



**WESTERN CANADA MOTORSPORT ASSOCIATION  
TECHNICAL REGULATIONS – RACE 2017**

SECTION 1 - FOREWORD .....	6
SECTION 2 - CLASSES.....	7
SECTION 2.1 - CHAMPIONSHIP CLASSES	7
SECTION 2.2 - OTHER CLASSES	7
SECTION 3 - TOURING CAR.....	8
<b>SECTION 3.1 - TOURING CAR</b>	<b>8</b>
A. Definition.....	8
B. Grouping.....	8
C. Classing.....	8
<b>SECTION 3.2 - PERFORMANCE TOURING</b>	<b>9</b>
A. Purpose .....	9
B. Structure .....	9
C. Regulations .....	9
D. WCMA Dyno Assigned base Procedures .....	9
E. WCMA dyno Testing Procedures.....	12
F. Forms, Inspection, Protests.....	15
<b>SECTION 3.3 - SUPER TOURING &amp; SUPER UNLIMITED</b>	<b>17</b>
A. Purpose .....	17
B. Structure .....	17
C. Regulations.....	17
D. Dynamometer/Power Testing .....	18
E. Forms & Inspections.....	20
<b>SECTION 3.4 - SPEC MIATA</b>	<b>22</b>
A. Purpose .....	22
B. Regulations.....	22
C. Tires .....	22
<b>SECTION 3.5 - CHALLENGE CAR</b>	<b>23</b>
A. Purpose .....	23
B. Regulations.....	23
C. Make of Car .....	23
D. Body.....	23
E. Suspension .....	24
F. Engine.....	24
G. Brakes.....	25
H. Drive Train .....	25
I. Exhaust .....	25
J. Weight .....	25
K. Radio Communication, Onboard Timing & Data Acquisition .....	25
<b>SECTION 3.6 - CLUB CLASSES</b>	<b>26</b>
A. Purpose .....	26
B. Regulations.....	26
C. Vehicle eligibility .....	26
D. Classing rules .....	26

<b>SECTION 3.7 - ICE RACING</b>	<b>27</b>
A. Purpose .....	27
B. Regulations.....	27
C. Vehicle eligibility .....	27
D. Classing rules .....	27
<b>SECTION 4 - OPEN WHEEL.....</b>	<b>28</b>
<b>SECTION 4.1 - OPEN WHEEL</b>	<b>28</b>
A. Definition.....	28
B. For the purpose of classification, open wheel vehicles will be grouped into the following classes: .....	28
C. Classing.....	28
<b>SECTION 4.2 - FORMULA LIBRE</b>	<b>28</b>
A. Definition.....	28
B. Regulations .....	28
<b>SECTION 4.3 - FORMULA 1600</b>	<b>29</b>
A. Definition.....	29
B. Engine.....	29
C. Transmission.....	34
D. Chassis .....	35
<b>SECTION 4.4 - FORMULA CONTINENTAL</b>	<b>38</b>
A. Definition.....	38
B. CHASSIS .....	38
C. BODYWORK .....	39
D. SUSPENSION .....	39
E. BRAKES .....	39
F. SHOCK ABSORBERS.....	39
G. STEERING.....	39
H. WHEELS .....	39
I. CATCH TANKS .....	39
J. FUEL SYSTEM .....	39
K. WEIGHT .....	39
L. MISCELLANEOUS .....	39
M. STARTER .....	40
N. PERMITTED ENGINES.....	40
O. FORD NE SERIES ENGINES .....	40
P. FORD NE SERIES INDUCTION .....	43
Q. FORD NE SERIES EXHAUST.....	44
R. FORD NE SERIES LUBRICATING SYSTEM .....	44
S. FORD NE SERIES COOLING SYSTEM .....	44
T. FORD NE SERIES FUEL PUMPS .....	44
U. FORD NE SERIES DISTRIBUTOR .....	44
V. FORD NE SERIES FLYWHEEL AND CLUTCH.....	45
W. FORD ZETEC ENGINES.....	45
X. TRANSMISSION.....	47
Y. DIAGRAM AND DIMENSIONS .....	48
<b>SECTION 4.5 - FORMULA VEE</b>	<b>49</b>
A. Definition.....	49
B. Weight and Dimensions .....	49
C. Suspension .....	49
D. Brakes.....	50

E.	Engine.....	50
	Figure 1 Port Measurement.....	52
F.	Transmission/Rear Axle.....	56
G.	Frame/Chassis.....	58
H.	Body.....	58
I.	Non-Standard Replacement Parts.....	59
J.	Electrical.....	59
K.	Ballasting.....	59
<b>SECTION 5 - SPORTS RACING.....</b>		<b>60</b>
<b>SECTION 5.1 - SPORTS RACING REGULATIONS</b>		<b>60</b>
A.	Definition.....	60
B.	Coachwork And Chassis.....	60
C.	Suspension, Wheels And Tires.....	60
D.	Engine And Drivetrain.....	60
E.	Miscellaneous.....	60
F.	SPORTS RACING CaRS IN SUper TOURING / SUPER Unlimited (trial).....	61
<b>APPENDIX 1 - ROLL CAGE SPECIFICATIONS.....</b>		<b>62</b>
<b>SECTION 1 - ALL VEHICLES</b>		<b>62</b>
<b>SECTION 2 - CURRENT REGULATIONS (after January 1st 2016)</b>		<b>62</b>
A.	Construction Materials.....	62
B.	Accepted Designs.....	62
1.	FIA.....	62
2.	SCCA.....	62
4.	WCMA.....	63
4.	Removable Type Cages.....	65
5.	Alternate Designs.....	65
6.	Increasing Roll Cage Height.....	65
<b>SECTION 3 - Previous roll cage specs (archived)</b>		<b>65</b>
<b>APPENDIX 2 - VEHICLE REQUIREMENTS.....</b>		<b>66</b>
A.	Driver Restraint System.....	66
1.	BELTS / HARNESS.....	66
2.	Seat.....	67
B.	Onboard Fire Suppression Systems.....	67
C.	Safety Kill Switch.....	68
D.	Windows.....	68
2.	Other windows.....	68
E.	NETS.....	69
1.	Protection (Window) Nets.....	69
2.	Driver (Inside) Net.....	69
F.	Firewall.....	69
G.	Body Panels.....	70
H.	Interior.....	70
I.	Lights.....	71
J.	Fuel System.....	71
K.	Oiling System.....	72
L.	Power steering.....	72
M.	Cooling system.....	72
N.	Starter.....	73

O.	Transmission, Rear Axle and Drive Shafts .....	73
P.	Ballast .....	73
Q.	Brakes .....	74
R.	Noise.....	74
S.	Exhaust .....	74
T.	Battery.....	74
U.	Tow strap.....	74
V.	Mirrors.....	74
W.	Tires .....	74
X.	Wheels / Hubs .....	75
Y.	Fuel to Be Used .....	75
Z.	Other .....	75
<b>APPENDIX 3 - VEHICLE APPEARANCE.....</b>		<b>76</b>
A.	Decals and Advertising .....	76
B.	Appearance of Cars .....	76
C.	50 at 50.....	76
D.	RACING NUMBERS AND CLASS DESIGNATION .....	76
<b>APPENDIX 4 - COMPETITOR SAFETY EQUIPMENT.....</b>		<b>78</b>
A.	Apparel .....	78
B.	Helmets .....	78
C.	Frontal Head Restraint .....	79
D.	Driver Suits and Underwear Systems .....	79
E.	Other .....	80
<b>APPENDIX 5 - DEFINITIONS (REFERENCE ONLY).....</b>		<b>81</b>

## SECTION 1 - FOREWORD

Auto racing is a dangerous sport.

These regulations are intended to assist in the conduct of Competitions and to further general safety. They are a guide and in no way guarantee against injury or death to participants, spectators or others. No express or implied warranties of safety or fitness for a particular purpose are intended or result from the publication or compliance with these or any other official regulations. **Entering a WCMA event constitutes an agreement, without reservation, by any person participating in such event in any capacity, that he or she has read and understands the within Regulations and shall at all times conduct himself or herself in accordance with them.**

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Affiliated Clubs may adopt these Regulations and the WCMA Sporting Regulations - Race for use within WCMA sanctioned competitions. WCMA license holders and WCMA officials may print copies of these Regulations for their own use.

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These regulations detail preparation and performance rules for WCMA racing classes.

Headings used in these regulations are not to be read into the regulations.

If anywhere in these regulations does not specifically say you can change something, assume that you cannot. If you wish to change something not permitted in these regulations you must apply to the tech committee for permission or a rule change

WCMA reserves the right to alter these regulations at any time.

WCMA bulletins become part of these regulations.

These regulations have been prepared in English text which shall prevail in terms of meaning and intent.

**These Regulations are effective January 1<sup>st</sup>, 2017**

Should clarification be required on these regulations, please contact the WCMA Race Technical Committee through the WCMA Race Director.

All competitors must have a copy of the current rules in their possession, [or access to the electronic copy on WCMA.ca.](http://www.wcma.ca)

## SECTION 2 - CLASSES

The WCMA recognizes the following classes, which are defined in the following regulations.

### SECTION 2.1 - CHAMPIONSHIP CLASSES

The following classes, are recognized as WCMA Championship classes.

SU - Super Unlimited

ST1 - Super Touring 1

ST2 - Super Touring 2

ST3 - Super Touring 3

ST4 - Super Touring 4

~~PTB - Performance Touring B~~

PTC - Performance Touring C

PTD - Performance Touring D

PTE - Performance Touring E

PTF - Performance Touring F

SM - Spec Miata

CC - Challenge Cars (Under Review for 2018)

FL - Formula Libre

F1600 - Formula ~~Ford~~ 1600

FC - Formula Continental

FV - Formula Vee

SR - Sports Racing Cars

Club Classes (only for races and series held in province where the Club Class exists)

### SECTION 2.2 - OTHER CLASSES

The following classes, are NOT WCMA Championship classes.

~~CLUB CLASSES (ie IT-J)~~

ICE RACING

## **SECTION 3 - TOURING CAR**

### **SECTION 3.1 - TOURING CAR**

#### **A. DEFINITION**

Touring Cars are defined as race vehicles with 4 wheels where no more than 2 of wheels are inline and all wheels are covered by fenders or bodywork. Touring Cars are often based on or made to look like Production automobiles

#### **B. GROUPING**

For the purpose of classification, Touring Cars will be grouped into the following classes:

Super Touring & Super Unlimited

Performance Touring

Spec Miata

Challenge Cars

Club Classes & Ice Racers

#### **C. CLASSING**

While all new and existing competitors are expected to read both the Technical and Sporting Regulations, any competitor with question regarding how do determine their class are encouraged to email [classing@wcma.ca](mailto:classing@wcma.ca) and/or [racedirector@wcma.ca](mailto:racedirector@wcma.ca).



## SECTION 3.2 - PERFORMANCE TOURING

### A. PURPOSE

Performance Touring (PT) is intended to provide the membership with the opportunity to compete with a high degree of both safety and convenience. PT along with its sister series, Super Touring and Super Unlimited provide a home for nearly every type of racecar to compete in a fair and logical competition environment.

### B. STRUCTURE

Cars progress from a Base Classification (outlined in the NASA Performance Touring rules Section 5.2 starting on page 7) or an assigned WCMA Base Classification (See SECTION 3.2 -D). Final competition class determined by the Base Classification plus (or minus) any modification points assessed (see NASA Performance Touring rules Section 5.3 starting on page 18). Each competition class has a minimum adjusted WT/HP ratio to help ensure fair competition, these ratios are only considered once a vehicle has a competition class. As vehicles potential performance increases they move upwards from PTF to PTB to ST to SU. Any vehicle adjusted WT/HP of less than ~~10.5~~ 14.25lb/hp (or 14.5lb/ Avg HP) competes in ST or SU and should refer to section 3.2

### C. REGULATIONS

1. The Regulations for this class are the NASA Performance Touring (NASA PT) Official rules for this calendar year and can be found at <https://www.nasaproracing.com/rules>, in the "Performance Touring" section.
2. The regulations listed in this section take precedence over the NASA rules.
  - a. WCMA Sporting Regulations
  - b. WCMA Technical Regulations SECTION 3.2 -D replaces NASA Performance Touring 5.4 "Dyno Re-Classing Procedures"
  - c. WCMA Technical Regulations SECTION 3.2 -E replaces NASA Performance Touring 6 "Dyno Testing Procedures"
  - d. WCMA Technical Regulations SECTION 3.2 -F replaces the NASA Performance Touring 7 "Forms, Inspections, Protests, Penalties"
  - e. All WCMA Technical Appendices and Sporting Regulations

### D. WCMA DYNO ASSIGNED BASE PROCEDURES

1. Assigning a WCMA Base Classing
  - a. The following Modifications require cars that have to be assigned a WCMA Base class
    - i. An added, modified, or upgraded turbocharger or supercharger.
    - ii. Non-BTM head(s) or increased number of camshafts (hybrid engines).
    - iii. An engine swap (unless it has been designated as not required by the WCMA)
    - iv. A Rotary Engine that has been ported.
  - b. All other vehicles that have been designated by The WCMA to be classed based upon dynamometer testing.
    - i. A driver/owner may submit a request for a Dyno WCMA assigned base class for a vehicle that does have one of the above four situations that requires one, but it may not be approved.

2. Requests for a WCMA Base class Procedures
  - a. If a WCMA assigned Base class is required as by SECTION 3.2 -D.1.a, a requested for a WCMA Base class must be sent before the vehicle can enter competition
  - b. An owner/driver must submit the following information in order to request a WCMA Base Class, by e-mail to the WCMA (at [classing@wcma.ca](mailto:classing@wcma.ca)),
    - i. Your name
    - ii. Competition vehicle--year, make, model, subtype and trim type (if applicable)
    - iii. Reason for the request (FI, swap, heads, rotary porting, hybrid, not required, etc.)
    - iv. Actual measured Displacement,
      1. if a swap: Engine
        - a. model #/name
        - b. disp
        - c. #cyl
        - d. valvetrain/VVT?
        - e. F/I?
        - f. OEM crank
    - v. Hp & Tq
      1. The Certified Dyno report will consist of both the Dyno sheet with three separate, reproducible Dyno tests with SAE correction (with the identifying information listed in SECTION 3.2 -E.2.a) and the "Super Touring (ST), Performance Touring (PT) Official Dyno Certification Form"
    - vi. Amount of extra Hp requested for "Dyno Variance" (1-3% recommended over above max Hp
      1. The extra Hp requested above, is to help ensure that any hp testing done at another location or at the track by Officials will show hp ratings equal to or less than those provided by the owner/driver.
    - vii. Minimum Competition Weight (with driver)
      1. An owner/driver can submit 1-6 above, along with a specific requested new base class, including number of asterisks (7 points each), instead of the vehicle weight. The new Minimum Competition Weight will then be provided in the Official Re-class e-mail response.
    - viii. Once a vehicle is re-classed based on Dyno testing and Minimum Competition Weight, an Official Re-class e-mail will be sent to the competitor, stating the
      1. New base class,
      2. New base tire size
        - a. The new base tire size will match the new base class
      3. Maximum Dyno horsepower
      4. Minimum Competition Weight
      5. As well as any other specific limitations for that particular re-classification.

- ix. The competitor will then complete the PT Car Classification Form, but will not assess any points for
  - 1. NASA Performance Touring 5.3.B (Weight Reduction)
  - 2. NASA Performance Touring 5.3.C (Engine). Modification Points will be assessed for all other non-BTM modifications.
  - 3. The competitor must not exceed the limits of either power or weight listed in the Dyno Re-class e-mail in order to prevent disqualification.
- c. If the vehicle is modified, and the power level or weight has changed, a new request for a WCMA Base class must be sent to the WCMA.
- d. Any vehicle that has been assigned a base class by the WCMA and has had a change to either its base class or its base weight in the table in NASA PT Section 5.2.2 since the WCMA base class was approved, MUST be re-submitted for re-classification
- e. The competitor must include a copy of the Official WCMA base class e-mail, along with the Certified Dyno report when submitting the PT Car Classification Form to the Regional Tech inspector or Race Director before competition.
- f. All competitors will be required to include the latest Certified Dynamometer (Dyno) report and minimum weight in their vehicle logbook at all times.
- g. Any subsequent modifications or adjustments done to the car that could alter power output will require repeat Dyno testing, and a new Certified Dyno report.
- h. WCMA Officials may request repeat Dyno testing at any time.

**E. WCMA DYNO TESTING PROCEDURES**

## 1. Dyno Testing

The following procedures apply to all vehicles being tested on a dynamometer, whether for initial classing purposes, or for technical inspection post-competition.

## 2. Dyno Testing Procedures

- a. A certified Dyno report consists of
  - i. Three separate, reproducible Dyno tests for each Fuel/Timing Map or boost controller setting with SAE J1349 Rev JUN 90 SAE correction
  - ii. the car owner's name
  - iii. car number
  - iv. car year/make/model
  - v. shop name and phone number
  - vi. Dyno operator's name on the Dyno sheet
  - vii. Is accompanied by a completed ST/PT Dyno Certification Form.
- b. All Dyno tests must show
  - i. horsepower and torque on the Y-axis (vertical)
  - ii. Engine RPM on the X-axis (horizontal) of the Dyno graph.
  - iii. The numerical table of horsepower and RPM (in 50 RPM increments) must be included in the report (for all Dyno tests completed after December 1, 2015).
  - iv. An inductive pickup or other direct sensor shall be used to measure engine RPM (as opposed to obtaining RPM data from the ECU/OBD port or from calibration from the vehicle's tachometer.)
    1. If this is not possible due to vehicle configuration, the Dyno operator must note on the Dyno sheet the method used for obtaining RPM data, and the reason for not using an inductive pickup or sensor\*.
- c. Dyno testing shall be done with
  - i. the vehicle at normal operating temperature
  - ii. at least 28 psi tire pressure (but should be at normal operating tire pressure if higher),
  - iii. In the gear producing the highest horsepower readings.
    1. It is the competitor's responsibility to ensure that the vehicle is compliant with horsepower limits in ALL gears.
  - iv. The vehicle's hood shall be open with a cooling fan placed in front of the engine during testing.
  - v. Engine, ECU, boost controller, etc. settings shall only be altered between Dyno runs in order to obtain the required additional sets of three Dyno tests for each of the alternate ECU Fuel/Timing maps and/or boost controller settings.
  - vi. The highest peak horsepower number of the three tests will be used as the official certified horsepower for weight to horsepower calculations- ~~(with the exception of the ST3)~~ for PTD-PTF and the Avg HP will be used for PTC.
  - vii. A smoothing factor up to five (5) shall be used.
  - viii. All Dyno graphs must show decreasing power for 1500 rpm from the peak horsepower level, or the car must reach the rev-limiter during the Dyno testing.
  - ix. All horsepower measurements will be rounded to the nearest whole number.
  - x. Test results using a Mustang or Dyno Dynamics dynamometer will have 10% added to the ~~maximum~~ horsepower reading (Mustang or Dyno Dynamics Dyno whp x 1.1 = ~~Maximum~~ whp for wt/hp calculation).

### 3. Average Horsepower Calculation

- a. For PTC the number that will be used to calculate the "Adjusted" Weight/Power Ratio will be Average Horsepower
- b. A calculated average giving a better approximation of the maximum horsepower available over a range of usable RPM.
  - i. For pre-competition testing, the Dyno test with the highest maximum horsepower will be used to calculate this average (not an average of the three Dyno runs) as follows
  - ii. all horsepower numbers will be rounded to the nearest whole number before any calculations
- c. Calculation
  - iii. Definitions
    1. Avg HP = Average HP calculated and used in in the Adjusted Wt/HP Ratio
    2. Max HP = Maximum horsepower shown on the actual Dyno graph
  - iv. Data Points
    1. The following ten (10) data points will be obtained from the Dyno's 50 RPM data export numeric RPM/HP table printout
      - a. Horsepower at: 500 rpm, 1000 rpm, 1500 rpm, 2000 rpm, 2500 rpm greater than Max HP rpm
      - b. Horsepower at: 500 rpm, 1000 rpm, 1500 rpm, 2000 rpm, 2500 rpm less than Max HP rpm
      - c. If any of the above data points at higher RPM than Max HP RPM do not exist due to redline, then those potential data points will not be used in the calculation of Avg HP
  - v. Formula for Avg HP

$$\text{Avg HP} = (\text{Max HP} + (\text{sum of the three highest data points}))/4$$

3.4. Dyno Compliance Inspections

- a. Dynamometer tests are official and certified when performed by series Officials for compliance testing (without the need for a Dyno Certification Form—but must be signed by the Official).
- b. It is the responsibility of the competitor to be within power levels on any device that a WCMA official chooses to use for testing.
- c. For compliance testing, the Official and the dynamometer operator will determine
  - i. Which gear(s) to use
  - ii. How many test runs to perform for any given vehicle
  - iii. What the normal operating temperature is for that vehicle.
  - iv. Tire pressures shall not be adjusted between the time the vehicle was on track competing and the time of Dyno testing.
    1. If the competitor violates this rule, the tires will be inflated to 40 psi before compliance Dyno testing.
- d. Prior to the dynamometer inspection the competitor may top off any fluids needed to ensure the engine and drivetrain are not damaged during testing.
  - i. The fluids must be added with a WCMA Official present.
  - ii. No other modifications or adjustments may be made to the car.
- e. To ensure fairness, an Official, or an individual appointed by an Official, may operate any cars being inspected.
- f. At their discretion Officials may have the vehicle sealed and transported for off-site Dyno testing at a later date
- g. Vehicles may not have any adjustments during the competition day to systems that allow adjustment of horsepower levels that would serve to alter Dyno, Examples of such systems are
  - i. driver-adjustable electronic tuning
  - ii. engine timing advance devices
  - iii. fuel pump output modification devices
  - iv. boost controllers
  - v. adjustable MAP and MAF voltage clamps,
- h. Any restriction device placed in the air intake system must be clearly identified as such and marked to indicate its dimensions.
- i. Vehicles that have more than one fuel/timing program or “map” in the computer/ECU/PCM must submit a certified Dyno report (3 pulls) for each of those fuel/timing “maps” which will be used during competition.
  - i. The method used to switch between these “maps” must be clearly written on the PT Car Classification Form.
- j. Any hardware that allows a competitor or crew member to wirelessly or directly connect to the ECU (or alter ECU maps) at any time during competition or post-competition impound is strictly prohibited
  - i. Regardless of whether such hardware is external or internal to the ECU, and regardless of the direction of data flow.

