FORMULA FORD SINGLE SEATER RACING CAR REGULATIONS AND SPECIFICATIONS FOR Zetec Cars for 2013

THE CONCEPT OF "THAT WHICH IS NOT SPECIFICALLY PERMITTED, IS DISALLOWED" APPLIES TO THESE REGULATIONS (158395/134)

1. **DESCRIPTION AND ELIGIBILITY**

Four wheel single seater racing car fitted with a Ford 1800cc, 16 Valve Zetec engine. Only 2007 model, and older, cars are permitted for the 2013 season. No car may compete without the written approval of the Formula Ford Association, which will keep a register of all eligible cars and/or models. The Formula Ford Association may, at its discretion, exempt older models from compliance with some of the regulations and specifications. The Formula Ford Association will record the exemptions allowed for each individual car and/or model and may cancel any or all such exemptions (30) thirty days after giving written notice of the cancellation. Locally manufactured 2012 model cars, may be permitted to compete during the 2013 season, subject to written approval being granted by the Formula Ford Association.

2. **SAFETY**

2.1 **Roll-over structure:** The rollbar must be symmetrical about the length-wise centreline of the car and of minimum height 90cm measured vertically from the base of the cockpit or 92cm measured along the line of the driver's spine from the bottom of the car seat. There must be at least one brace rearwards from the top of the rollbar at an angle not exceeding 60 degrees with the horizontal. This brace must be the same diameter as the rollbar, if two braces are fitted to the tube the diameter may be reduced to 20-26mm the wall thickness being maintained. In addition, forward facing braces should be considered. The width inside the roll-over bar main tubes must be 33cm minimum measured 60cm above the base of the seat. It must incorporate a cross-brace to restrain the driver's head and give rearward support. The top hoop radius must not be less than 5cm measured at the centre line of the tube. Minimum Material: Carbon steel 350N/mm2 Minimum Dimensions: Cold drawn seamless 42.4mm diameter x 2.6mm wall thickness. Exceptions: They only exceptions to the requirements is as follows Safety cage manufacturers may submit a safety cage of their own design to MSA for approval as regards the quality of the steel used, the dimensions of the tubes, the optional reinforcing members and the mounting to the vehicle, provided that the construction is certified to withstand the forces

given hereafter in any combination on top of the Safety Cage: 1.5w Lateral 5.5w Fore and aft 7.5w Vertical w = 525Kg (450Kg for weight of car + 75kg) Note: Where a safety cage manufacturer submits a cage and full documentation to MSA a "Rollbar" certificate will be raised and issued. Duly authorised copies of this certificate containing a drawing and/or photograph of the safety cage and a declaration that the rollcage can resist the forces specified must be available to event Scrutineers. To obtain MSA approval, a manufacturer must have demonstrated his consistent ability to design and manufacture safety cages, which comply with the specifications approved by FIA.

2.1.1 Manufacturers recognised by the Formula Ford Association (FFA) must only supply customers with products designed and manufactured to the approved standards.

2.1.2 Each FFA-approved manufacturer must be able to demonstrate to the Association:

a) That the material used has a certificate of origin or traceability and is kept segregated from other batches of material.

b) That welding procedures he uses produce consistent and sound welds and are regularly checked by laboratory tests,

c) That he operates and maintains auditable in-house quality standards and procedures, which are updated regularly.

2.1.3 The rollbar must be symmetrical about the length-wise centreline of the car and of minimum height 90cm measured vertically from the base of the cockpit or 92cm measured along the line of the driver's spine from the bottom of the car seat. There must be at least one brace rearwards from the top of the rollbar at an angle not exceeding 60 degrees with the horizontal. This brace must be the same diameter as the rollbar, if two braces are fitted to the tube the diameter may be reduced to 20-26mm the wall thickness being maintained. In addition, forward facing braces should be considered. The width inside the rollbar main tubes must be 33cm minimum measured 60cm above the base of the seat. It must incorporate a cross-brace to restrain the driver's head and give rearward support. The top hoop radius must not be less than 5cm measured at the centre line of the tube. Minimum Material: Carbon steel 350N/mm2 Minimum Dimensions: Cold drawn seamless 42.4mm diameter x 2.6mm wall thickness.

2.1.4 All aluminium alloy roll cages are prohibited.

2.1.5 Aerodynamics: the use of a rollbar to achieve or supplement aerodynamic effects is prohibited.

2.2 **Safety Harness**: be fitted with a safety harness to be worn at all times by the driver during training, practice and competition.

2.2.1 Safety Harness (seat belts): Six point, incorporating two shoulder straps, one abdominal strap and two straps between the legs, with six

fixation points on the chassis of the vehicle. One either side of the driver, two to the rear of the driver's seat and two between the legs. The fixation point to the rear should be positioned so that the strap from the shoulder is as near horizontal as possible. It should not be located on the floor directly behind the driver. Seat belts once involved in a serious accident should be discarded. It is not permitted to mix parts of seat belts. Only complete sets as supplied by manufacturers should be used. Only one release mechanism is permitted on each seat belt configuration and this must be available for the wearer to operate whilst seated in the competing position. Belts subjected to oil, acid or heat should be replaced. All seat belts must conform to the minimum FIA standards.

2.2.2 Competitors are advised that the use of Head and Neck Restraint System (HANS) devices is compulsory under these regulations. Any HANS device used must comply with the FIA code

2.3 **Fire Extinguishers**: a fire extinguisher system must be carried on all vehicles, the minimum requirement being that the system be discharged with one of the permitted extinguishants and be operable by the driver whilst normally seated either by manual operation or by a mechanical/electrically assisted triggering system.

2.3.1 Minimum Capacity: 2kg

2.3.2 Plumbed in systems. The unit should have two points of triggering: one for the driver and one outside the car for activation by marshals etc.

2.3.3 The triggering point from the exterior must be positioned close to the circuit breaker (or combined with it) and must be marked by the letter "E" in red inside a white circle of at least 10cm diameter with a red edge.

2.3.4 In installing units the direction of nozzles should be carefully considered, induction, exhaust, ignition and fuel pumping systems being the most likely areas for fire to occur. All the LED lights must fit within a square of 11 x 11cm.

2.3.5 Where possible sources of fire exist outside the engine or cockpit areas advice should be sought from the Formula Ford Association concerning plumbed-in system installations.

2.3.6 All bottles should discharge simultaneously and must be operable in any position of the car even if inverted.

2.3.7 It is strongly recommended that plumbed-in bottles should be mounted in the fore and aft direction in the vehicle. The fitting of a pressure gauge is mandatory.

2.3.8 Method of operation: the preferred method of operation is electrical which should have its own source of energy for triggering, ideally with provision for checking the integrity of the system's triggering circuit.

2.3.9 Installation: particular attention should be paid to the installation and maintenance of any system, especially if it is mechanically operated. Pull cables should be fitted in such a way that no kinks or "S" bends are formed, which could cause malfunction. Mechanically operated systems, if used, should be fitted with "Total discharge valves" (i.e. ones that continue to discharge even if the operating mechanism should fail after triggering).

2.3.10 Weight checking: extinguisher systems should be capable of being dismantled for the purpose of checking the weight of the extinguishant and the integrity of the cylinder, also to enable the operating system to be serviced without discharging the contents. The tare weight of the unit must be marked on the cylinder.

2.3.11 During events: all plumbed-in extinguisher systems must be in an "ARMED" condition (i.e. be capable of being operated without the removal of any safety device) at all times whilst competing or practising.

