

FORMULA SAE RULES CHANGE PROPOSAL FOR 2013

Notice of Possible Rule Changes for the 2013 Formula SAE Series

This document is intended to provide teams with advance notice of possible changes to the Formula SAE Rules that are being considered by the Formula SAE Rules Committee.

The change presented here is only a possibility and may not be implemented. It is provided as information and is not intended to be the final text of the rules under consideration.

Invitation to Comment

Students and faculty advisors are invited to comment on any of the proposed rule changes. The Committee welcomes the input of team members and faculty advisors on all aspects of the rules. Comments should include your (1) name, (2) team, (3) contact information and (4) your engineering or philosophical reasons for supporting or opposing a proposed rule change including any supporting data you care to provide.

This is your chance to be part of the FSAE rules making process. We urge you to send us your views. Please email your comments to: fsae@sae.org

Please remember that FSAE is an educational competition which is organized to give you a platform for enhancing your engineering design and project management skills. The Rules are intended to present you with a challenging experience which allows you a high level of design freedom, consistent with fair and equitable operation of the competitions of the FSAE Series.

Current Rule

B8.5 Throttle and Throttle Actuation

B8.5.1 Carburetor/Throttle Body

The car must be equipped with a carburetor or throttle body. The carburetor or throttle body may be of any size or design.

B8.6 Intake System Restrictor

B8.6.1 In order to limit the power capability from the engine, a single circular restrictor must be placed in the intake system between the throttle and the engine and all engine airflow must pass through the restrictor.

B8.6.2 Any device that has the ability to throttle the engine downstream of the restrictor is prohibited.

B8.6.4 The restrictor must be located to facilitate measurement during the inspection process.

B8.7 Turbochargers & Superchargers

B8.7.1 Turbochargers or superchargers are allowed if the competition team designs the application. Engines that have been designed for and originally come equipped with a turbocharger are not allowed to compete with the turbo installed.

B8.7.2 The restrictor must be placed upstream of the compressor but after the carburetor or throttle valve. Thus, the only sequence allowed is throttle, restrictor, compressor, engine.

Proposed Rule

B8.5 Throttle and Throttle Actuation

B8.5.1 Carburetor/Throttle Body

The car must be equipped with a carburetor or throttle body. The carburetor or throttle body may be of any size or design.

B8.5.8 Carburetors are not allowed on boosted applications.

B8.6 Intake System Restrictor

B8.6.1 In order to limit the power capability from the engine, a single circular restrictor must be placed in the intake system and all engine airflow must pass through the restrictor. The only allowed sequences of components are the following:

- (A) For naturally aspirated or Roots type (positive displacement) supercharged engines, the sequence must be: throttle body, restrictor, supercharger (if used), engine.
- (B) For turbocharged or centrifugally supercharged engines, the sequence must be: restrictor, compressor, throttle body, engine.

B8.7 Turbochargers & Superchargers

B8.7.1 Turbochargers or superchargers are allowed if the competition team designs the application. Engines that have been designed for and originally come equipped with a boosting device are not allowed to compete with the factory designed boosting device installed.

B8.7.2 Delete

B8.7.4 If a positive displacement boosting device is used, the intake system layout must be as described in B8.6.1(A).

B8.7.5 Recirculation (anti-surge) valves are prohibited for all boosting systems. Note: recirculation valves apply to the centrifugal compressor and not to wastegate valves which are used to control the turbine.

Reasons for Changes:

B8.5.8

Carburetors are specifically banned for boosted applications because of the potential fire safety hazard of pressurized air/fuel mixture leaking past shaft seals when mounted downstream of the boosting device.

B8.6.1:

Moving the throttle body downstream of the centrifugal boosting devices will avoid creating a vacuum in the compressor housing when the throttle is closed which draws oil past the seal resulting in visual engine smoking and potential plug fouling. No performance benefit will be gained by centrifugally boosted engines as any air leaks in the throttle body will reduce the amount of air going into the engine at wide open throttle. The restrictor will continue to choke the flow through the compressor limiting power as with the current configuration.

Placing the throttle body downstream from the turbocharger will put it in the normal position used in current production vehicles thus making the turbo a realistic design option for the teams. Turbocharging of production vehicles is widely expected to grow significantly worldwide in the near future so providing an opportunity to incorporate this technology into FSAE performs an important part of the educational purpose of the competition.

Naturally aspirated engines would keep the same layout (sequence) as currently required because of concerns that a leaky throttle body downstream could allow unregulated extra airflow to the engine if it was placed downstream of the restrictor. Positive displacement boosted engines would continue to use this layout because oil seal leakage is not an issue and there is no motivation to change the design.

B8.7.1

This item has been revised to use more general terminology to remove ambiguity about whether applicability was to only turbochargers or also OEM supercharged systems.

B8.7.2

The issue of intake system layout is now fully covered in B8.5 for both naturally aspirated and boosted engines.

B8.7.4:

If a positive displacement boosting device is used (with or without a centrifugal boosting device) then the current intake system layout would be retained to avoid the possibility of the pressurized air/fuel leaks in the throttle body as noted in the rationale for B8.5.2. The occurrence of boosting device oil leaks under closed throttle conditions, if applicable, would then be identical to current rules.

B8.7.5:

With correct matching of boosting device and engine powertrain, recirculation valves are unnecessary. In addition, recirculation valves are not required for adequate durability given the limited life requirements of FSAE vehicles. Enforcement in tech inspection would also be difficult to ensure the restrictor was not bypassed.

Location of New Rule

As above.

Proposed By

Powertrain Subcommittee

Date

13 September, 2011