\*Note the intent of this section not to prevent competitors from data logging or viewing data

**F. FORMS, INSPECTION, PROTESTS**

1. Car Classification Forms
  - a. All competitors will submit a completed Performance Touring Car Classification Form (3.2.C) to the WCMA prior to the first qualifying session of a race day.
    - i. A copy of the current completed Performance Touring Car Classification Form will be kept with the vehicle logbook.
  - b. Any competitor that has not submitted a Car Classification Form may be disqualified or moved to the Super Unlimited race class.
  - c. Once a form has been submitted during a season, if there are no modifications to the vehicle, a new form does not need to be submitted at subsequent races.
    - i. However, if there are any changes to the vehicle that would alter the modification points for that vehicle in any way, either a new form needs to be submitted, or the WCMA may allow the driver to revise the old form (again, prior to any qualifying sessions that the vehicle is run in with the new modifications).
    - ii. Failure to comply with the correct procedure regarding Classification Forms is a violation of the rules that may be penalized, regardless of whether or not the vehicle's competition class has changed.
  - d. The Car Classification Form substitutes for the class rules and vehicle specification sheet that would be present under a traditional racing paradigm.
    - i. As such, the Form needs to be kept up to date, and accurate at all times.
  - e. Forms can be downloaded here: <http://www.wcma.ca/new/racing/racing-forms/>
  - f. A driver may choose to compete at any time in a higher level PT class than would be dictated by the Performance Touring Car Classification system.
  - g. A car may be modified an unlimited number of times
  - h. Substitute vehicles may be used provided they comply with all PT rules.
    - i. Substitution of a vehicle or class change after the qualifying session is completed will result in the new vehicle/re-classed vehicle being placed at the back of its class in pre-grid.
2. Vehicle Inspection
  - a. All completed PT Car Classification Forms will be available from the WCMA for review by any competing driver by request while at the track.
  - b. Performance Touring vehicles are subject to detailed inspection by any WCMA Technical Inspector and visual inspection by Performance Touring competitors at any time when the car is at the track.
  - c. WCMA Officials retain the right to request any disassembly or other procedure required to verify vehicle compliance.
  - d. At random times or at the discretion of WCMA Officials, any car may be ordered to report for rules compliance on a chassis dynamometer.
  - e. All Performance Touring competitors have the option to be present for official chassis dynamometer testing
    - i. However, the results of Dyno testing are the property of WCMA, and will only be shown to Officials,
      1. Who will let the competitor know whether or not the vehicle was compliant
      2. Who may show the competitor the results at their discretion.
  - f. Competitors must comply with any request by WCMA Officials to review and/or download ECU program "maps" using the competitor's programming hardware and software, when such equipment is used by the competitor.
  - g. Competitors may have GPS accelerometer units placed in/on their vehicles at any time by WCMA Officials to help verify rules compliance.

3. Competitive Balance

- a. If a driver believes that a competitor is compliant under the Performance Touring rules, but that the vehicle is grossly misclassified, he may report this information to the WCMA Classing at [Classing@wcma.ca](mailto:Classing@wcma.ca), who will Forward the information to NASA, who will determine if any changes in the PT base classifications or rules are necessary in order to meet the goal in PT rule 4 Purpose of having a “fair and logical competition environment”.



**SECTION 3.3 - SUPER TOURING & SUPER UNLIMITED****A. PURPOSE**

Super Touring (ST) and Super Unlimited (SU) is intended to provide the membership with the opportunity to compete with a high degree of both safety and convenience. ST/SU using an "Adjusted Weight/Power Ratio" as the ultimate equalizer between vehicles and along with its sister series, Performance Touring provide a home for nearly every type of racecar to compete in a fair and logical competition environment.

**B. STRUCTURE**

Vehicles are classified based on Adjusted Weight/Power Ratio calculated using the formula in the NASA Super Touring and Super Unlimited rules. Vehicles with an Adjusted Weight/Power greater than ~~10.5~~ 14.25lb/hp or (14.5 lb/Avg hp) may be able to compete in Performance Touring.

**C. REGULATIONS**

1. The regulations for this class are NASA Super Touring and Super Unlimited (NASA ST and SU) Official rules for this calendar year and can be found at <https://www.nasaproracing.com/rules>, in the "Super Touring/Super Unlimited" section.
2. The regulations listed in this section take precedence over the NASA rules.
  - a. WCMA Sporting Regulations
  - b. WCMA Technical Regulations SECTION 3.3 -D replaces the NASA Super Touring section 8 "Dyno Testing"
  - c. WCMA Technical Regulations SECTION 3.3 -E replaces the NASA Super Touring section 9 "Forms, Inspection, Protests, Penalties"
  - ~~c.~~ d. WCMA Technical Regulations APPENDIX 3 -Vehicle appearance replaces the NASA Super Touring section 10 "Vehicle Appearance"
  - ~~d.~~ e. All WCMA Technical Appendices and Sporting Regulations

**D. DYNAMOMETER/POWER TESTING**

## 1. Dyno Testing

The following procedures apply to all vehicles being tested on a dynamometer, whether for initial classing purposes, or for technical inspection post-competition.

## 2. Dyno Testing Procedures

- a. A certified Dyno report consists of
  - i. Three separate, reproducible Dyno tests for each Fuel/Timing Map or boost controller setting with SAE J1349 Rev JUN 90 SAE correction
  - ii. the car owner's name
  - iii. car number
  - iv. car year/make/model
  - v. shop name and phone number
  - vi. Dyno operator's name on the Dyno sheet
  - vii. Is accompanied by a completed ST/PT Dyno Certification Form.
- b. All Dyno tests must show
  - i. horsepower and torque on the Y-axis (vertical)
  - ii. Engine RPM on the X-axis (horizontal) of the Dyno graph.
  - iii. The numerical table of horsepower and RPM (in 50 RPM increments) must be included in the report (for all Dyno tests completed after December 1, 2015).
  - iv. An inductive pickup or other direct sensor shall be used to measure engine RPM (as opposed to obtaining RPM data from the ECU/OBD port or from calibration from the vehicle's tachometer.)
    1. If this is not possible due to vehicle configuration, the Dyno operator must note on the Dyno sheet the method used for obtaining RPM data, and the reason for not using an inductive pickup or sensor\*.
- c. Dyno testing shall be done with
  - i. the vehicle at normal operating temperature
  - ii. at least 28 psi tire pressure (but should be at normal operating tire pressure if higher),
  - iii. In the gear producing the highest horsepower readings.
    1. It is the competitor's responsibility to ensure that the vehicle is compliant with horsepower limits in ALL gears.
  - iv. The vehicle's hood shall be open with a cooling fan placed in front of the engine during testing.
  - v. Engine, ECU, boost controller, etc. settings shall only be altered between Dyno runs in order to obtain the required additional sets of three Dyno tests for each of the alternate ECU Fuel/Timing maps and/or boost controller settings.
  - vi. The Dyno test with highest peak horsepower number of the three tests will be used ~~as the official-certified-to determine the Average~~ horsepower (Avg HP) for weight to horsepower calculations. ~~(with the exception of the ST3)~~
  - vii. A smoothing factor up to five (5) shall be used.
  - viii. All Dyno graphs must show decreasing power for 1500 rpm from the peak horsepower level, or the car must reach the rev-limiter during the Dyno testing.
  - ix. All horsepower measurements will be rounded to the nearest whole number.
  - x. Test results using a Mustang or Dyno Dynamics dynamometer will have 10% added to the maximum horsepower reading (Mustang or Dyno Dynamics Dyno whp x 1.1 = Maximum whp for wt/hp calculation)

3. ~~To obtain t~~The number that will be used to calculate the “Adjusted” Weight/Power Ratio ~~(Mustang or Dyno Dynamics Dyno whp x 1.1 = Maximum whp for wt/hp calculation). ST3- will be~~ Average Horsepower ~~1.—It is anticipated that in '17, this formula will be adopted for all TT/PT/ST classes~~
- a. ~~The horsepower used for calculating the Adjusted Wt/HP Ratio for the ST3 class will not be the maximum horsepower of the three Dyno runs, it will be a~~ A calculated average giving a better approximation of the maximum horsepower available over a range of usable RPM.
    - i. For pre-competition testing, the Dyno test with the highest maximum horsepower will be used to calculate this average (not an average of the three Dyno runs) as follows
    - ii. all horsepower numbers will be rounded to the nearest whole number before any calculations
  - b. Calculation
    - iii. Definitions
      1. Avg HP = Average HP calculated and used in in the Adjusted Wt/HP Ratio
      2. Max HP = Maximum horsepower shown on the actual Dyno graph
    - iv. Data Points
      1. The following ten (10) data points will be obtained from the Dyno’s 50 RPM data export numeric RPM/HP table printout
        - a. Horsepower at: 500 rpm, 1000 rpm, 1500 rpm, 2000 rpm, 2500 rpm greater than Max HP rpm
        - b. Horsepower at: 500 rpm, 1000 rpm, 1500 rpm, 2000 rpm, 2500 rpm less than Max HP rpm
        - c. If any of the above data points at higher RPM than Max HP RPM do not exist due to redline, then those potential data points will not be used in the calculation of Avg HP
    - v. Formula for Avg HP
    - vi.  $\text{Avg HP} = (\text{Max HP} + (\text{sum of the three highest data points}))/4$
4. Dyno Compliance Inspections
- a. Dynamometer tests are official and certified when performed by series Officials for compliance testing (without the need for a Dyno Certification Form—but must be signed by the Official).
  - b. It is the responsibility of the competitor to be within power levels on any device that a WCMA official chooses to use for testing.
  - c. For compliance testing, the Official and the dynamometer operator will determine
    - i. Which gear(s) to use
    - ii. How many test runs to perform for any given vehicle
    - iii. What the normal operating temperature is for that vehicle.
    - iv. Tire pressures shall not be adjusted between the time the vehicle was on track competing and the time of Dyno testing.
      1. If the competitor violates this rule, the tires will be inflated to 40 psi before compliance Dyno testing.
  - d. Prior to the dynamometer inspection the competitor may top off any fluids needed to ensure the engine and drivetrain are not damaged during testing.
    - i. The fluids must be added with a WCMA Official present.
    - ii. No other modifications or adjustments may be made to the car.
  - e. To ensure fairness, an Official, or an individual appointed by an Official, may operate any cars being inspected.

- f. At their discretion Officials may have the vehicle sealed and transported for off-site Dyno testing at a later date
- g. Vehicles may not have any adjustments during the competition day to systems that allow adjustment of horsepower levels that would serve to alter Dyno, Examples of such systems are
  - i. driver-adjustable electronic tuning
  - ii. engine timing advance devices
  - iii. fuel pump output modification devices
  - iv. boost controllers
  - v. adjustable MAP and MAF voltage clamps,
- h. Any restriction device placed in the air intake system must be clearly identified as such and marked to indicate its dimensions.
- i. Vehicles that have more than one fuel/timing program or “map” in the computer/ECU/PCM must submit a certified Dyno report (3 pulls) for each of those fuel/timing “maps” which will be used during competition.
  - i. The method used to switch between these “maps” must be clearly written on the PT Car Classification Form.
- j. Any hardware that allows a competitor or crew member to wirelessly or directly connect to the ECU (or alter ECU maps) at any time during competition or post-competition impound is strictly prohibited
  - i. Regardless of whether such hardware is external or internal to the ECU, and regardless of the direction of data flow.

\*Note the intent of this section not to prevent competitors from data logging or viewing data

## E. FORMS & INSPECTIONS

1. Car Classification Forms
  - a. All competitors will submit a completed Super Touring Car Classification Form to the WCMA prior to the first qualifying session of a race day.
    - i. A copy of the current completed Super Touring Car Classification Form will be kept with the vehicle logbook.
    - ii. Super Unlimited (SU) Competitors do not need to submit any classification forms or certified Dyno Reports.
    - iii. Competitors are permitted (and encouraged) to enter an n maximum-Average horsepower level (~~average horsepower level for ST3~~) on the ST Car Classification form that is higher than that showing on their certified Dyno report to allow room for Dyno variance (between the pre-competition testing done by the competitor and any compliance testing performed by Officials).
  - b. Any competitor that has not submitted a Car Classification Form and certified dyno report prior to competition may be
    - i. Disqualified
    - ii. Moved to the Super Unlimited race class.
  - c. Once a form has been submitted during a season, if there are no modifications to the vehicle, a new form does not need to be submitted at subsequent races.
    - i. However, if there are any changes to the vehicle that would alter the HP for that vehicle in any way, either a new form needs to be submitted, or the WCMA may allow the driver to revise the old form (again, prior to any qualifying sessions that the vehicle is run in with the new modifications).

- ii. Failure to comply with the correct procedure regarding Classification Forms is a violation of the rules that may be penalized, regardless of whether or not the vehicle's competition class has changed.
  - d. The Car Classification Form substitutes for the class rules and vehicle specification sheet that would be present under a traditional racing paradigm.
    - i. As such, the Form needs to be kept up to date, and accurate at all times.
  - e. Forms can be downloaded here: <http://www.wcma.ca/new/racing/racing-forms/>
  - f. A driver may choose to compete at any time in a higher level ST class than would be dictated by the Adjusted Wt./Hp Ratio.
  - g. Substitute vehicles may be used provided they comply with all ST rules.
    - i. Substitution of a vehicle or class change after the qualifying session is completed will result in the new vehicle/re-classed vehicle being placed at the back of its class in pre-grid.
2. Vehicle Inspection
- a. All completed ST Car Classification Forms will be available from the WCMA for review by any competing driver by request while at the track.
  - b. Super Touring vehicles are subject to detailed inspection by any WCMA Technical Inspector and visual inspection by competitors at any time when the car is at the track.
  - c. WCMA Officials retain the right to request any disassembly or other procedure required to verify vehicle compliance.
  - d. At random times or at the discretion of WCMA Officials, any car may be ordered to report for rules compliance on a chassis dynamometer.
  - e. All Super Touring competitors have the option to be present for official chassis dynamometer testing
    - i. However, the results of Dyno testing are the property of WCMA, a
    - ii. And will only be shown to Officials,
      - 1. who will let the competitor know whether or not the vehicle was compliant
      - 2. And may show the competitor the results at their discretion.
  - f. Competitors must comply with any request by WCMA Officials to review and/or download ECU program "maps" using the competitor's programming hardware and software, when such equipment is used by the competitor.
  - g. Competitors may have GPS accelerometers placed in/on their vehicles at any time by WCMA Officials to help verify rules compliance.

**SECTION 3.4 - SPEC MIATA****A. PURPOSE**

Spec Miata (SM) is intended to provide the membership with the opportunity to compete in low cost, production-based cars with limited modifications, suitable for racing competition.

**B. REGULATIONS**

1. The parent regulations for this class are contained within the SCCA General Competition Rules and can be found at [www.scca.com](http://www.scca.com) under Club Racing, in the "Cars and Rules" section.
2. The regulations listed in this section take precedence over the SCCA rules.
  - a. WCMA Sporting Regulations
  - b. WCMA Technical Regulations SECTION 3.4 -C replaces the SCCA 9.1.7.5.c
  - c. All WCMA Technical Regulations Appendices and Sporting Regulations
3. As a replacement for compression testing, engine teardown, etc WCMA may Dyno test cars as outlined in 3.2.E
  - a. Car with greater than 135 HP will be considered not compliant.
    - i. Not Compliant cars will be subject to loss of points or disqualification
      1. Unless the competitor can prove at their expense, they are 100% compliant.

**C. TIRES**

All cars shall use

1. In dry conditions P205/50ZR15 Hoosier SM7
2. In wet conditions P205/50 15 Toyo RA-1

**SECTION 3.5 - CHALLENGE CAR**

Based on competitor input challenge car is under review for the 2018 season. Competitors are encouraged to provide input to the WCMA Race Director. A determination will be made at the 2017 AGM.

**A. PURPOSE**

Challenge Cars (CC) are 1979-85 Mazda RX-7's as described below. This class allows limited modifications, in order to put more emphasis on driver skill over car selection and preparation.

**B. REGULATIONS**

Only modifications SPECIFICALLY stated in these rules are allowed- no other modifications are acceptable. IF A MODIFICATION IS NOT STATED IN THESE RULES, IT CAN NOT BE DONE.

**C. MAKE OF CAR**

First generation Mazda RX-7 cars, from model years 1979-85, equipped with a 12A engine. Only S, GS or GSL models are eligible.

**D. BODY**

Permitted body modifications are listed below:

1. The interior of the car may be gutted, including removal of all carpet, all insulation, seats and center console. Dash instrumentation must remain in place, as well as top of dash across whole car.
2. Doors may be gutted only if two anti-intrusion bars are fitted, as per Appendix 1 of the WCMA Technical Regulations
3. Window glass may be removed from doors.
4. Driver seat must be replaced with a racing seat meeting applicable standards
5. A strap-type window net is required as per APPENDIX 2 -SECTION 1 -E.1 of the WCMA Technical Regulations
6. A roll cage as per APPENDIX 1 -SECTION 1 - of the WCMA Technical Regulations, must be fitted. Roll bar padding around driver is mandatory. Bracing forward of the drivers compartment is prohibited, with the exception of strut tower braces.
7. Minimum 5 point racing harness as per APPENDIX 2 -SECTION 1 -A.1 of the WCMA Technical Regulations is required.
8. A removable steering wheel may be installed.
9. Front air dam and rear spoilers are permitted.
10. Fiberglass body panels allowed if conforming to stock shape.
11. Fender openings may be modified to allow for tires.
12. Mirrors are free but must remain in stock locations.
13. Removal of front headlights / motors is allowed, although headlight covers must remain stock in appearance.
14. No non-stock holes may be made in any body panels. All cars must retain original stock appearance, with allowance for after-market air-dams, rear spoilers, and fender openings.
15. Windshield must remain stock. Windshield clips may be added.
16. Plexiglass main rear window allowed.
17. Hood pins are allowed.
18. Emblems and side moldings may be removed.
19. Cars may be painted as desired. Bodies must always be in good repair and presentable.
20. Any decals required for sanctioning bodies and sponsors must be placed in required positions.
21. Whenever the track surface is wet, thereby causing spray, all cars on the track shall turn on their tail/rain lights. The brake lights must continue to be functional whenever the tail/rain lights are used. The tail/rain lights must be dimmer than the brake lights when they come on, unless amber turn signal lamps are wired as rain lights.

**E. SUSPENSION**

1. The following are the only permitted suspension modifications.
2. Camber/Castor plates or slotting the strut towers to increase negative camber and to adjust castor are allowed.
3. Suspension Bushing kits are allowed but must remain within the stock dimensions.
4. Front and Rear shock tower braces are allowed. (bolt on or weld in)
5. Front and rear shocks are unlimited
6. Only stock suspension arms may be used.
7. Only stock anti-sway bars may be used. The rear sway bar may be removed.
8. Front coil over kit with springs are allowed. Front and rear spring rates are unlimited.
9. Spec tires are the Toyo R888 in size 205/60/13 with OEM 13" x 5.5" wheels or Toyo RR in size 205/50/15 with 15" x 7" wheels. Both wheel sizes have 4 x 110 bolt pattern.
10. Wheel spacers up to 5/16 inch are allowed on both axles.
11. A Watts Link Bracket reinforcement, part number MZ-1-WATT, may be installed.

**F. ENGINE**

1. The only permissible engine is a Mazda 12A. Street porting is allowed. Emission control equipment may be removed. All engine components must remain stock unless otherwise stated.
2. Intake manifold must remain stock.
3. Stock flywheels only, lightweight flywheels not allowed
4. Any original type spark plug may be used.
5. Oil cooler system is unrestricted.
6. Drive pulleys are unrestricted.
7. Radiator may be replaced with any radiator that will fit the stock location.
8. An operating radiator fan must be in place.
9. Fuel lines are unrestricted, however the return line must remain stock.
10. The stock fuel check valve must not be bypassed.
11. Fuel cells are allowed, provided they do not exceed the capacity of the stock RX-7 gas tank and comply with APPENDIX 2 -SECTION 1 -J.8 of the WCMA Technical Regulations.
12. Grose Jets may be used in place of the stock pieces.
13. Racing gas is prohibited. The only fuel allowed is gasoline generally available to the public at service stations.
14. Air filter is unlimited. Ducting air to the air filter is allowed, providing no additional holes are made in bodywork. Ducted air may come from in front of radiator, through existing holes in air dam, or through signal light holes in front bumper.
15. A screen may be mounted in front of the radiator and oil cooler to prevent stone damage to these components.
16. Battery must weight minimum 24 pounds and may be relocated. Lead acid batteries that are relocated must be enclosed in a ventilated and isolating box.
17. The electrical charging system must be functional and working at all times.
18. Ignition coils must be stock and must mount in the stock location.
19. Engine and drive train lubricants are unrestricted.
20. The stock fan may be replaced with an electric fan in the original position
21. A Carter P4594 fuel pump may be used in place of stock fuel pump. A fuel pressure regulator and a fuel pressure gauge may be used within the fuel line to maintain pressure.



**G. BRAKES**

Only stock brakes as fitted to 1979-1985 Mazda RX-7 S, GS or GSL models are permitted.

1. GSL-SE brakes are specifically excluded.
2. Modifications to the braking system are allowed as below:
3. Brake pad material is unlimited.
4. Braided steel brake lines may be used.
5. Adjustable brake bias valves are allowed.
6. Front and rear dust shields may be removed.
7. The inner plastic fender wells and splash guards may be modified or removed.
8. Brake ducting is allowed to a maximum diameter of 3".
9. Rear brake lights must be operating.

**H. DRIVE TRAIN**

1. Clutches are unrestricted, provided the replacement is the same weight as the original.
2. Only original equipment 1979-85 Mazda RX-7 differentials are allowed. 1979-85 Mazda RX-7 S or GS models with rear drum brakes may be upgraded to a rear-end assembly from a 1979-85 Mazda RX-7 GSL. (disc brakes and limited slip differential. Welding differentials is not permitted.
3. Stock wheel lug bolt system may be replaced with lug studs and nuts.
4. Only the stock transmission and differential gearing and gear ratios are permitted.

**I. EXHAUST**

1. A Racing Beat-type header (2 to 2) may be used.
2. The exhaust system must extend to the rear bumper. The exhaust system must remain outside of the passenger compartment
3. A muffler must be used. Maximum sound level must be in accordance with existing track limits.
4. Maximum exhaust pipe diameter 2-1/8" on primary tubes.

**J. WEIGHT**

1. Minimum weight is 2350 pounds with driver and fluids.
2. If ballast is needed to bring a car to minimum weight it must be securely bolted to the passenger side floor.

**K. RADIO COMMUNICATION, ONBOARD TIMING & DATA ACQUISITION**

1. Any two-way "voice only" communications may be used only between driver and crew.
2. Radio communications between drivers during a race or other track session is specifically prohibited.
3. Onboard timing systems are allowed. Onboard timing systems, if fitted, can only be used by the driver. Transmission of data between the car and the pits is prohibited.
  - a. Data acquisition systems of any type are prohibited.

**SECTION 3.6 - CLUB CLASSES****A. PURPOSE**

Club Class are intended to provide the membership with the opportunity to compete safely in a classing structure determined by the organizing club, and therefore there is no guarantee regarding the competition environment.