N.B. The fire extinguisher cannot be disarmed in any Parc Ferme area without the specific permission of the scrutineers for that event.

2.3.12 Any plumbed-in extinguisher system found to be incapable of being operated will be the subject of a report to the Clerk of the Course/Stewards for possible penalisation as an offence against Safety Regulations.

2.3.13 Checking for correctly "armed" extinguisher systems should only be carried out by Scrutineers.

2.4 **Red warning light:** a rearward facing red warning light of a minimum of 21 watts, with surface area minimum 20cm2, maximum 40cm2, or of 21 watts with a surface area minimum of 50cm2 and with lens and reflector to EC standards, must be located within 10cm of the centre line of the vehicle and be clearly visible from the rear. The warning light must be switched on when visibility conditions are reduced or when instructed by the Clerk of the Course.

2.5 **Electrical system:** to be equipped with an externally operated circuit breaker having positive ON-OFF positions clearly marked. An internal ignition switch must be operable by the driver when normally seated irrespective of whether a safety harness is worn or not.

2.5.1 External circuit breakers: the circuit breaker, when operated, must isolate all electrical circuits with the exception of those that operate fire extinguishers and other specifically specified components. On the cars it should be situated on the lower main hoop of the rollbar. The location to be identified by a "Red Spark on a White-Edged Blue Triangle", and the "ON" and "OFF" positions clearly marked. Note: When the cut-out is operated there must be no power source capable of keeping the engine running.

2.5.2 Not have any ignition components, coils, chokes, black boxes, located in the cockpit area, which has a working voltage greater than 15 Volts.

2.6 **Head restraints**: head restraints must be fitted, capable of restraining a 17kg mass decelerating at 5g. Dimensions to be 10cm x 10cm and located such that the driver's helmet is restrained and cannot move past it under rearward forces, or be trapped between the rollbar and the head restraint. It is recommended that it be within 5cm of the driver's helmet when normally seated. Side head restraints are permissible provided the internal gap between the ears is less than 400mm, and that the side restraints are fitted with an energy absorbing material of at least 20mm minimum thickness.

2.7 All other personal safety equipment, overall, underwear, helmets etc. must comply with at least the minimum requirements of MSA for the event being contested.

2.8 Either goggles or a visor must be worn at all times during training practice and competing.

2.9 **Electrical**

2.9.1 **Batteries:** precautions should be taken to reduce the possibility of acid burns from batteries in case of accidents. Batteries should be sealed in a leak-proof, non-conductive, insulated compartment.

2.9.2 **Electrical System**: all wiring should be secured and well protected to reduce the risk of fire from electrical short circuits.

2.10 **Fuel**

2.10.1 **Fuel tanks and pipes**: every effort should be made to isolate fuel tanks and pipes from the driver's compartment. The risk of fuel spillage from accident damage can be reduced by use of bag-type tanks or by coating metal tanks with GRP. Tanks should be located so that they are given maximum protection by the structure of the vehicle. Vents should be designed to avoid spillage if the vehicle becomes inverted.

2.10.2 **Fuel fillers:** these should be designed and located to reduce risk of damage. Filler caps should not be liable to open in the case of an accident. Simple screw caps are effective. The positive locking of the fuel filler caps is recommended. The filler pipe to the tank should be of minimum possible length and not protrude beyond the bodywork.

2.10.3 **Refuelling:** no refuelling will be permitted during official qualifying.

2.11 **Coolant**

2.11.1 Radiator Caps: these caps should be positioned or shielded in such a way that hot water or steam cannot scald the driver of the vehicle if they become opened or broken in an accident.

3. **CHASSIS**

Cars must conform to the following:

3.1 The chassis must be of tubular steel construction with no stress bearing panels

except bulkhead and undertray, curvature of the undertray must not exceed 2.54cm. The undertray/floor (Art. 4) extends from the bulkhead forward of the pedals tot he bulkhead between the fuel tank and the engine. Monocoque chassis construction is prohibited. Stress bearing panels are defined as, sheet metal affixed to the frame by welding or bonding or by rivets or by bolts or screws which have centres closer than 15.25cm. Bodywork must not be used as stress bearing panels. The use of stabilised materials, composite materials using carbon and/or Kevlar reinforcement is prohibited. The cars must incorporate a Lateral Protection Structure (Art. 3.6).

3.1.1 The maximum length of the weld attaching the panels to the chassis shall be 25.4mm. The gap between the end of the each weld shall be a minimum of 15.25cms.

3.2 Cars built after January 1 1995 The free internal cross section of the cockpit from the soles of the driver's feet to behind his seat shall at no point be less than 700cm2. The only thing which may encroach on this area is the steering column. A free vertical section of minimum 25cm width maintained to a minimum height of 25cm with corners of maximum 5cm radius must be maintained over the whole length of the cockpit with the steering wheel removed. The driver normally seated in his driving position with the seat belts fastened and the steering wheel in place must be able to raise both legs together such that his knees reach the plane of the steering wheel in the rearwards direction; this action must not be obstructed by any part of the car.

3.3 The soles of the feet of the driver, seated in the normal driving position and with his feet on the pedals in the inoperative position, shall not be situated to the fore of the vertical plane passing through the centre line of the front wheels.

3.4 No engine oil or water tubes are permitted within the cockpit.

3.5 Cars built after January 1 1995 The chassis must include an impact-absorbing structure fitted ahead of the front bulkhead of the tubular steel frame. This structure must be independent of the bodywork and must be solidly fixed to the extremities of the bulkhead (i.e. with bolts requiring tools for removal). It must constitute a box of 30cm minimum length, 15cm minimum height in any vertical section and 400cm2 minimum total cross section. It must be metallic using honeycomb sandwich construction with a panel thickness of 15mm minimum.

3.5.1 For cars built after January 1 1999, the impact-absorbing structure shall be fixed to the chassis with a minimum of 4 fasteners, in high quality steel using a core diameter of 6mm minimum.

3.6 Lateral Protection Structure Continuous panels whose projection on a vertical plane parallel to the longitudinal axis of the car shall be at least 15cm high, shall extend on either side of the car, at a minimum distance of 55cm from the car's longitudinal centre line between at least the transverse planes passing through the fuel tank rear face and the frontal extremity of the minimum cockpit

opening, and at a minimum distance of 35cm from the car's longitudinal centre line between at least the transversal planes passing through the above extremity and the front rollover bar hoop. These panels shall be made from a composite material of 30cm2 minimum cross section with a honeycomb core in metal giving adequate resistance to compression. The external skins shall be of aluminium alloy of a minimum thickness of 0.5mm or made up of another assembly of materials of equivalent efficiency. The panels must be securely attached to the bottom and at the upper extremity to the main structure of the car in such a manner as to ensure absorption of a lateral impact. The radiators may play the role of protective panels or of transversal struts. The periphery of the bodywork covering the Lateral Protection Structure, when viewed from below, must be curved upwards with a minimum radius of 5cm, and a maximum radius of 7cm with the exception of air entry and exit openings into the Lateral Protection Structure. The floor of the side pod must reflect the plan of the upper surface. The floor is to be in the same plane as the undertray in both directions, i.e. transverse and longitudinal, subject to all points being within 2.54cm of any flat plane situated under the car (see Art. 3.1).

3.7 Crushable structures: all oil tanks mounted outside the main chassis structure must be surrounded by crushable structure of minimum thickness of 10mm.

