

## 2015 JAF SUPER FORMULA (SF) TECHNICAL REGULATIONS

### ARTICLE 1 : GENERAL PRINCIPLES

#### 1.1) **Publication of the Regulation**

The following technical regulations for SUPER FORMULA (SF) cars are issued by the JAF.

#### 1.2) **Amendments of the Regulation**

Each year, prior to October at the latest, the JAF will publish all changes to be made to these regulations which will normally take effect on the 1st January following their publication.

Change made for safety reasons may come into force without notice.

#### 1.3) **Compliance with the regulations**

All SF cars must comply with these regulations in their entirety at all times during an Event **and official tests**.

#### 1.4) **Eligible cars**

**1.4.1) The cars which are in compliance with these regulations and supplied from SUPER FORMULA (SF) car manufacturer designated by the JAF.**

**1.4.2) No modification is allowed other than those permitted by these regulations separately and specified by the SUPER FORMULA (SF) car manufacturer.**

**1.4.3) The replaceable part as a part of the chassis must be supplied by the SUPER FORMULA (SF) car manufacturer except those permitted by these regulations separately.**

#### 1.5) **Measurements**

All measurements must be made while the car is stationary on a flat horizontal surface.

#### 1.6) **Duty of competitor**

It is the duty of each competitor to satisfy the scrutineers and the Stewards of the Meeting that his SF car complies with these regulations in their entirety at all times during an event.

#### 1.7) **Technical passport**

All competitors must be in possession of a technical passport for their car which will be issued by the JAF depends on Official Registration and must accompany the car at all times.

No car will be permitted to take part in an Event unless the valid passport is available for inspection at initial scrutineering.

### ARTICLE 2 : BODYWORK AND DIMENSIONS

**All entirely sprung parts of the car in contact with the external air stream, except cameras,**

camera housings and the parts definitely associated with the mechanical functioning of the engine, transmission and running gear, are defined as bodywork. Airboxes, radiators and engine exhausts are considered to be part of the bodywork.

**2.1) Modification allowed to original specification, fitting and change**

**2.1.1) Observance of these regulations, regular fitting position of components, cutting or adjustment of each part for ensuring dimensions and addition of shim.**

**2.1.2) The following modifications are allowed to the original specifications:**

**1) Fitting of on-board camera, radio, ECU, data logger, sensor antenna, communication connector and wiring.**

**2) Installing of opening and louver to control the volume of air discharged from radiator and oil cooler.**

**3) Attachment of tape onto bodywork only for tip ends of joints, fasteners or any vulnerable part.**

**4) Paint of the bodywork (including impact absorbing structures).**

**5) Installation of protective cover for ride height sensor:**

**(1) In plain view; aspect ratio is less than 3.5:1**

**(2) In lateral view; within a range of 200mm x 80mm**

**6) Fitting and removal of gurney-type trim tab.**

**2.2) Wheel center line**

The center line of any wheel shall be deemed to be half way between two straight edges, perpendicular to the surface on which the car is standing, placed against opposite sides of the complete wheel at the center of the tyre tread.

**2.3) Height measurements**

All height measurements will be taken normal to and from the reference plane.

**2.4) Overall width**

The overall width of the car, including complete wheels, must not exceed **1,910mm** with the steered wheels in the straight ahead position. Overall width will be measured when the car is fitted with tyres inflated to 1.4 bar.

**2.5) Width ahead of the rear wheel center line**

**2.5.1) Bodywork width between the rear wheel center line and the front wheel center line must not exceed 1,605mm.**

**2.5.2) Bodywork width ahead of the front wheel center line must not exceed 1,905mm.**

**2.5.3) In order to prevent tyre damage to other cars, the top and forward edges of the lateral extremities of any bodywork forward of the front wheels (including all elements comprising the frontal edge of the front end plate) must be at least 10mm thick with a radius of at least 5mm.**

If they are inclined inside at an angle less than 60° in relation to the center line of the car in plain view, the forward edge of any horizontal part of the bodywork situated in these areas need not comply with these requirements.

**2.6) Width behind the rear wheel center line**

**2.6.1) Bodywork width behind the rear wheel center line must not exceed 1,000mm.**

**2.6.2) The width of bodywork behind the rear wheel centre line and no less than 650mm above the reference plane must not exceed 900mm between the rear wheel centre line and the point 600mm lying behind it and the part situated more than 600mm**

from the rear wheel center line must not exceed 960mm.

**2.7) Overall height**

No part of the bodywork may be more than 960mm above the reference plane.

**2.8) Front bodywork**

All bodywork situated forward of a point lying 330mm behind the front wheel center line, and between the center line of the car and 725mm from the center line of the car, must be no less than 55mm above the reference plane, and the part situated more than 725mm from the center line of the car must be no less than 55mm and no more than 320mm above the reference plane.

Gurney type trim tab may be used but they should be less than 15mm from the crease.

The angle of the crease of gurney type trim tab is free, but its height from the reference plane must not exceed 320mm regardless of the angle.

**2.9) Bodywork in front of the rear wheels**

2.9.1) Other than the rear view mirrors defined in 13.4) and their attachments, no bodywork situated more than 330mm behind the front wheel center line and more than 330mm forward of the rear wheel center line, which is more than 600mm above the reference plane, may be more than 340mm from the center line of the car.

2.9.2) No bodywork between the rear wheel center line and a line 550mm forward of the rear wheel center line, which is more than 500mm from the center line of the car, may be more than 375mm above the reference plane.

2.9.3) No bodywork between the rear wheel center line and a line 400mm forward of the rear wheel center line, which is more than 500mm from the center line of the car, may be more than 335mm above the reference plane.

**2.10) Bodywork between the rear wheels**

2.10.1) No bodywork situated between the rear wheel center line and a point lying 330mm forward of it may be more than 805mm above the reference plane.

2.10.2) No bodywork situated between the rear wheel center line and a point lying 115mm behind it may be more than 560mm above the reference plane.

**2.11) Bodywork behind the rear wheel center line**

2.11.1) Any part of the car situated more than 120mm behind the center line of the rear wheels must not be more than 960mm above the reference plane.

2.11.2) Any bodywork more than 120mm behind the rear wheel center line which is between 650mm and 960mm above the reference plane, and between 115mm and 405mm from the car center line, must lie in areas between 135mm and 540mm behind the rear wheel center line.

When these areas are viewed from the side of the car, no longitudinal cross section may have more than two closed sections in this area.

However, if there is one closed section (one element) it must lie in an area between 135mm and 725 mm behind the rear wheel center line.

2.11.3) In order to ensure that the relationship between these two sections cannot change whilst the car is in motion they must be bridged by means of more than one rigid impervious supports.

2.11.4) Gurney type trim tab may be used but they should be less than 15mm from the crease.

The angle of the crease of gurney *type trim tab* is free, but its height from the reference plane must not exceed 960mm regardless of the angle.

## **2.12) Bodywork around the front wheels**

With the exception of *air* ducts *defined in 10.5) and the rear view mirror defined in 13.4) and its mounting part*, in plain view, there must be no bodywork in the area formed by two longitudinal lines parallel to and 350mm and 955mm from the car center line and two transversal lines, one 425mm forward of and one 800mm behind the front wheel center line.

## **2.13) Bodywork facing the ground**

2.13.1) All sprung parts of the car situated more than 1000mm behind the front wheel center line and more than 330mm forward of the rear wheel center line, and which are visible from underneath, must form either the reference plane or the step plane. This does not apply to any parts of rear view mirrors which are visible and to suspension arm bracket.

2.13.2) Additionally, the surface formed by all parts lying on the reference plane must :

- extend from a point lying 330mm behind the front wheel center line to the center line of the rear wheels ;
- have minimum and maximum widths of 300mm and 500mm respectively ;
- be symmetrical about the center line of the car ;

2.13.3) All sprung parts of the car situated more than 330mm behind the front wheel center line and more than 330mm forward of the rear wheel center line, and which are visible from underneath, must produce uniform, solid, hard, continuous, rigid (no degree of freedom in relation to the body/chassis unit), impervious surfaces under all circumstances.

Holes are permitted in the surfaces lying on the reference and step planes, which are fully enclosed by the planes themselves, provided no part of the car is visible through them when viewed from directly below.

2.13.4) To help overcome any possible manufacturing problems, and not to permit any design which may contravene any part of these regulations, a vertical tolerance of +/-5mm is permitted for the shape of the surfaces of the reference plane and the step plane situated between a point lying 330mm behind the front wheel center line and the rear wheel center line. A horizontal tolerance of 5mm is permitted when assessing whether these surfaces are visible from directly beneath the car.

2.13.5) All sprung parts of the car situated behind a point lying 330mm behind the front wheel center line, which are visible from underneath and are more than 250mm from the center line of the car must be at least 30mm above the reference plane.

## **2.14) Skid block**

2.14.1) Beneath the surface formed by all parts lying on the reference plane, a rectangular skid block, with a 50mm radius (+/-2mm) on each front corner, must be fitted. This skid block may comprise more than one piece but must :

- a) extend longitudinally from a point lying 330mm behind the front wheel center line to a point lying 255mm in front of the center line of the rear wheels.
- b) be made from an homogeneous material with a specific gravity between 1.3 and 1.45.
- c) have a width of 300mm with a tolerance of +/- 2mm.
- d) have a thickness of 10mm with a tolerance of +/- 2mm.
- e) have a uniform thickness when new.

- f) have no holes or cut outs other than those necessary to fit the fasteners permitted by 2.14.2) or those holes specifically mentioned in g) below.
- g) have seven precisely placed holes the positions of which are detailed in Drawing 1. In order to establish the conformity of the skid block after use, its thickness will be measured in the following.  
Will only be measured around the three 80mm diameter holes.  
At least one of these three holes' circumferences, the thickness of minimum 8mm must be respected.
- h) be fixed symmetrically about the center line of the car in such a way that no air may pass between it and the surface formed by the parts lying on the reference plane.

**2.14.2)** Fasteners used to attach the skid block to the car must

- a) Fasteners used to minimum 10 spots.
- b) have a total area no greater than 40,000mm<sup>2</sup> when viewed from directly beneath the car ;
- c) be no greater than 2,000mm<sup>2</sup> in area individually when viewed from directly beneath the car ;
- d) be fitted in order that their entire lower surfaces are visible from directly beneath the car.

Fasteners should be installed to the plane flush with the bottom surface or above it.