**B. REGULATIONS**

1. Must meet WCMA safety rule regulations as outlined in
  - a. All WCMA Technical Appendices
  - b. Classing rules as defined by the organizing club
2. Non-functional additions
  - a. It is preferred that non-functional additions to vehicles, whose primary purpose is to express creativity, theme, or general humor are removed.
  - b. Non-functional additions are allowed only if they do not create a potential safety hazard to driver or fellow competitors or track workers.
  - c. External “props” are expressly forbidden.

**C. VEHICLE ELIGIBILITY**

1. Must be based on a “mass produced” vehicle
2. Meet WCMA Technical regulation SECTION 3.1 -A
3. Have Maximum weight of 4000lbs

**D. CLASSING RULES**

1. The individual organizing clubs may provide event supplementary regulations, classification definitions and tire restrictions.
  - a. These may not contravene the WCMA Sporting or Technical regulations

**SECTION 3.7 - ICE RACING****A. PURPOSE**

Ice racing vehicles are intended to provide the membership with the opportunity to compete safely on ice or hard packed snow surfaces. Classing structure is determined by the organizing club, and therefore there is no guarantee regarding the competition environment.

**B. REGULATIONS**

1. Must meet WCMA safety rule regulations as outlined in
  - a. WCMA Technical Appendices
  - b. Classing rules as defined but the organizing club
2. Mud flaps are required on all rear wheels and driving wheels.
  - a. Mud flaps must cover the entire tread face of the tire and reach to within three (3) inches of the ice surface without touching the ice surface when the vehicle is static on its racing tires and in racing trim. Mud flaps must be made from a material that will effectively prevent sailing

**C. VEHICLE ELIGIBILITY**

1. Must be based on a "mass produced" vehicle
2. Meet WCMA Technical regulation SECTION 3.1 -A
3. Have Maximum weight of 4000lbs

**D. CLASSING RULES**

1. The individual organizing clubs may provide event supplementary regulations, classification definitions and tire restrictions.
  - a. These may not contravene the WCMA Sporting or Technical regulations

**SECTION 4 - OPEN WHEEL****SECTION 4.1 - OPEN WHEEL****A. DEFINITION**

An open wheel racing vehicle is defined as a purpose-built racing vehicle with 4 wheels where no more than 2 of wheels are inline having a single seat, and open wheels (no wheel or suspension fenders).

**B. FOR THE PURPOSE OF CLASSIFICATION, OPEN WHEEL VEHICLES WILL BE GROUPED INTO THE FOLLOWING CLASSES:**

1. Formula Libre
2. Formula F1600
3. Formula Continental
4. Formula Vee

**C. CLASSING**

While all new and existing competitors are expected to read the both Technical and Sporting Regulations, any competitor with question regarding how do determine their class are encouraged to email [classing@wcma.ca](mailto:classing@wcma.ca) and/or [racedirector@wcma.ca](mailto:racedirector@wcma.ca).

**SECTION 4.2 - FORMULA LIBRE****A. DEFINITION**

A Formula Libre vehicle is an open wheel purpose-built racing vehicle that does not meet Formula F1600, Formula Continental or Formula Vee requirements.

**B. REGULATIONS**

1. Firewall, floor pan, and other safety items must meet the standards described in the F1600 regulations;
  - SECTION 4.3 -D.1.c,
  - SECTION 4.3 -D.2,
  - SECTION 4.3 -D.3,
  - SECTION 4.3 -D.4,
  - SECTION 4.3 -D.5,
  - SECTION 4.3 -D.7.a,
  - SECTION 4.3 -D.7.b,
  - SECTION 4.3 -D.7.c,
  - SECTION 4.3 -D.7.i,
  - SECTION 4.3 -D.7.m,
  - SECTION 4.3 -D.7.r
2. Other components are unrestricted
3. The class designation for Formula Libre will be a letter L or the characters FL, displayed adjacent to the racing number on the sides of the vehicle.

**SECTION 4.3 - FORMULA 1600****A. DEFINITION**

F1600 is a set of specifications that prescribe the requirements for a single seat, open wheel racing vehicle using a production based Ford 1600cc of a crossflow, pushrod configuration of the type supplied in Ford Cortina GT automobiles. These vehicles will be equipped with safety equipment including firewalls, floors and other equipment described elsewhere in this set of regulations.

This class is intended to be restrictive in nature. As such, allowable modifications are only those outlined in this section of the regulations. Unless a change in specifications is stated in this section it is specifically NOT authorized. There is deemed to be no room for interpretation of these regulations by competitors or builders.

**B. ENGINE****1. General**

- a. The engine to be used in this class shall be one of the two following configurations of the Ford 1600 GT engine known as the 'Kent' pushrod, crossflow design:
- b. Original Style: Cortina 1600 GT produced through to 1970
- c. Uprated Style: Cortina 1600 GT produced from 1971 on
- d. Components will not be interchangeable between the two styles of engines unless specifically authorized in these regulations. Unless there is a specific mention of the engine style affected, all of the following regulations apply to both styles. There will be no modifications, alterations or changes allowed to any components in the engines or chassis unless specifically authorized by these regulations.
- e. The gasket face of the cylinder head may be resurfaced provided that the maximum compression ratio is not exceeded and the minimum depth of the combustion chamber is maintained.
- f. Valve guides are not restricted providing that a change in valve guide does not change the original position of the valve. Standard replacement valves with oversize stems may be used as part of normal rebuilds or maintenance. Dimensions as shown elsewhere in this rule book, must be maintained. Valve seats maybe re-cut or replaced. Valve seat angles are not restricted.
- g. All exhaust emission control equipment must be removed. This includes air pumps, associated lines and nozzles. Where the air nozzles are removed the resulting holes must be completely plugged.
- h. All moving parts of the engine may be balanced provided that this balancing does not remove more material than is necessary to accomplish the balance. All parts of the engine may be polished providing that the original shape and contour of the part is unchanged and that it can be recognized as the original part.
- i. Maximum Compression Ratio
  - i. Original Engine - 10.0 to 1
  - ii. Uprated Engine - 9.3 to 1
- j. The following allowances are made when determining the compression ratio:
  - i. Original Engine:
    1. 1.64 cc - Top ring to top of piston
  - ii. Uprated Engine:
    1. 1.33 cc - Top ring to top of piston
    2. 0.30 cc - Volume of valve protrusion
  - iii. Both Engines:
    - 4.75 cc - Head gasket

- k. Minimum Unswept Volumes:
- i. Original Engine:
    1. 44.4 cc - with standard pistons
    2. 45.1 cc - with .030 o/size pistons
  - ii. Uprated Engine:
    1. 48.2 cc - with standard pistons
2. Block
- a. The bore may be enlarged to provide clearance between the cylinder and piston.
  - b. Cylinder liners may be fitted to correct oversize piston clearance.
  - c. The top surface of the block may be surfaced to provide the maximum allowable compression ratio.
  - d. Any steel center main bearing cap may be used in place of the standard cast part.
  - e. The oil pump mounting surface may be machined to provide for the mounting of an oil pump.
  - f. The cylinder block used in Ford Pinto automobiles, Part No. DIFZ-6010-C, may be used as a replacement for the Cortina GT block. The standard Pinto lifters, Part Nos. DORY-6500-A and DIFZ-6500-A, may be used as replacements when this block is used.
3. Cylinder Head
- a. Ports may be reshaped by the removal of metal as long as the port dimensions at the manifold face of the head do not exceed those listed elsewhere in this rulebook.
  - b. Exhaust Port Dimension - 2.83 cm (1.113") Minimum cross section.
  - c. Combustion Chamber - Original Engine Only
    - i. Minimum Depth: 0.29 cm (0.115")
    - ii. Maximum Length: 8.00 cm (3.15")
    - iii. Minimum Volume/Cylinder: 7.8 cc
  - d. Reshaping of the combustion chamber is prohibited.
  - e. The standard head gasket shall be used. Head gaskets may be interchanged between styles of engines.
  - f. Ford Pinto cylinder head, Part. No. DORY-6049-B is permitted as a replacement of the Cortina GT engine.
4. Intake Manifold
- a. The ports may be reshaped through the removal of metal providing the following dimensions are maintained:  
Maximum size at head face:
- |                                   | Original Engine                     | Uprated Engine  |
|-----------------------------------|-------------------------------------|-----------------|
| Cylinder 1 & 4                    | 3.76 cm X 3.25 cm (1.48" X 1.28")   | 3.15 cm (1.24") |
| Cylinder 2 & 3                    | 3.175 cm (1.25") 3.17 cm (1.25")    | 3.17 cm (1.25") |
| Maximum Size at Carburetor Flange | 7.77 cm X 3.53 cm (3.060" X 1.389") |                 |
| Maximum Length                    | 9.65 cm (3.80")                     |                 |
| Primary Choke and Radius          | 1.80 cm (.709")                     |                 |
| Secondary Choke and Radius        | 1.99 cm (.787")                     |                 |
- b. The carburetor face of the inlet manifold may be machined to the horizontal to compensate for the tilt of the engine in a fore/aft plane.
  - c. The diameter of the ports on the uprated engine may exceed the listed dimensions providing the casting bore is untouched and in its original state.
  - d. The water passages in the inlet manifold may be plugged.

## 5. Pistons

- a. Standard 0.038 cm (.015") over size or 0.076 cm (.030") oversize pistons may be used in the original engines only. Uprated engines are required to use only standard size pistons.
- b. Pistons may be from any manufacturer but must meet all dimensions as listed in the following section and must be same material and construction as the original Ford parts.
- c. The following piston dimensions must be observed:

	Original Engine	Uprated Engine
Maximum Diameter Standard	8.10 cm (3.189")	8.10 cm (3.189")
0.038 cm (0.015") o/s	3.204"	Not Permitted
0.076 cm (0.030") o/s	8.176 cm (3.219")	Not Permitted
Depth Of Bowl (+/- 0.013 cm (.005"))	1.27 cm (0.500")	1.27 cm (0.500")
Minimum Volume Of Bowl	31.50 cc	31.50 cc
Maximum Diameter Of Bowl	5.78 cm (2.28")	5.78 cm (2.28")
Centre line Of Wrist Pin To Crown (+/- 0.005 cm (.002"))	4.41 cm (1.737")	4.41 cm (1.737")
Overall Height	8.38 cm (3.30")	8.38 cm (3.30")
Minimum Weight With Rings And Pins	573 grams	555 grams
Weight of Pin (+/- 2 grams)	115 grams	115 grams

- d. Piston rings are unrestricted as to make and material except that there must be one oil control and two compression rings on each piston and no modification is made to the piston to allow for the installation of the rings.

## 6. Valves

- a. The following dimensions must be observed:

	Original Engine	Uprated Engine
Distance Apart At Centers	3.91 +/- 0.05 cm (1.540" +/- .020")	3.91 +/- 0.05 cm (1.540" +/- .020")
Maximum Diameter Inlet	3.815 cm (1.502")	3.962 (1.560")
Maximum Diameter Exhaust	3.180 cm (1.252")	3.403 (1.340")
Overall Length Inlet	10.87 cm +/- 0.015 cm (4.280"+/- .006")	11.09 cm +/- 0.05 cm (4.367"+/- .020")
Overall Length Exhaust	10.82 cm +/- 0.015 cm (4.260"+/- .020")	11.06 cm +/- 0.05 cm (4.355" +/- .020")

- b. Reshaping the valves is specifically prohibited.

7. Camshaft
  - a. The camshaft lobe profile shall not be provided for checking purposes. The following specifications will be used to check the profile of the camshaft to determine its legality.
    - i. Lobes, heel to toe:
      1. Inlet: 3.329 cm (1.311") maximum
      2. Exhaust: 3.332 cm (1.312") maximum
    - ii. Lobes, base circle radius:
      1. Inlet: 1.371 cm (0.540")
      2. Exhaust: 1.384 cm (0.545")
    - iii. Lift at top of pushrod:
      1. Inlet: 0.586 cm +/- 0.005 cm (0.231" +/- .002") maximum
      2. Exhaust: 0.589 cm (0.232") +/- maximum
    - iv. Lift at top of spring cap:
      1. Inlet: 0.904 cm (0.356") maximum
      2. Exhaust: 0.909 cm (0.358") maximum
  - b. Reshaping of the valve stem contact pad of the rocker arm is permitted provided the maximum lift at the spring cap is not exceeded.
  - c. Offset camshaft drive dowels are permitted.
  - d. Camshaft lobe centers and profiles shall be checked using the official procedure available from WCMA.
8. Valve Springs
  - a. Valve springs and shims may be replaced with those from any source providing that no more than one spring per valve is used and standard spring caps and retainers are used.
  - b. Maximum standard cap diameter is 2.78 cm (1.096").
9. Pushrods
  - a. The following pushrod specifications must be observed for both styles of engine:
    - i. Minimum Stem Diameter - 0.635 cm (0.25")
    - ii. Overall Length - 19.41 cm (7.64") minimum
    - iii. Minimum Weight - 50 grams
10. Connecting Rods
  - a. Minimum weight (both engines) including cap, bolts and small end bushing, but not big end bearing shells: 640 grams.
11. Crankshaft
  - a. The following specifications for the crankshaft must be complied with:
    - i. Weight (minimum):
      1. Original Engine - 23lbs. 8oz. 10.6596 kg.
      2. Uprated Engine - 24lbs. 8oz. 11.1132 grams
      3. Stroke At Piston: 7.762 cm +/- 0.010 cm (3.056" +/- .004")
    - ii. Any crankshaft pulley may be used.
    - iii. The crankshaft is interchangeable between engine styles.
    - iv. The crankshaft may be shot peened.



## 12. Flywheel

- a. Flywheel weight with ring gear and dowels (minimum):
  - i. Original Engine - 18lbs.
  - ii. Uprated Engine - 20lbs.
  - iii. Machining the flywheel to achieve minimum weight is permitted. Locating dowel pins may be installed.
  - iv. The standard Ford Pinto flywheel may be substituted for the original part on either engine provided that machining to meet minimum weight regulations retains the standard profile.

## 13. Carburetor

- a. The standard carburetors as supplied on the original engines will be used. Those carburetors are as follows:
  - i. Original Engine:  
Weber 32 DFM or DFD or Holley 5200
  - ii. Uprated Engine:  
Weber 32/36 DGV or Holley 5200
  - iii. Venturi Diameter - Both Engines (maximum)
    - 1. Primary 26mm
    - 2. Secondary 27mm
- b. Any jets may be substituted provided that they may be fitted in their original positions in the carburetor without any modifications to the carburetor body.
- c. The external throttle linkage(s) may be modified.
- d. Internal or external anti-surge tubes may be fitted.
- e. Air cleaners may be removed or substituted with those of any origin and a velocity stack may be fitted instead of or in addition to these air cleaners.
- f. The choke linkage and butterflies may be removed.
- g. Carburetor gaskets may be replaced with those of any origin provided that they are the same dimension and thickness as the original part.
- h. On carburetors where the fuel inlet fitting is a swaged or press fit type, this fitting must be removed and replaced with one which is threaded. The body of the carburetor will be drilled and tapped to accept this threaded fitting.

## 14. Fuel Pump

- a. Any fuel pump may be used.

## 15. Exhaust Manifold

- a. Any Exhaust manifold may be used, provided that the outlet is no more than twenty four inches from the ground and that the system terminates no more than 6 inches past the bodywork.

## 16. Oiling Systems

- a. Oiling systems may be either wet or dry sump style, and oil pans of any origin or material may be used.

## 17. Cooling Systems

- a. Radiators, fans and water pumps may be of unrestricted origin.
- b. Any method of drive and the necessary pulleys may be used for the water pump, fan or generator.

## 18. Electrical Equipment

- a. The distributor must be the standard Motorcraft or Autolite item or one from Bosch or Lucas that can be fitted to the engine and driven by the normal camshaft gear without modification of any other component of the engine.
- b. Only the standard breaker point method of spark trigger shall be used. Electronic ignition or crank firing of the ignition is specifically prohibited.
- c. Ignition timing may only be controlled by vacuum or mechanical means within the distributor itself.
- d. Remote timing changes are not allowed.
- e. The distributor advance plate may be fixed by being soldered, welded or bolted down with suitable fasteners. The vacuum advance unit may be removed.
- f. The advance curve may be modified through the use of any advance springs.
- g. Generators and/or alternators are not required.
- h. All other electrical equipment is unrestricted in origin.

## 19. Miscellaneous

- a. The front engine cover may be modified or replaced with another of unrestricted origin.
- b. The following components may be replaced with those of unrestricted origin providing their use does not require the modification of any other engine component:
  - i. Nuts, bolts, screws, washers or any other fasteners.
  - ii. Gaskets and seals except for head, carburetor to manifold, and intake manifold to head gaskets.
  - iii. Engine bearings of the same type and size as original parts. Normal over/under sizes are permitted. Modification of the standard bearing area is not permitted.
  - iv. Spark plugs.
- c. A mechanical tachometer is permitted.
- d. The crankcase breather may be modified or removed.
- e. The rocker cover may be modified to allow for crankcase ventilation and the filler cap may be modified or replaced.
- f. The rocker cover may be replaced by one of any origin or material providing the replacement offers no function not provided by the original part.
- g. The main bearing caps may be treated with salt bath nitriding covered by SAE spec AMS 2755A (tuftriding, etc.).
- h. Any oil or lubricants may be used.
- i. Exhaust systems may be constructed of any material.
- j. The outlets of all exhaust systems must not extend more than 60 cm (23.62") beyond the rear axle centreline. The outlet must be more than 30 cm (11.81") and less than 60 cm (23.62") from the ground. All exhaust systems must end outside of any body work.
- k. Any single plate clutch may be used providing no changes to the flywheel are made other than altering the attachment points for the clutch to flywheel bolts.

**C. TRANSMISSION**

1. Any transmission may be used providing it has no more than four forward gears and an operational reverse gear.
2. Any final drive unit may be used providing that:
3. Drive shall be to the rear wheels only.
4. The differential is not modified in any way to limit its normal function. Torque biasing, limited slip or locked differentials are specifically prohibited.

**D. CHASSIS**

Sections labeled 'A' apply to vehicles built after January 1, 1986. Sections labeled 'B' apply to vehicles built prior to January 1, 1986.

1. Frame
  - a. A - The chassis must be of steel frame construction. Monocoque structures are prohibited. Stabilized (honeycomb) or composite (carbon fibre or Kevlar) materials are specifically prohibited except as authorized by specific sections of these rules.
  - b. The frame shall incorporate a roll cage structure with forward facing braces. Additional forward facing braces shall extend from the front roll hoop to the front bulkhead. The front bulkhead is the furthest for
  - c. The frame will be designed such that the soles of the competitors feet are positioned behind the forward edge of the front wheel rims. The competitor will be seated with pedals not depressed. At no time will the competitors feet move ahead of the front bulkhead.
  - d. The lower main frame rails must be a minimum of 25 cm (9.84") apart, inside dimension, from the front bulkhead to the rear roll bar hoop.
  - e. The chassis must be a steel space frame. Monocoque style frames are prohibited.
2. Crush Structure
  - a. A - There shall be a crushable structure, securely attached to the front bulkhead, with a minimum cross section of 200 sq. cm (31 sq. in.). This structure will end a minimum of 40 cm (15.74") ahead of the clutch and brake pedals, in their normal, non-depressed position. The structure will be constructed of a minimum of 18 gauge 6061-T4 aluminum or equivalent. Radiators may be a part of this structure.
3. Anti-Intrusion Devices
  - a. A - The area between the upper and lower main frame rails extending from the front roll bar hoop bulkhead to the rear roll bar hoop bulkhead must be protected from intrusion into the cockpit area by one of the following methods:
  - b. Panel(s) made of either 0.15 cm (.060") heat treated aluminum (6061-T6) or equivalent or 18 gauge steel attached to the outside of the main frame rails.
  - c. Reinforced body consisting, at minimum, of a double layer, 5 oz. bi-directional, laminated Kevlar material incorporated into this area of the body only. The Kevlar area of the body shall be securely fastened to the frame.
  - d. For either method, fasteners shall be no closer than 15.24 cm (6") on center and provide no stress bearing function. The materials used for chassis braces in this area will be at least the same dimension as the roll hoop brace material.
4. Floor Pan
  - a. A/B - A stress bearing floor pan/under tray, of a minimum 0.15 cm (.060") heat treated aluminum or 18 gauge steel, is required extending from the front bulkhead to the rear roll hoop bulkhead.
  - b. The floor pan shall not exceed 1 inch in curvature.
  - c. The sheet material may be attached to the frame by any method. These attachments must be closer than 15.24 cm (6") on centre in order to qualify as stress bearing panels.
  - d. Stabilized or composite materials may not be used for this panel.
  - e. The front roll bar hoop or dashboard; and rear roll bar hoop bulkheads may also be covered with a stress bearing panel as outlined above.
  - f. No other stress bearing panels are permitted.

5. Firewall
  - a. A/B - The firewall portion of the rear roll hoop bulkhead panel must extend the full width of the cockpit. It must extend from the lowest portion of the chassis to a height at least equal to a height of the top of the carburetor.
  - b. Forward facing openings may be made in the firewall for the purpose of delivering air directly to the engine compartment. These ducts or any others in the cockpit area must be designed in such a way as to prevent the passage of flame or other debris to the cockpit area.
6. Brackets
  - a. A/B - Brackets for mounting other components to the chassis (eg. Engine mounts, suspension mounts) may be of any material or shape and may be fastened to the chassis in any safe manner.
7. Bodywork
  - a. The bodywork opening giving access to the cockpit will have the following minimum dimensions:
    - i. Length - 60 cm (23.6")
    - ii. Width - 45 cm (17.7")
  - b. This width must extend over a length of at least 30 cm (11.8"). This opening may exist anywhere forward of the firewall. Forward facing roll bar braces and padding will not be considered in these measurements.
  - c. The competitor's seat must be capable of being entered without the manipulation or removal of any body panel.
  - d. Bodywork, including fuel tanks, will not exceed a maximum width of 95 cm (37.40"). The bodywork may not extend more than 60 cm (23.6") past the centreline of the rear axle.
  - e. Bodywork will not increase in width behind the rear axle centreline in any horizontal plane.
  - f. There will be no forward facing gaps in the bodywork except those to allow for engine cooling, engine air intake, brake and/or shock cooling.
  - g. Wings and airfoil devices which have a principal effect of creating aerodynamic downforce are prohibited. An aerofoil is defined as any device or part of a car (excluding normal and conventional styled bodywork) which has the principal effect of creating downforce. Within this definition may be included forward facing gaps or openings in the bodywork, but shall not include spoilers in the form of raised surfaces continuous with the body surface and not wider than the body surface.
  - h. A single rear spoiler may be attached and may have provision for adjustment. This adjustment may not be made from the cockpit. This spoiler may be no wider than the bodywork surface to which it is attached and may not have a forward facing gap between itself and the bodywork surface to which it is attached.
  - i. All bodywork must be firmly attached to the chassis.
  - j. No part of the bodywork or rear spoiler will exceed a height of 90 cm (35.4") from the ground. This measurement is taken with the competitor on board and the vehicle as raced or qualified. The roll bar/cage structure and the engine intake air box are not included in this measurement.
  - k. The effect of these rules is to limit the use of ground effects to achieve aerodynamic downforce.
  - l. The bottom surface of the vehicle, as licked by the wind shall not deviate more than 2.54 cm (1") in its horizontal plane at any longitudinal point behind the front axle and ahead of the rear axle. This does not mean that a belly pan is required behind the rear roll hoop bulkhead.
  - m. No aerodynamic devices, such as skirts, may extend more than 1 cm (0.39") below the lower surface of the floor pan behind the front axle.
  - n. Seat buckets and other protrusions will not circumvent this rule.
  - o. Air may not be ducted through the body or any other part of the vehicle for the purpose of providing aerodynamic downforce.