4 BODYWORK

4.1 See table of single seater dimensions (Appendix B). The use of composite materials using carbon and/or kevlar reinforcement is prohibited. Bodywork is not required behind the vertical plane taken through the front of the top most portion of the roll over structure. If bodywork is used it must conform with the following regulations:

4.2 Any device designed to aerodynamically augment the downthrust on the vehicle is prohibited, as are aerofoils, nose fins or spoilers of any type.

4.3 The engine cover must not extend rearwards past the rearmost point of the gearbox housing (no gearbox extensions permitted). The shape of the cover must not include any reflex curves and no flat surfaces are permitted within 15 degrees of the horizontal.

4.4 The lower rear bodywork (located below the wheel centre line) is only permitted alongside and beneath the engine and can only extend from behind the cockpit to a line drawn through the rear axis. The incorporation of suspension or other fairings in this bodywork or separately is prohibited.

4.5 It is not permitted to construct any suspension members in the form of an aerofoil or to incorporate a spoiler in the construction of any suspension member. A symmetrical oval tube is not considered an aerofoil.

4.6 All cars must have at least two mirrors mounted so that the driver has visibility on both sides of the car (minimum surface area of each one: 55cm2).

4.7 Cockpit opening: the opening giving access to the cockpit must allow a

designated horizontal template to be inserted vertically into the cockpit (not considering the steering wheel, the removable seat, or any side head support) down to 25mm lower than the lowest point of the cockpit opening. For cars built prior to January 1 1999 this template is defined by dimensions J, K and L in Appendix B. The insertion depth for the template is increased to 250mm for cars built after January 1 1999.

4.8 See also Lateral Protection Structures (Art. 3.6).

4.9 Be fitted with bodywork with a driver's compartment isolated from the engine, wet batteries, gearbox, transmission shafts, brakes, road wheels, their operating linkages and attachments, petrol tanks, oil tanks, water header tanks and catch tanks. Have a protective bulkhead of non-inflammable material between the engine and the driver's compartment capable of preventing the passage of fluid or flame. Gaps must be sealed with GRP or Intumescent Putty. Magnesium is prohibited for bulkheads. Where a fuel tank constitutes part of the bulkhead, an additional bulkhead must be fitted.

4.10 Have a complete floor of adequate strength rigidly supported within the driver compartment.

4.11 The maximum time for a driver to get in or out of the vehicle must not exceed 5 seconds.

4.12 Have any undertray provided with drainage holes to prevent accumulation of liquids.

4.13 The forward extremity of the nose of the car shall be less than 200mm from the ground. Implementation:- For cars built after 1 January 1998.

4.14 All cars must run with complete (all) bodywork at all times during race meetings. The only exception shall be where the bodywork is damaged in such a way that it cannot be fitted and fastened to the vehicle to prevent it coming loose and endangering other competitors.

5. **ENGINE**

Engines will be mounted upright and aligned fore and aft in the chassis. The only permitted engine is the engine supplied by the Formula Ford Association. No component of the engine, as supplied, may be disassembled or removed from the engine and no modification may be made to any component of the engine, (unless allowed for elsewhere in these regulations) without the written approval of the Formula Ford Association technical representative/s. Engine will be supplied by the Formula Ford Association in a sealed condition. In the event of any engine seal being broken, or bearing evidence of having been tampered with, the competitor concerned may be excluded from the race meeting concerned and may be excluded from the next three race meetings of the championship (or the three previous events of the championship should the exclusion occur within the final three race meetings). The onus is on the competitor to ensure that all his/her engine seals are intact at all times and to

immediately report any broken or damaged engine seals to the Formula Ford Association. The mass air flow meter shall be mounted at the forward end of the intake pipe (opposite end of the pipe to the restrictor). The air intake pipe shall be such that it permits an airtight seal to the restrictor and the mass air flow meter. The mass air flow meter shall be mounted in such a manner that the sensor is positioned at the top of the airflow unit (see diagram, Appendix "E"). All the air entering the engine must pass through the prescribed filtering device prior to the mass air flow meter. No pipe extension or air horn is allowed in front of, or inside, the air filter unit. The air filter must be fitted to the mass air flow meter without any intermediary device. The induction air filter unit may be placed in a cold air chamber. The engine induction air shall not pass through any form of tube or pipe, however manufactured, prior to the air filter element in the cold air chamber. The whole of the cold air chamber must fit inside the bodywork, with no body panels specifically designed to accommodate an extended cold air chamber. With the exception of the intake pipe, which may be shortened from its production length of 525mm (measured on the pipe centre line) up to a minimum length of 465mm in order to allow the freedom to position the mass air flow meter as indicated in Appendix "E", unmodified Ford production parts will be mandatory for the air restrictor, intake pipe (except as above), the mass air flow meter and the air filter. All the air for the engine must pass through the restrictor. Any means of reducing intake air temperature is prohibited. Any form of water injection is prohibited. Forced induction is prohibited. Ram air generated by the forward motion of the cars is not considered as forced induction.

5.1 **Exhaust System**

5.1.1 The exhaust manifold may not be modified, other than for fitting airtight plugs into the 4 bosses used for pulse air on the production car. The tubular exhaust pipes from the exhaust manifold may be reworked or replaced, except for the cast exhaust pipe flange which can only be modified as indicated in Appendix E. Their lengths and internal diameters shall remain unaltered, as must the position of the exhaust gas sensor (Hego Sensor). The dimensions of the exhaust pipes are given in Appendix E. The standardised muffler/silencer, as shown in Appendix "E", must be fitted. The muffler/silencer must form the end portion of the tailpipe and the "slip on" section must be welded to the remainder of the tailpipe. The tubular portions of the exhaust system to be manufactured from plain round tubing only.

5.1.2 Not have exhaust pipes extending more than 60cm beyond the rear wheel axis.

5.1.3 At all times the car must conform with the noise requirements contained in GCR 245. The exhaust must exit the rear of the car, and shall remain airtight, at all times for its entire length. The end of the

exhaust pipe must be square to the centre line.

5.2 **Cooling System**

5.2.1 A liquid cooling system is mandatory. The radiator and associated pipes are free.

5.2.2 The water thermostat housing must be retained and unmodified, except unused car heater connections must be blanked off. If may however be repositioned by the fitment of an extension pipe from the original cylinder head location to the revised location, subject to it remaining the highest part of the water system. The thermostat is free. If the thermostat is removed then the water recirculation pipe should also be blanked off. However, if one is fitted it must conform to the following:- The standard production thermostat, or another twin seat thermostat unit working in the same manner as the standard part, but which controls the hot engine water coolant temperature above 70 degrees C only are permitted. The car water circulation concept must be retained, and NO water bypass pipes or air bleed pipes are allowed which interfere with the design principle of the production thermostat. See basic car race system in Appendix E. No thermostat may be fitted or removed (notwithstanding anything else mentioned in this article) without the written permission of the Formula Ford Association technical representative/s.

5.2.3 The radiator, if housed in or incorporating a cool air scoop of deflector, must comply with bodywork regulations.

5.3 **Fuel System**

5.3.1 A high-pressure fuel pump and fuel filter assembly (maximum volume 0.5 litre) must be mounted within the area defined by the chassis rails and not directly in the cockpit area. The maximum capacity of the fuel pump shall be 120 litres/hr. at a pressure of 3.1 bar.

5.3.2 The fuel pressure in the engine fuel injector rail must remain in conformity with the Ford Motor Company workshop manual for 130PS version of engine at all times.

5.3.3 Fuel pressure: with an engine at correct operating temperature, and the engine idling, the pressure in the fuel rail shall be:

a) With manifold vacuum applied to pressure regulator, fuel pressure = 2.1 bar ± 0.2 bar,

b) With the manifold vacuum pipe NOT connected to the pressure regulator, fuel pressure = 2.7 bar ± 0.2 bar.