**2.14.3)** The lower edge of the periphery of this block may be chamfered at an angle of 30° to a depth of 8mm, the trailing edge however may be chamfered over a distance of 200mm to a depth of 8mm.

## **2.15) Overhangs**

**2.15.1)** No part of the car shall be more than 875mm behind the center line of the rear wheels *and* more than 1245mm in front of the center line of the front wheels.

**2.15.2)** *No part of the bodywork situated more than 120mm behind the center line of the rear wheels and more than 650mm above the reference plane may be more than 725mm behind the center line of the rear wheels.*

**2.15.3)** No part of the bodywork more than 200mm from the center line of the car may be more than 1,010mm in front of the front wheel center line.

All overhang measurements will be taken parallel to the reference plane.

## **2.16) Aerodynamic equipment**

Any specific part of the car (excluding the non-structural shroud which is used independently for the purpose of protecting wheel tethers stipulated in 9.5.5) and the air duct defined in Article 10.5)) influencing its aerodynamic performance:

- Must comply with the rules relating to bodywork.
- Must be rigidly secured to the entirely sprung part of the car (rigidly secured means not having any degree of freedom).
- Must not use any elastic material such as rubber and must be combined by rigid materials.
- Must remain immobile in relation to the sprung part of the car.

Any device or construction that is designed to bridge the gap between the sprung part of the car and the ground is prohibited under all circumstances.

No part having an aerodynamic influence and no part of the bodywork, with the exception of the skid block in 2.14) above, may under any circumstances be located below the reference plane.

### 2.17) Upper bodywork

- 2.17.1) When viewed from the side, the car must have bodywork in the triangle formed by three lines, excluding the opening defined in Article 2.17.2), one vertical passing 1,200mm forward of the rear wheel center line, one horizontal 540mm above the reference plane and one diagonal which intersects the vertical at a point 760mm above the reference plane and the horizontal 270mm forward of the rear wheel center line.

The bodywork over the whole of this area must be arranged symmetrically about the car center line and must be at least 150mm wide when measured at any point along a second diagonal line parallel to and 200mm vertically below the first.

Furthermore, over the whole area between the two diagonal lines, the bodywork must be wider than a vertical isosceles triangle lying on a lateral plane which has a base 150mm wide lying on the second diagonal line.

- 2.17.2) In order that a car may be lifted quickly in the event of it stopping on the circuit, the principal rollover structure must incorporate a clearly visible unobstructed opening designed to permit a strap, whose section measures 60mm x 30mm, to pass through it. *The opening must be marked by a red or yellow arrow for clear indication.*

When the strap or the template passes through the opening, the structure has to permit it to pass without a fall.

### 2.18) Flexibility of bodywork

No lateral extremity of any bodywork situated forward of the front wheels may deflect more than 5mm vertically when a vertical 0.5kN load is applied to it.

During such a test the load will be applied through a 50mm pad whose center is positioned 850mm forward of the front wheel center line and 650mm from the car center line. The load will be applied in a downward direction using a 50mm diameter ram and an adapter 200mm long and 150mm wide.

*Competitors* must supply the latter when such a test is deemed necessary.

## ARTICLE 3 : WEIGHT

### 3.1) Minimum weight

The weight of the car must not be less than 660kg.

- 3.1.1) All the fuel on board which affects the verification of the minimum weight of the car must be drained by the on-board fuel pump.
- 3.1.2) When the on-board pump can not be used, a supplementary pump connected outside may be used temporarily for this purpose on condition that it is evident that all the fuel on board can be completely drained.

### 3.2) Ballast

Ballast can be used provided it is fitted in the place provided for this purpose and is secured in such a way that tools are required for its removal. It must be possible to fix seals if deemed necessary by the scrutineers.

### 3.3) Adding during the race

With the exception of fuel, nitrogen or compressed air, no substance may be added to the car during the race. If it becomes necessary to replace any part of the car during the race, the new part must not weigh any more than the original part.

**ARTICLE 4 : ENGINE****4.1.1) Type and cubic capacity of engine**

Permitted engine is an in-line four cylinder direct injection supercharged engine of which cubic capacity does not exceed 2,000cc, which was submitted to and approved by the JAF only.

The application must be submitted to the JAF up to two months prior to the event in which the competitor participates for the first time with the relevant engine.

Only one application per season can be submitted.

**4.1.2) Crank axis must be positioned longitudinally and cylinders must be positioned vertically.****4.1.3) There shall be one injector per cylinder.****4.1.4) Valves per cylinder shall be two for intake and two for exhaust.****4.1.5) Valve spring shall be a coil-type.****4.1.6) Maximum number of the camshaft is two.****4.1.7) Variable valve timing is prohibited.****4.1.8) Variable compression ratio system is prohibited.****4.1.9) Height of the deck is not limited.****4.1.10) Diameter of the bore is 88 +/- 2.0mm.****4.1.11) Diameter of the pin and diameter of the main journal for the crankshaft are free.****4.1.12) Crankshaft bearing shall be a plain bearing.****4.1.13) The distance between the center of the crank and the bottom surface of the sump is 100mm minimum.****4.1.14) The overall length of the engine (between both mounting surfaces of fore and aft of the engine) is 500+/-0.5mm.****4.1.15) The minimum weight of the engine is 85kg. The following parts are not included for the measurement of this weight:**

Alternator, flywheel and stud bolts, oil, water, ECU, exhaust pipe and its gasket (between the head and the exhaust pipe), air filter, a set of clutch and heat insulating board.

**4.1.16) Restriction on materials**

The following restriction on materials is applied:

**a) The following parts must be made of aluminium alloy or ferrous alloy:**

Cylinder head cover, cylinder head, cylinder block sump, front cover, rear cover and cylinder liner (sleeve)

**b) The following parts must be made of titanium alloy, ferrous alloy or nickel alloy:**

Valve, valve spring retainer, valve cotter and turbo center housing.

**c) The following parts must be made of ferrous alloy:**

Camshaft, valve spring, piston pin, crankshaft, connecting rod and flywheel.

**d) The following part must be made of aluminium alloy:**

Piston

**e) The following parts must be made of cobalt, iron or nickel-based alloy:**

Bolts and nuts.

**f) Ceramics can be used for the following parts:**

Ignition plug and sensors.

**g) Intermetallic compound and magnesium alloy are prohibited (magnesium alloy can be used solely for turbo compressor housing).**

h) Diamond Like Carbon Coating(DLC) is prohibited for :  
Piston and cylinder liner (sleeve).

4.1.17) Supercharging device

Only one specification of supercharging device that is submitted to and approved by the JAF may be used.

4.2) Engine modifications

4.2.1) Fuel system

1) Fuel pump

It is obligatory to use high pressure pump and pump cam profile that are submitted to and approved by the JAF.

It must not be installed inside of the cockpit and outside of the bodywork.

2) Fuel flow restriction system

It is obligatory to install a fuel flow restriction system that is submitted to and approved by the JAF.

3) Fuel pressure

Max.200 bar for high pressure side and max. 8 bar for low pressure side.

4) Fuel injector

It is obligatory to use a fuel injector that is submitted to and approved by the JAF.

One injector per cylinder.

4.2.2) Ignition system

One ignition plug per cylinder

4.2.3) Lubricating system

When viewed from above, the oil cooler must not protrude from the vehicle perimeter.

4.3) Air intake system

The use of a variable inlet ports, air intake adjustment devices and variable intake trumpet is not permitted.

4.3.1) Intercooler

There should be one intercooler for cooling the intake air .Any device, system, procedure, construction or design which have the purpose and/or effect decreasing the temperature of air supplied for the engine other than the intercooler are forbidden.

4.4) Cooling

4.4.1) There should be one core for water radiator.

For the purpose of cooling the water radiator, oil cooler and each engine part, only air is permitted and other cooling method by injection or spraying of any substance other than air into them is prohibited.

4.5) Exhaust system

The exhaust system is free. However,

1) at least one catalytic unit must be installed through which all exhaust gases should pass. The unit must be submitted to and approved by the JAF.

2) any variable exhaust system is not permitted.

3) FAS (Fresh Air System) pass (piping of anti-lag system) is prohibited.

4.6) Engine control computer

*It is obligatory to use engine control computer that is designated by the JAF.*

## ARTICLE 5 : FUEL SYSTEM

### 5.1) Permitted modifications to the original specifications and fitting and change

*Lines and fittings must resist a minimum burst pressure more or equivalent to those of the originals.*

1) Oil lines (including oil tower)

2) Fuel lines

3) Inside of the fuel tank (excluding fuel bladder)

4) Water lines (including radiator cap)

5) Fuel pump

### 5.2) Fuel tanks

5.2.1) The fuel tank must be a single fuel bladder conforming to or exceeding the specifications of FIA/FT5-1999.

5.2.2) All the fuel stored on board the car must be situated between the front face of the engine and the driver's back when viewed in lateral projection.

Furthermore, no fuel can be stored more than 300mm forward of the highest point at which the driver's back makes contact with his seat.

However, a maximum of 2 liters of fuel may be kept outside the survival cell, but only that which is necessary for the normal running of the engine.

5.2.3) Fuel must not be stored more than 400mm from the longitudinal axis of the car.

5.2.4) All fuel bladders must be made by manufacturers recognized by the FIA. In order to obtain the agreement of the FIA, the manufacturer must prove the compliance of his product with the specifications approved by the FIA. These manufacturers must undertake to deliver to their customers exclusively tanks complying with the approved standards.

A list of approved manufacturers is *included in the Technical List No.1.*

5.2.5) All fuel bladders shall be printed with the name of the manufacturer, the specifications to which the tank has been manufactured and the date of manufacture.

5.2.6) No rubber bladders shall be used more than 5 years after the date of manufacture.

### 5.3) Fittings and piping

5.3.1) All apertures in the fuel tank must be closed by hatches or fittings which are secured to metallic or composite bolt rings bonded to the inside of the bladder.

Bolt hole edges must be no less than 5mm from the edge of the bolt ring, hatch or fitting.

All hatches and fittings must be sealed with the gaskets or 'O' rings supplied with the tank.

5.3.2) All fuel lines between the fuel tank and the engine must have a self sealing breakaway valve.

This valve must separate at less than 50% of the load required to break the fuel line fitting or to pull it out of the fuel tank.

5.3.3) No lines containing fuel may pass through the cockpit.

5.3.4) All lines must be fitted in such a way that any leakage cannot result in accumulation of fuel in the cockpit.