- p. All air ducted for use by heat exchangers, must pass through those heat exchangers.
  - q. Fuel filler necks, caps or lids will not protrude outside of the bodywork of the vehicle.
  - r. Fuel cell or tank vents must be located at least 25 cm (9.84") to the rear of the cockpit opening. Fuel vents may not vent through the roll bar structure.
8. Suspension
- a. The suspension system of the vehicle consists of springs, shock absorbers, control arms and other various links and swivel joints that support the vehicle through its axles. Sway bars, their links and steering components are not considered as suspension parts.
  - b. All suspension parts will be constructed of steel. Exceptions to this are hubs, hub carriers, bearings and bushings. Vehicles manufactured after January 1, 1983 must have hub carriers that are made of only steel or aluminum.
  - c. Springs must be manufactured of steel only.
  - d. Shock absorbers can be of any make or manufacturer and of any material.
  - e. Control arms and all associated parts which attach directly to the chassis must have their mounting points designed and manufactured in a manner which will prevent their intrusion into the cockpit area.
  - f. Spoilers, fairings or other devices which may exert downforce may not be attached to moveable suspension members.
  - g. If the suspension arms themselves are streamlined or of an airfoil cross section, they must be symmetrical about their horizontal axis.
  - h. All components not defined as chassis, frame or suspension may be of unrestricted origin unless specifically restricted by these rules.
  - i. Titanium may not be used for any part of the vehicle.
  - j. Brake lines may be attached to suspension components.
9. Brakes
- a. Brakes may be derived from any source providing cast iron brake calipers and rotors of ferrous material are used.
  - b. Forward facing brake cooling ducts may be installed providing they serve no other purpose.
10. Wheels
- a. Wheels may be of unrestricted origin except that:
    - i. Material is free but must be metal.
    - ii. Diameter must be 13 inches.
    - iii. Rim width is not more than 5.5 inches at the bead seat.
    - iv. Wheel covers, fans or any other method of fairing in the wheel may not be used.
11. Weight
- a. Minimum weight for the vehicles will be taken as the vehicle leaves the track following qualifying sessions or races with competitor in place and wearing all of the normal competitor's equipment. The minimum weight for the vehicles is as follows:
    - i. Vehicles with outboard suspension - 1075 lbs.
    - ii. Vehicles with inboard suspension - 1125 lbs.
    - iii. Vehicles with mixed suspension styles - 1100 lbs.
12. Tires
- a. Tires will be: Goodyear R600 slick:
    - i. Front: 20 X 6 X 13 and Rear: 22 X 7.5 X 13
13. Rain tires may be of any manufacture provided they are threaded tires and conform to the same dimensions as the slick tires.

**SECTION 4.4 - FORMULA CONTINENTAL****A. DEFINITION**

Formula Continental is a set of specifications that prescribe the requirements for a single seat, open wheel racing vehicle using a production based Ford 2000cc SOHC NE engine with a 2-venturi carburetor of the type supplied in the Ford Pinto/Mustang/Capri automobiles, or the Ford Zetec ZX3 engine.

These vehicles will be equipped with safety equipment including firewalls, floors and other equipment described elsewhere in this set of regulations.

The class is intended to be restrictive in nature. As such, allowable modifications are only those outlined in this section of the regulations. Unless a change in specifications is stated in this section it is specifically NOT authorized. There is deemed to be no room for interpretation by competitors and builders.

**B. CHASSIS**

1. The chassis shall be of tubular steel construction. Monocoque chassis construction is prohibited.
2. Stress bearing panels are defined as sheet metal affixed to the frame by welding or bonding or by bolts screws or rivets located closer than 155.4mm center to center.
3. Cars shall have a complete metal floor within the Driver Compartment which shall be a stressbearing panel, rigidly supported, and of adequate strength. Its curvature shall not exceed 25.4mm.
4. The mountings for brake and clutch pedals and cylinders, and for the instrument panel and the bulkhead behind the driver may be stress bearing. No other stress bearing panels including body panels are permitted.
5. Cars shall have a protective bulkhead of non-flammable material between the driver and the engine compartment capable of preventing the passage of fuel or flames in the case of a fire.
6. Gaps shall be sealed with a fireproof material.
7. AERFOILS AND SPOILERS
8. See drawing and table of dimensions herein (Section 4.3.X WCMA Technical Regulations)
9. AEROFOIL
10. Any device or part of a car (excepting normal and conventional styled bodywork), which has a principal effect of creating aerodynamic downforce. Within this definition should be included forward facing gaps or openings in the bodywork, but will not include spoilers in the form of raised surfaces continuous with the body surface and not wider than the body surface. It is not permitted to mount aerofoils on unsprung parts of the car.
11. SPOILER
12. Any device (splitter, trim tab etc.) other than an aerofoil, added to a car to divert airflow to create an aerodynamic advantage.
13. No part of the safety rollover structure higher than 900mm from the ground shall be shaped so as to have an aerodynamic influence by creating vertical thrust.
14. It is not permitted to construct any suspension member in the form of an asymmetrical aerofoil or to incorporate a spoiler in the construction of any suspension member. Symmetrical streamlining of suspension members is permitted.
15. All cars built after January 1, 1986 shall conform to the “flat bottom” regulation, requiring that, between the rear edge of the complete front wheels and the front edge of the complete rear wheels, all sprung parts of the car visible from directly beneath the car shall lie in one plane with a tolerance of +5mm. All of these parts shall produce a uniform, solid, hard rigid (no degree of freedom in relation to the body/chassis unit) impervious surface, under all circumstances. The periphery of the surface formed by these parts may be curved upwards with a maximum radius of 50mm. No part having an aerodynamic influence and no part of the coachwork may under any circumstances be located below a geometrical plane generated by the plane surface designated above.

**C. BODYWORK**

1. See Section 4.3.X of WCMA technical Regulations Contained herein.
2. All cars shall be fitted with bodywork including a driver compartment isolated from the engine, wet batteries, gearbox, transmission shafts, brakes, road wheels, fuel tanks, oil tanks, water header tanks and catch tanks.
3. All cars shall have positive and secure fastenings for all bodywork and detachable parts.
4. Skirts, bridging devices or any form of aerodynamic device between the chassis/coachwork and the ground are prohibited. Any specific part of the car influencing its aerodynamic performance shall comply with rules relating to coachwork, be rigidly secured in the entirely sprung part of the car, and remain immobile in relation to the car.

**D. SUSPENSION**

1. All parts shall be of ferrous material, with the exception of hubs, hub adapters, hub carriers, bell cranks, pivot blocks, bearings and bushings, spring caps, abutment nuts, antiroll bar links, shock absorber caps bolts and nuts.
2. Springs shall be of steel.

**E. BRAKES**

1. Calipers and rotors shall be of ferrous material.

**F. SHOCK ABSORBERS**

1. Shock absorbers shall have bodies of steel or aluminum alloy.

**G. STEERING**

1. Steering is unrestricted.

**H. WHEELS**

1. Wheel diameter is 13in with maximum front width of 6in and rear of 8in.

**I. CATCH TANKS**

1. Oil catch tanks shall be fitted to the engine and crank case breathers venting to the atmosphere in such a way as to prevent oil from spilling on the course. Required minimum capacity is 1 litre.
2. Catch tanks shall be made of either a translucent material or include a transparent panel or gauge in order to facilitate checking its contents. Catch tanks shall be readily capable of being emptied.

**J. FUEL SYSTEM**

1. Though not required it is recommended that all cars be required to be fitted with a WCMA approved fuel cell. Other jurisdictions may specify a fuel cell.
2. The maximum capacity shall be 41.00 litres.
3. Fillers and caps shall not protrude beyond the bodywork or be situated within the driver compartment. The cap shall have an efficient locking action.
4. Air vents shall be at least 250mm to the rear of the cockpit and shall be fitted with an anti spill check valve.

**K. WEIGHT**

1. The minimum weight, including driver and required safety equipment shall be 540kg (1190 lbs).

**L. MISCELLANEOUS**

1. The use of titanium is prohibited.
2. The use of composite materials using carbon and/or Kevlar reinforcement is prohibited, except in cases of deformable crash structures.
3. The use of magnesium for bulkheads is prohibited.

**M. STARTER**

1. Cars shall be equipped with a self starter

**N. PERMITTED ENGINES**

1. The Permitted Engines shall be:
  - a. The Ford NE series, 2-litre SOHC engine
    - i. Ford NE blocks shall contain casting number HM6015BA, HM6015AA, HM6015BB, HM6015AB, HM6015DA or HM6015AD.
    - ii. The nominal dimensions will be: bore 90.84mm and stroke 76.95mm.
    - iii. Production tolerances are permitted providing the total swept volume does not exceed 2000cc.
  - b. The Ford Zetec ZX3
    - i. Ford Zetec ZX3 blocks with block numbers #RFYS4G6015AA, or #RFYS4G6015AD or #RFYS4G6015AE are permitted

**O. FORD NE SERIES ENGINES**

The Ford NE series engine shall conform to the following specifications and may be modified only as specifically allowed. If these specifications do not explicitly allow a modification, then it may not be done.

1. Cylinder Head (Including valves, valve gear & camshaft)
  - a. It is permitted, as a means of repair, to replace damaged seats by replacement cast iron valve seat inserts, and valve guides may be replaced with cast iron or bronze, all to standard dimensions.
  - b. Non-standard camshaft covers are permitted providing they in no way improve the performance of the engine. Water passages are not permitted in the cam cover.
  - c. Standard valve spring retainers shall be used. Only single valve springs are permitted.
  - d. Shims are permitted. Valve springs are otherwise unrestricted.
  - e. Camshafts must be from Ford Motor Company, or Crower Part # E-57553 FF2000.
  - f. An alternate optional camshaft, Elgin part # 2000FC, may be used.
  - g. The rockers shall remain entirely unmodified. They shall be fully manufactured and ground as supplied by the Ford Motor Company. Alternate manufactures may be used as long as the original materials and dimensions remain the same as OEM.
  - h. Regrinding camshaft lobes is permitted as long as the camshaft lobe center is  $122^\circ \pm 2^\circ$ .
  - i. Tuftriding or Parkerising is permitted.
  - j. The key/keyway in the camshaft pulley may be offset. Alternately an adjustable camshaft sprocket which retains the same number of teeth and pitch with the stock sprocket may be used.
  - k. Maximum valve lift at determined points by camshaft rotation will be determined with zero tappet clearance. Either standard springs or substitute low rate springs may be used at the scrutineers' discretion.



m. The following table gives the valve lift in mm, angle measured from point of max lift.

i. Standard Camshaft

Angle	Inlet		Exhaust	
	Opening	Closing	Opening	Closing
0	10.442	10.442	10.442	10.442
5	10.360	10.360	10.360	10.360
10	10.110	10.110	10.110	10.110
15	09.690	09.690	09.690	09.690
20	09.110	09.110	09.110	09.110
30	07.450	07.450	07.450	07.450
40	05.170	05.170	05.170	05.170
50	02.590	02.580	02.580	02.590
60	00.860	00.810	00.810	00.860
70	00.540	00.430	00.430	00.540
80	00.370	00.190	00.190	00.370
90	00.200	00.010	00.010	00.200

ii. Alternate Camshaft

Angle	Inlet		Exhaust	
	Opening	Closing	Opening	Closing
0	11.182	11.182	10.149	10.149
10	10.853	10.821	9.831	9.829
20	9.821	9.721	8.854	8.826
30	8.177	7.955	7.205	7.154
40	5.960	5.624	4.920	4.866
50	3.425	3.010	2.346	2.380
60	1.278	0.994	0.722	0.825
70	0.344	0.307	0.385	0.524
80	0.134	0.130	0.224	0.404
90	0.022	0.024	0.090	0.279

n. Valves may be of Ford manufacture or Ferrea part numbers VSOIN200 and VSOEX2000.

- i. No reprofiling or polishing is permitted.
  - ii. The original 45-degree seat angle shall be retained.
  - iii. Regrinding the seat face within service limits, as defined in the Ford Service Manual, is permitted. The distance between the valve centres and the angles of the valves shall not be altered.
  - iv. Maximum face diameter inlet: 42.20mm
  - v. Maximum face diameter exhaust: 36.20mm
  - vi. Overall length inlet: 111.15mm (+/-0.5mm)
  - vii. Overall length exhaust: 110.55mm (+/- 0.5mm)
  - viii. Maximum valve stem diameter 8.40mm
- o. It is permissible to reshape inlet and exhaust ports by removal of metal within limits. Addition of material in any form is prohibited. Maximum port dimension at manifold head face: inlet diameter 39.5mm, exhaust 35.5mmx27mm.
- p. An external oil drainpipe from the cylinder head is permitted. The fitting of a union by drilling and tapping is permitted.

## 2. COMPRESSION RATIO

- a. The maximum compression ratio will be controlled as follows:
  - i. Minimum cylinder head combustion chamber volume 49cc (not including head gasket). Polishing and/or tooling of the cylinder head to achieve only the required combustion chamber volume is permitted.
  - ii. Standard Ford gasket; minimum thickness 0.90mm, minimum diameter of cylinder aperture 92.00mm.
  - iii. Pistons shall not protrude above cylinder head surface at TDC.

## 3. PISTONS

- a. The following combinations are permitted, unmodified in any way except for balancing as detailed herein.
  - i. Mahle piston P/N 80HM6102LA with rings, pin and connecting rod with bolts, without bearings. Minimum weight = 1332.50 grams
  - ii. Mahle piston P/N 85HM6102DA with rings, pin and connecting rod with bolts, without bearings. Minimum weight = 1240.00 grams.
  - iii. Note: This piston may have either casting #90V108 or #90V118.
  - iv. JE piston P/N M-6102-B200 with rings, pin and connecting rod with bolts, without bearings. Minimum weight = 1240.00 grams.
  - v. AE Hepolite piston P/N 21426 with rings, pin and connecting rod with bolts, without bearings. Minimum weight =1240.00 grams.
  - vi. CP piston P/N IV 2.0 LTR with rings, pin and connecting rod with bolts, without bearings.
  - vii. Minimum weight = 1240.00 grams.
- b. Piston rings are unrestricted provided that:
  - i. One oil control and two compression rings are used.
  - ii. No modification is made to the piston for the installation of the rings.
- c. To achieve balance, material may be removed from the internal surfaces at any location below the lowest point of the gudgeon pin.
- d. All external surfaces, dimensions and profiles shall remain standard with the exception of the top surface of the piston crown, which may be subject to simple machining to achieve balance and the objectives of 6.14.c.i.3.

## 4. CONNECTING RODS

- a. Connecting rods may be standard Ford, Cosworth, Oliver or Crower. The approved Crower part numbers are SP93230B- or SP93230PF-4. Any rod bolts may be used. Floating piston pins may be used. Standard rod length must be 5.00 inches (+0.005" - 0.010" )
- b. Tuftriding, Parkerizing, shot-peening, shot-blasting and polishing are permitted.
- c. It is permitted to radius the area around the big end retaining bolt heads and nuts. Big end bolts P/N 905500 are permitted.

## 5. CRANKSHAFT

- a. A standard crankshaft shall be used. Spot machining, to achieve balance is permitted. Tuftriding, Parkerizing, shot-peening, shot-blasting and polishing are permitted. Crankshaft minimum weight is 12.5kg (27.5lb).
- b. It is not permitted to alter the number of bearings or fit bearings of less than standard production width.
- c. Standard oversize and undersize bearings are permitted. This does not allow reducing the bearing surface by reducing the width of standard bearings.

**6. CYLINDER BLOCKS**

- a. It is permitted, as a means of repair, to replace damaged cylinder bores with cast iron cylinder liners, all to standard dimensions.
- b. Localized machining of the cylinder block is permitted to allow fitting of the dry sump system.
- c. The crank case breather may be altered or removed, but all breathers shall discharge into a catch tank directly or indirectly.
- d. The cylinder block may be machined to establish correct deck height.

**7. GENERAL ENGINE**

- a. Engines shall be mounted upright and aligned fore and aft in the chassis.
- b. The addition of any material be it metal, plastic or composite, etc. by any means be it welding, bonding, encapsulation, or encasement to any component is prohibited. However specific repairs of castings may be allowed with the written approval of the WCMA Chief Scrutineer.
- c. Balancing of reciprocating and rotating parts is permitted only by removal of material from locations so provided by the manufacturer.
- d. Pump, fan and generator (alternator) drive pulleys and their retention bolts, washers and belts are unrestricted.
- e. Mechanical tachometer drives may be fitted.
- f. Generators or alternators are optional.
- g. The use of non standard replacement fasteners, nuts, bolts, studs, screws and washers which are not connected with or which do not support any moving parts of the engine or its compulsory retained accessories is permitted.
- h. The use of thread locking compounds is permitted.
- i. Gaskets are unrestricted except for cylinder head and carburetor to inlet manifold gaskets, which shall be standard Ford manufacture for the engine, and inlet manifold to cylinder head gasket which shall not exceed a thickness of 1.1mm.
- j. Any process of cleaning may be used providing the surface finish, on any component, which shall remain standard, is not affected.
- k. Only modifications and additions specifically covered in these Regulations are permitted.
- l. Engine components not covered by these Regulations shall remain absolutely standard and unmodified. In cases of dispute on engines, references will be made to Ford Company manuals.

**P. FORD NE SERIES INDUCTION**

1. A single carburetor shall be used on a standard inlet manifold.
  - a. Carburetor types
    - i. Webber 32/36 DGV, DFAV or DGAV:
      1. Number of main ventur 2
      2. Max diameter of main ventur 26.0/27.0 mm
      3. Max diameter of carb outlet to inlet manifold 32.0/36.0 mm
    - ii. Holley 32/36 Carburetor
2. Forced induction is prohibited
3. The air cleaner may be removed or replaced with a trumpet fitted.
4. It is permitted to change jets, open both throttles together, remove cold start devices and diffuser bar, fit internal and external anti-surge pipes, and remove seals on emission control carburetors.
5. No other modifications are permitted. Chokes shall remain standard and no polishing or reprofiling is permitted.
6. Carburetor with the swaged fuel inlet fitting shall be replaced by drilling and tapping the carburetor body for a threaded fitting.

7. Any means of reducing intake air temperature is prohibited. Fresh air intakes are permitted.
8. Any form of water injection is prohibited.
9. Flexible mounts for the carburetor may be incorporated providing they do not exceed a maximum of 25.4mm from face to face.
10. Only the standard inlet manifold may be used. The ports may be reshaped by the removal of metal as long as the following dimensions are maintained:
  - a. Maximum size at head face 36.50mm
  - b. Maximum size at carburetor flange 86.50mm x 40.55mm
11. The carburetor seat face may be machined to horizontal in the fore aft plane. The diameter of the ports may exceed the above dimensions if the casting bore is untouched and in its original state. The water passages in the inlet manifold may be blanked off or plugged.
12. Holes in the inlet manifold resulting from the removal of emission/vacuum lines shall be plugged.
13. The manifold may be machined externally sufficiently to clear the throttle mechanism case of both throttles being opened together.
14. All cars shall be equipped with two external throttle springs for positive throttle closing in addition to those provided by the carburetor manufacturer.

#### **Q. FORD NE SERIES EXHAUST**

1. The exhaust system and manifold are unrestricted, within these Regulations.
  - a. It shall be isolated from the driver compartment.
  - b. It shall have no part protruding laterally beyond the plane through the outer edge of the front and rear wheels.
  - c. It shall have no part extending rearwards beyond the wing.
  - d. The exhaust outlet shall be within 300mm and 600mm from the ground.
  - e. All exhaust tail pipes shall terminate outside the bodywork.

#### **R. FORD NE SERIES LUBRICATING SYSTEM**

1. The lubricating system is unrestricted. Existing standard production oil ways, linings or oil grooves may be enlarged or reduced but no additional ones are permitted.
2. Localized machining of the cylinder block is permitted to allow fitting the oil pump.
3. Dry-sump is permitted, oil coolers are unrestricted.

#### **S. FORD NE SERIES COOLING SYSTEM**

1. A liquid cooling system is mandatory but radiator and water pump are unrestricted.
2. The radiator, if housed in or incorporating a cool air scoop or deflector, shall comply with bodywork regulations.

#### **T. FORD NE SERIES FUEL PUMPS**

1. Fuel pumps are unrestricted.
2. Fuel pipes and fittings are unrestricted. Fuel cooling radiators are permitted and shall be mounted within the chassis frame.

#### **U. FORD NE SERIES DISTRIBUTOR**

1. Distributors are unrestricted providing they retain the original drive and location.
2. The distributor is defined as the component that triggers the LT, and distributes the HT, current. The ignition timing may only be varied by vacuum and/or mechanical means. It is prohibited to use any other method or component to trigger, distribute or time the ignition.

**V. FORD NE SERIES FLYWHEEL AND CLUTCH**

1. The flywheel shall be a standard component or the approved alternate Eliet-001. The minimum weight with ring gear is 4.762kg (10.5lbs). The flywheel may be machined to achieve minimum weight. Spot machining to achieve balance is permitted. Flywheel bolts are free and locating dowels are permitted. A 1600 GT starter ring may be fitted.
2. Any single plate clutch assembly may be used provided that no modifications are allowed on the flywheel other than changing the points of attachment of the clutch to the flywheel.
3. Carbon Fibre clutches are not permitted.

**W. FORD ZETEC ENGINES**

The Ford Zetec ZX3 engine shall conform to the following specifications and may be modified only as specifically allowed. If these specifications do not explicitly allow a modification, then it may not be done. The philosophy of the Zetec engine in FC is to allow limited engine rebuilds but no performance modifications to the engine. Blue printing, balancing, head porting, polishing, etc. are strictly prohibited and against the spirit of the Zetec formula. Where Ford part numbers are specified, normal industry part number supersession is expected and the superseding part numbers are automatically included.