5.3.4 It is permitted to fit a low-pressure fuel pump and fuel collector (maximum volume 1 litre) prior to the high-pressure fuel pump. This must be mounted within the area defined by the chassis rails and not directly in the cockpit area.

5.3.5 All lines containing petroleum spirit must be fitted in such a way that

any leakage cannot result in the accumulation of fluid in the cockpit. When flexible, all lines must have threaded connectors and an outer braid, which is resistant to abrasion and flame. All fuel lines must have a minimum burst pressure of 41 bar at the maximum operating temperature of 135 degrees C. To facilitate the repeated fitting of screwed connectors for the aluminium fuel rail it will be permitted to have short adaptor hoses (to the same specification) between the engine and the chassis system. The production fuel pressure-measuring valve must be retained. Fuel cooling radiators are permitted, within safety regulations, but must be mounted within the main chassis frame. Fuel cooling may only employ air at ambient temperature as the cooling medium, and fan assistance is not allowed.

5.4 **Electrical**

5.4.1 Spark plugs will be supplied by the Formula Ford Association.

5.4.2 The coil unit may be repositioned, but the existing HT leads to the spark plugs must be retained without modification.

5.4.3 It is prohibited to use any other method or component to trigger, distribute or time the ignition or injection.

5.4.4 A standard engine management-wiring loom is mandatory.

5.4.5 A 12-Volt (nominal) alternator must be fitted. The alternator may be driven from either the engine or transmission. The minimum output of the alternator shall be 240 Watts, and the installation shall ensure that this output is available at all times whilst the car is circulating on the racetrack. Only high volume automotive alternators may be used.

5.5 **Fuel Injection and Engine Management System**

5.5.1 All standard production engine sensors which have any influence whatsoever on the engine management system must be retained in the correct position and in working order. It is not permitted to reposition positional sensors. The main engine "Electronic Control Unit" (ECU) shall not be modified in any way. It is not permitted to change the strength or form of any of the sensor signals to, or the outputs from, the ECU or the ignition amplifier unit. The only ECU allowed is as supplied by the Formula Ford Association. The only engine wiring harness allowed is as supplied by the Formula Ford Association and it may not be modified in any way.

5.5.2 The ECU, and the electronics diagnostic connector, must be positioned in an accessible position, allowing scrutineers free access to it at all times.

5.5.3 The engine ECU and/or ignition amplifier may be exchanged or electronically interrogated at any time (including the time allocated for practice) upon request of a representative of the Formula Ford Association.

5.5.4 The engine high pressure fuel pump(s) and any low pressure pump(s) must be activated through a relay (minimum 15 Amp capacity) triggered from the "Fuel pump relay" pin on the main ECU (ECU: pin 4, chassis loom Connector: pin 7).

5.6 **Flywheel and Clutch** The clutch assembly must consist of the following components:

1. Sachs Pressure Plate Part No. 3082249343
2. Sachs Clutch Plate Part No. 881861999796; as used in Formula Ford racing.

No other type of clutch assembly may be used. The flywheel and clutch assembly may not be lightened or modified in any way. Flywheel minimum mass 7,25kg (excluding all flywheel and crankshaft mounting bolts). Flywheel and clutch cover minimum permitted mass = 11,4kg (clutch cover bolts not included). The position of the ignition timing mark on the flywheel relative to the crankshaft must remain within Ford design limits at all times. No part of these regulations allows this to be altered. Also the electronics regulations specifically ban any change that could in any way alter the ignition timing as defined by the standard calibrations within the engine electronics. Flywheel bolts must remain standard production components.

5.7 **Lubrication System**

No line containing lubricating oil may pass through the cockpit. All lubricating oil lines, which carry oil at a nominal working pressure of 1 bar or above, must have a minimum burst pressure of 70 bar (1000psi) and a minimum operating temperature of 135 degrees C (250 degrees F). When flexible, these lines must have threaded connectors and an outer braid resistant to abrasion and flame (will not sustain combustion). All other oil containing lines must be made from hose material and fittings that meet the minimum operating temperatures stated above, and have adequate burst strength.

6. SUSPENSION

6.1 Be fitted with sprung suspension between the wheels and the chassis. Suspension must be controlled to avoid fouling of wheels on chassis or bodywork.

6.2 The following parts must be of alloy steel or other ferrous material: wishbones, rockers, push and/or pull rods. All other stress bearing components must be metallic with no composite materials allowed. It is permitted to incorporate suspension-mounting points on the engine and transmission assembly.

6.3 Active suspensions are prohibited, as is any system which allows control of the flexibility of the suspension springs, shock absorption and trim height when the car is moving.

6.4 Anti-roll bars for front and/or rear suspension may be capable of manual,

mechanical adjustment by the driver when seated in the car.

7. **BRAKES**

7.1 Be fitted with brakes that are operative and capable of stopping the vehicle as required. Only brake discs made predominantly from ferrous material are permitted. Callipers may be ferrous or aluminium alloy castings with a maximum of two working cylinders per calliper. Brake pad materials, including carbon metallic, are free.

7.2 Be equipped with two independent brake circuits, so that, in event of failure of one system, braking is maintained on at least two wheels. Vehicles must have braked on all wheels.

7.3 Not to be fitted with an anti-lock braking system.

8. **SHOCK ABSORBERS**

The shock absorber casing is free. They can be ferrous or light alloy units and separate reservoirs for fluid and/or gas are permitted. The shock absorber casing is defined as the item, which contains the piston, fluid/gas, and moving parts, which control the damping action. Any form of active damping is prohibited. Any method of altering the damper performance by the driver whilst seated in the car is prohibited.

9. **STEERING**

9.1 The steering must consist of a mechanical link between the driver and the wheels. Rear wheel steering prohibited, otherwise free.

9.2 Have a steering wheel, with a continuous rim. No reflex curves are permitted in the basic shape of the outer rim of the steering wheel.

9.3 Have steering movement controlled to avoid fouling of wheels on chassis or bodywork.

10. **WHEELS AND TYRES**

10.1 13-inch diameter wheels with a maximum rim width of 6 inch for the front and 7 inch for the rear are the only wheels permitted. The challenge cars may use 6 inch front rims and 7 or 8 inch rear rims. The material of the complete wheel assembly (rim and mounting flange) shall be ferrous material or aluminium alloy. Magnesium alloy is not permitted. All road wheels, steel or aluminium (one or three piece) must be of substantial construction, and the decision of the event scrutineer as to their suitability will be final. All wheels must be retained onto the hub by a minimum of four equally spaced stud and nut (or bolt) fixing. The minimum mass of any wheel without tyre fitted is 4kg.

10.2 The only tyres permitted are those specified by the Formula Ford Association from the official tyre supplier.

10.3 Not be fitted with any wheel spacer exceeding 2.5cm in thickness or of less than

hub diameter. Multiple or laminated spacers prohibited.

10.4 Have all hub nave plates and wheel embellishers removed.

10.5 Have all nuts securing road wheels of steel and in thread contact over a minimum length of 1.5x bolt/stud diameters. Extended or composite wheel bolts/studs are prohibited.

11. **TRANSMISSION**

11.1 The gearbox must 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 free. The only gearbox permitted is the "Hewland LD 200" gearbox. Gearbox components may be lightened.