5.3.5) When flexible, all lines must have threaded connectors and an outer metallic braid

which is resistant to abrasion and flame.

- 5.3.6) All fuel lines must have a minimum burst pressure of 4.1 MPa (41 bar) at the maximum operating temperature of 135°C.

**5.4) Crushable structure**

The fuel tank must *form a part of a survival cell and* be completely surrounded by a crushable structure which is able to withstand the loads required by the tests in Articles 17.2.1) and 17.3).

**5.5) Fuel tank fillers:**

- 5.5.1) All cars must be fitted with fuel tank fillers and vents which must be combined or single units, installed or not on both sides of the car (in accordance with drawing 252-5 and 252-7 of FIA Appendix J *to the International Sporting Code*; the interior diameter D1 must not exceed 50 mm).
- 5.5.2) Both fillers and air vents must be equipped with leak proof dry break couplings complying with the dead man principle and therefore not incorporating any retaining device when in an open position.
- 5.5.3) The fuel tank fillers and vent holes must not protrude beyond the bodywork.
- 5.5.4) If the fuel tank has a structure in which a tank filler and a vent hole are attached directly to the tank and also the filler and the hole are not situated at the top of it, it is not permitted to install a duct(snorkel)at the filler and the hole. The tank fillers and vent holes must not protrude beyond the bodywork.
- 5.5.5) The tank fillers, vent holes, vents and breathers must be placed where they would not be vulnerable in the event of an accident.
- 5.5.6) Any breather pipe connecting the fuel tank to the atmosphere must be designed to avoid liquid leakage when the car is running and its outlet must not be less than 250mm from the cockpit opening.
- 5.5.7) Any vent or breather connecting the fuel tank to atmosphere must exit on the outside of the bodywork, must be fitted with a non-return valve and must be designed in such a way as to avoid any liquid leakage when the car is running, upside down, or refueling.
- 5.5.8) All cars must be fitted with a self sealing connector which can be used by the scrutineers to obtain fuel from the fuel tank.  
This connector must be the type approved by the FIA.  
Specifications of the connector and its fitting diagram shall comply with the FIA Technical list No.5.

**5.6) Refueling**

- 5.6.1) All refueling during the race must be carried out using equipment *in accordance with drawing 252-7 of FIA Appendix J to the International Sporting Code or* which described in Article 3 10.3.2)"Refueling tank".
- 5.6.2) The standard leak proof coupling must be fitted to the refueling hose during the race, which must fit the standard filler apertures and vent holes installed on the car.
- 5.6.3) Before refueling commences, the car and the refueling system must be connected electrically to earth.
- 5.6.4) All metal parts of the refueling system from the coupling to the supply tank must also be connected to earth.
- 5.6.5) Any storage of fuel on board the car at a temperature of more than ten degrees centigrade below the ambient temperature is forbidden.
- 5.6.6) - The use of any specific device, whether on board or not, to decrease the

temperature of the fuel below the ambient temperature is forbidden.

- A cooling device may be installed on the fuel feed lines mounted on the car for the purpose of decreasing the temperature of the fuel, provided the method of cooling is air-cooled by the normal air flow.

## ARTICLE 6 : OIL AND WATER SYSTEMS

### **6.1) Permitted modifications to the original specifications and fitting and change**

**Lines and fittings must resist a minimum burst pressure equivalent to those of the originals or more.**

**1) Lines and fittings**

**2) Partial closure of the intake opening of oil or water radiator**

**3) Installation of stone guard in front of oil or water radiator.**

### **6.2) Location of oil tanks**

All oil storage tanks must be situated between the front wheel axis and the rearmost gearbox casing longitudinally, and must be no further than the lateral extremities of the survival cell are from the longitudinal axis of the car.

### **6.3) Longitudinal location of oil system**

No other part of the car containing oil may be situated behind the complete rear wheels.

### **6.4) Catch tank**

When a car's lubrication system includes an open type sump breather, this breather must vent into a catch tank of at least **2,000cc** capacity.

### **6.5) Transversal location of oil system**

No part of the car containing oil may be more than 700mm from the longitudinal center line of the car.

### **6.6) Oil and water lines**

6.6.1) No lines containing water or lubricating oil may pass through the cockpit.

6.6.2) All lines must be fitted in such a way that any leakage cannot result in the accumulation of fluid in the cockpit.

6.6.3) No hydraulic fluid lines may have removable connectors inside the cockpit.

6.6.4) All lubricating oil lines must have a minimum burst pressure of 4.1 MPa (41 bar) at the maximum operating temperature of 135°C.

6.6.5) All hydraulic fluid lines which are not subjected to abrupt changes in pressure, with the exception of lines under gravity head, must have a minimum burst pressure of 40.8 MPa (408 bar) at the maximum operating temperature of 204°C when used with steel connectors and 135°C when used with aluminium connectors.

6.6.6) All hydraulic fluid lines subjected to abrupt changes in pressure must have a minimum burst pressure of 81.6 MPa (816 bar) at the maximum operating temperature of 204°C.

## ARTICLE 7 : ELECTRICAL SYSTEMS

### **7.1) Permitted modifications to the original specifications and fitting and change**

**1) Installation of communication device for drivers**

**2) Mounting of wiring to download the collected data as defined in 7.3).**

### **7.2) Supplementary device for starting the engine**

A supplementary device temporarily connected to the car may only be used to start the engine on the starting grid and in the pits.

### **7.3) Data acquisition systems**

**7.3.1)** It is the duty of each competitor must collect the following data at all times during the race :

- Engine rev speed
- Vehicle speed
- Gear position.

**7.3.2)** A connector must be fitted to the car which may download the collected data described in 7.3.1).

**7.3.3)** Collected data described in above 7.3.1) will be downloaded by the scrutineers during and after all the practice sessions and after the race. In addition, competitors must present collected data (including all other collected data) to the scrutineers when they are required to do so.

### **7.4) Driver radios**

All radio equipment may transmit only voice communication.

## ARTICLE 8 : TRANSMISSION SYSTEM

### **8.1) Permitted modifications to the original specifications and fitting and change**

**1) Fitting of wheel rotation sensor**

**2) CV boots**

**3) Clutch**

**It is must be the one specified by the engine supplier.**

**4) Fitting of covers around the clutch**

**5) Master cylinder**

**6) Reservoir tank**

**7) Fluid**

**8) Lining**

**9) Fitting**

### **8.2) Neutral switch**

**8.2.1) Even if engine stops and car is stationary there must be a measure to make the gear position of transmission neutral.**

**8.2.2) The switch or button required for the measure mentioned above must be positioned easily visible from outside in order to be operated readily and be marked clearly.**

### **8.3) Four wheel drive**

Four wheel drive cars are forbidden.

**8.4) Differential**

The mechanism of differentials must be mechanical only.

**8.5) Forward gears**

All cars must have no more than six forward gears.

**8.6) Reverse gear**

All cars must have a reverse gear operable any time during the Event by the driver seated normally in the cockpit when the engine is running.

**8.7) Traction control**

The use of traction control is forbidden.

**8.8) Car speed limiter**

When the car speed limiter is activated, rear lights must always flash regardless of the weather. They must flash when the operational switch is turned on even if the car is not in motion.

**ARTICLE 9 : SUSPENSION AND STEERING SYSTEM**

**9.1) Permitted modifications to the original specifications and fitting and change**

**1) Attachment of sensors and deformation gauge to the components of suspension and fitting of wires.**

**2) Fitting of sensors and stay, bracket and support for the purpose of connection. The sensors, deformation gauge, stay, bracket and support must not have any influence of the strength/function of the components of suspension and they must maintain the strength reliability equivalent to those of the originals or more.**

**3) Fitting of axle cap**

**4) Dumper**

**5) Camber shim**

**6) Wheel nut**

**7) Fitting of steering position sensor and wires**

**8) Addition of spacers for the purpose of moving steering wheel position.**

**9) Change of steering wheel.**

**The substitution must have passed the impact test defined in the Art.15.5).**

**9.2) Active suspension**

The use of active suspension is forbidden.

**9.3) Chromium plating**

Chromium plating of any steel suspension is forbidden.

**9.4) Sprung suspension**

Cars must be fitted with sprung suspension.

## 9.5) Suspension members

9.5.1) All suspension members must be made from an homogeneous metallic material.

9.5.2) The cross-sections of each member of every suspension component (including the non-structural shroud which is used independently for the purpose of protecting wheel tethers stipulated in 9.5.5) ) must have an aspect ratio no greater than 3.5:1 and be symmetrical about its major axis. All suspension components may however have sections with an aspect ratio greater than 3.5:1, and be non-symmetrical, provided these are adjacent to their inner and outer attachments and form no more than 25% of the total distance between the attachments of the relevant member.

All measurements will be made perpendicular to a line drawn between the inner and outer attachments of the relevant member.

9.5.3) No major axis of a cross section of a suspension member may subtend an angle greater than 5°(+/-angle of attack) to the reference plane when measured parallel to the center line of the car.

9.5.4) Non-structural parts of suspension members are considered bodywork.

9.5.5) In order to help prevent a wheel becoming separated in the event of all suspension members connecting it to the car failing, flexible cables *must be fitted*, each with a cross sectional area than 110mm<sup>2</sup>, the purpose of which is to connect each wheel/upright assembly to the main structure of the car. The cables and their attachments must also be designed in order to help prevent a wheel making contact with the driver's head during an accident.

The length of each cable should be no longer than that required to allow normal suspension movement.

Each cable must have its own separate attachments which:

- is able to withstand an tensile force of 70kN;
- is able to accommodate a cable end fitting with a minimum inside diameter of 15mm

Each wheel may be fitted with one or two cables, dependent upon their performance when tested under FIA Test Procedure 03/07. If one cable is fitted it must exceed the requirements of 3.1.1 of Test Procedure 03/07 and if two are fitted each must exceed the requirements of 3.1.2.

Each cable must exceed 450mm in length and must utilize end fittings which result in a tether bend radius greater than 7.5mm.

## 9.6) Steering

9.6.1) The steering must consist of a mechanical link between the driver and the wheels.

Power steering may be used on condition that it is a simple system, without programmable control.

9.6.2) Four wheel steering is forbidden.

9.6.3) The steering wheel, steering column and steering rack assembly must pass an impact test, details of the test procedure may be found in Article 15.5).