1. The cylinder head may not be ported or polished. Machining the cylinder head is not permitted except as specified in these rules. A standard three- angle "production" valve job is required and the only allowed angles are those defined in the Ford factory manual. The intake valve seats must be 30° 45° 70° with the 45° face a minimum 1.5 mm wide. The exhaust valve seats must be 30° 45° 55° with the 45° seat 1.5 mm wide minimum. Valve seats and guides may be replaced providing that they remain in the original stock locations. The camshaft, valves, springs, and shim/bucket components must be original Ford parts and may not be modified in any way. Only original unmodified Ford parts may be used for direct replacement. The camshafts must remain as ground by Ford; no polishing is permitted. The head may not be surfaced or milled beyond the minimum thickness of 5.230" measured between the cam cover seating surface and the lower plane of the head. Only the Ford #RFYS4E6090AC or RFYS4E6090AD head is allowed. The only allowed camshafts are the Ford #L913B YSAA intake and #L913B C2B exhaust. The original, unmodified Ford camshaft and crankshaft timing pulleys must be used. Required camshaft timings are as follows:
  - a. Intake centerline 116-117 degrees ATDC
  - b. Exhaust centerline 106-107 degrees BTDC
2. Only original Ford or Sealed Power H872cp pistons may be used. Crankshaft, and rods may be replaced only with standard original Ford replacement parts. The crankshaft, rod and main bearing journals may be reground or polished for the purpose of installing oversize main or rod bearings. The big end of the connecting rod may be honed to fit .002 inch larger rod bearings. Connecting rod bearings may be replaced with unmodified bearings which are specifically designated for use in this engine. The required original crankshaft main bearing journal dimension is 2.282-2.283 inches and the required original crankshaft rod journal dimension is 1.846-1.847 inches. The corresponding main journal dimensions for oversized bearings are either 2.273-2.274 inches or 2.263-2.264 inches; the corresponding rod journal dimensions for oversized bearings are either 1.837-1.838 inches or 1.827-1.828 inches. The crankshaft centerline to deck dimension is 8.378 inches and may not be altered. The main bearing housing bore is 2.452-2.453 inches and the rod housing bore is 1.9642-1.9650 inches. Only original Ford rod bolts with a minimum weight of 24.6 grams or ARP rod bolts with a minimum weight of 23.5 grams may be used.

3. Only original stock Ford replacement piston rings (part number 2S4Z6148AA) or Hastings Rings (part number 2M4887 Std) may be used. The ring end gaps may not be altered and must remain as manufactured. All of the rings must be installed including the complete oil scraper assembly. The piston bore may be honed solely to allow piston ring seating. The first and second compression rings must be installed in the positions designated by the manufacturer.
4. All surfaces on the head, block, rods, pistons, and crankshaft must remain as manufactured by Ford and may not be altered in any way unless specifically provided for in these rules. The original casting marks and cast surfaces must remain as-cast and also meet all of the Ford design values and tolerances as stated in the Ford factory manual or as delineated in these specifications. The block may not be decked. Only Ford Zetec ZX3 blocks with block numbers #RFYS4G6015AA, or #RFYS4G6015AD or #RFYS4G6015AE are permitted. The blocks may be sleeved however all bore tolerances must remain stock or as otherwise provided for in these rules. The required compression ratio is 9.6:1, the required standard bore is 3.3390–3.3420 inches and the required stroke is 3.461 +/- .004 inches. The maximum bore dimension of 3.3420 inch is intended to allow for cylinder wear only. It is not permitted to machine to this dimension. This measurement will be taken .250 below the block deck where the bore is untouched by the piston ring.
5. Flywheel: The minimum weight is 8.0 lbs. and any weight removal from the specified flywheel must come from the clutch plate surface. The friction and clamping force surface of the flywheel may be resurfaced. Only the Quarter Master #QM107160 flywheel may be used. It is permitted to install a new ring gear on the flywheel.
6. Any 7¼ inch single plate or double plate, non-carbon fiber clutch is allowed.
7. Any oil pan is allowed. The oil pan may not contain an oil scraper between the oil pan and the block. No device in the oil pan may be contoured to the crankshaft assembly to function as an oil scraper nor may any device be closer to the rotating crankshaft assembly than 0.500 inches.
8. Any three-stage oil pump with a maximum of two scavenge stages is allowed. The maximum scavenge rotor dimensions are 1.600 inches in diameter and 1.375 inches in length. The maximum pressure rotor dimensions are 1.600 inches in diameter and 0.863 inches in length.
9. The exhaust system manifold tubing OD must be 1.5 inches (as measured 1 inch or more from the face of the head) and the manifold tubes must be a minimum of 24 inches in length and must terminate into a single exhaust pipe through a 4 into 1 collector. The collector angles must be the standard 15 degree bend, (30 degree included angle) with an exit diameter of 2 inches. The tail pipe must be a minimum of 24 inches in length. The tail pipe includes a muffler, if present, as long as the inlet and outlet pipes of the muffler are the same diameter as the tail pipe. 4 into 2 into 1 exhaust collectors or reduced diameter venturi sections are prohibited.
10. ECU: The Pectel T2 or the Performance PE-3 unit is required. The current specification SCCA Club map or 2013 Pro map as published by SCCA is required. The SCCA Club and 2013 Pro map are available on the SCCA website.

11. Intake manifold and fuel injection components: The Quicksilver Race Engines (QSRE) intake air scoop, intake manifold, throttle bodies, air horns, fuel rail, injector system, pressure regulator and carbon fiber air scoop with filter are required and must be used with no modifications of any kind unless specifically provided for in these rules. (Due to the aging of the air scoops alternative means of securing the filter will be permitted which may include modifications to the debris tube and other mounting hardware. The air scoop however must have a minimum .430 inch operable air bleed at its rear most point.) The only allowed intake manifold and throttle body combination is the #0138 manifold available through QSRE. Only 19 pound fuel injectors may be used and they may not be modified in any way. Fuel injectors may be replaced only with stock Ford injector part number #0280155887 XS4U-AA or Accel injector part number ACC150819.
12. Intake restrictor must meet FPIR specifications: The QSRE #1975 intake restrictor must be used and may not be modified in any way. The restrictor internal diameter is 1.340. The restrictor is to be placed between the air scoop mounting flange and the intake manifold.
13. Engines will be mounted and aligned fore and aft in the chassis
14. The addition of material by any means to any component is prohibited
15. Non-standard rocker covers are permitted providing they in no way improve the performance of the engine.
16. Oil coolers are unrestricted.
17. A liquid cooling system is mandatory, but radiators are unrestricted. The stock water pump may be modified; electric water pumps are prohibited.
18. Fuel pump is unrestricted.
19. Gaskets and seals are unrestricted except for
  - a. cylinder head gasket, Ford part number XS7Z6051CA or Victor Reinz part number 54502
  - b. a continuous o-ring of cross-section of 0.100 inches must be fitted to each intake runner groove between the intake manifold and the head which to ensures that no air by-passes the o-ring seal
20. Pump, fan, and generator drive pulleys are unrestricted.
21. The use of non-standard replacement fasteners (nuts, bolts, screws, studs, and washers) which are not connected with or which do not support the intake manifold or any moving parts of the engine are permitted.
22. Any tapered seat 14mm x 25mm (.984 inch) reach spark plugs may be used.
23. Ford OEM coil P/N 988Z12029A or any other single OEM type replacement coil is allowed.

#### **X. TRANSMISSION**

1. The gearbox shall contain not more than four forward gears and include an operable reverse gear, capable of being engaged by the driver whilst normally seated. The ratios are unrestricted.
  - a. The use of an automatic or sequential gearbox is prohibited.
  - b. Electronic assist gear change mechanisms are prohibited.
  - c. Gearboxes with shafts that are transverse to the longitudinal axis of the chassis are prohibited. The sole exception are the gearbox final drive (crownwheel) shaft axis and the final drive shafts (halfshafts). All change gears shall be located in the case aft of the final drive.
2. Only rear wheel drive is permitted.
3. The final drive ratio is unrestricted.
4. The differential shall not be modified in any way to limit its normal function. Torque biasing, limited slip and locked differentials are prohibited.
5. Electronically controlled differentials are prohibited.

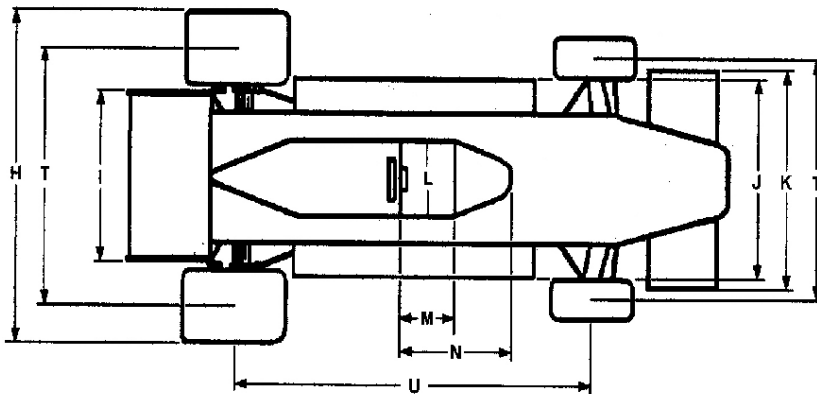
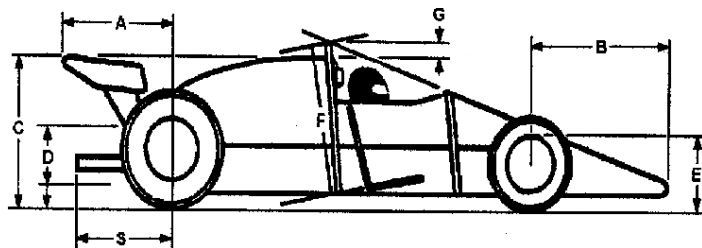
**Y. DIAGRAM AND DIMENSIONS**

## 1. Notes

- a. Maximum height of the car is measured with the driver aboard.
- b. Maximum height excludes the roll cage on which there is no maximum height.

## 2. Dimensions

- a. Refer to drawing - FC diagram and dimensions
- b. All dimensions are in millimetres.
  - i. Maximum rear overhang from rear wheel axis 800
  - ii. Maximum front overhang from front wheel axis 1000
  - iii. Maximum height measured from the ground: 900
  - iv. Exhaust height measured from ground 300 to 600
  - v. Max height of any aerodynamic device ahead of front wheels: Rim height
  - vi. Minimum main roll bar height in line with drivers spine 920
  - vii. Minimum allowed helmet clearance: 50
  - viii. Maximum width: 1850
  - ix. Maximum rear aerofoil width (includes end plates) 950
  - x. Maximum Body width behind front wheels 950
  - xi. Maximum nose width: 1350
  - xii. Minimum cockpit coachwork opening: 450
  - xiii. Minimum cockpit coachwork parallel opening length: 300
  - xiv. Minimum cockpit overall opening length 600
  - xv. maximum exhaust length from rear wheel axis: 800
  - xvi. Minimum track: 1200
  - xvii. Minimum wheelbase 2000
  - xviii. Minimum ground clearance None





**SECTION 4.5 - FORMULA VEE****A. DEFINITION**

A Formula Vee vehicle is a single-seat, open-wheel race vehicle based on standard Volkswagen 1200 series Type 1, U.S. or Canadian model sedan (imported by VW) components. All vehicles must comply with the applicable current WCMA regulations as well as the following rules.

No component of the engine, power train, front suspension, or brakes may be altered, modified, or changed, nor be of other than VW manufacture, unless specifically authorized by these rules.

External surfaces of the suspension, brakes, and transmission/rear axle may be painted, plated, or anodized.

**B. WEIGHT AND DIMENSIONS**

1. Minimum Race Weight, including competitor - 1075 lbs.(488.6 kg)
2. Wheelbase - 207 cm to 212 cm (81.5" to 83.5")
3. Front track - Standard VW 51.7" / 131 cm (no spacers, shims or adapters)
4. Rear track - 126 +/- 1.5 cm (49.5" +/- 0.5")
5. Length - (including exhaust) 312 cm to 323 cm (123" to 127")
6. Body depth at firewall - 63.5 cm (25")

**C. SUSPENSION**

1. The front suspension and steering shall be standard VW Sedan as defined herein, or an exact replica of the same material and dimensionally identical. The following modifications are allowed:
  - a. Removal of one torsion bar is permitted.
  - b. The use of any anti-sway bar(s), mounting hardware, and trailing arm locating spacers is permitted.
  - c. The use of any shock absorber which can be mounted directly on the standard mounts is permitted. Spring shocks (coil-overs) are prohibited.
  - d. Relocation of the steering gearbox to any position, utilizing an appropriate mounting structure, and replacement of the tie rods is permitted.
  - e. The steering column may be altered or replaced and any steering wheel may be used.
  - f. The use of any desired Pitman arms is permitted.
  - g. Standard steering arms may be altered or replaced and speedometer cable hole may be plugged. No other modification of the wheel spindle is permitted. Non-VW replacement spindles shall maintain the same bearing dimensions and locations and shall maintain the geometric relationship between the spindle and the king pin bore and boss. Wheel tethers are recommended. If wheel tethers are used, a hole may be drilled in the spindle for the purpose of attachment.
  - h. Modification of the standard front torsion bar(s) is permitted.
  - i. The rubber portion of the bump stop and any portion or all of the bump stop horn may be removed up to its base at the beam upright. Caster and toe in/out settings are unrestricted. Clearancing of carrier or trailing arm to eliminate binding is permitted. Offset suspension bushings are permitted.
  - j. Front end ride height adjusters may be used provided they are not adjustable from the cockpit.
  - k. No structure, item or component (including battery) other than bodywork, can protrude further than ten (10) inches from the lower axle beam tube. Any item protruding further than eight (8) inches must include a vertical safety plate. This plate must be constructed of no less than .060" 6061-T-6 aluminum or no less than 16 gauge steel. The plate shall have a minimum frontal surface area of 42 square inches, and shall have a height of not less than four (4) inches and a width of not less than six (6) inches. The plate may have no more than 1/2 inch curvature or deflection from the horizontal or vertical plane, and shall be attached to the chassis (frame) at all four corners. The lower braces shall not exceed a 15-degree upward angle when measured from the horizontal plane of the lower frame tubes.

- l. If a vented lead acid battery is mounted in front of the axle beam, it shall be encased in a marine type container.
- m. It is recommended that the front cavity of the nose be filled with foam to aid in impact absorption.
- n. The rear axle assembly shall be standard VW Sedan as defined herein with axle location provided by a single locating arm on each side. The rear axle tube may be rotated about its axis. Coil spring shall provide the primary springing medium, with telescopic shock absorber mounted inside the springs. Optionally, the use of a mono-shock system attached within the bodywork and attached through a bracket mechanism to the rear axle tubes is permitted. If a mono-shock system is used, then the original spring/shock assemblies will be removed. Cables, straps, or other positive stops may be used to limit positive camber. An anti-roll bar or camber control device may also be used. When said anti-roll bar or camber control device is removed, the required coil springs must continue to perform functionally.
- o. Wheels shall be steel, 55mm (14in) by 152mm (6.0in), and a minimum weight of 5.44 kg (12lbs) each. Wheels may be balanced only by the use of standard automotive balance weights (adhesive or clip-on). Hub cap clips shall be removed. Wheel bolts may be replaced by studs of equal strength, permanently installed in the brake drum.
- p. The Spec tire is Falken RT615K in size 195/60R14, Yokohama A032RH in size 185/60R14.

#### **D. BRAKES**

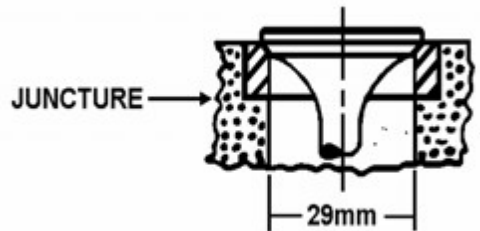
1. Brake drums, backing plates, and wheel cylinders shall be standard VW Sedan as defined herein, or an exact replica of the same material and dimensionally identical. Ribbed type rear brake drums (Part No. 113-501-615D or F) may be used in place of the 1200 series rear brake drums.
2. These vehicles shall be equipped with a dual brake system operated by a single pedal. In the case of leak or failure at any point in the system, effective braking power shall be maintained on at least two wheels. Any master cylinder(s) may be used.
3. A separate hand brake (emergency brake) is not required. Removal of the hand brake and operating mechanism is permitted.
4. Two 5/8" holes may be drilled in each backing plate to provide adjustment of brakes. These holes shall not be used for any other purpose.

#### **E. ENGINE**

1. The engine shall be a standard VW power plant as normally fitted to VW Sedans as defined herein. Any engine part(s) listed by the manufacturer (VW) as current, superseding, replacement parts for the standard VW 1200 Series, Type-1, U.S. and Canada model Sedan and interchangeable with the original parts may be used.
2. Engine components must be assembled in standard configuration. Exceeding the wear limits specified in the VW manual or other VW guides is not prohibited provided that tolerances, dimensions, and specifications stated herein are met.
3. The engine transmission shall be mounted in the chassis with the transmission to the rear.
4. Turbocharging is prohibited.
5. The following component parts may be replaced with that of other manufacture, provided the replacement part is of the same material, is dimensionally identical, and meets all other tolerances and specifications stated in these regulations
  - a. Engine case
  - b. Cylinder heads
  - c. Cylinders (an O-ring for centering is permitted).
  - d. Pistons and wrist pins (minimum combined weight without clips or piston rings: 330.0 grams)
  - e. Piston material shall be cast aluminum with steel inserts.

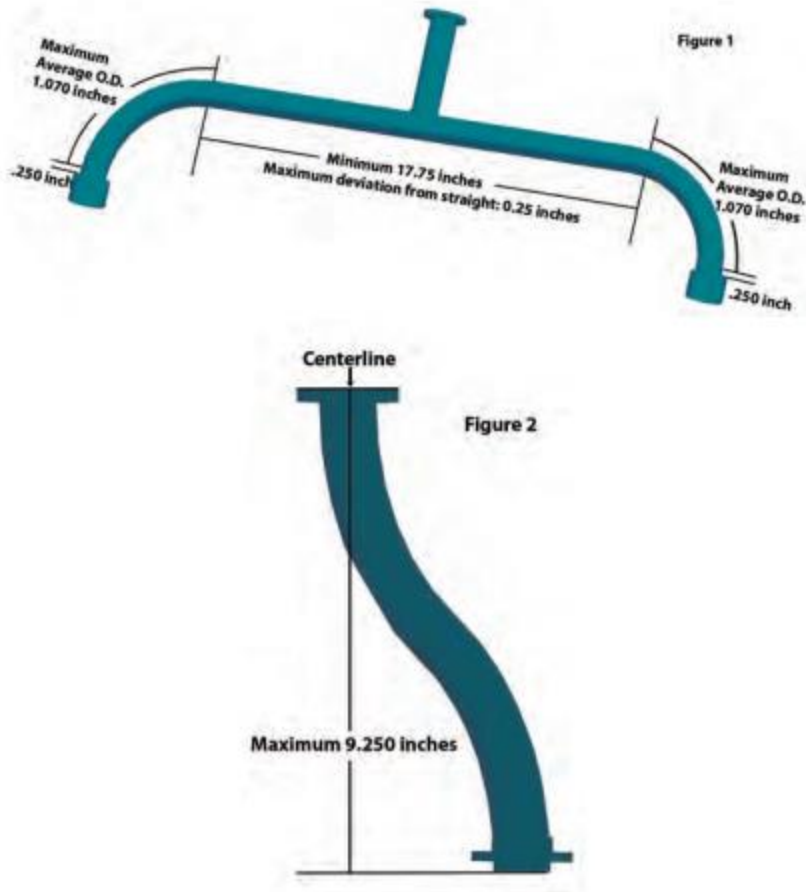
- f. Maximum distance from bottom of wrist pin bore to top of #1 (top) compression ring groove: 1.655 inches (20 mm wrist pin bore assumed).
  - g. Width of #1 and #2 (compression) ring grooves: .100 +.003 inches or -.023 inches (2.0-2.5mm nominal).
  - h. Width of #3 (oil) ring groove: .158 +/- .003 inches (4.0mm nominal).
  - i. Wrist pin offset from centerline: .059 +/- .005 inches.
  - j. Eccentricity of piston below the oil ring groove: .012 +/- .008 inches. Eccentricity shall be defined as the difference between the largest diameter and smallest diameter measured at the same distance from the crown of the piston and below the oil ring groove.
  - k. Cam followers (minimum weight: 60.0 grams)
  - l. Connecting rods with bolts and small end bushing (minimum weight: 425.0 grams)
  - m. Oil cooler
  - n. Oil pump (exact replica of any standard VW oil pump)
  - o. Ignition points or drop-in ignition triggering module (e.g. Pertronix)
  - p. Distributor
  - q. Distributor cap
  - r. Fuel pump (Any standard type VW pump which can be fitted without modification to any other part)
  - s. Crankshaft (minimum weight 16 lbs. (7.272 kg)
  - t. Crankshaft gear
  - u. Flywheel
  - v. Pressure plate
  - w. Clutch disc
  - x. Throw-out bearing
  - y. Push rods
  - z. Push rod tubes
  - aa. Valve covers
6. The following modifications to the engine and its components are authorized:
- a. Removal of the air cleaner and choke mechanism is permitted.
  - b. Replacement of the standard exhaust system with any exhaust system terminating 2.5 to 7.5 cm (1" to 3") behind the rearmost part of the body is permitted.
  - c. Lightening the flywheel to a minimum of twelve pounds is permitted.
  - d. Balancing of all moving parts of the engine, provided such balancing does not remove more material than is necessary to achieve the balance except on those component parts where weights are specified. The crankshaft may be ground and the case may be machined to accommodate the use of standard factory oversize/undersize crankshaft bearings, provided the crankshaft location is not changed.
  - e. Polishing of the intake and exhaust ports, provided such polishing does not enlarge the intake port beyond 29 mm (1.142 in) inside diameter and the exhaust port beyond 33 mm (1.299 in) inside diameter. The measurements are to be taken at the juncture of the seat insert and the aluminum port material, and at the manifold face. Valve seat angles shall be machined as specified in the official VW Workshop Manual.

FIGURE 1 PORT MEASUREMENT



- f. Matching of manifold flanges is permitted.
7. Complete or partial removal of any cooling duct component is permitted. Removal of the fan and the fan housing is permitted. Fan belt origin is unrestricted. The use of a fan belt is optional.
8. Fitting of any standard Solex 28 PCI or 28 PCIT carburetor is permitted. The use of any jets is permitted. Any venturi of standard VW/Solex dimensions, which may be fitted without alteration to the carburetor body, may be used. The venturi must be fitted in the standard position, but its internal diameter may be machined. The carburetor may be rotated 180 degrees about its vertical axis. Modification of the float is allowed as long as no change is made to the float chamber and/or float valve. The carburetor shall remain untouched with the following exceptions:
  - a. No material shall be added.
  - b. Bead blasting is permitted for cleaning only.
  - c. The throttle shaft shall be a minimum of 0.185" with throttle plate installed. Machined sides shall remain flat and parallel with no chamfering or radiusing.
  - d. The throttle plate shall be a minimum of 0.053", flat and parallel with no chamfering or radiusing. Diameter shall be a minimum of 1.095".
  - e. Carburetor top: - The junction of the bowl and bore may be radiused. The bore beneath the radius shall be a maximum of 1.120". The accelerator pump boss shall remain original. The orifice in the base of the accelerator pump boss shall not allow #56 (0.046") drill bit to pass through i.e. the maximum hole diameter
  - f. Carburetor body: Removal of flashing from internal surfaces is permitted, but no additional material may be removed from the casting in the area of the bore, emulsion tube carrier, or any carrier supports. Bore diameter from throttle shaft down shall not exceed 1.110".
9. The fitting of any standard VW distributor (not restricted to the 1200 series) is permitted. Any non-transistorized ignition coil may be used. Coil location is unrestricted.