11.2 Rear wheel drive only is permitted.

11.3 Final drive ratio is free.

11.4 Torque biasing, limited slip and lock differentials are prohibited. Non ferrous differential components are permitted provided that, at any temperature, they do not provide any form of torque biasing, etc.. The only differential permitted is the "**SALISBURY TYPE FREE DIFFERENTIAL**". The car, stationary with one rear wheel lifted off the ground, must allow the lifted wheel to be rotated continuously by hand relative to each other in both directions.

11.5 Gear change must be manual in operation, and no signal transmitted to, or connection may be made in any form between the gearbox, or any part of the gear change system, and any part of the engine or engine control system (mechanical, electrical, or electronic).

11.6 a) The only position for the main gear cluster will be wholly behind the rear axle output shaft centre-line, and in line with the crankshaft centre line. Transverse, vertical, or other non-in line configurations are not permitted.

b) A gearbox change mechanism that only allows sequential selection of the gears is not permitted.

12. **FUEL SYSTEM**

12.1 Tanks outside the chassis frame must comply with FIA FT3 as a minimum specification.

12.2 Inboard tanks, covered externally with a fireproof coating, are acceptable for events of less than 70Km.

12.3 Protection must at all times comply with Art 4. A metal tank coated with GRP does not comply.

12.4 Maximum capacity 41 litres unless carried in FIA FT 3 as a minimum specification.

12.5 Only commercially available fuel may be used, as regulated by the Formula Ford Association. The Formula Ford Association may specify the fuel to be used at any time. The Formula Ford Association may request any competitor at any

time, not less than half an hour before any practice or race, to drain all fuel from a car and to substitute a control fuel. (See also GCR 240).

12.6 At the end of practice and the race at least 5 (five) litres of fuel from the tank of the competing car must be available to the scrutineers for analysis. Compliance with minimum weight for the car will be taken before the fuel is removed (See also GCR 240).

12.7 Be equipped with an effective method of stopping fuel supply operable by the driver when normally seated.

12.8 Safety fuel cells. The FIA approved standard for safety fuel cells is FIA FT3. These fuel cells are only manufactured by authorised companies and bear the name of the company, specification, code and date of manufacture stencilled on each cell. No other cells are approved. Cells of over five years old are deemed obsolete.

12.9 Tank Fillers, vents and caps: tank fillers and caps must not protrude beyond the bodywork or be situated within the driver/passenger compartment. The caps must have an efficient locking action to reduce the risk of opening during an accident and ensure closing after refuelling. Air vents must be at least 25cm to the rear of the cockpit.

13. STARTING AND BATTERY

13.1 Compulsory electric starter with electrical source of energy carried on board the car, and able to be controlled by the driver when normally in his seat.

13.2 A supplementary external source of energy temporarily connected to the car may be used to start the engine whilst in the pit area or on the dummy grid, but cannot be used whilst checking.

13.3 Have any wet batteries in driver's compartment enclosed in a securely located leak-proof container. Have batteries duly protected to exclude leakage of acid and to protect terminals from short-circuiting and producing sparks. Have the battery earth lead, if not readily distinguishable, identified by a yellow marking.

13.4 The battery must be capable of demonstrating at least 5 engine starts without external recharge at any time during practice, the race, or in parc ferme

14. WEIGHT

Cars built after 01 January 2000

Minimum weight of car plus driver at any time during a race meeting (practice and racing): **560kg**

Cars built between 01 January 1997 and 31 December 1999

Minimum weight of car plus driver at any time during a race meeting (practice and racing): **540kg**

Cars built before 31 December 1996

Minimum weight of car plus driver at any time during a race meeting (practice and racing): **520kg**

The Formula Ford Association may vary the minimum weight for some cars/models to equalise performance between the older and the newer cars. Any variation in minimum weights will come into effect fourteen days after written notice of a variation is given by the Formula Ford Association.

15. **ENGINE SEALING**

15.1 A hole must be available in the bell housing to allow the clutch to be sealed to the flywheel without removal of the engine from the car or seal the engine to the gearbox.

15.2 Tamper proof seals will be used for all cases when sealing of any component is required.

15.3 Scrutineers are empowered to undertake any form of verification procedure necessary and may order the removal of parts from the car, incurred costs to be borne by the competitor. The right is reserved for a competitor's vehicle to be sealed for later inspection and to be removed to a location nominated by the Formula Ford Association for examination. The competitor, or his agent, will be invited to witness this inspection and will be required to provide all the labour necessary to carry out the vehicle or component strip. The scrutineer's job is to observe and report. It is the entrant's responsibility to present any component requested by the scrutineer for inspection.

16. **MISCELLANEOUS**

16.1 Use of titanium, high strength composites, and similar materials is prohibited.

16.2 Electronic dashboards and data logging equipment are allowed subject to them having no influence whatsoever on the behaviour of the car during competition. All information obtained from any date logging or storage equipment shall be made freely available to the scrutineer on request. Data logging is, however, limited to the following variables:

Engine RPM	Battery voltage	Steering angle
Wheel speed	Sector time	Lateral acceleration
Lap time	Water temperature	Longitudinal acceleration
Oil temperature	Fuel pressure	Brake pressure
Oil pressure	Throttle position	

No other engine or chassis variables may be monitored either in real time or by means of data logging. No data logging sensors may be fitted to a car other than those required for data logging of the above-mentioned permitted variables.

16.3 Competitors are reminded that only modifications or additions specifically covered by these regulations are permitted. Engine components not covered by these regulations must remain completely standard and unmodified. In cases of dispute on engines, reference will be made to Ford Motor Company Limited drawings.

16.4 Be of sound construction and mechanical condition and be well maintained.

16.5 Have positive fastenings for all hinged or detachable parts of the bodywork.

16.6 Have no temporary parts incorporated in their construction.

16.7 Comply with carrying cameras unless authorised not to by the Chief Scrutineer and Event Organiser.

16.8 Not have Skirts, bridging devices or any form of aerodynamic device between the chassis and the ground/track. Any specific part of the car influencing its aerodynamic performance must: a) comply with rules relating to coachwork, b) be rigidly secured to the entirely sprung part of the vehicle, c) remain immobile in relation to the vehicle.

16.9 Not carry or pass any liquids in or through any tubes comprising part of the chassis structure, or safety roll bar.

16.10 Be presented at scrutineering with all steering mechanism, suspension linkages and flexible brake lines in clean condition.

Appendix A – Definitions

1. **Ground clearance**:
   The clearance between the ground and the lowest part of the bodywork, and/or of the suspended part of the car, in the condition in which it crosses the finishing line, or at anytime during the practice and/or competition, with the driver aboard.

2. **Minimum weight**:
   The minimum weight must be the weight of the car in the condition in which it crosses the finishing line, or at any time during the competition and/or practice. The minimum car plus driver weight, will include the driver dressed for the competition with all required personnel safety items.

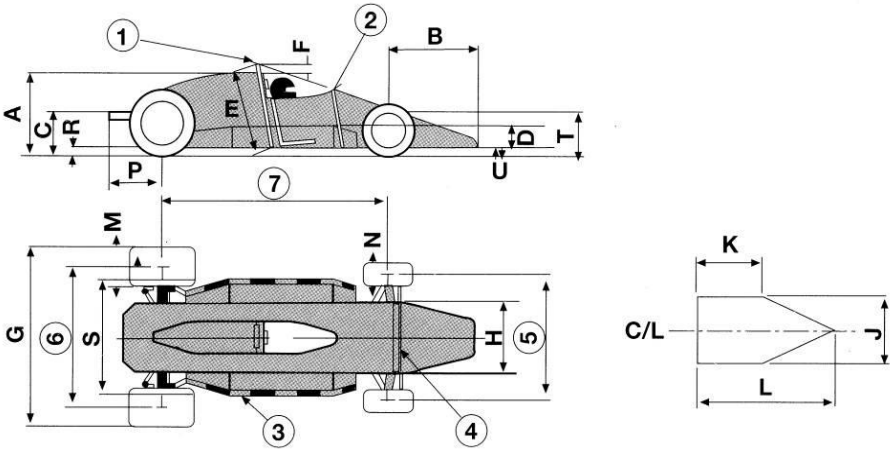
3. **Date of car build**:
   Cars built before January 1 xxxx is interpreted to indicate cars built for the season indicated as shown by the year code. Consequently cars built to the new or revised specification, but finished before that date will still be defined as new season cars.