9.6.4) The steering wheel, steering column, quick release mechanism, steering rack assembly and steering mechanism which have passed the impact tests must not be changed or modified.

## ARTICLE 10 : BRAKE SYSTEM

### 10.1) Permitted modifications to the original specifications and fitting and change

Lines and fittings must resist a minimum burst pressure equivalent to those of the originals or more.

1) Air ducts around brake

(1) Partial closure of the intake of air duct.

(2) Installation of stone guard in front of air duct.

2) Mater cylinder

3) Reservoir tank

4) Fluid

5) Lining

6) Fitting

7) Fitting of brake pressure sensor and wires

**10.2) Brake circuits**

All cars must be equipped with one brake system which has at least two separate hydraulic circuits operated by one pedal. This system must be designed so that if a failure occurs in one circuit the pedal will still operate the brakes in the other.

The brake circuit which is operated by a pedal must not have a function or effect which may be achieved by the other operational means than the brake pedal regardless of the means (mechanical, electric, hydraulic, pneumatic, and a combination of these means).

**10.3) Brake discs**

All brake discs must have maximum thicknesses of 30mm and maximum outer diameter of 300mm.

**10.4) Brake calipers**

10.4.1) All brake calipers must be made from a homogeneous metallic material.

10.4.2) There must be no more than 6 brake caliper pistons on each wheel.

**10.5) Air duct**

Air ducts around the front and rear brakes will be considered part of the braking system and must be within the following area:

- above the reference plane.

- when viewed from the side of the car within a projection of the complete wheel.

- within the area between the inner surface of the complete wheel rim and the lateral surface of the car.

**10.6) Liquid cooling**

Liquid cooling of the brakes is forbidden.

**10.7) Brake pressure modulation**

Anti lock brakes and power braking are forbidden.

**ARTICLE 11 : WHEELS AND TYRES**

**11.1) Location**

Wheels must be external to the bodywork in plain view, with the rear aerodynamic device removed.

## 11.2) Dimensions

- 11.2.1) Maximum complete wheel width: 18.0"  
Maximum complete wheel diameter: 26.5"  
Nominal wheel bead diameter: 13.0"
- 11.2.2) These measurements will be taken horizontally at axle height.

## 11.3) Wheel material

All wheels must be made from homogeneous metallic materials.

## 11.4) Maximum number of wheels

The number of wheels is fixed at four.

## 11.5) Wheel assembly

The only parts which may be physically attached to the wheel in addition to the tyre are surface treatments for appearance and protection, valves for filling and discharging the tyre, wheel fasteners, balance weights, drive pegs, tyre pressure and temperature monitoring devices, tyre pressure adjustment device, wheel spacers and wheel cover that is not integrated in the wheel.

However the maximum width defined in the Article 11.2.1) must not be exceeded.

## ARTICLE 12 : COCKPIT

### 12.1) Permitted modifications to the original specifications and fitting and change

#### 1) Pedal

#### 2) Pedal brace

#### 3) Pedal mount base

#### 4) Screen

#### 5) Footrest

The above mentioned parts must maintain the strength reliability equivalent to those of the originals or more after modification, fitting and change.

#### 6) Drink device

## 12.2) Cockpit opening

- 12.2.1) In order to ensure that the opening giving access to the cockpit is of adequate size, the template shown in Drawing 2 will be inserted into the survival cell and bodywork.

During this test the steering wheel, steering column, seat and all padding required by Articles 13.7.1) ~13.7.6)(including fixings), may be removed and :

- the template must be kept horizontal when lowered vertically from above the car until its lower edge is 525mm above the reference plane and;

- referring to Drawing 2, the edge of the template which lies on the line d-e must be no less than 1800mm behind the line A-A shown in Drawing 5.

Any measurements made from the cockpit entry template (when referred to in Articles 12.1.3), 14.2.1), 14.4.4), 14.5.4), 15.3) and 17.4), must also be made whilst the template is held in this position.

- 12.2.2) The forward extremity of the cockpit opening, even if structural and part of the survival cell, must be at least 50mm in front of the steering wheel.
- 12.2.3) The driver must be able to enter and get out of the cockpit without it being necessary

to remove any part of the car other than the steering wheel. When seated normally, the driver must be facing forwards and the rear edge of his crash helmet may be no more than 125mm from the rear edge of the cockpit entry template.

- 12.2.4) From his normal seating position, with all seat belts fastened and whilst wearing his usual driving equipment, the driver must be able to remove the steering wheel and get out of the car within 5 seconds and then replace the steering wheel in a total of 10 seconds.

After the steering wheel has been replaced steering control must be maintained.

### 12.3) Steering wheel

The steering wheel must be fitted with a quick release mechanism operated by pulling a flange concentric to the steering wheel axis installed on the steering column behind the wheel.

### 12.4) Internal cross section

- 12.4.1) A free vertical cross section, which allows the outer template shown in Drawing 3 to be passed vertically through the cockpit to a point 100mm behind the face of the rearmost pedal when in the inoperative position, must be maintained over its entire length.

The only things which may encroach on this area are the steering wheel and any padding that is required by Article 13.7).

- 12.4.2) A free vertical cross section, which allows the inner template shown in Drawing 3 to be passed vertically through the cockpit to a point 100mm behind the face of rearmost pedal when in the inoperative position, must be maintained over its entire length.

The only thing which may encroach on this area is the steering wheel.

- 12.4.3) The driver, seated normally with his seat belts fastened and with the steering wheel removed must be able to raise both legs together so that his knees are past the plane of the steering wheel in the rearward direction.

This action must not be prevented by any part of the car.

### 12.5) Position of the driver's feet

- 12.5.1) The survival cell must extend from behind the fuel tank in a forward direction to a point at least 300mm in front of the driver's feet, with his feet resting on the pedals and the pedals in the inoperative position.

- 12.5.2) When he is seated normally, the soles of the driver's feet, resting on the pedals in the inoperative position, must not be situated forward of the front wheel center line.

## ARTICLE 13 : SAFETY EQUIPMENT

### 13.1) Permitted modifications to the original specifications and fitting and change

1) Fire extinguishers

2) Rear view mirrors

3) Positions of the rear view mirrors

The original installing position must be kept.

4) Safety belts

5) Removable seat

This must satisfy the Articles 13.2),13.4),13.5) and 13.8) after modification,

fitting and change.**13.2) Fire extinguishers**

- 13.2.1) All cars must be fitted with a fire extinguishing system which must discharge into the cockpit and into the engine compartment.
- 13.2.2) Any AFFF which has been specifically approved by the FIA and the extinguishing systems listed in the FIA Technical list No.16 are permitted.
- 13.2.3) The quantity of extinguishant may vary according to the type of AFFF used. The minimum capacity according to the type of extinguishant shall comply with the FIA Technical List No.6.
- 13.2.4) When operated, the fire extinguishing system must discharge 95% of its contents at a constant pressure in no less than 10 seconds and no more than 30 seconds.  
If more than one container with extinguishant is fitted, they must be released simultaneously.
- 13.2.5) Each pressure vessel must be equipped with a means of checking its pressure which may vary according to the type of AFFF used. FIA technical list No.6 must be respected.
- 13.2.6) The following information must be visible on each container with extinguishant :  
a) Type of extinguishant ;  
b) Weight or volume of the extinguishant ;  
c) Date the container must be checked which must be no more than two years after the date of filling.
- 13.2.7) All parts of the extinguishing system must be situated within the survival cell and all extinguishing equipment must withstand fire.  
In all cases their mountings must be able to withstand a deceleration of 25G.
- 13.2.8) Any triggering system having its own source of energy is permitted, provided it is possible to operate all extinguishers system should the main electrical circuits of the car fail.  
The driver must be able to trigger the extinguishing system manually when seated normally with his safety belts fastened and the steering wheel in place.  
Furthermore, a means of triggering from the outside must be combined with the circuit breaker switch as defined in the Article 13.2.2). It must be marked with a letter "E" in red (minimum height of 80mm and minimum stroke width of 8mm) inside a white circle of at least 100mm diameter with a red edge which has 4mm stroke width at minimum.
- 13.2.9) The system must work in any position, even when the car is inverted.
- 13.2.10) Extinguisher nozzles must be suitable for the extinguishant and be installed in such a way that they are not directly pointed at the driver.

**13.3) Master switch**

- 13.3.1) The driver, when seated normally with safety belt fastened and steering wheel in place, must be able to cut off all electrical circuits to the ignition, all fuel pumps and the rear light by means of a spark proof circuit breaker switch operated by him.  
This switch must be located on the dashboard and must be clearly marked by a symbol showing a red spark in a white edged blue triangle.
- 13.3.2) There must also be an exterior switch, with two horizontal handles, which is capable of being operated from a distance by a hook. These handles must be situated at the base of the main rollover structure on both sides of car and must have the same function as the switch mentioned in the Article 13.3.1).

### **13.4) Rear view mirrors**

13.4.1) All cars must have at least two mirrors mounted so that the driver has visibility to the rear and both sides of the car.

13.4.2) The reflective surface of each mirror must be at least 150mm wide, this being maintained over a height of at least 50mm. Additionally, each corner may have a radius no greater than 10mm.

**Each mirror must not have area more than 16,000 mm<sup>2</sup> in plain & frontal view and 14,000 mm<sup>2</sup> in side view including its attachments when it is fitted onto the car.**

13.4.3) No part of the reflective surface may be less than 250mm from the car center line or more than 830mm from the rear of the cockpit entry template.

13.4.4) The driver shall be required to identify any letter or number, 150mm high and 100mm wide, placed anywhere on boards behind the car, the positions of which are detailed below :

Height : From 400mm to 1000mm from the ground.

Width : 2000mm either side of the center line of the car.

Position : 10m behind the rear axle line of the car.

### **13.5) Safety belts**

It is mandatory to wear two shoulder straps, one abdominal strap and two straps between the legs. These straps must be securely fixed to the car and must comply with FIA standard 8853/98.

### **13.6) Rear light**

All cars must have a red light in working order throughout the event which :

- is the model specified by the FIA ;
- faces rearwards at 90 degrees to the car center line ;
- is clearly visible from the rear ;
- is not mounted more than 100mm from the car center line ;
- is mounted between 300mm(+/-5mm) and 375mm(+/-5mm) above the reference plane ;
- is no less than **800**mm behind the rear wheel center line measured parallel to the reference plane ;
- can be switched on by the driver when seated normally in the car.
- is must be always flash when the operational switch is turned on.