10. US imported VW Type 1, 1200 sedan manifold must be used. The heat riser tube and heat sink must be removed. Removal of metal from the interior of the intake manifold and rust-proofing the interior are permitted provided that the following dimensions are not exceeded:
- a. Down Tube: The down tube shall be measured at two different locations within an area between 12.70 mm and 50.80 mm above the horizontal manifold tube. Each measurement shall be taken four times rotating around the circumference of the tube and averaged. Averaged down tube dimension shall not exceed 1.140in (2.895 cm) O.D. Removing material from the outside of the manifold to achieve the legal dimension is not permitted. Removal of the manifold down tube from the horizontal tube is prohibited. The original factory furnace bronze attaching process and original factory bronze repair material MAY be visible, inside and outside the manifold.
  - b. Horizontal Tube: The horizontal tube shall be measured at four different locations on each side of the down tube. The area to be measured on each side of the down tube is defined as being between the bend and a point that is 38.10 mm from the center of the down tube connection. Each measurement shall be taken four times, rotating around the circumference of the tube, and averaged. Averaged horizontal tube dimension shall not exceed 25.25mm O.D. These dimensions shall be an average of at least four measurements at equal intervals around the tube at any point. Removing material from the outside of the manifold to achieve the legal dimension is not permitted.
    - i. The tubes making up the manifold must also meet the following requirements:
      1. The minimum bend-to-bend distance is 17.75 inches (Bend-to-bend distance is the distance between points along the horizontal tube where the .994 inch OD, as described above, is first exceeded.)
      2. At no point in the bends of the horizontal tube may the average O.D. exceed 26.15 mm (1.029") inches. Measurements will be taken four (4) times rotating around the circumference of the tube and averaged.
      3. The maximum carburetor flange height is 22.86cm (9.00 inches) Measurement is to be taken from the intake cylinder head sealing surface with no gasket, to the top center of the carburetor mating flange.
      4. Gaskets mating the intake manifold to the intake port shall not exceed 2mm in thickness.
      5. Deviation from straight of the horizontal tube between the bends (45.0 cm) may not exceed 6.35mm (0.250") in any direction with the following exception:
        - a. 3" straight edge centered on the bottom of the horizontal tube opposite the down tube should not show a deviation greater than 26.20 mm (0.090") in the bottom of the tube.
  - c. The finished, race prepared manifold shall not weigh less than 24 ounces. (680 gm) Intake manifolds may be repaired. Repaired manifolds shall start at 24 ounces BEFORE repair. The addition of excessive material to achieve the minimum weight is not permitted. Manifolds that have not been repaired shall retain the 1.070 inch averages from where the tube exits the 2-hole flange through the entire manifold bend. The area of the 0.250 inch dimension in Figure 1 above is considered to be the average length of the tube where most repairs have been made. This area may vary slightly among manifolds; discretion should be used by scrutineers to determine if the repair is excessive. Inspection of the inside of the manifold in this area will aid in this determination. Enlarging the inside of the manifold and attempting to hide it with repair material is not permitted. The measurement averaging shall start just above the repaired area and continue through the manifold bend.



- d. All exterior surfaces shall be in original condition. Bead blasting is permitted for cleaning only. Manifolds must remain unpainted with color but may have a thin transparent coat of rust proofing material or clear coat type material applied. Removing material from the outside of the manifold to achieve the legal dimensions is not permitted.
  - e. Matching of manifold flanges (to the ports) is permitted. Seal rings or “gaskets” of any type are acceptable as long as the bottom of the manifold flange is not raised above the cylinder head casting around the port opening. Gaskets mating the intake manifold to the intake port shall not exceed 2mm in thickness. Removal of the manifold flanges that connect the manifold to the cylinder head is prohibited. Factory “VW” casting marks surrounded by a circle and VW casting numbers shall be visible on the bottom side of the flanges, closest to the head. No repair material of any type shall be visible or cover these markings on the bottom of the flanges. Factory furnace Bronze and manifold repair material may be visible where the horizontal tube enters the top of the flange. The exterior dimensions of these flanges must not exceed 2.990” x 1.360” .
11. The generator and/or generator stand may be removed. The voltage regulator may be removed.
  12. The installation of baffles housed completely within the original oil sump and crankcase is permitted.
  13. The use of any oil temperature indicating device in the crankcase is permitted.
  14. The use of any standard VW oil pump, or exact replica thereof, is permitted.
  15. The use of any valve spring shims is permitted.
  16. The following standard dimensions and tolerances of engine components are included for information and shall be observed:

- a. Maximum bore: 77.2 cm (3.040")
  - b. Stroke: 64 cm +/- 0.1 cm (2.520" +/- 0.005")
  - c. Minimum combustion chamber volume: 43.0 cc (Polishing and/or tooling is prohibited.)
  - d. Minimum depth from top of cylinder barrel to top of piston: 1.00 cm (0.039")
  - e. The above dimensions may be achieved by machining any previously machined surface, providing that the total surface is machined on the same plane as the previously machined surface. The above dimensions shall be the average of all four cylinders.
17. The use of any VW clutch of the same diameter as fitted to the standard VW Sedan as defined herein is permitted. The standard clutch operating arm may be modified to allow its attachment in any appropriate location.
  18. An oil sump extension may be fitted utilizing the oil strainer cover plate, provided the extension does not extend horizontally beyond the edge of the oil strainer cover plate and the capacity does not exceed 250 cc. The oil pump pickup pipe may be extended into the sump extension. Accumulators (Accusump) may be fitted.
  19. The replacement of oil galley plugs with threaded plugs is permitted.
  20. The following dimensions are included for information only and shall be observed:
    - a. Exhaust valve diameter 25.7 mm or 30 mm
    - b. Intake valve diameter 30.0 mm or 31.5 mm
    - c. Reprofilng of valves is not permitted
  21. The crankcase may be machined to permit the use of standard VW camshaft bearing inserts, provided the camshaft location is not changed. The use of the two-relief valve crankcase (Part No. 111-110-025E) is permitted.
  22. A VW camshaft (Part No. 113-109-015D, -017D, -019D, -021D, -023D, -025D, or -027D) or an exact replica of the same material and dimensionally identical, must be used. The maximum lift at the spring collar with zero valve clearance is:
    - a. with 1200 rocker arms - Intake-- .3340in + 0.000in (8.4836mm)
    - b. with 1200 rocker arms - Exhaust-- .3165in + 0.000in (8.0391mm)
    - c. with 1300/1500 rocker arms --Intake-- .3540in + 0.000in (8.9916mm)
    - d. with 1300/1500 rocker arms-- Exhaust-- .3365in + 0.000in (8.5471mm)
  23. The camshaft profile must match exactly that specified by the official SCCA camshaft plots, plus or minus 0.05 cm (0.002"). It is permitted to regrind the camshaft to duplicate but not exceed the official profile. In doing so, the relationship between the centre lines of peak lift at the exhaust and intake lobes shall remain at 214 degrees 15 minutes, plus or minus 1 degree. The camshaft timing may be changed in relationship to the crankshaft timing by utilizing an offset key at the crankshaft timing gear. The camshaft timing may also be changed in its relationship to the crankshaft by utilizing an adjustable cam gear that retains the existing helical gear thrust angle and that is statically adjustable only (e.g., no dynamic adjustment mechanisms that respond to engine speed changes). Camshaft timing is unrestricted within the restrictions imposed by these rules.
  24. Installation of a spark plug hole repair insert is permitted provided that the spark plug centre line is not changed.
  25. A single standard automotive oil filter of not more than 1 litre total capacity is permitted and a suitable mounting bracket and bypass valve may be installed. Cooling fins are not permitted on any component. Only flexible, unfinned, 25cm (1.0" ) maximum outside diameter oil line with a maximum length of 3.6 m (12' ) and suitable fittings may be used. Modification of the lubrication system to facilitate installation of the oil filter is permitted. All components must be contained within the body to the rear of the firewall.

26. Any oil cooler is allowed.
27. Oil coolers shall be mounted completely inside a plumb line extending downward from the outermost edge of the bodywork.
28. Where minimum weights are specified, any lightening is permissible provided the original part complied with the dimensional restrictions set forth.
29. Alternate exhaust valves are allowed provided the dimensions and materials are the same as standard (VW) exhaust valves
30. An alternate oil pressure regulator spring may be used when original oil cooler is replaced with an alternate oil cooler.
31. Rocker arm wave type spacer washers may be replaced by solid steel type flat washers of suitable thickness.
32. Rocker arms may be lightened to a minimum weight of 80.0 grams. VW parts shall be used, from 1200, 1300, 1500, or 1600 Type 1 engines; 1:1 or 1.1:1 ratios only.
33. Valve springs are unrestricted providing:
  - a. No more than one spring shall be used per valve.
  - b. The standard spring cap and retainers shall be used.
  - c. Spring shall be made of steel.
34. Bolt on valve covers may be fitted.
35. Crankshaft pulley is unrestricted and may be fitted with an oil seal. The engine case may be machined to facilitate the installation of an oil seal.
36. Rocker arm shafts may be modified or replaced by those of other manufacture, including shafts that replace the stock clips with a solid center spacer and bolt on end caps/washers.
37. The rocker arm shaft assembly may be shimmed out on the cylinder head mounting studs by placing appropriate shims between the cylinder head mounting boss and the blocks on the rocker arm shaft assembly.

#### F. TRANSMISSION/REAR AXLE

1. The transmission/rear axle assembly shall be standard VW Sedan as defined herein. The synchromesh components must be in place and operating on at least three gears. Reverse gear must be operable from the competitor's seat.
2. The following modifications to the transmission/rear axle assembly are authorized:
3. The installation of any standard VW gear set which can be fitted without modification of any component of the transmission or of the gear set itself, and the transposing of the ring gear to provide proper axle rotation are permitted.
  - a. Fully synchromeshed transmission:

Gear	Part Number	No. of teeth	Ratio
1st	113-311-251A	10:38	3.80
2nd	113-311-261	17:35	2.06
3rd	113-311-375	22:29	1.32
	113-311-275B	23:29	1.26
	113-311-275A	23:28	1.22
	211-311-341	28:23	0.82
4th	113-311-341	27:24	0.89
Ring & Pinion	211-517-143A	8:35	4.375
	311-517-143B	8:33	4.125

- b. Partly synchromeshed transmission:

Gear	Part Number	No. of teeth	Ratio
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1st	113-309-251A	10:36	3.60
2nd	113-309-261	17:33	1.94
	113-309-261	17:32	1.88
3rd	113-309-375	22:29	1.22
	113-309-275A	22:27	1.23
4th	113-309-341A	28:23	0.82
Ring & Pinion	113-517-141B	7:31	4.43

- c. Part Numbers - There are different part numbers for various gears in addition to the ones listed here. This in general indicates changes on the parts such as:

<b>Gear</b>	<b>Part Number</b>	<b>Ratio</b>	<b>Difference</b>
4th	113 311 341	0.82	With Keyway
	113 311 341A	0.82	With Splines
Ring & Pinion	311 517 143	4.13	6 mtg bolts
	311 517 143	4.124	8 mtg bolts

4. However, there are no standard ratios other than the ones listed here. A gear removed from a transmission can be identified by the number of teeth.
5. Alteration of the shock absorber mounts is permitted.
6. The transmission shall not be installed in an inverted position.
7. The differential cannot be modified in any way to limit its normal function. Torque biasing, limited slip, and locked differentials are prohibited.

**G. FRAME/CHASSIS**

1. The frame/chassis shall be constructed of steel tubing of a maximum diameter or width of 10.2cm (4in) and be of a safe and suitable design. The Driver's feet shall not extend beyond the rear of the front axle beam tubes.
2. There may be no frame/chassis rigidity or strength derived by means other than the frame/chassis tubes. Stressed skin, monocoque, or semi-monocoque construction is not permitted, except that:
  - a. The firewall panel may be rigidly attached to the frame tubes.
  - b. The bottom of any bodywork that extends beyond the frame members shall be on the same flat plane as the undertray and shall not deviate from that flat plane by more than 1in. Effective for any newly registered Cars after 1/1/83.
  - c. Engine bay undertray(s) shall be no wider than the frame rails in this area or no more than 1/4 inch wider (on each side) than the frame rail when the undertray has an upward turned edge that facilitates mounting the undertray to the chassis or that facilitates mounting the body to the chassis. The undertray(s) between the axle center lines shall be rigidly attached to the frame provided the curvature of said tray(s), measured vertically from the lowest point to the highest point at their attachment to the frame rail members at the sides, shall not exceed 1in and have no downward turned edges.
  - d. Transmission undertrays for Cars with a rear subframe shall be no wider than the subframe, or no more than 1/4 inch wider (on each side) than the subframe when the undertray has an upward turned edge that facilitates mounting the undertray to the subframe or that facilitates mounting the body to the subframe, or 16in whichever is wider. For Cars without a subframe, the tray shall be no wider than 16in and both shall be firmly attached.
  - e. The area between the upper and lower main frame tubes, or for 14in above the floor pan, whichever is greater, and between the front and rear roll hoop bulkheads shall be protected by one of the following methods to prevent the intrusion of objects into the cockpit.
    - i. Panel(s) of a minimum of either 0.060in heat treated aluminum (6061 T6 or equivalent) or 18 gauge steel shall be attached outside the main frame tubes.
    - ii. A reinforced body of a double layer, 5oz bi-directional, laminated Kevlar material incorporated into the body shall be securely fastened to the frame tubes.
    - iii. For either method, fasteners shall be no closer than an average of 6in centers (no stress bearing panels). The material used for the chassis braces in this area shall be at least equivalent to the roll hoop brace material.

**H. BODY**

1. The rear bodywork shall enclose the engine by surrounding it from a point no higher than the lower edge of the intake manifold and extending from the front of the engine to its rear on each side. The top of the rear bodywork shall extend from the back of the firewall to a point at least 41 cm (16in) to the rear of the center line of the rear axle.
2. The rear locating arms, coil springs, and shock absorbers may not be faired in and must be visible and accessible from the side without removal or manipulation of any panel or part. Where a mono-shock rear suspension has been fitted, the bodywork may cover the spring shock assembly. Specifically, the front mounting point of the radius pad may be inside the trailing edge of the side body panel so long as the panel does not extend back over the trailing arm itself.
3. The competitor's seat must be capable of being entered and left without the removal or manipulation of any panel or part. Removable side bolsters are permitted, as long as they are secured during racing and can be removed by the driver to facilitate emergency egress from the vehicle. Firewall, floor, and safety equipment must conform to the F1600 requirements.

4. A firewall to prevent passage of flame and debris between the engine area and Driver's compartment shall extend the full width of the cockpit and be at least equal to the top of the carburetor in vertical height.
5. The front suspension uprights (shock absorber mounts), shock absorbers, and/or trailing arms may not be faired in by covering or shrouding away from the airstream.
6. No part of the frame or body shall project beyond a plane connecting the vertical center lines of the front and rear tires.
7. Any bodywork forward of the center of the torsion bar tubes shall have a maximum width of 81 cm (31.75").
8. Forward facing air ducts may be installed for the purpose of delivering cooling air directly to the engine, cylinder heads, oil cooler, and/or carburetor, provided the ducted air makes a 90 degree bend within the bodywork. Air duct openings may be located within the cockpit area, and/or penetrate the firewall, provided the duct is baffled or the firewall is extended to prevent flame and debris from reaching the Driver. Any shape may be used to form firewall extension. Any other firewall inlet shall also prohibit passage of flame and debris. (Recommend: that ALL of this extension be the same width as the firewall, allowing for bodywork contour limitations, and extend in a horizontal plane back 2in, minimum, past the carburetor body.)
9. Wings (air foils) are prohibited.
10. Fuel filler caps, necks, or lids, may not protrude beyond the bodywork of the vehicle.
11. The competitor must be able to see 90 degrees to either side with both eyes by turning the head, but without lifting the head forward or otherwise moving from the normal driving position. Lexan or similar transparent uncoloured material may be substituted for existing bodywork. Token portholes do not satisfy this requirement.
12. Only a structural member (frame tube or roll bar braces) may interrupt the required field of vision.

#### **I. NON-STANDARD REPLACEMENT PARTS**

1. The use of the following non-standard replacement parts is permitted provided that no unauthorized modification of any other component results.
  - a. Fasteners (nuts, bolts, screws, etc.)
  - b. Wiring
  - c. Gaskets and seals
  - d. Brake lines and fuel line
  - e. Spark plugs (maximum 1/2in reach)
  - f. Piston rings
  - g. Wheel bearings
  - h. Connecting rod bearings and crankshaft main bearings of same type and size as standard VW
  - i. Brake shoes and brake lining
  - j. Valve guides
  - k. Ignition points or drop-in ignition triggering module

#### **J. ELECTRICAL**

1. The use of any single 6 or 12 volt battery is permitted to power the starter and engine ignition system.
2. Any secondary batteries connected only to gauges, and communications or data acquisition equipment are allowed.
3. The electrical system may be 6 or 12 volt except the starter motor which shall remain as the 6 volt unit.

#### **K. BALLASTING**

1. Ballasting is permitted as long as it is securely attached to the vehicle in a safe manner that does not interfere with the safe operation of the vehicle or impede access for the driver.

**SECTION 5 - SPORTS RACING****SECTION 5.1 - SPORTS RACING REGULATIONS****A. DEFINITION**

Sports racing vehicles are defined as purpose-built (not production based) racing vehicles with bodywork which extends the full width of the vehicle including the wheels and tires.

**B. COACHWORK AND CHASSIS**

1. The vehicle must be equipped with a roll-over bar which extends at least 5 cm (2") above the competitor's helmet when the competitor is in a normal seating position.
2. The maximum overall vehicle width including wheels and tires is 221 cm (87"); the maximum overall vehicle length is 533 cm (210").
3. Bodywork must cover all suspension components when viewed from above. The competitor's position must have an opening for competitor entry/egress at least as large as required in the current F1600 rules.
4. Any wings or aerodynamic devices may be used provided they do not exceed the overall width of the vehicle, and that the total length of the vehicle including these devices does not exceed 533.4cm (210").

**C. SUSPENSION, WHEELS AND TIRES**

1. Suspension is unrestricted.
2. Wheels must be a minimum of 25 cm (10") in diameter on both axles. Width is unrestricted provided the wheel/tire combination used does not protrude beyond the sides of the vehicle.
3. Tires must be of a type specifically made for racing, or DOT approved radials with a minimum speed rating of 'H'.

**D. ENGINE AND DRIVETRAIN**

1. Engine and drivetrain type, mounting location, and orientation is unrestricted.
2. Front engine/rear drive vehicles must be fitted with driveshaft safety hoops as specified in the GT rules.
3. Clutch scattershields are required if the clutch or flywheel plane of rotation intersects any portion of the competitor's position.
4. Sports Racing engines will have their effective engine displacement calculated by multiplying they actual display by all of the following factors that apply:
  - a. Forced Induction 1.55
  - b. Reciprocating Engines with less than valves per cylinder 0.85
  - c. Wankel Engines - non-bridge ported 1.35, bridge ported 1.55, peripheral ported 1.85
5. Sports Racing cars may not exceed 2.5 litres in effective engine displacement.
6. Sports racing vehicles must be fitted with four-wheel hydraulic brakes. A dual-action system must be fitted such that in the event of a leak or failure of one circuit, full braking is maintained on at least two wheels.

**E. MISCELLANEOUS**

1. The electrical system must be equipped with an externally accessible and clearly marked kill switch, as described in the APPENDIX 2 -SECTION 1 -C
2. The competitor's position must be equipped with a racing seat offering head support and a minimum five-point restraint system. The restraint system must be FIA or SFI approved and be in like-new condition. Appendix 2 contains more specifications on the driver restraint system.
3. Sports racing vehicles must be equipped with a fuel cell.

**F. SPORTS RACING CARS IN SUPER TOURING / SUPER UNLIMITED (TRIAL)**

1. Sports Racing Cars will be permitted in to run in (and with) the appropriate ST/SU class provided they meet the follow additional requirements;

a. Rollover Protection / Cage includes front lateral bars to provide addition protection to the cockpit.

b. Lights which meet the requirements of APPENDIX 2 -SECTION 1 -I Lights

2. Driver Conduct

a. Given the possible performance differences between Sports Racing cars and Touring Cars, drivers of Sports Racing cars will be held to the highest standard of Driver Conduct as described in the WCMA Sporting Regulations.

b. All drivers of sports racing cars must discuss the risks associated with mixed class racing before the first session on track (with touring cars) with the Clerk of the Course (this can be part of a drivers meeting)

**APPENDIX 1 - ROLL CAGE SPECIFICATIONS****SECTION 1 - ALL VEHICLES**

1. All vehicles, regardless of date of manufacture, must be fitted with a roll cage

**SECTION 2 - CURRENT REGULATIONS (after January 1st 2016)**

1. This Section applies to all vehicles registered (issued a WCMA logbook) after January 1, 2016.
  - a. Cars registered before January 1, 2016 may continue to compete with their previous roll cage, however it is recommended to upgrade to the following specifications.
    - i. Vehicles registered with a valid logbook from any other ASN region or sanctioning body (including SCCA) before January 1, 2016, may be registered with the WCMA at the discretion of the Chief Scrutineer. The vehicle must meet WCMA's requirements on the date the logbook was originally issued.