1.	Safety roll over bar	2.	Substantial support structure
3.	Lateral Protection structure	4.	Substantial structure
5.	Front track	6.	Rear track
7.	Wheelbase		

NOTES: Maximum height is measured with the driver aboard. Maximum height excludes safety roll-over bar on which there is no maximum height.

Appendix B – Table of Dimensions

A.	Maximum body height measured from the ground	90cm
B.	Maximum front overhang from front wheel axis	100cm
C.	Maximum exhaust height measured from the ground	60cm



D.	Minimum height of Lateral Protection Structure	15cm
E.	Minimum safety roll-over bar length in line with driver's spine	92cm
F.	Minimum allowed helmet clearance	5cm
G.	Maximum width	185cm
H.	Maximum body width behind front wheels	95cm

J.	Minimum cockpit opening	45cm
K.	Minimum cockpit parallel opening length	30cm
L.	Minimum cockpit overall opening length	60cm
M.	Maximum rear wheel width	7 inch
N.	Maximum front wheel width	6 inch
P.	Maximum exhaust length from rear wheel axis	60cm
R.	Minimum ground clearance	4cm
S.	Maximum width including Lateral Protection Structure	130cm
T.	The maximum height of any part wider than 110cm ahead of the front wheels is not to exceed the front rim height	
U.	Maximum height of nose (see Art. 4.13 for date)	200cm
	Minimum wheelbase	200cm
	Minimum track	120cm
	Wheel diameters	13 inch

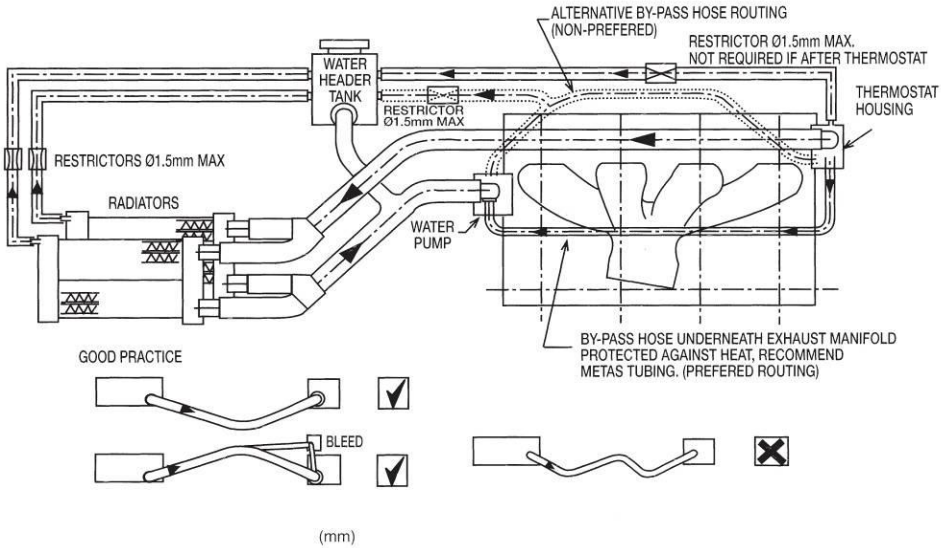
Appendix C – Stability Exceptions

Red warning light

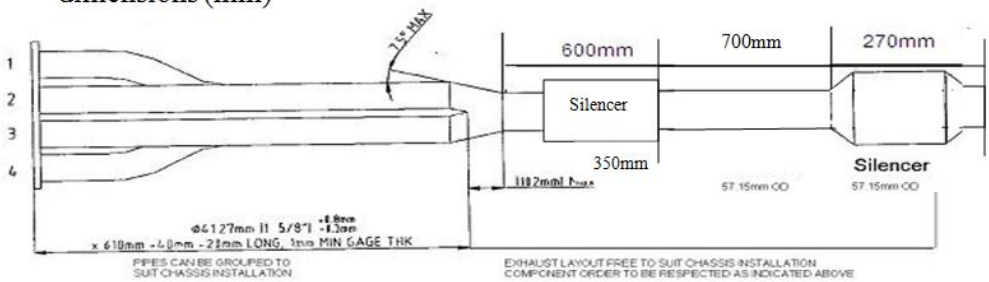
New cars built after 1 January 1998: A multi-LED, continuous illumination, rearward facing light, for use in adverse weather conditions, is recommended.

APPENDIX "E"

RECOMMENDED WATER SYSTEM FOR ZETEC ENGINED CARS FITTED WITH THERMOSTAT



Exhaust system basic dimensions (mm)