The three measurements above will be taken to the center of the rear face of the light unit.

### **13.7) Cockpit padding**

13.7.1) All cars must be equipped with three areas of padding for **protecting** the driver's head which **satisfy the following criteria**:

- they can be removed from the car as one part ;
- **they** are located by two horizontal pegs behind the driver' head and two fixings **at each frontal part**, which are easily removable without tools.

Each of the two front fixings should be distinguished clearly by being painted in yellow or marked by an arrow ;

- are made from a material specified by the FIA: CONFOR form **CF42(Pink) or CF42(Blue)** ;
- **are covered, in all areas where the driver's head is likely to make contact, with two plies of aramid fibre/epoxy resin composite pre-prig material in plain weave**

**60-240gsm fabric with a cured resin content of 50% (+/-5%) by weight;**

- are positioned so as to be the first point of contact for the driver's helmet in the event of an impact projecting his head towards them during an accident.
- 13.7.2) The first area of padding for the driver's head must be positioned behind him and be between 75mm and 90mm thick over an area of at least 40,000mm<sup>2</sup>.  
If necessary, and only for driver comfort, an additional piece of padding no greater than 10mm thick may be attached to this headrest provided it is made from a similar material **to the pad defined in Article 13.7.1).**
- 13.7.3) **Whilst he is seated normally the two further areas of padding for the driver's head must be positioned in an area bounded by two vertical lines and one horizontal line through the front, rear and lower extremities of the driver's helmet (on the car centre line), and the upper surface of the survival cell.**  
**Each of these must cover an area greater than 30,000mm<sup>2</sup> when viewed from the side of the car and be no less than 95mm thick, this minimum thickness being maintained to the upper edges of the survival cell and over their entire length. The minimum thickness will be assessed perpendicular to the car centre line but a radius no greater than 10mm may be applied along their upper inboard edges.**  
Additional piece of padding to the side headrest may be installed for the purpose of driver's comfort only, provided that the material of such padding should be the same as that defined in Article 13.7.1) and it has low friction surface, and it is made from a material similar to the main headrest, and also rescue marshals may remove it easily without tools.
- 13.7.4) Forward of the areas of **lateral protection** padding further cockpit padding **connection** must be provided on **both** sides of the cockpit rim. The purpose of the additional padding is to afford protection to the driver's head in the event of an oblique frontal impact and must therefore be made from the same material as the other three **protection padding** areas of padding.  
These extensions must :  
  - be symmetrically positioned about the car center line and a continuation of the side areas of padding ;
  - be positioned with their upper surfaces at least as high as the survival cell over their entire length;
  - have a radius on their upper inboard edge no greater than 10mm ;
  - be positioned in order that the distance between the two is no less than 320mm ;
  - be as high as practicable within the constraints of driver comfort.
- 13.7.5) All of the padding described above must be so installed that if movement of the driver's head, in any expected trajectory during an accident, were to compress the foam fully at any point, his helmet would not make contact with any structural part of the car.  
Furthermore, for the benefit of rescue crews all of the padding described above must be installed using the FIA approved system. The method of removal must also be clearly indicated.
- 13.7.6) **No part of the protection padding areas described above may obscure sight of any part of the driver's helmet when he is seated normally and viewed from directly above the car.**
- 13.7.7) In order to minimise the risk of leg injury during an accident, additional areas of padding must be fitted each side of, and above, the driver's legs.  
These areas of padding must :  
  - be made from a material specified by the FIA CONFOR form CF42(Pink) **or** **CF45(Blue)**;

- be no less than 25mm thick over their entire area ;
- cover the area situated between points lying 50mm behind the center of the point at which the second roll structure test was carried out and 100mm behind the rear edge of pedal when in the inoperative position, as shown in Drawing 4 ;
- cover the area above the line A-A shown in Drawing 3.

### **13.8) Seat fixing and removal :**

- 13.8.1) In order that an injured driver may be removed from the car in his seat following an accident, all cars must be fitted with a seat which, if it is secured, must be done so with no more than two bolts. If bolts are used they must :
- be clearly indicated and easily accessible to rescue crews ;
  - be fitted vertically ;
  - be removable with the same tool for all Teams and which is issued to all rescue crews.
  - be distinguished clearly by being painted in yellow or marked by arrows.
- 13.8.2) The seat must be equipped with receptacles which permit the fitting of belts to secure the driver and one which will permit the fitting of a neck support.
- The location of a slot of the head stabilization device that is supplied in FIA Extrication Bag must be clearly indicated by yellow painting or an allow marking of its inlet section.
- 13.8.3) The seat must be removable without the need to cut or remove any of the seat belts. Details of the tool referred to above, the belt receptacles and the neck support are mentioned in the following material issued from the FIA:  
"RECOMMENDED SPECIFICATION FOR EXTRACTABLE SEATS IN SINGLE SEATER AND SORTS CARS Version 3 01-20-2005"

### **13.9) Head and neck protection for the driver**

- 13.9.1) must be in accordance with the FIA Technical List No.29,
- 13.9.2) must not be less than 25mm from any structural part of the car when the driver seated normally in his position.

## **ARTICLE 14 : CAR CONSTRUCTION**

### **14.1) Materials**

- 14.1.1) The use of magnesium sheet less than 3mm thick is forbidden.
- 14.1.2) Within composite structures, the strain-to-failure of any fibrous reinforcing material must not be less than 1.5%.
- 14.1.3) Any repairs to the survival cell or nose box must be carried out in accordance with the manufacturers specifications and be carried out in a repair facility approved by the manufacturer.
- 14.1.4) The car may not be used in another event until the technical passport has been completed satisfactorily.

### **14.2) Roll structures**

- 14.2.1) All cars must have two roll structures which are designed to help prevent injury to the driver in the event of the car becoming inverted.
- The principal roll structure must be at least 940mm above the reference plane at a point 30mm behind the cockpit entry template. The second roll structure must be in front of the steering wheel but no more than 250mm forward of the top of the

circumference of steering wheel rim in any position.

The two roll structures must be of sufficient height to ensure the driver's helmet and his steering wheel are at least 70mm and 50mm respectively below a line drawn between the highest points of the principal roll structure and the second roll structure at all times.

- 14.2.2) The principal roll structure must pass a static load test details of which may be found in Article 16.2).

Furthermore, the car manufacturer must supply detailed calculations which clearly show that it is capable of withstanding the same load when the longitudinal component is applied in a forward direction.

- 14.2.3) The second roll structure must pass a static load test details of which may be found in Article 16.3).

- 14.2.4) Both the principal roll structure and the second roll structure must have minimum structural cross sections of 10000mm<sup>2</sup>, in vertical projection, across a horizontal plane passing 50mm below the highest point of each roll structure.

### 14.3) Structure behind the driver :

The parts of the survival cell immediately behind the driver which separate the cockpit from the car's fuel tank, and which lie less than 150mm from the center line of the car, may be situated no further forward than the line a-b-c-d-e shown in Drawing 2.

In order to validate the integrity of this structure the survival cell must pass an impact test against a solid vertical barrier placed at right angles to the car centre line. Details of the test procedure may be found in Article 15.2.

### 14.4) Survival cell specifications :

- 14.4.1) Every survival cell must incorporate three FIA supplied transponders for identification purposes. These transponders must be a permanent part of the survival cell, be positioned in accordance with Drawing 6 and must be accessible for verification at any time.

- 14.4.2) The survival cell must have an opening for the driver, the minimum dimensions of which are given in Article 12.2). Any other openings in the survival cell must be of minimum size to allow contact with mechanical components.

- 14.4.3) An impact absorbing structure must be fitted in front of the survival cell. This structure need not be an integral part of the survival cell but must be solidly attached to it.

It must have a minimum external cross section, in horizontal projection, of 9000mm<sup>2</sup> at a point 50mm behind its forward-most point and furthermore no part of this cross-section may lie more than 500mm above the reference plane.

- 14.4.4) Referring to Drawing 5 :

The external width of the survival cell between the lines B-B and C-C must be no less than 450mm and must be at least 60mm per side wider than the cockpit opening when measured normal to the inside of the cockpit aperture. These minimum dimensions must be maintained over a height of at least 350mm.

The width of the survival cell may taper forward of the line B-B but, if this is the case, the outer surface must not lie closer to the center line of the car than the plane which tapers at a linear rate to a minimum of 300mm at the line A-A.

The minimum width must be arranged symmetrically about the car centre line, must be maintained over a height of at least 400mm at the line B-B and 275mm at the line A-A. The height at any point between A-A and B-B must not be less than the height defined by a linear taper between these two sections. When assessing the

minimum external cross-sections of the survival cell, radii of 50mm at the line B-B, and reducing at a linear rate to 25mm at the line A-A, will be permitted.

Following the application of the permitted radii, the external cross-sections of the survival cell between the lines A-A and B-B must, over their respective minimum widths, have a minimum height of 300mm at the line B-B reducing at a linear rate to a minimum height of 225mm at the line A-A.

The minimum height of the survival cell between the lines A-A and B-B need not be arranged symmetrically about the horizontal centre line of the relevant section but must be maintained over its entire width.

The minimum width of the survival cell between the lines B-B and C-C is 550mm.

- 14.4.5) When the test referred to in Article 12.2.1) **has been** carried out and the template is in position with its lower edge 525mm above the reference plane, the shape of the survival cell must be such that no part of it is visible when viewed from either side of the car.

The parts of the survival cell which are situated each side of the driver's helmet must be no more than 550mm apart.

In order to ensure that the driver's head is not unduly exposed and for him to maintain good lateral visibility he must, when seated normally and looking straight ahead with his head as far back as possible, have his eye visible when viewed from the side. In this situation, the centre of gravity of his head will be deemed to be the intersection of a vertical line passing through the centre of his ear and a horizontal line passing through the centre of his eye.

- 14.4.6) In order to give additional protection to the driver in the event of a side impact a flat test panel of uniform construction, which is designed and constructed in order to represent a section of the survival cell sides, must pass a strength test. Details of the test procedure may be found in Article 17.6).

Referring to Drawing 5, with the exception of local reinforcement and/or inserts, all parts of the survival cell which are as wide or wider than the minimum widths stipulated in Article 14.4.4), including any radii applied, must be manufactured to the same specification as the panel tested under Article 17.6). Furthermore, parts to this tested specification must cover an area which :

- begins at least 250mm high at line A-A ;
- tapers at a linear rate to at least 400mm high at line B-B and which remains at this height to the rear of the survival cell ;
- is no less than 100mm above the reference plane between the line B-B and the rear of the survival cell.

