing down and mounting brackets facing upward.
- C. Position the fixture box (with wing installed) in the test machine such that the center of the machine ram is centered laterally between the wing mount points and the ram center shall be located longitudinally 4.5 inches aft of the forward edge of the wing surface (when viewing the wing as positioned on a race car).
- D. Attach a test machine ram to the wing mounting brackets with the appropriate adapters.

- E. Apply approximately 1 – 4 PSI into the air bags and bring the test machine ram load (downward) to approximately 1000 lbs. If the bags have not approximately conformed to the wing surface contour, increase ram load slightly until no more than 1,250 lbs. is reached. Minor adjustments to the test setup can be made here to confirm that deflections at both wing ends are relatively close to each other.
- F. Bring all linear instrumentation to zero readings.
- G. Apply ram load at 1 to 2 inches/minute until 1,500 lbs. is reached and hold until all instrumentation is stable. Record all instrumentation readings.
- H. Increase ram load at increments of 250 lbs. each, hold for 20 seconds at each increment until 2,500 lbs.  $\pm$  200 lbs. is reached, measuring and recording loads and deflections at each load point or continuously if possible.
- I. Release load slowly to zero and record all instrumentation readings. Inspect mounting points, brackets and wing surface for damage.
- J. Allow test set up to remain as is in Paragraph I above for approximately one (1) hour.
- K. Repeat Paragraphs E through I.
- L. Calculate left and right wing tip instrumentation movements from the 1,500 lbs. load point (Paragraph G) to the 2,500 lbs. load point (Paragraph H) separately for the first and second test runs (Paragraph E through I and K).
- M. Calculate the average movement of the left and right wing tips together for the first test run and then calculate average movement of the left and right wing tips together for the second test run.
- N. Subtract the first test run wing tip average movements from the first run machine ram movement between 1,500 lbs. to 2,500 lbs. load points and record results.
- O. Subtract the second test run wing tip average movement from the second run machine ram movement between 1,500 lbs. and 2,500 lbs. load points and record results.

- P. Visual inspection of wing surfaces for material delaminating and mount structure for cracks or yielding shall be performed after test completion and reported.

Note: For metric values above, 1,000 lbs. = 454kg.

#### 5.1.4 INTERPRET RESULTS

- A. The result values of Paragraphs 5.1.3.N and 5.1.3.O above shall be within 0.25 inch of each other or the wing sample performance is considered unacceptable.
- B. If all Paragraphs of 5.1.3 are completed successfully but if inspections per Paragraph 5.1.3.P show cracks of any length or yielding of more than 0.10 inch of the wing mounting structure or any delaminating or separation of wing material, the test shall be considered unacceptable.

### 6.0 PROOF OF COMPLIANCE

The Top Fuel Front Wing Assembly manufacturers are required to provide the following information to enroll in this program:

#### 6.1 TEST RESULTS

- A. Test results shall be documented in a test report which shall include the values of loads applied and deflections of all instrumentation at each load point as described in Paragraphs 5.1.3.A through 5.1.3.K.
- B. Information required in Paragraph 7.0 of the specification is also necessary.

### 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 49.2 Program, the manufacturer must submit to SFI all information delineated in the Proof of Compliance section. This information shall be provided for each Top Fuel Front Wing Assemblies 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 4 year period following the date of the initial design validation test for each model of Top Fuel Front Wing Assemblies 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 Top Fuel Front Wing Assemblies for sale with the representation that their product meets the SFI Specification 49.2. 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. The month and year of original manufacturer shall be punched out with an 1/8" hole punch on each sticker. Besides placing the sticker on the part, the serial number of the label along with the date shall be permanently marked on the Top Fuel Front Wing Assemblies. The permanently marked information should be in the same location as the conformance label. 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 49.2" 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 49.1, Top Fuel Rear Wing Assemblies, Program, must demonstrate full compliance with the requirements of this specification within ninety (90) days of the latest effective date.

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