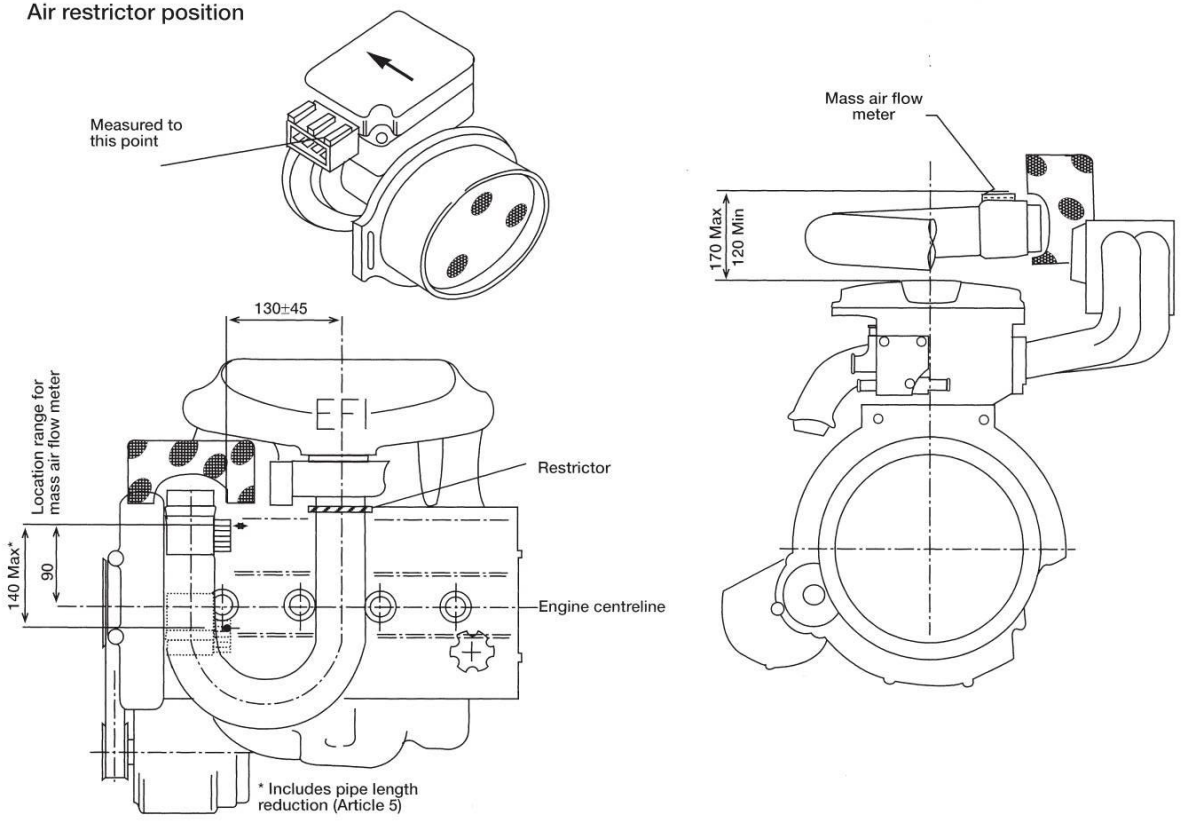


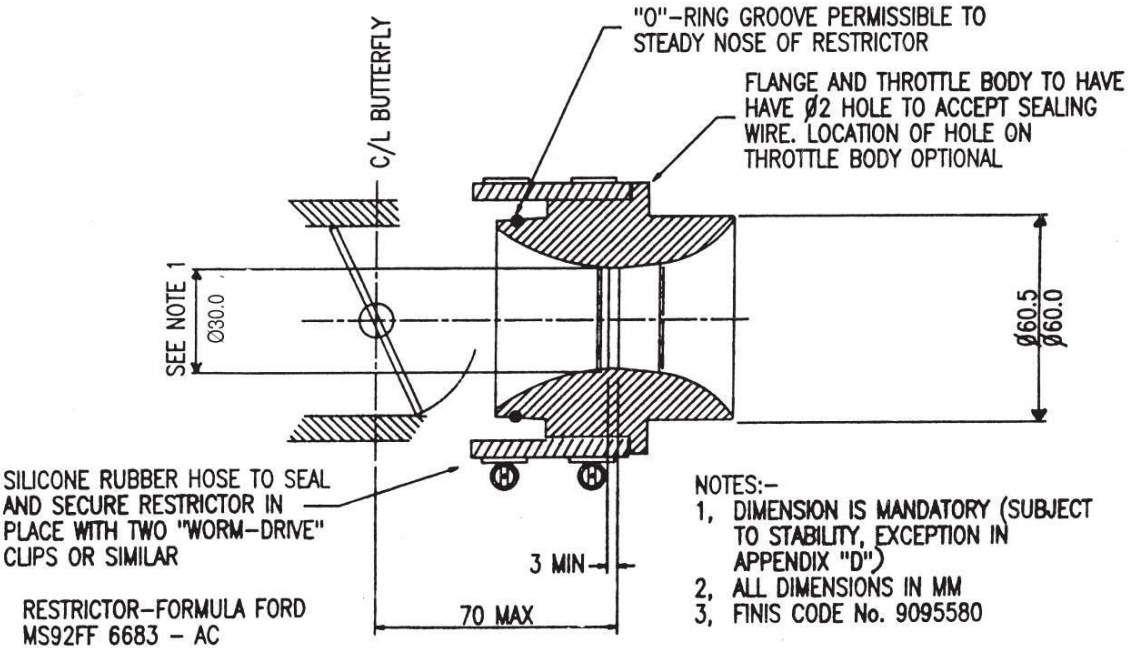
APPENDIX "E"

UNTOLERANCED DIMENTIONS TO: DIN 7168 D	CHANGE LEVEL		
SURFACE FINISH:	LEVEL	DATE	ALTERATION
CRITICAL DIMENSIONS:			
PAINT COLOUR:			
PAINT SPECIFICATIONS			
MATERIAL SPECIFICATIONS SAE 1010 / BS6323			
SCALE: NTS DRAWN FB. DATE 01/04/99			
SHEET NO: 1 OF:1 APPROVED: D.WEED DATE 01/04/99			

CUSTOMER: FORMULA FORD ASSOCIATED
OE PART NO:
KILBER PART NO: E166
PART DESCRIPTION: MUFFLER Z.TEC FORMULA FORD

Air restrictor position




"O"-RING GROOVE PERMISSIBLE TO STEADY NOSE OF RESTRICTOR
FLANGE AND THROTTLE BODY TO HAVE HAVE Ø2 HOLE TO ACCEPT SEALING WIRE. LOCATION OF HOLE ON THROTTLE BODY OPTIONAL
C/L BUTTERFLY
SEE NOTE 1
Ø30.0
Ø60.5
Ø60.0
SILICONE RUBBER HOSE TO SEAL AND SECURE RESTRICTOR IN PLACE WITH TWO "WORM-DRIVE" CLIPS OR SIMILAR
3 MIN
70 MAX
RESTRICTOR-FORMULA FORD MS92FF 6683 - AC
NOTES:-
1, DIMENSION IS MANDATORY (SUBJECT TO STABILITY, EXCEPTION IN APPENDIX "D")
2, ALL DIMENSIONS IN MM
3, FINIS CODE No. 9095580

ART

1. **CONTROLLERS MSA**

Shall have overriding authority in respect of all aspects of the championship series. The Formula Ford Association (FFA) shall be responsible for the normal administration of the series, subject to the aforementioned.

2. **AIM OF THE CHAMPIONSHIP**

To declare a S.A. National Formula Ford Zetec Champion.

3. **REGULATIONS APPLICABLE**

All qualifying races will be held under the GCR's and SSR's of MSA, and the supplementary regulations issued by the promoters.

4. **ELIGIBILITY OF CARS**

The championship will be open to all cars complying with MSA specifications and regulations for Formula Ford cars as per the 2012 MSA Handbook. Organisers may not accept any car that does not comply with these specifications and regulations.

5. **CHAMPIONSHIP EVENTS**

The 2013 National Championship venues and dates are contained in the 2013 MSA Motorsport calendar.

6. **SCORING**

There shall either be two races for Formula Ford cars at all the race meetings listed in the 2013 MSA Motorsport Calendar or, alternatively, one single race of longer duration. Points will be scored in each race as follows:

1st	-	10 points	5th	-	4 points
2nd	-	8 points	6th	-	3 points
3rd	-	6 points	7th	-	2 points
4th	-	5 points	8th	-	1 point

In addition one point will be scored for pole position and one point will be scored for the fastest race lap of the day. Where only one race of longer duration is run, then double the number of points listed above will be scored. All races will count towards the Championship.

7. **SEPARATION OF TIES**

The competitor with the greatest number of first place points in all championship races (not race meetings) will be declared the champion. If this

does not resolve the tie then the greater number of seconds, failing this thirds, and so on will be used to resolve the tie. If a tie still remains then MSA will declare a champion on such basis as it deems fit.

8. The Formula Ford sponsorship fund is administered by MSA, which has delegated the issue of sponsorship monies to the Formula Ford Association.

9. **SPONSORS EXPOSURE AND NUMBERS**

a) The Formula Ford Association will issue each competitor with a competition number. Numbers complying with SSR 4, are to be displayed on the front and both sides of the car.

b) The Association will issue competitors with a decal chart and decals, which must be strictly adhered to, failing which a competitor may not be permitted to start an event, or may be excluded from the results of an event (see also GCR's 246 and 247).