- 14.4.7) Once the requirements of Articles 14.4.4), 14.4.6), 14.5.1), 14.5.2), 14.5.4), 14.5.5), 15.1), 15.2), 15.3), 16.1), 16.2), 16.3), 17.1), 17.2), 17.3), 17.4), 17.5), 17.6) and 17.8 )have been met, panels no less than 6.2mm thick must then be permanently attached to the survival cell sides. These panels must :

1) In a longitudinal sense, cover the area lying between a vertical plane 125mm forward of the cockpit entry template and a vertical plane 50mm to the rear of the cockpit entry template. A 50mm horizontal linear taper may be included at both ends.

2) In a vertical sense, cover the area constructed in accordance with the Articles 14.4.6) and 17.6). This will not apply to the minimum chassis width where any radius permitted by Article 14.4.4).

3) Be constructed from 16 plies of Zylon and two plies of carbon, precise lay-up details must be followed, which may be found in "Specification for 2008 Secondary Side Intrusion Panel (Final Version 1.0)" issued by the FIA.

**4) Be permanently attached to the survival cell with an appropriate adhesive which has been applied over their entire panel surface.**

**Cut-outs in these panels totalling 25,000mm<sup>2</sup> per side will be permitted for fitting around side impact structures, wiring loom holes and essential fixings.**

#### **14.5) Survival cell safety requirements**

14.5.1) The survival cell and frontal absorbing structure must pass an impact test against a **solidly fixed** barrier placed at right angles to the center line of the car, details of the test procedure **are stipulated** in Article 15.2).

14.5.2) Between the front and rear roll structures, on each side of the survival cell, impact absorbing structures must be fitted and must be solidly attached to it.

The purpose of these structures is to protect the driver in the event of a lateral impact and, in order to ensure this is the case, a lateral strength test in the vicinity of the driver's seating position must be carried out successfully. Details of the test procedure may be found in Article 17.2).

The survival cell and one of these impact absorbing structures must pass an impact test, details of this test procedure may be found in Article 15.3). If these structures are not designed and fitted symmetrically about the car center line **each of the structures must** pass the impact test.

14.5.3) An impact absorbing structure must be fitted behind the gearbox symmetrically about the car center line with the center of area of its rearmost face 300mm(+/-5mm) above the reference plane and no less than 575mm behind the rear wheel center line.

The rearmost face of the impact structure must be a rectangular section no less than 100mm wide, this minimum width must be maintained over a height of at least 130mm and each corner may incorporate a radius no **less** than 10mm. Between the rear face and the rear wheel center line no dimension of the area thus defined may diminish not may any part of the structure or gearbox which is visible from below, other than the permitted radii, be higher than the lower edge of the rear face. **Pockets of minimum size within the structure are permitted for the sole purpose of attaching suspension members.**

This structure must be designed in order to pass an impact test and must be constructed from materials which will not be substantially affected by the temperatures it is likely to be subjected to during use. Details of this test procedure **are stipulated** in Article 15.4).

14.5.4) The survival cell must also be subjected to five separate static load tests :

- 1) on a vertical plane passing through the center of the fuel tank ;
- 2) on a vertical plane passing through the rearmost point at which the outer end of the forward-most front wheel tether would make contact with the survival cell when swung about its inner attachment ;
- 3) on a vertical plane 375mm forward of the rear edge of the cockpit entry template ;
- 4) from **directly underneath** the fuel tank ;
- 5) on each side of the cockpit opening.

Details of the **respective** test procedures may be found in Articles 17.2) – 17.4).

14.5.5) To test the attachments of the frontal, **side and rear** impact absorbing structure to the survival cell, a static side load test must be carried out. Details of the test procedure may be found in Article 17.5), **17.7) and 17.8)**.

**ARTICLE 15 : IMPACT TESTING****15.1) Conditions applicable to all impact tests**

- 15.1.1) All tests must be carried out in accordance with FIA Test Procedure 01/00, in testing center for crash test and static test recognized by the FIA(See FIA technical list No.4) and in the presence of an FIA technical delegate and by using measuring equipment which has been calibrated to the satisfaction of the FIA.
- 15.1.2) Any significant modification introduced into any of the structures tested shall require that part to pass a further test.
- 15.1.3) The reference survival cell must have passed every static load test described in Article 14.2), 14.5.4) and 14.5.5) before being subjected to any impact test.

**15.2) Frontal test-1**

All parts which could affect the outcome of the test must be fitted to the test structure which must be solidly fixed to the trolley through its engine mounting points but not in such a way as to increase its impact resistance.

The fuel tank must be fitted and must be full of water.

A dummy weighing at least 75kg must be fitted with safety belts described in Article 13.5) fastened. However, with the safety belts unfastened, the dummy must be able to move forwards freely in the cockpit.

The extinguishers, as described in Article 13.2) must also be fitted.

For the purposes of this test, the total weight of the trolley and test structure shall be 780kg (+1%/-0) and the velocity of impact no less than 15.0 meters/sec.

The resistance of the test structure must be such that during the impact :

- 1) the average deceleration over the first 150mm of deformation does not exceed 10G ;
- 2) the deceleration over the first 60kJ energy absorption does not exceed 20G;
- 3) the average deceleration of the trolley does not exceed 40G ;
- 4) the peak deceleration in the chest of the dummy does not exceed 60G for more than a cumulative 3ms, this being the resultant of data from three axes.
- 5) Furthermore, there must be no damage to the survival cell or to the mountings of the safety belts or fire extinguishers.

This test must be carried out on the survival cell subjected to the tests described in Articles 17.2) – 17.4), and on a frontal impact absorbing structure identical to the one which was subjected to the test described in Article 17.5).

**15.3) Side test**

All parts which could materially affect the outcome of the test must be fitted to the test structure which must be solidly fixed to the ground and a solid object, having a mass of 780kg (+1%/-0) and traveling at a velocity of no less than 10m/s, will be projected into it.

The object used for this test must :

- 1) incorporate an impactor assembly specified by the FIA which is fitted in accordance with their instructions ;
- 2) be positioned in order that its center of area strikes the structure 300mm(±25mm) above the reference plane and at a point 500mm (±3mm) forward of the rear edge of the cockpit opening template.

During the test the striking object may not pivot in any axis and the survival cell may be supported in any way provided this does not increase the impact resistance of the parts being tested. The impact axis must be perpendicular to the car center line and

parallel to the ground.

The resistance of the test structure must be such that during the impact :

- 3) the average deceleration of the object, measured in the direction of impact, does not exceed 20G ;
- 4) the force applied to any one of the four impactor segments does not exceed 80kN for more than a cumulative 3ms ;
- 5) the energy absorbed by each of the four impactor segments must be between 15% and 35% of the total energy absorption.
- 6) Furthermore, all structural damage must be contained within the impact absorbing structure.

This test must be carried out on the survival cell subjected to the tests described in Articles 17.2) – 17.4). **This also must be carried out on the lateral impact absorbing structure(s) which was(were) subjected to the test described in Article 17.8).**

#### 15.4) Rear test

All parts which will be fitted behind the rear face of the engine and which could materially affect the outcome of the test must be fitted to the test structure. If suspension members are to be mounted on the structure they must be fitted for the test. The structure and the gearbox must be solidly fixed to the ground and a solid object, having a mass of 780kg **(+1%/-0)** and traveling at a velocity of **no less than 11m/s**, will be projected into it.

The object used for this test must be flat, measure 450mm **(±3mm)** wide by 550mm high **(±3mm)** and may have a 10mm radius on all edges. Its lower edge must be at the same level as the car reference plane **(±3mm)** and must be so arranged to strike the structure vertically and at 90° to the car center line.

During the test, the striking object may not pivot in any axis and the crash structure may be supported in any way provided this does not increase the impact resistance of the parts being tested.

The resistance of the test structure must be such that during the impact :

- 1) **the deceleration over the first 225mm of deformation does not exceed 20G.**
- 2) the maximum deceleration does not exceed **20G** for more than a cumulative **15ms**, this being measured only in the direction of impact.
- 3) Furthermore, all structural damage must be contained within the area behind the rear wheel center line.

This test must be carried out on the rear impact absorbing structure which was subjected to the test described in Article 17.7.

#### 15.5) Steering column test

The parts referred to in Article 9.6.3) and **all other parts which could materially affect the outcome of the test** must be fitted to a representative test structure. Any other parts which could affect the outcome of the test must also be fitted. The test structure must be solidly fixed to the ground and a solid object, having a mass of 8 kg **(+1%/-0)** and traveling at a velocity **no less than 7 m/s**, will be projected into it.

The object used for this test must be hemispherical with a diameter of 165 mm **(+/- 1mm)**.

For the test, the center of the hemisphere must **be projected to** strike the structure at the center of the steering wheel along the same axis as the main part of the steering column.

During the test the striking object may not pivot in any axis and the test structure may be supported in any way provided this does not increase the impact resistance of

the parts being tested.

The resistance of the test structure must be such that during the impact the peak deceleration of the object does not exceed 80G for more than a cumulative 3 ms, this being measured only in the direction of impact.

After the test, all substantial deformation must be within the steering column and the steering wheel quick release mechanism must still function normally.

## ARTICLE 16 : ROLL STRUCTURE TESTING

### 16.1) Conditions applicable to both roll structure tests

- 16.1.1) Rubber 3mm thick may be used between the load pad and the roll structure.
- 16.1.2) Both peak load must be applied in less than three minutes and be maintained for 10 seconds.
- 16.1.3) Under the load, deformation must be less than 50mm, measured along the loading axis and any structural failure limited to 100mm below the top of the rollover structure when measured vertically.
- 16.1.4) Any significant modification introduced into any of the structures tested shall require that part to pass a further test.

### 16.2) Principal roll structure test

A load equivalent to 50kN laterally, 60kN longitudinally in a rearward direction and 90kN vertically, must be applied to the top of the structure through a rigid flat pad which is 200mm in diameter and perpendicular to the loading axis.

During the test, the roll structure must be attached to the survival cell which is supported on its underside on a flat plate, fixed to it through its engine mounting points and wedged laterally by any of the static load test pads described in Article 17.2).

### 16.3) Second roll structure test

A vertical load of 75kN must be applied to the top of the structure through a rigid flat pad which is 100mm in diameter and perpendicular to the loading axis.