**A. CONSTRUCTION MATERIALS**

1. The main hoops and primary bracing should be constructed from round, mild steel, DOM type tubing or Cold drawn Seamless (CDS)
  - a. Chrome molly tubing such as 4130 is only permissible if the cage is FIA Homologated.
  - b. ERW tubing is prohibited
  - c. Aluminum and composite materials are prohibited
2. Aluminum and composite materials are prohibited construction materials for all parts of the roll cage structures.
3. All cages must have a 0.476 cm (3/16") diameter inspection hole drilled in a non-critical area of each main hoop, fore and/or aft supports (as applicable), and front hoop (as applicable).
  - a. ~~Expect~~Except if the cage is FIA Homologated

**B. ACCEPTED DESIGNS**

All vehicles, regardless of date of manufacture, must be fitted with a roll cage conforming to the following specifications (Please note, It is anticipated that national roll cage specifications will be released mid ~~2016~~ 2017 to take effect January 1<sup>st</sup> ~~2017~~2018. It is anticipated that these national regulations will align with Appx 1 Sections 1, 2.1, 2.A and 2.B.1)

1. FIA
  - a. A Cage that is FIA Homologated, or
  - b. A Cages that conform to the FIA International Sporting Code article 253-8 Appendix J article 8 (available at [http://www.fia.com/file/31272/download?token=F\\_32B8Tx](http://www.fia.com/file/31272/download?token=F_32B8Tx) ) at the time of vehicle registration.
    - i. Door bars (covered in 8.3.2.1.2), maybe be in anti-intrusion design (multiple plains), if they are according to drawing 253-9 or 253-11
    - ii. A Dash Bar as described in Transverse members (8.3.2.2.5) drawing 253-29 is required.
    - iii. DOM is an acceptable alternate (CDS)
2. SCCA
  - a. SCCA roll cage as per SCCA 9.4
    - i. Must have bracing as per WCMA Technical Regulations Appendix 1.2.E.9.e (Dash bar)
    - ii. Must have Mounting Plate that met or exceed WCMA Technical Regulations Appendix 1.2.E.10

4. WCMA

- a. The top of the roll bar shall be at least 5.08 cm (2") above the top of the competitors helmet or as close to the roof as possible. The top of the roll bar shall be no more than 25.4 cm (10") behind the competitor's helmet when the competitor is in the normal driving position.
- b. Any component/part of the roll cage structure which the competitor may come in contact or may be struck by the competitor's helmet in a serious impact must be covered with a flame-retardant energy absorbing material.
- c. Minimum tube size and wall thickness are as follows for vehicle weights including competitor:

<b>Vehicle Weight</b>	<b>Tube size</b>	
	<b>outer diameter</b>	<b>wall thickness</b>
<b>Up to 1700 lbs</b>	<b>1.375"</b>	<b>0.080"</b>
<b>1701-2699 lbs</b>	<b>1.500"</b>	<b>0.095"</b>
	<b>1.625"</b>	<b>0.080"</b>
<b>2700 lbs and up</b>	<b>1.500"</b>	<b>0.120"</b>
	<b>1.750"</b>	<b>0.095"</b>
	<b>2.000"</b>	<b>0.080"</b>

- a. Fabrication
  - i. Bends
    - 1. The radius of bends in roll cages (measured at centerline of the tubing) shall not be less than three (3) times the diameter of the tubing.
    - 2. Must be smooth continuous bends and no evidence of crimping or wall failure.
- b. Main Hoops
  - i. One continuous piece of tubing must be used for the main hoop with
  - ii. All hoops should start as close as possible to the floor of the vehicle and come as close as possible to the sides of the vehicle for maximum competitor protection.
  - iii. A figure of each hoop configuration is provided to illustrate the acceptable basic configurations:
- c. Ovality: Maximum allowable ovality is 8% of the nominal pipe diameter. Ovality is measured as the variation between the maximum and the minimum dimension of the pipe in one location per figure.
- d. In the case of tube frame vehicles, the roll cage structure must be attached to the chassis with suitable webbing or gusseting to distribute loads over as wide an area as possible.
- e. In the case of unit body vehicles, it is recommended procedure to attach the four ends of the main hoop tubes into L shaped plates at the junction of the floor and rocker panels rather than just to a plate on the floor. Additionally, it is highly recommended that all cages be tabbed into the basic body structure at least every 60.96 cm (24") or wherever possible.
- f. Bracing
  - i. In the case of the twin lateral hoop design, the front and rear hoops shall be joined by a piece of equal dimensioned tubing on each side.
  - ii. Rear stays must attach to the rear hoop no lower than 20.32 cm (8") from the top of the hoop and at an angle no steeper than 35 degrees from vertical. These rear stays must be made from a straight piece of tubing and be attached to a suitably stiff or reinforced area.
  - iii. A diagonal brace must be fitted from near the top of the Main hoop to a position near the opposite corner of the Main hoop. This brace must be as straight as possible.

- v. Side protection bars must be attached between the front and rear hoops on both sides of the vehicle. These bars should be attached to the front hoop no higher than 30.48 cm (12") off the floor and on the rear hoop and no higher than 60.96 cm (24") off the floor. The competitor's side must be fitted with at least two side protection bars which follow as closely as possible the outline of the door. NASCAR style multiple anti-intrusion bars are highly recommended.
- vi. A bar joining the two outer members of the front hoop near steering column level is required.
- g. Mounting Plates
  - i. The four lower hoop tubes and backstays must be connected to plates welded or bolted to the frame or floor of the vehicle.
  - ii. On unibody vehicles,
    - 1. Plates for Front, main, lateral rollbars or Lateral Half rollbars shall be at least 120 square cm (18.9 square inches) area.
    - 2. Plates for backstay Shall be at least 60 square cm (9.5 square inches)
    - 3. The minimum thickness of these plates shall be 0.20 cm (.080") in the case of weld on plates and 0.1875" for bolt on types.
  - iii. Vehicles with frame type construction
    - 1. When mounting to the frame plates shall be at least 51.6 square cm (8 square") area and 0.1875 thickness regardless of whether they are bolted or welded.
    - 2. When mounting to other points plates must follow APPENDIX 1 -SECTION 1 -A.g.ii
  - iv. Bolt on types shall use 0.952 cm (.375") grade 5 bolts fasteners and must have a backup plate of equal size and thickness on the other side of the floor with the bolts passing through both plates and the floor.
    - 1. Front, main, lateral rollbars or Lateral Half rollbars shall have a minimum of three bolts
    - 2. Backstay shall have a minimum of two bolts
- h. Welding
  - i. It is essential that all welding be of the highest possible quality. Slag welds, poor arc and gas welds are NOT acceptable. It is highly recommended that only certified people carry out arc welding on roll cages. TIG or MIG are the preferred welding processes. Cages with unacceptable welding will not be passed.
- i. Gusseting
  - i. It is important that loads be distributed over as wide an area as possible especially in the case of cages on space frame type vehicles. Gussets or tie-in tubes must be used at main tube junctions of the roll cage members. Gussets should also be used when it is not possible to weld all around a tube because of body interference. Gusset thickness should be at least the same as the tubing wall thickness they are attached to.
  - ii. Each gusset shall extend in length for a minimum of one pipe diameter in both directions from the center point of the gusset.



4. Removable Type Cages
  - a. Removable roll cages may be fitted to vehicles only if their construction and design allow them to meet the strength requirements of the designs above.
  - b. Where tubes join, a double shear type mating tab may be used. Where such a tab is used, the tube joining this tab shall have a small piece of tubing welded perpendicular to its length for the bolt to pass through to prevent crushing of the main tube. Tabs shall be at least 3.49 cm (1.375") wide and 0.476 cm (.1875") thick and must be welded to one of the main tubes. When single bolts are used to fasten tubes, they must be of at least 1.11 cm (.4375") diameter and grade 8 material.
  - c. Sliding tube type junctions may also be used if they meet the following criteria:
    - i. Wall thickness of the joining tube shall be a minimum of 0.30 cm (.120").
    - ii. Length of this tube shall be a minimum of 7.62 cm (3") on either side of the splice.
    - iii. Attachment shall be made using two bolts on each side of the splice 90 degrees to each other passing straight through the tubing. Grade 5 bolts of at least 9.52 cm (.375") diameter shall be used here. Splicing tubes may be slid either inside the main tubing or over the outside.
  - d. Alternate joint designs may be approved at the discretion of the scrutineer.
  - e. Basic design and fabrication of removable type cages must conform to the specifications for non-removable type cages.
5. Alternate Designs
  - a. Alternate cage designs may be approved by the scrutineer provided the competitor can produce stress analysis data from a certified professional engineer stating that the roll over structure is capable of withstanding the following loads applied simultaneously to that structure:
    - i. 1.5 (x) lateral
    - ii. 5.5 (x) fore/aft
    - iii. 7.5 (x) vertical
    - iv. (x) is the weight of the car in race trim with the driver aboard and full fuel tank. Calculations shall assume the all up race weight of the vehicle with competitor.
  - b. The certificate shall be accompanied by a drawing or photograph of the roll cage.
6. Increasing Roll Cage Height
  - a. The old main hoop shall be cut off near the chassis mounting and either a new main hoop of equal tube size or a section of equal sized tubing may be added
  - b. Inner tubing shall be used to mate all sections together.
  - c. All braces should be a minimum distance of 6 inches from the top of the hoop.
  - d. The inner tubes shall be rosette welded at three points near the top and three points near the bottom.

### **SECTION 3 - Previous roll cage specs (archived)**

1. June 1<sup>st</sup> 2013 to December 31<sup>st</sup> 2015, see Appendix 99 – Archived - Section 2
2. Prior to June 1<sup>st</sup> 2013, see Appendix 99 – Archived - Section 1

**APPENDIX 2 - VEHICLE REQUIREMENTS****A. DRIVER RESTRAINT SYSTEM**

- a. The driver restraint system includes the Harness (Belts), head and neck restraint, helmet, seat and seat mounting.

**1. BELTS / HARNESS**

- a. All race cars in WCMA events must utilize either a five (5), six (6) or seven (7) point restraint harness meeting FIA/ISO standard No. 8853 or SFI 16.1 at all times during practice, qualifying and the race. The restraint system installation is subject to approval of the scrutineer.
  - i. A five (5) point system (at minimum) is required for use in cars where the driver is seated in an upright position and consists of a lap belt, two (2) shoulder straps and an anti-submarine strap.
  - ii. A six (6) point system (at minimum) is required for use in cars where the driver is seated in a semi-reclining position and consists of a lap belt, two (2) shoulder straps and two (2) antisubmarine straps.
  - iii. The shoulder straps shall be of 76mm (3") minimum width, however when used in conjunction with a HANS-style device HANS-specific two-inch/three-inch hybrid shoulder straps are permitted. Lap belt and anti-submarine strap(s) shall be of 44mm (1.73") minimum width, however it is recommended that lap belts are 76mm (3") in width.
  - iv. It recommended to have load spreading padding at pressure points.
  - v. Only separate shoulder straps are permitted. "H" type configuration is allowed. "V" and "Y" type shoulder straps are not allowed.
  - vi. The buckles must be of metal-to-metal quick release type except in the case of leg straps of the six point system where they attach to the seat belt or shoulder harness straps.
  - vii. Drivers of open cockpit cars must use SFI or FIA approved arm restraints. This includes open Targa tops, sunroofs and t-tops
- b. Mounting
  - i. The minimum acceptable bolts used in the mounting of all belts and harnesses are 3/8in SAE Grade 5.
  - ii. Where possible, seat belts, shoulder harness and anti-submarine straps should be mounted to the roll structure or frame of the car
  - iii. If clip-in eye bolts are used, the clip must be secured with a cotter pin or lock wire to prevent accidental release.
  - iv. All straps must be free to run through intermediate loops or clamps/buckles.
  - v. Where it is not possible to mount belts and straps directly to the roll structure or frame of the car and they must be attached to a structural panel, the panel must be suitably reinforced in a workmanlike manner to prevent distortion under load. Steel reinforcing plates of adequate large area and thickness must be installed to prevent the belt attachment from pulling through the panel under load.
  - vi. Bolting directly to the floor panels, etc. without adequate reinforcement in not acceptable.
- c. Expiry / Condition
  - i. The material of all straps shall be in good condition.
  - ii. SFI 16.1 Driver restraint systems shall be replaced or re-certified every two (2) years. SFI 16.1
    - 1. Restraint systems must show a date stamp less than two (2) years old.
  - iii. FIA/ISO 8853 Driver Restraint systems shall be replaced every five (5) years from the date of manufacture or the expiry date as indicated by the manufacturer's label.

2. Seat
  - a. A one-piece racing seat must be fitted in place of the standard driver's seat
    - i. If a competitor is replacing an existing seat with a new seat in a touring car it is recommended to install a racing seat that carries a SFI, FIA 8855 1999 or FIA 8862 2009 approved label.
    - ii. Plastic or composite seats must carry a SFI, FIA 8855 1999 or FIA 8862 2009 approved label.
  - b. The driver's seat shall be located longitudinally so that the seat back, at the driver's shoulders, does not break an imaginary vertical plane located at the front of the rear seat platform. On 2-seat vehicles the seat back may go back to the OEM rear bulkhead, package tray, etc.
  - c. It is recommended that the floor be reinforced in the areas where the seat is mounted to the chassis. Vehicles with a nonmetallic floor shall add tubing elements, with a minimum wall thickness of .090", connecting metallic parts of the chassis, or within the cage structure, to mount the seat to.
  - d. Club class and Ice Racing classes may use original equipment seats, provided shoulder harness anchor or guide must be provided immediately behind the seat back at shoulder level and adequate headrest (as defined below) is fitted to the rollover structure.
  - e. All seats must provide a headrest
    - i. Alternately, a padded head rest may be affixed to the roll cage. The head restraint must have a minimum area of 235 square cm (36 square") and be capable of absorbing two hundred (200) pounds force in a horizontal direction. The headrest must be within five (5) centimeters (2 inches) of the driver's helmet in a normal seated position.

## **B. ONBOARD FIRE SUPPRESSION SYSTEMS**

1. It is highly recommended that a self-contained push-button or pull-handle fire system be installed with all lines routed through the car with a single actuator to engage in case of emergency.
2. Minimum requirements
  - a. Five (5) pound or 2 liter bottle Capacity
  - b. Minimum two (2) nozzles (one (1) in cockpit and one (1) in engine bay
  - c. Appropriate nozzles shall be used (ie atomizing for AFFF)
  - d. Manual or auto release.
  - e. AFFF internally pressurized system bottles should use a working pressure gauge
  - f. The activation point for the system should be identify by a circle "E" decal on the outside of the vehicle on the entry point nearest the activation point, and be accessible from both outside the vehicle and by the driver while seated in driving position.
3. AFFF, FE-36, NOVEC 1230 or similar systems safe for the occupants of enclosure space are recommended. Halon 1301, 1211, or Halotron I, hexafluoropropane, HFC-236a, CC0610 and other agents used in SFI or FIA certified systems are acceptable. Remember extinguishing systems which are primarily based on inert gases presents a risk of suffocation when used in enclosed spaces.
4. If an electric solenoid or switch is used to activate the system, it must not lose power when the electrical master (Kill) switch or vehicle ignition switch is turned off.
5. It is high recommend that the manufactures requirements for re-certification / inspection / expiration dates are followed. Since there is a variance between systems and manufacturers it will be the sole responsibility of the entry and/or competitor to ensure these obligations and requirements are met or exceeded.
6. Handheld extinguisher are NOT recommend, and strongly discouraged, if used must be
  - a. Class ABC and Rated Equal to or less than 5lb
  - b. Be secured as in such a way that APPENDIX 2 -SECTION 1 -H.5.j is met
    - i. Vehicles with inadequately secured extinguisher must remove them
      1. Failure to remove the extinguisher will result in disqualification of the vehicle

**C. SAFETY KILL SWITCH**

1. A safety kill switch must be fitted. It must disable all of the electrical systems, except Fire Suppression Systems system on the vehicle directly, i.e. solenoids may not be used. If the kill switch does not disable the main starter cable, the starter cable must be fitted with a fusible link. This fusible link must not be installed near the engine compartment or fuel cell. It is preferred for the safety kill switch to be mounted on the cowl at the base of the windshield, or near the A pillar on the driver's side. Location of the Kill switch must be marked clearly (using a red spark on a blue triangle with a white border), or the outside of the vehicle and its operation must be obvious. If the driver cannot reach this switch while in the normal driver's position, a second switch with identical function must be fitted in the driver/passenger compartment such that the driver can operate the switch while strapped in safety harness.
2. The kill switch may also be mounted remotely and operated by a pull cable with a loop in the above specified locations.
3. The use of FIA approved electrical shut off relay systems also permitted. Activation switch must also be clearly marked.

**D. WINDOWS**

1. Windshields
  - a. All cars may use a standard safety glass windshield, mounted in the stock location and at the stock angle.
    - i. Standard Safety glass windshield must be installed in the factory urethane method
    - ii. Standard Safety glass windshield where the factory method is weather stripping, window tabs and straps are required as outlined in Appendix 2 section D.1.b.iii
  - b. as permitted in the individual class preparation regulations
    - i. Polycarbonate windshields such as Lexan are allowed.
    - ii. Polycarbonate windshields must be of 6mm minimum thickness.
    - iii. Polycarbonate windshields must have In addition to other methods of attachment
      1. Five 5 (or more) Retaining safety clips.
      2. Three (3) metal clips 7.62 cm x 2.54 cm x 3.2 mm (3" x 1" x 0.125") must be bolted or riveted to the body at the top of the windshield.
      3. Two (2) clips (same dimension) must be bolted or riveted to the cowl and extend over the bottom edge of the windshield.
      4. Clips must be spaced at least 30 cm apart.
      5. Three (3) inner supports to prevent the windshield from collapsing inward.
        - a. These supports must be 0.75" by .125" minimum straps of aluminum.
        - b. Spacing between these inner supports must be eight (8) inches minimum.
2. Other windows
  - a. Windows must be of laminated windshield safety glass, tempered safety glass, or as permitted in the individual class preparation regulation Three (3.0) mm minimum thickness clear polycarbonate materials
  - b. Acrylic plastic glass is prohibited.
  - c. Polycarbonate Rear windows must have in addition to other methods of attachment
    - i. Two 2 straps bolted or riveted to the body both above and below the rear glass.
    - ii. Straps must be a minimum of 2.54 cm wide X 3.2 mm (1" x 0.125") thick, and must be made of metal.
  - d. Removal of driver and passenger door window glass is recommended.
  - e. All rear windows and/or hatchbacks and deck lids must be completely closed. Ventilation holes in the rear windows to the competitor/passenger compartment are permitted in the individual class preparation regulation

- f. As permitted in the individual class preparation regulations.
  - i. Vehicles with convertible tops may remove any or all glass panels and window frames.
  - ii. Glass sunroofs, Targa, T-top, etc top must be removed
  - iii. If removed these resulting openings must be covered in a suitable and workmanlike fashion
- g. Touring Cars must have both front door windows fully open or removed during all on-track sessions
  - i. ~~Expect~~ Except where the touring car has been homologated by the FIA or “Professional Series” (SCCA Pro Racing, World Challenge, etc)
  - ii. Or, Ice Racing
- h. Doors with windows installed in the raised position must be able to be opened from the outside.
- i. Windows shall be clear or uncolored
- j. Except if no factory or aftermarket clear windows are available.
- k. Replacement
- l. Officials may require the replacement of windows/windshields that are considered a safety hazard.

#### E. NETS

1. Protection (Window) Nets
  - a. All Touring-cars must have a window net fitted on the driver’s window.
    - i. ~~Expect~~ Except when the touring car has been homologated with Polycarbonate side windows
  - b. The Window net must be attached to the structure of the vehicle and/or cage.
    - i. It is recommend to attach the net using a Spring-Loaded style bracket (like Joe’s racing or racequip 700101), and avoid using Latch or buckle style brackets
  - c. Window nets must be in good condition
2. Driver (Inside) Net
  - a. An inside net running between the main roll hoop and the dash is recommended for all Touring cars and two-seater Sports Racing cars.
  - b. It is recommended that the lower strand of the net pass the shoulder and run horizontally from the cage to the dash. The upper strand should pass the Cg of the helmet in the side view.
  - c. The net should run parallel to the center of the car in plain view and be as close to the seat as possible.
  - d. It is recommended that the net be tensioned tightly and have a way to quickly disconnect it in case the driver needs to exit through the car in an emergency.
  - e. Metal collars, or some other equivalent method, should be used to keep the strands of the net from moving along the roll cage.

#### F. FIREWALL

1. The firewall/Bulkhead must completely separate the driver/passenger compartment from the engine compartment.
2. The firewall must extend from the floor to the base of the windshield and across the full width of the competitor's compartment (from door skin to door skin).
3. Any existing plumbing or wiring holes must be sealed

**G. BODY PANELS**

1. Where permitted in the individual class preparation regulations,
  - a. Doors may be pinned, but not bolted, to prevent their opening in case of an accident.
    - i. If doors are pinned this must be clearly indicated below the window opening.
  - b. Standard door hinges and latch mechanisms may be removed, but the doors must be capable of being opened or removed.
    - i. Production hood and deck lid latches may be removed.
    - ii. If removed the hood and deck lid must be secured by at least two pins at the corners opposite to the hinged end.
  - c. Hood and deck lid hinges may be removed and replaced with additional pins or straps.
  - d. Removable sunroof, Targa, T-top, etc may be retained if bolted or welded in, or removed completely.
    - i. If removed these resulting openings must be covered in a suitable and workmanlike fashion.

**H. INTERIOR**

1. All flammable material must be removed from the interior of the vehicle. This includes rear seat backrests and cushions, carpets, door panels, kick panels, headliners, insulation, etc. The stock dashboard and/or instrument panel may be retained.
2. The following items must be removed from the cockpit:
  - a. Tool kit
  - b. spare tire
  - c. All loose objects in the vehicle's passenger compartment must be removed
  - d. The following items must be removed from the cockpit or disabled;
    - i. supplemental restraint systems (SRS)
    - ii. Passive restraint systems.
3. Any component/part of the roll cage structure which the competitor may come in contact or may be struck by the competitor's helmet in a serious impact must be covered with a flame-retardant energy absorbing material
4. When permitted in the individual class preparation regulations, the passenger seat may be removed or replaced with a racing seat.
5. When permitted in the individual class preparation regulations The following items may be installed in the cockpit
  - a. Safety equipment/structures,
  - b. seat,
  - c. instrumentation,
  - d. electronic equipment (radio, camera, etc)
  - e. driver cooling system
  - f. driver ventilation system
  - g. battery
  - h. replacement door panels/interior trim
  - i. controls necessary for driving
  - j. The above components shall be attached/contained to the chassis or cage in such a way as to be able to withstand 25-g deceleration. Any sharp edges shall be covered, padded, protected, etc. to prevent injury to driver, crew, course workers, and officials.
  - k. Vertical bulkheads, and enclosures, within the cockpit shall not be any higher than the bottom of the side windows

**I. LIGHTS**

1. Touring cars must retain functional tail/rain lights and brake lights. The tail lights must be at least 8W equivalent per side; the brake lights at least 23 W equivalent per side. The brake lights must be enabled by the brake pedal only. Formula cars and sports racers must have functional rain lights at least 8W equivalent per side.
  - a. The equivalent wattage in LED lights will be accepted.
    - i. 23 watts = 6 watts LED
    - ii. 8 watts = 2 watts LED
2. The Clerk of the Course or technical inspector may at their lone discretion require a watt to be used on any vehicle they deem to require more.
3. Whenever the track surface is wet, thereby causing spray, all cars on the track shall turn on their tail/rain lights.
4. The brake lights must continue to be functional whenever the tail/rain lights are used.
5. The tail/rain lights must be dimmer than the brake lights when they come on, unless amber turn signal lamps are wired as rain lights.
6. Any glass lenses must be taped.
7. Where permitted in the individual class preparation regulations
  - a. Headlights, parking and/or signal lights may be removed.
  - b. If these lights are removed, the openings must be covered with wire mesh screen or panels made of metal, fiberglass, or sheet plastic, or other composite.
  - c. In the case of pop-up headlights, the entire assembly may be removed and the opening covered with a plate made of metal or alternate material.