10. **LEGALITY/STRIPPING PROCEDURE**

a) The pole position car, the race winner and the lap record scorer (if applicable) may be impounded after each race or heat for legality checks.

b) The engines of at least six fastest cars may be sealed after official practice, should this occur at any time other than on race day.

c) Any Formula Ford at any race, be it National, Regional or Club level, setting a lap record may be impounded and checked for legality. (Refer GCR 252 for Parc Ferme Regulations).

d) Should any seal be broken on an engine, the competitor concerned shall be penalised in accordance with GCR 176 (i) b) i.e. an advantage gain will be assumed.

e) Unless advised to the contrary by the Formula Ford Association's Technical Consultant, all cars must proceed to parc ferme after each official qualifying session or race to have their weights and tyres checked, as well as to have their minimum ground clearances checked on the weighbridge (scale) with the drivers in the cars.

11. **TYRE RESTRICTION**

a) Competitors will only use the AVON tyres purchased from the Formula Ford Association, unless otherwise notified in writing. Purchased tyres may be selected at random from the stock.

b) The serial numbers of all tyres, to be used as specified below, will be recorded. The onus is on the competitor to ensure that these serial numbers are recorded timeously and correctly. The race scrutineers and/or Formula Ford Association representative/s will check the tyre serial numbers at random at any time. The use of tyres with incorrect serial numbers, during any official practice or race,

may result in exclusion from the race meeting concerned as well as the imposition of further penalties.

c) Tyre Quantities

i) **Slick Tyres**

- Competitors shall be permitted to use one set of new tyres (2 x front and 2 x rear) per race meeting during the 2013 season.

Notes:

- Once a new set of tyres has been recorded, it may be used at any time , during official practice sessions at a race event.

- The championship tyre registration of the allocated tyres for races will officially begin at the official qualifying session for the first race of the championship season.

ii) **Rain Tyres**

Competitors will be limited to the use of one set of specified AVON rain tyres per championship race meeting. Competitors will be required to nominate a set of rain tyres for each race meeting , which tyres will be marked by the technical consultant. This marked set of rain tyres will be the only set permitted to be used in the event of wet conditions at any time during the race meeting (official practice,qualifying and racesIf the use of rain tyres becomes necessary during a race meeting, the Formula Ford Association will determine after the event whether new rain tyres will be permitted at a subsequent event.

- Only tyres with serial numbers that have been recorded for each competitor must be used in: 1 – Friday official practice sessions 2 – Official timed practice (Qualifying) 3 – Races 1 & 2

Notes:

- Once a set of rain tyres has been recorded, it may only be used at that event, however these rain tyres may be nominated for use at the next event or any future events.
- Competitors who enter the series after the start of the season shall be issued tyres at the discretion of the Formula Ford Association's Technical Consultant.
- **NB - All Formula Ford competitors shall use the specified Avon rain tyres should a race be declared a 'wet race' by the Clerk of the Course at any given race meeting.**

d) Competitors may request a replacement tyre or tyres, where tyre/s have become unsafe for use due to bona fide accidental damage. This request must, in the first instance, be made to a Formula Ford Association representative in writing within two hours after the end of the event in which the tyres were damaged. The onus is on the competitor to check the tyres on his car for damage after each event. The Formula Ford Association will examine the

damaged tyre/s in question and, at its sole discretion, allow replacement tyre/s, which may be selected from any previously used set of tyres. New tyres will only be allowed in exceptional circumstances to be determined by the Formula Ford Association.

e) The use of tyre warmers is forbidden. g) No mechanical (other than rubber removal by normal wear), heat or chemical treatments are permitted at any time to allocated control tyres.

f) The only approved tyres for Formula Ford cars are:
Pattern Size and Specification No:

1- Front Slick Tyre 6.0/21.0/13 8810
2- Rear Slick Tyre 7.0/22.0/13 8811
3- Front Wet Tyre 6.0/21.0/13 7414
4- Rear Wet Tyre 7.0/22.0/13 7415

12. **CONTROL FUEL**

The following procedure will be used to apply control fuel: A Formula Ford Association representative will designate which cars are to run on a control fuel at any time before qualifying or a race. The competitors concerned will gather at a place designated by the Formula Ford Association no later than half an hour before the event. Competitors will then be required to drain all the fuel from their race cars. Competitors are required to provide all the necessary equipment to facilitate draining of fuel. The volume of the fuel to be drained must exceed 3 (three) litres. Competitors must provide containers to drain the fuel into. In addition, each competitor must provide a clear see-through plastic container of at least 25 litres in volume to receive control fuel. Control fuel will then be added to each car under supervision and the fuel filler cap and any pipes to or from the fuel tank will then be sealed. The onus is on the competitor to ensure that they obtain control fuel on time. Competitors should apply all the necessary safety procedures to ensure that the draining of fuel is undertaken in a safe manner. A fully charged and operable fire extinguisher of at least 2kg capacity is to be made available by each competitor during fuel draining and refilling at his/her vehicle.

13. **PRACTICE RESTRICTION**

For Formula Ford Zetec inland – based competitors may practice on the inland race circuits (i.e. Kyalami, Phakisa, and Zwarkops) at any time during the racing season.

Coastal based competitors may nominate a coastal race circuit (i.e. Killarney , Aldo Scribante or East London) as their 'home'race circuit and may practice at this nominated circuit at any time during the season. For the purpose of this rule, However, neither the Formula Ford Zetec / Formula 1600 car (with any

driver), nor the driver (with any other car), may practice on a coastal race circuit (in the case of inland–based competitors) or on any inland circuit(in the case of coastal-based competitors) within 30 days prior to the start of official practice for a scheduled championship event at the circuit concerned . The net effect of this is that competitors may not travel to 'away' circuits to practice within 30 days of a scheduled event.

The committee of the Formula Ford Association reserves the right to relax this restriction if circumstances warrant such relaxation. Any such relaxation shall however only be in force when reduced to writing in an MSA circular or bulletin.

14. **TRANSPONDERS**

All competitors must ensure that their race cars are fitted with the official timing transponder from the first practice session of each and every round of the 2013 National Championship series.

15. **ENGINE CLAIMS**

Should a competitor be of the view that his/her engine is under-powered, he/she can claim the latest race winner's engine, subject to the following:

i) The request shall be recorded in writing to the Formula Ford Association (FFA) on the day of the race, together with a payment of R5000 to the FFA.

ii) The engine shall be removed from the winner's car by his/her team immediately after the second race of the day.

iii) The competitor claiming the equipment must return his/her existing equipment to the FFA immediately after completion of the final race of the day.

iv) A fee of R2500 shall be payable to the owner of the claimed engine, by way of compensation.

v) A fee of R2500 shall be payable to the FFA, to defray the cost of testing and compensate for time and effort spent.

vi) Where a winner's engine has been claimed and he wins again at the next race meeting, his/her engine may not again be claimed, i.e. the same competitor's engine may not be claimed at two consecutive race meetings.

vii) Should two or more competitors claim the same winner's engine, the first claim received by the FFA shall be the one accepted.

viii) A competitor whose engine has been claimed shall receive a replacement engine from the FFA's engine pool.

viiii) The competitor who claims the winners engine may retain this engine for a minimum of 2 x Race events . Eg. The engine may not be claimed by another competitor for 2x race events in the event he/her wins the race event.

16. **ECU REPLACEMENT**

The appointed Technical Consultant may, at any time during a race meeting (practice or racing), replace the ECU on any competitor's car, with an ECU of identical make and model.

The TC may also at any time during an event swop competitors ECU with other competitors.

17. **QUALIFYING**

Should any Zetec (slick tyre) competitor fail to post a qualifying time he/she will start behind the Zetec (slick tyre) cars.