During the test, the rollover structure must be attached to the survival cell which is fixed to a flat horizontal plate.

## ARTICLE 17 : STATIC LOAD TESTING

### 17.1) Conditions applicable to all static tests

- 17.1.1) The static load test described in the Articles 17.2),17.3),17.4),17.5) and 17.8.2) must be carried out on the survival cell subjected to the impact test described in Article 15.2).
- 17.1.2) Deflections and deformations will be measured at the center of area of circular load pads and at the top of rectangular pads.
- 17.1.3) All peak loads must be applied in less than three minutes, through a ball jointed junction at the center of area of the pad, and maintained for 30 seconds.
- 17.1.4) After the tests described in Articles 17.2), 17.3) and 17.4), permanent deformation must be less than 1.0mm (0.5mm in 17.3)) after the load has been released for 1 minute.
- 17.1.5) All tests must be carried out by using measuring equipment which has been

calibrated to the satisfaction of the FIA.

- 17.1.6) A radius of 3mm is permissible on the edges of all load pads and rubber 3mm thick may be placed between them and the test structure.
- 17.1.7) If the weight differs by more than 5% from the one subjected to the impact tests described in Articles 15.2) and 15.3) further frontal and side impact tests and roll structure tests must be carried out.
- 17.1.8) Any significant modification introduced into any of the structures tested shall require that part to pass a further test.

### 17.2) Survival cell side tests

- 17.2.1) For test 1), referred to in Article 14.5.4), pads 100mm long and 300mm high, to which the test load is applied should conform to the shape of the survival cell. The pad must be placed against the outermost sides of the survival cell with the lower edge of the pad at the lowest part of the survival cell at that section.

A constant transverse horizontal load of 25.0kN will be applied and, under the load, there must be no structural failure of the inner or outer surfaces of the survival.

- 17.2.2) For test 2), referred to in Article 14.5.4), pads 200mm in diameter which conform to the shape of the survival cell, must be placed against the outermost sides of the survival cell.

The center of area of the pads must pass through the plane mentioned above and the midpoint of the height of the structure at that section.

A constant transverse horizontal load of 30.0kN will be applied to the pads and, under the load, there must be no structural failure of the inner or outer surfaces of the survival cell and the total deflection must not exceed 15mm.

- 17.2.3) For test 3), referred to in Article 14.5.4), pads 200mm in diameter which conform to the shape of the survival cell, must be placed against the outermost sides of the survival cell.

The center of area of the pads must be placed 350mm above the reference plane and on the vertical plane mentioned in the Article 14.5.4).

A constant transverse horizontal load of 30.0kN will be applied to the pads and, under the load, there must be no structural failure of the inner or outer surfaces of the survival cell and the total deflection must be no more than 15mm.

### 17.3) Fuel tank floor test

A pad of 200mm diameter must be placed in the center of area of the fuel tank floor and a vertical upwards load of 12.5kN applied.

After the load was applied, there must be no structural failure of the inner or outer surfaces of the survival cell.

### 17.4) Cockpit rim test :

Two pads, each of which is 100mm in diameter, must be placed on both sides of the cockpit rim with their upper edges at the same height as the top of the cockpit side with their centers at a point 250mm forward of the rear edge of the cockpit opening template longitudinally.

A constant transverse horizontal load of 15.0kN will then be applied at 90° to the car center line and, under the load, there must be no structural failure of the inner or outer surfaces of the survival cell and the total deflection must not exceed 20mm.

### 17.5) Nose push off test :

During the test the survival cell must be resting on a flat plate and secured to it

solidly but not in a way that could increase the strength of the attachments being tested.

A constant transversal horizontal load of 40.0kN must then be applied to one side of the impact absorbing structure, using a pad identical to the ones used in the lateral tests in Article 17.2.1, at a point 550mm from the front wheel axis.

The center of area of the pad must pass through the plane mentioned above and the midpoint of the height of the structure at the relevant section. After 30 seconds of application, there must be no failure of the structure or of any attachment between the structure and the survival cell.

#### **17.6) Side intrusion test**

17.6.1) The test must be carried out in accordance with FIA Test Procedure 02/00, and by using measuring equipment which has been calibrated to the satisfaction of the FIA.

**The details of the test procedure are found in 2013 FIA Formula 1 Technical Regulations.**

17.6.2) The test panel must be 500mm x 500mm and will be tested by forcing a rigid truncated cone through the center of the panel at a rate of 2mm (+/-1mm) per second until the displacement exceeds 150mm.

During the first 100mm of displacement the **test** load must exceed **250**kN and the energy absorption must exceed 6000J. There must be no damage to the fixture or **systematic damage to the** border before these requirements have been met.

#### **17.7) Rear impact structure push off test**

17.7.1) During the test the gearbox and the structure must be solidly fixed to the ground but not in a way that could increase the strength of the attachments being tested.

17.7.2) A constant transversal horizontal load of 40kN must then be applied to one side of the impact absorbing structure, using a pad identical to the ones used in the lateral tests in Article 17.2, 1), at a point 400mm from the rear wheel axis.

The center of area of the pad must pass through the plane mentioned above and the midpoint of the height to the structure at the relevant section.

After 30 seconds of application, there must be no failure of the structure or of any attachment between the structure and the gearbox.

#### **17.8) Side impact structure push off tests :**

**17.8.1) Super Formula (SF) manufacturer must supply detailed calculations which clearly show that the structure(s) is (are) capable of withstanding :**

**- Horizontal loads of 20kN applied in a forward and rearward direction respectively through ball-jointed pads. The pads may conform to the shape of the structures, measuring 550mm high x 100mm wide and whose centre of area lies 600mm from the car center line and 300mm above the reference plane.**

**- Horizontal loads of 10kN applied to the upper and lower direction respectively through ball-jointed pads. The pads may conform to the shape of the structures, measuring 400mm high x 100mm wide and whose centre of area lies 600mm from the car center line and 500mm forward of the rear edge of the cockpit entry template.**

**In all cases the calculations should show that there will be no structural failure of the parts. It should be assumed that ball-jointed pads are used, the joint lying at the centre of area of the pad.**

**When a complex impact absorbing structure is installed to the car, the only part that contacts the pad should be receive the load applied to the structure.**

17.8.2) During the push off tests the survival cell must be resting on a flat plate and secured to it solidly but not in a way that could increase the strength of the attachments being tested.

Constant horizontal loads of 20kN then applied in a rearward direction to the point at 600mm from the car center line of the structure through a ball-jointed pad, which may conform to the shape of the structure, measuring 550mm high x 100mm wide.

The center of the pad area is placed 300mm above the reference plane and there must be no failure of any structures or of any attachment between the structure and the survival cell.

When a complex impact absorbing structure is installed to the car, the only part that contacts the pad should be tested.

## ARTICLE 18 : FUEL

### 18.1) Fuel

Limited to normal commercial fuel. Once supplied nothing may be added to the fuel.

### 18.2) Air

Only air may be mixed with the fuel as an oxidant.

## ARTICLE 19 : ON BOARD TELEVISION CAMERAS

19.1) Whether a television camera is mounted or not, the minimum weight (see 3.1) must be respected.

19.2) If a car has no on-board camera system installed it must be equipped with a dummy weight equivalent to the weight the camera system.

19.3) The rules concerning bodywork dimensions shall not apply to the television camera system.

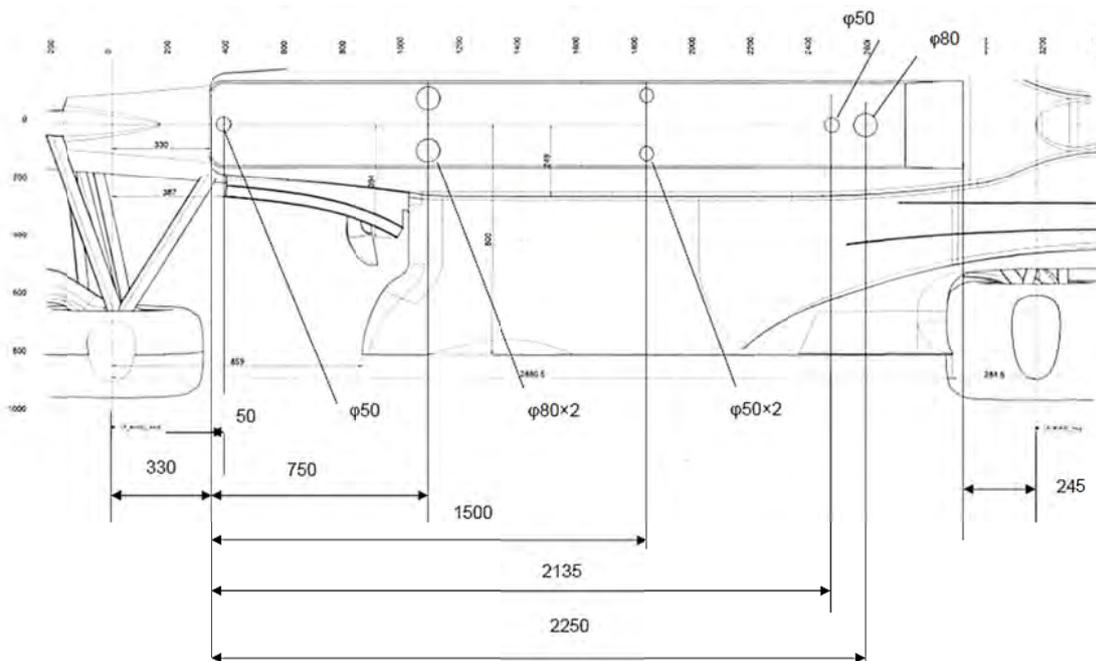
19.4) The designate position, jig, way and dimensions must be used when the camera is mounted onto the car (including principal roll structure).