**J. FUEL SYSTEM**

1. Fuel pumps may not be mounted in the driver/passenger compartment.
2. Fuel lines passing through the driver/passenger compartment must be metal line, or metal braided line, or be completely enclosed by a supplemental metal cover.
3. There should be a solid bulkhead completely separating the fuel tank, fuel pump, fuel cell, filler neck hoses, and/or vent lines, from the driver compartment.
4. Such a bulkhead must be added if the standard vehicle has none (example, hatchback vehicles, and tube frame vehicles).
5. Bulkheads which extend from the floor to the roof behind the competitor are prohibited.
6. The fuel tank cap must be non-venting and must not protrude from the bodywork. All fuel
7. Tank vents must terminate away from the body and incorporate check valves to prevent fuel spillage.
8. Fuel Cell
  - a. All cars with tube frame construction must have a fuel cell.
  - b. A fuel cell is permitted for production cars, except where prohibited by class rules.
    - i. All vehicles having a fuel cell must comply with the rules in this section, even if a fuel cell is not required by the class rules.
  - c. All fuel cells must be FIA FT3 (or higher) certified.
    - i. No part of the fuel cell shall be closer than 15 cm to the ground unless contained within the basic structural frame rails of the vehicle forward of the rear axle.
    - ii. The fuel cell shall be located in approximately the same location as in the production vehicle or behind the rear axle, but not within the driver/passenger compartment.
      1. For vehicles where these requirements conflict with the production tank location, a specific variance may be granted.

- iii. There must be a metal bulkhead completely separating the cockpit from the compartment containing the fuel cell. This does not negate the requirement that the fuel cell bladder be contained in a metal container.
  - iv. The fuel cell bladder must be completely contained within a metal container constructed of at least 20 gauge steel or 0.149 cm (0.059") aluminum.
  - v. Where permitted in the individual class preparation regulations this fuel cell may have a maximum capacity of 120 litres (26.40 Imperial gallons).
9. Fuel Cells and Tanks must have adequate crash protection
- a. Cells and tanks which are mounted mid-ship (contained with the front and rear axle and the frame rails or unibody equivalent) will be considered to have adequate protection.
  - b. Cells and tanks mount in other locations may require additional protection to be added.
    - i. OEM Bumpers, Crumple Zones and Crash structures may be considered as adequate protection (or part of the adequate protection)

#### **K. OILING SYSTEM**

1. Oil reservoirs must be located within the coachwork, and must be located so that in case of spillage, leakage or tank failure, oil cannot reach the driver.
2. If oil storage tanks are not located in the original position they must be surrounded by a 10 mm thick crushable structure. Provided that the oil tank is not located in close proximity to the outer surface of the bodywork, and there is some of the structure of the vehicle between the oil tank and the bodywork, the car's structure will meet the 10mm crushable structure rule.
3. All oil lines, including gauge and vent lines that pass into or through the driver/passenger compartment, shall be of steel tube or metal braided hoses, or be completely enclosed by a supplemental metal cover.
4. If the oil tank is located in the cockpit area, or a trunk area that is open to the driver, it must be separated from the driver by a metal enclosure made up of .036" steel, or .059" aluminum. This is in addition to the 10mm thick crushable structure. The floor of the enclosure must be designed to prevent accumulation of fluids.
5. When permitted in the individual class preparation regulations
  - a. Oil coolers must be mounted in or under the coachwork, but not in the driver/passenger compartment.
  - b. A mechanical pressure accumulator must be securely mounted within the bodywork and be shielded so that engine oil or spray cannot reach the competitor in the event of a tank rupture or leak.
  - c. Catch tanks may be fitted and are highly recommended
  - d. Engine oil breather system and or Oil catch tank is required

#### **L. POWER STEERING**

1. When permitted in the individual class preparation regulations Hoses may be replaced with metal braided

#### **M. COOLING SYSTEM**

1. Coolant catch tanks / reservoir are required
2. With minimum capacity of
  - a. one (1) litre for vehicles with engine displacement of under two liters of engine displacement
  - b. Two (2) litres for vehicles with engine displacement of over two litres
3. Any catch tanks shall be translucent or be fitted with sight tubes to facilitate easy checking of their contents.
4. All coolant lines, including gauge and vent lines that pass into or through the driver/passenger compartment, shall be of steel tube or metal braided hoses, or be completely enclosed by a supplemental metal cover.



**N. STARTER**

1. The engine must be equipped with an onboard electric starter.
2. The main starter cable terminal must be securely insulated.
3. When permitted in the individual class preparation regulations An external boosting system to assist the vehicle's electrical system may be installed, provided that it cannot be accidentally shorted.
4. Vintage exhibition vehicles are exempt from these regulations.

**O. TRANSMISSION, REAR AXLE AND DRIVE SHAFTS**

1. When permitted in the individual class preparation regulations, the addition of an external scattershield is permitted and recommended.
2. A scattershield is required for any tube-frame car if the plane of rotation of the flywheel/clutch assembly intersects any portion of the driver's position.
3. The scattershield must be made of one of the following materials:
  - a. 3.2 mm SAE 4130 alloy steel plate
  - b. 6.3 mm mild steel plate
  - c. 6.3 mm aluminum alloy plate (not cast aluminum)
  - d. NHRA or SEMA approved flexible shield

The use of automatic transmissions may approve on a case-by-case basis.

4. Clutch linkage may be operated by a hand control, if a driver is disabled
5. Two drive shaft safety hoops must be fitted to front engine, rear drive tube-framed vehicles, and are recommended for all front engine, rear drive vehicles.
  - a. These hoops shall be
    - i. located within 30 cm (12") of the universal joints on the ends of the drive shaft,
    - ii. Constructed of at least 6.35 cm x 2.54 cm (0.25" x 1.0") steel material.
    - iii. The hoops must completely encircle the drive shaft.
    - iv. A section of each hoop may be made removable to facilitate driveshaft removal;
6. If this is done, the removable section must be attached to the permanent section by a minimum of two 0.952 cm (0.375") grade 8 or higher bolts.
  - i. The drive shaft hoops must be securely attached to the frame or driveshaft tunnel.

**P. BALLAST**

1. Ballast may be added but must be securely mounted within the coachwork in such a fashion that a tool is required for removal of ballast.
2. Unless superseded by class rules, all ballast shall be solid metal such as steel, and consist of a minimum of five (5) pounds per piece. Each piece should be bolted in place with through-bolts, fender washers, and a locking-nut / system (e.g. jam-nuts, Nylock, etc.). All bolts should be grade five (5). There should be at least one 3/8" diameter, or larger bolt for every ten (10) pounds of weight (e.g. 20 pound block uses two bolts).

**Q. BRAKES**

1. The brakes should be in good working condition and must be able to stop the vehicle in a reasonable distance in a safe and controlled manner. The pedal pressure should be adequate. The fluid level must be above the minimum limit as specified by the manufacturer. The brake lines must be in good condition
  - a. Where permitted in the individual class preparation regulations,
    - i. The use of any dual action master cylinder and/or pressure equalizing device is permitted.
    - ii. Brake lines may be relocated and shielded.
    - iii. Any suitable brake lines may be used. The use of braided steel/Teflon lined flexible hose to replace flexible rubber hose is highly recommended
    - iv. Any brake cooling devices may be used. Ventilation openings may be made in the body work to accommodate cooling ducts.
    - v. Brake backing plates may be modified or removed.
    - vi. The handbrake and related operating mechanism may be removed.
    - vii. brake proportioning valves are allowed
2. All vehicles must be equipped with a dual circuit braking system which permits effective braking on at least two wheels in the event of a leak in one circuit.

**R. NOISE**

1. The maximum permissible noise level as measured at 16m/50ft (+/- 0.5m/2ft) from the side of the track surface is 98 dBA, subject to local track and supplemental regulations.

**S. EXHAUST**

1. All portions of the exhaust must be shielded by metal bulkheads from the driver/passenger compartment.
2. The exhaust must exit behind the competitor's position or at a point rearward of the centre of the wheelbase. Side exhausts must exit less than 17.78 cm (7") from the lower edge of the rocker panel.

**T. BATTERY**

1. The battery must be securely attached to the vehicle.
  - a. No Bungee cords or rubber cords may be used to function as the sole hold down mechanism
2. Electrically non-conductive material should cover the positive battery terminal
3. Where permitted in the individual class preparation regulations, the battery may be relocated.
  - a. If a Lead Acid battery is relocated it must be enclosed in a ventilated and Insulated box

**U. TOW STRAP**

1. Vehicle must be equipped with a towing eye, strap, or towing point at the front and rear. Such a towing eye should not protrude dangerously from the vehicle.
2. The towing eye, strap, or towing point location but be clearly label

**V. MIRRORS**

1. A minimum of 2 is required, the mirrors shall provide driver visibility to the rear of both sides of the car.

**W. TIRES**

1. Recapped or re-grooved tires are not allowed.
2. Filing, buffing, or any other disguising of tire sidewall is prohibited. Chemical treatments, or any means to artificially enhance tire performance is prohibited.
3. The only modification allowed to tires is having treads "shaved" or "trued".
4. There should not be cords exposed, bubbles, or other visible damage on the tire
5. The class regulations may specify particular and/or size of tires for use by competitors during competitions and in such cases these are the only tires permitted.

**X. WHEELS / HUBS**

1. No modifications (including grinding) are allowed on a vendor-supplied wheel.
2. Valve stems and caps are free.
3. There should be no cracks or other damage to the wheel
4. All lug nuts must be present and tightly hold the tire and rim assembly to the car's hub
5. No hubcaps or beauty rings are allowed.
6. Where permitted in the individual class preparation regulations
  - a. Lug nuts and/or wheel studs are free
  - b. As long as at least two (2) threads of the wheel studs are visible and the outside edge of the nuts and studs are inside the wheel rim when properly mounted.

**Y. FUEL TO BE USED**

1. Fuel used in a racing vehicle must comply with current federal legislation concerning the use of motor fuels in racing applications. Note that the use of aviation gasoline and all leaded fuels in vehicles registered for road use is prohibited by federal Law
2. The fuel used must be based on or patterned after commercially available pump gasoline, commercially available gasoline/alcohol blends (including M85), commercially available diesel fuel or commercially available racing gasoline. Any fuel blend must contain at least fifteen (15) percent medium chain (7 or 8 carbons) aliphatic or aromatic hydrocarbon compounds and must burn with a visible flame. The addition of benzene or hydrazine is prohibited. The addition of other ketones, alcohols, or aromatic compounds is permitted. The addition of compounds containing nitrogen is prohibited.
3. Fuel samples may be taken by the scrutineers at any time and laboratory analysis may be performed. The findings of any analysis permitted are final and not subject to protest or appeal and any penalties arising from such analysis are not subject to protest or appeal.
4. During refueling, no person(s) shall be under the car.

**Z. OTHER**

1. Touring cars must have an effective defogging/demisting system that is capable of keeping the windshield clear during wet sessions. Anti-fog films meet this requirement.
2. Touring cars must be fitted with at least one effective windshield wiper motor, which must be in working order throughout the event. Wiper blades, arms and associated hardware may be substituted freely, or removed.
3. Steering columns must be designed as to collapse or fold to avoid impaling the driver in the event of a collision.
  - a. This could be accomplished by
    - i. Two (2) or more universal joints in them that would allow the steering column to fold on impact.
    - ii. Collapsible sections
    - iii. Or a combination of Universal joints and collapsible sections
  - b. If used with an extension, the design must also ensure that the extension cannot impale the driver
4. All hoses carrying fluids should be in good condition with no cracks or other damage.
5. There should be no significant fluid leaks from vehicle
6. There should be no loose wires inside the driver's compartment that interfere with the safe operation of the vehicle.
7. No live (hot) wires may be uninsulated anywhere in the vehicle.

**APPENDIX 3 - Vehicle appearance****A. DECALS AND ADVERTISING**

1. WCMA decals as supplied by WCMA must be placed on all cars, one (1) on each side.
2. Event/Series as supplied by the WCMA or Event organize must be placed in the assigned location
3. Advertising and symbols displayed on a car must be in good taste and not interfere with racing numbers or other required markings.

**B. APPEARANCE OF CARS**

1. The body condition, paint work and signage (decaling) of a car shall remain intact at all times. Cars will not be permitted to compete in a competition with damage from a previous competition that has not been repaired in a workmanlike manner.
2. All entered vehicles must be in good condition and appearance. Vehicles with excessive body damage, primed body panels, etc., are not allowed. The vehicle must meet the "50 at 50" rule.
3. Reasonable efforts must be made to restore the appearance of a car damaged during an event prior to the start of a race.
4. A car that is visually unacceptable, in the opinion of the steward in consultation with the clerk of the course will not be permitted to start a race. A claim for return of entry fees, or any protest or appeal against any action taken by the steward under this regulation is not allowed.

**C. 50 AT 50**

1. ALL Vehicles must look undamaged and straight at fifty (50) mph from fifty (50) feet.

**D. RACING NUMBERS AND CLASS DESIGNATION**

1. Racing numbers are applied only as follows:
  - a. Primary Location
    - i. One (1) number must be on the front hood of Touring cars and on the nose of on Sports Racers and open wheel cars
    - ii. One (1) number must be on each side of the car positioned on the body above an imaginary line running through the center line of the wheels. Open wheel cars may vary this location, however, side numbers shall in no way be partially or completely obscured by the vehicle's wheels.
    - iii. Size for Primary Location
      1. The numbers must be at least ten (10) inches high on Touring cars and eight (8) inches high on Sports Racers and open wheel cars.
      2. The minimum width of stroke of all numbers is two (2) inches.
  - b. Secondary Location
    - i. On touring cars a racing number must be placed on the rear of the car on a vertical surface
    - ii. Size for Secondary Location
      1. The numbers must be at least Five (5) inches high on Touring cars and Four (4) inches high on Sports Racers and open wheel cars.
      2. The minimum width of stroke of all numbers is one (1) inches.
  - c. Colour
    - i. The numbers must be in a solid colour,
    - ii. The numbers must be on a solid background of a significantly contrasting colour.
    - iii. Black numbers on white background is preferred and recommended.
    - iv. Metallic or other highly reflective numbers are not permitted.

2. Class designations are applied as follows:
  - a. Primary Location
    - i. Shall be placed close by the numbers on the sides of the car.
  - b. Size for Primary Location
    - i. The numbers and letters must be at least Five (5) inches high on Touring cars and Four (4) inches high on Sports Racers and open wheel cars.
    - ii. The minimum width of stroke of all numbers is one (1) inches
  - c. Secondary Location
    - i. No requirement for secondary locations
  - d. Size for Secondary Location
    - i. The class designation shall be at least one half the size of the numbers.
3. Minimum weight
  - a. The minimum weight shall be displayed beneath the class designation on the driver's door. Minimum font height is 1 inch.

Cars not meeting the specification of this regulation, in the opinion of the steward, during any scheduled track session will be black flagged and not allowed to re-enter the track until the numbers are in compliance.

**APPENDIX 4 - COMPETITOR SAFETY EQUIPMENT**

These standards constitute the minimum acceptable standard of safety precaution. Individual class preparation rules may increase applicable safety requirements.

**A. APPAREL**

1. Drivers must wear the following equipment during all on-track sessions:
  - a. Helmet (as pre Appendix 4.B)
    - i. Chin strap must tight and secure
  - b. fire-resistant (e.g. Nomex) balaclava (as pre Appendix 4.E)
  - c. One-piece fire-resistant suit (as pre Appendix 4.D)
    - i. Depend on suit fire-resistant (e.g. Nomex) underwear (as pre Appendix 4.D)
  - d. Gloves (as pre Appendix 4.E)
  - e. Shoes (as pre Appendix 4.E)
  - f. Belts (As pre Appendix 2.1.B) Must be tight and secure

**B. HELMETS**

1. Only helmets in FIA technical list 25 will be accepted:
  - a. Snell Foundation
    - i. Snell SA2005 (**not valid after Dec 31, 2018.**)
    - ii. SA2010 or SAH2010 (**not valid after Dec 31, 2023.**)
    - iii. SA2015 (**not valid after Dec 31, 2023.**)
  - b. FIA Standard
    - i. 8860-2004 (**not valid after Dec 31, 2020.**)
    - ii. 8860-2010
    - iii. 8859-2015
  - c. SFI Foundation
    - i. SFI 31.1, (**not valid after Dec 31, 2018**)
    - ii. SFI 31.1A (**not valid after Dec 31, 2018**)
    - iii. SFI 31.2 (**not valid after Dec 31, 2018**)



Specimens of helmet labels

2. Once the new standard of helmet is available every effort should be made to have that helmet
3. No helmet may be modified from its specification as manufactured, except in compliance with instructions approved by the manufacturer. Any other modification will render the helmet unacceptable. The fitting of earplugs and microphones may be done only in respect of the paragraph above.

4. The back of each helmet must be labeled indicating name, date of birth and allergies and other pertinent medical history such as tetanus immunization, diabetes, etc.
5. Helmets must be in good condition. Helmets which have deep scratches, gouges, or cracks will not be permitted for use in on-track sessions. It is highly recommended that helmets be kept out of direct sunlight to prevent UV radiation damage.
6. The inside liner of the helmet must be in good condition. The fireproof lining should be free from contaminants, and the foam should not show any degradation.
7. The chin strap must be functional, in good condition, and not slip when tugged upon.
8. Full face helmets and shields must be worn by drivers of open cockpit cars and are strongly recommended for drivers of closed cars.

### C. FRONTAL HEAD RESTRAINT

1. An ~~FIA 8858~~ approved Frontal Head Restraint (FHR) is mandatory for road course racing.
  - a. Approved FHR include
    - i. FIA 8858-2002 and 8858-2010
      1. Devices are listed in FIA Technical List N 29.
    - ii. SFI 38.1
  - b. Always consult the manufacturer for proper use of any safety equipment.
2. For vintage classes the use of a FIA 8858 approved Frontal Head Restraint is not mandatory but is highly recommended.
3. For ice races, the use of a FIA 8858 approved Frontal Head Restraint is not mandatory but is highly recommended.

### D. DRIVER SUITS AND UNDERWEAR SYSTEMS

1. The following one piece, driver suit/underwear systems are approved.
  - a. Suits of two layers of approved material worn with approved underwear.
  - b. Suits of three layers of approved material.
  - c. Suits carrying an SF13-2A/3 rating worn with approved underwear.
  - d. Suits carrying an SF13-2A/5 or higher rating.
  - e. Multilayer suits carrying an FIA Homologation.
  - f. Suits, which the manufacturer states in writing meet or exceed the standards stated herein, may be substituted for that standard.
  - g. It is highly recommended that underwear of approved material be worn under all driver suits.
  - h. While competing, drivers should not wear any clothing composed in whole or in part of Nylon.
  - i. In the case of doubt concerning the composition of a suit/underwear system, the driver shall be able to present adequate evidence that it conforms to one of the above standards.
2. For Ice Races only drivers may use Fire Resistant Coveralls (Oil Field) in place of an approved driver suit/underwear system
  - a. Coveralls must be Nomex, Proban, or equal with a CSA rating.
  - b. Coveralls must be clean and good condition
  - c. Natural or Fire Resistant fabrics (that will not melt) are worn under the coverall
  - d. Note while Fire Resistant Coveralls permitted an approved driver suit/underwear systems is recommended.

**E. OTHER**

1. Socks made of fire-resistant material are mandatory.
  - a. For ice races only socks maybe Natural or Fire Resistant fabrics (that will not melt)
2. Shoes or gloves made of leather or any approved fire-resistant material containing no holes
  - a. Shoes may have synthetic rubber soles.
  - b. Gloves and shoes must have a layer of fire-resistant material next to the skin.
3. Balaclava made of any approved fire-resistant material



**APPENDIX 5 - Definitions (Reference Only)**

Adjusted Weight/Power Ratio		Is a vehicles WT/HP after the addition or subtraction of factors listed in the ST or PT rules. Used to determine Class in ST1-3 and to insure fair competition in PT
AFFF	Aqueous film forming foams	Foam based fire extinguisher system
ASN	ASN Canada FIA	Canada's Motor Sports Sanctioning Authority appointed by the FIA
Average Horsepower		The horsepower used to Calculated WT/HP in ST3, see 3.2.D.2
Base Classification		The starting point or class of a vehicle before any modification points are assessed
Base tire size		The tire size to be used for purposes of base classing and modification points assessment
Base Weight		The weight to be used for purposes of base classing and modification points assessment
BTM	Base Trim Model	Unless otherwise specified in the base class listing. A vehicle's Base(lowest) U.S./CAN domestic market trim, package, or model, without factory upgrades or options, will be used for purposes of base classing and modification points assessment
CC	Challenge Cars	A Regional spec class for the first gen Mazda RX-7
CDS	Cold Drawn Seamless	Tubing used for roll cage construction
Competition weight		The minimum weight a vehicle competes at
DOM	Drawn Over Mandrel	Tubing used for roll cage construction
ERW	Electric Resistance Welded	Tubing NOT suitable for roll cage construction
F1600	Formula Ford 1600	
FC	Formula Continental	
FIA	Federation Internationale de l'Automobile	
FL	Formula Libre	A Catch-all for Formula cars
FV	Formula Vee	Volkswagen based open wheel cars
HANS	Hans Device	Shoulder based helmet tethering system to prevent neck injury
Mass produced		produced large quantities (great than 500)
Maximum horsepower		The high horsepower recorded on a Dyno rounded to the nearest whole number
Modification Points		These Points are added (or subtracted) as vehicles are modified for their BTM
NASA	National Auto Sport Association	A US Sanctioning Authority
Non-BTM	NON Base Trim Model	Any factory upgrades or option not on vehicle's Base(lowest) U.S./CAN domestic market trim, package, or model.
OEM	Original Equipment Manufacturer	Original production Items available from the vehicle manufacturer
PT	Performance Touring	One of two Core groups touring car classes
SCCA	Sports Car Club of America	An FIA affiliated US Sanctioning Authority
SFI	SFI Foundation	an administrator of standards
SM	Spec Miata	An International spec class for the first and second gen Mazda Miata
SNELL	Snell Foundation	Helmet testing and standards Foundation
SR	Sports Racing Cars	Non-production based tube frame based closed wheel racecar
ST	Super Touring	One of two Core groups touring car classes
SU	Super Unlimited	A Catch-all for touring cars
tube-frame(d)		A vehicle where the frame/tube or part of the frame is not from a mass produced vehicle. If the cutting of a single tube means the vehicle would not be able to operated it is likely to considered tube-frame
WCMA	Western Canada Motorsport Association	The authority for amateur motorsports in Alberta, Saskatchewan, Manitoba and the territories as delegated by ASN Canada FIA
WCMA Base Classification		A PT Base class assigned by the WCMA based on WT/HP
50 at 50		50 feet at 50 miles per hour, the distance and speed at which a vehicle must look undamaged and straight