## ARTICLE 20 : FINAL TEXT

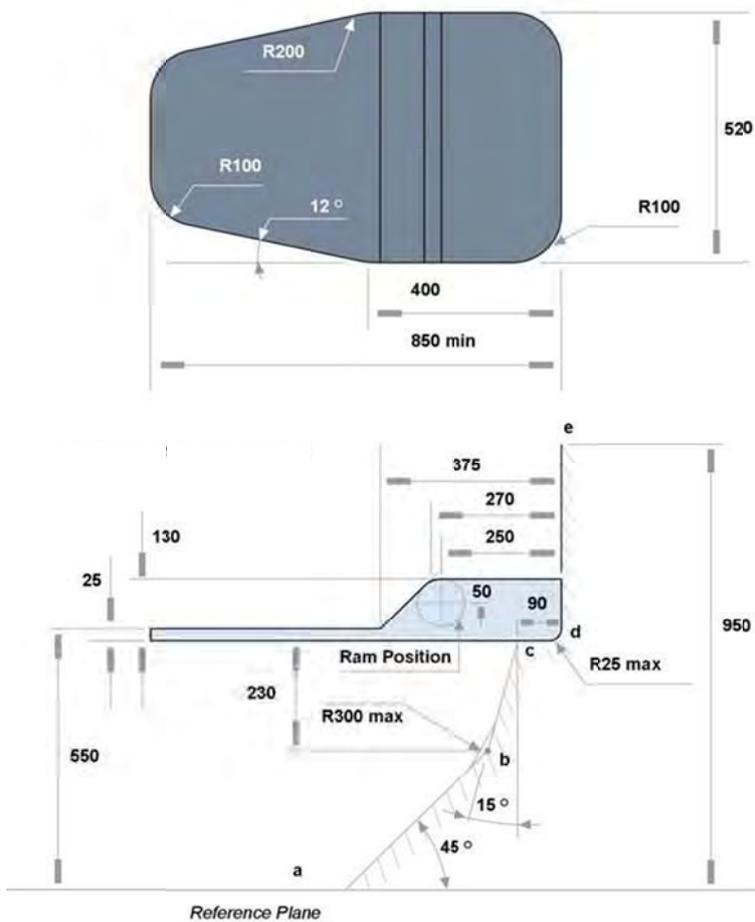
The final text for these regulations shall be the Japanese version which will be used should any dispute arises over their interpretation.

Headings and typeface in this document are for ease of reference only and do not form part of these Technical Regulations.

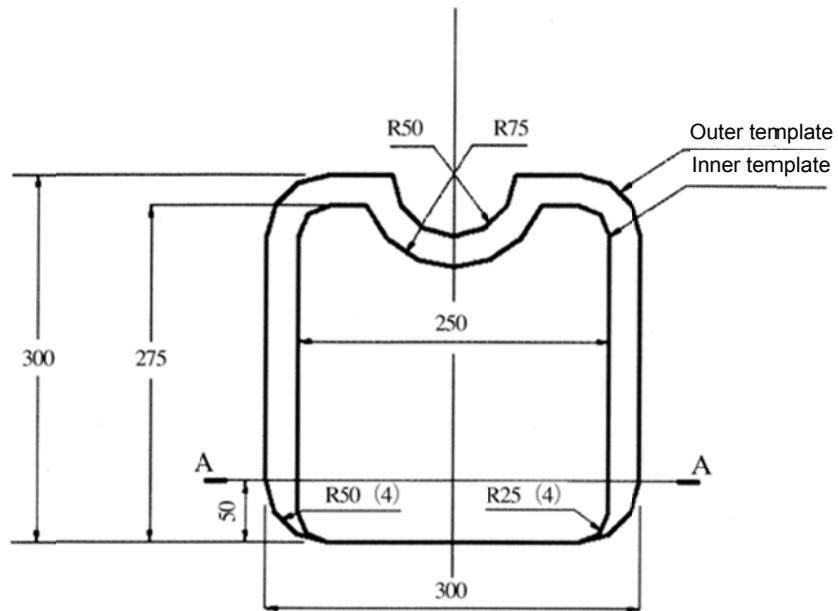
**Drawings**



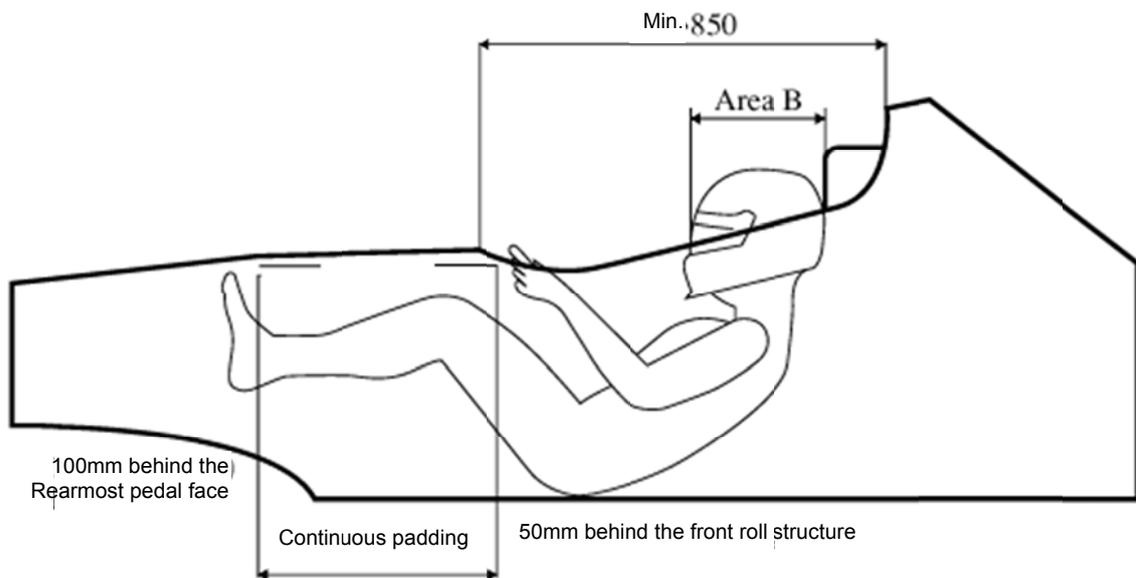
**Drawing 1 : Skid block Dimensions**



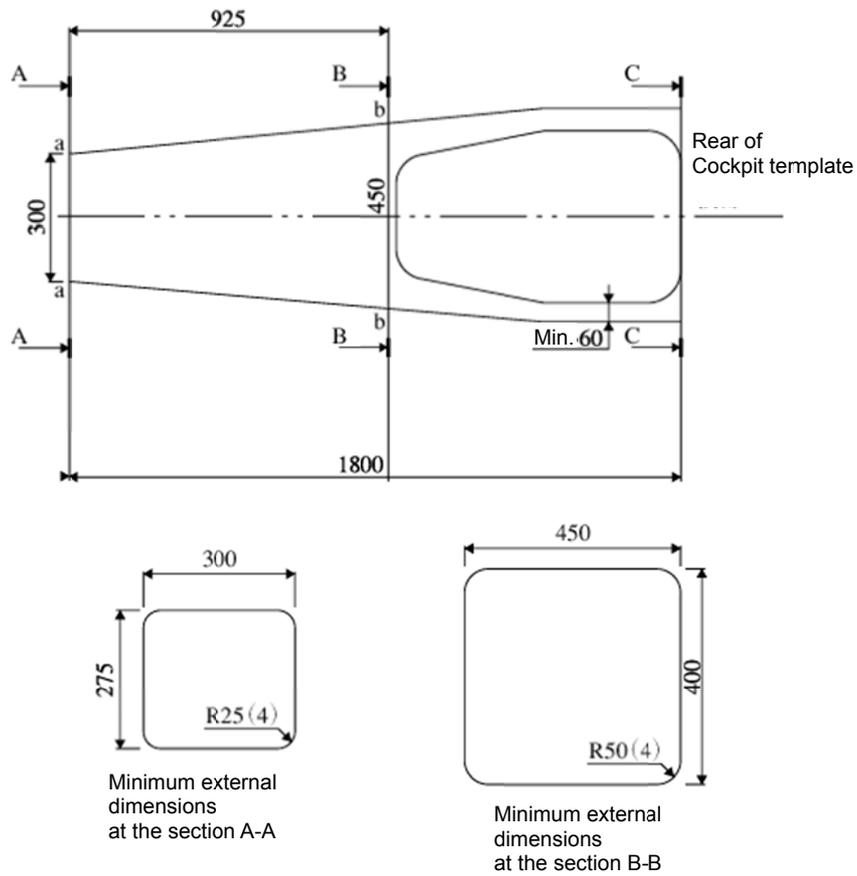
**Drawing 2 : Cockpit Entry Templates**



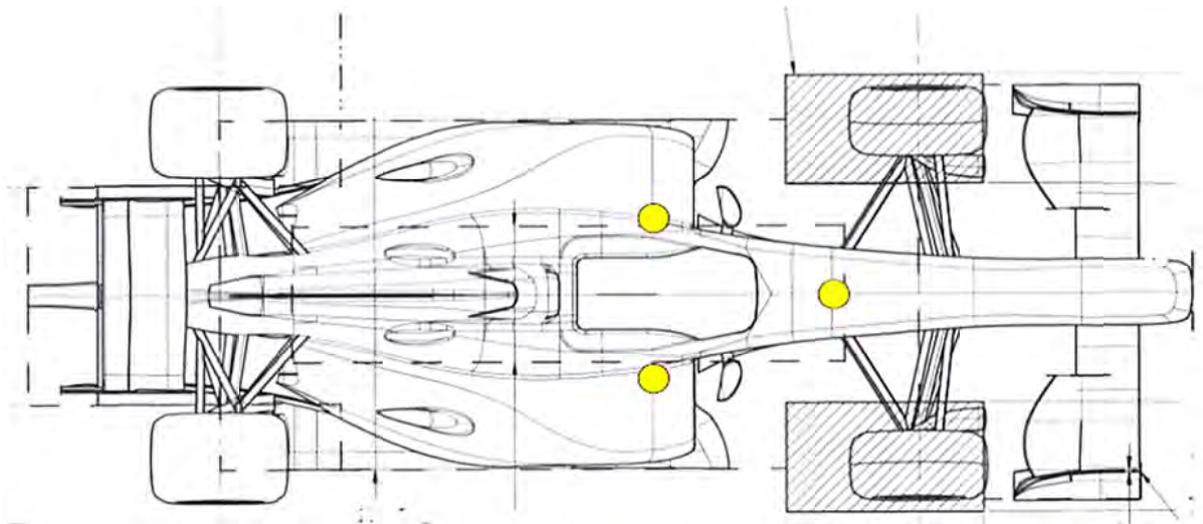
**Drawing 3 : Cockpit Cross Section Templates**



**Drawing 4 : Cockpit Padding**



**Drawing 5 : Survival Cell Dimensions**



**Drawing 6 : Position of Transponder**