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2022 FIA ETCR eTouring Car World Cup Technical Regulations

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ART. 1 GENERAL REMARKS

Article 1 of the WSC ETCR Technical Regulations applies.

Unless otherwise stated, Articles 251, 252 and 253 of the FIA Appendix J are applicable, but the articles set out in the present regulations and the FIA ETCR Technical Passport have predominance. Articles 255 and 263 of the FIA Appendix J are also occasionally referred to. All modifications which are not explicitly allowed by the present regulations are forbidden.

An authorised modification may not entail a non-authorised modification.

ART. 2 DEFINITION

2.1 Bodywork

See art. 251-2.5.2 App. J.

Any air intake is considered to be part of the bodywork.

2.2 Chassis (body shell)

The main body of the car to which the motor, transmission, running gear, electrical systems, seats, controls, bodywork, etc. are fitted.

2.3 Production (part)

As fitted to the Series Production Car; the proof rests with the Competitors

2.4 Original (part)

As fitted to the WSC certified car and in compliance with the ETCR Technical Form.

2.5 Minimum Weight

The weight of the car without driver, with empty tanks of consumable fluids (wind screen wash & drinking water, etc.) and with all other tanks filled at the working level. (Certification)

2.6 Minimum Racing Weight

The minimum weight of the car with the driver with full compulsory equipment (Appendix L) imposed to be respected at any time during the competition. The minimum racing weight doesn't include the non-compulsory equipment.

2.7 Cockpit

The interior volume of the main structure which is reserved for the occupants. Its limits are defined by the roof, the floor, the doors, the lateral parts, the glazed parts and the front and rear bulkheads (or the back plane of the rear seats).

2.8 ETCR-kit

WSC Ltd. supplies the product ETCR-kit. ETCR-kit is a common integrated powertrain and includes necessary systems for operation. ETCR-kit details are in the ETCR-kit Technical Manual (TM) issued by WSC Ltd. All information, and instructions that are necessary for a manufacturer to design vehicle components and integrate this ETCR-kit into the vehicle are provided in TM. The ETCR-kit must be installed corresponding to the instructions in TM.

Modification of any elements (hardware and software) of the ETCR-kit is only allowed if explicitly stated and must be approved by WSC.

2.9 Motor Control Unit (MCU)

Devices that are controlling the current, and thus the torque or rotational speed of the electric motors. [inverter, power inverter].

Supplied as part of the ETCR - Kit.

2.10 Vehicle Control Module (VCM)

Device with the main function of controlling ETCR-kit subsystems, assuring safe operation of ETCR-kit. Supplied as part of the ETCR-kit.

2.11 Vehicle Dynamic Control (VDC)

Set of control functionalities that aim to increase vehicle performance through controlling the torque demand, depending on driver inputs, and vehicle motion-state supplied as part of the ETCR-kit.

2.12 Rechargeable Energy Storage System (RESS)

General definition according to art. 251-3.1.7 App.J. The RESS can only store electrical energy. A Rechargeable Energy Storage System (RESS), is a system that is designed to propel the car via the electric motor, recover electric energy from the power grid and from charging via the electric motor. The RESS cannot be recharged from any fuel-based energy converter inside the car. The RESS comprises all components needed for the normal operation and is supplied as part of the ETCR-kit.

Any hardware or software modification of the RESS is prohibited.

Charging procedure, maintenance and storage instruction for the RESS, must be performed as per the ETCR - Kit technical manual.

2.13 Motors

Electric motors. Supplied as part of the ETCR - Kit.

2.14 Location

A site defined relative to the production: centre line of the car, axles centre (middle of the wheelbase on the centre line), cockpit, luggage compartment and engine compartment.

2.15 Position

The site defined by dimensions from the series production car data, e.g. axles centre and centre line of the car.

For position evaluation a tolerance of ±5 mm will be used.

2.16 Production Car Standard Position (PCSP) (Certification)

Defined by the Manufacturer. Established by the SPC's OEM ground clearance and rake with OEM tyres and wheels, having 0° camber. This position is used as the starting design position for defining references and datums serving as foundations for locating and positioning prescribed elements of the race car. (Certification)

2.17 Ground contact point

Ground contact point is defined as a point on the intersection of the boundary cylinder and the longitudinal, and transversal mid-plane of the wheel where the wheel makes contact with the physical ground when it is assembled to a car which is stationary.

2.18 Ground plane

Defined by the ground contact point of the rear wheels of the series production car and the midpoint of the line connecting the two front wheel ground contact points.

2.19 Rear Axle Line

Defined as a line connecting the rear wheel ground contact points of the race car.

2.20 Transversal Midplane

A plane normal to the rear axle line, erected at its midpoint.

2.21 Rear Axle Coordinate System (RACS)

A standard, Cartesian coordinate system with its origin at the midpoint of the rear axle line. Direction "X" is parallel to the transversal midplane, pointing to the opposite direction of the normal travel direction. Direction "+Z" is normal to the ground plane, pointing towards the roof of the car.

2.22 Reference Plane

A plane which is passing through the lowest point of the series production car bodyshell measured from the ground plane and is parallel to the lowest spot-welded flange while being normal to the transversal midplane. The definition of the reference plane must happen in the production car standard position of the bodyshell.

2.23 Rear Axle Reference Plane

Defined as a plane normal to the ground plane in the rear axle line.

2.24 Reference Coordinate System (RFCS)

A standard, Cartesian coordinate system which is defined by the intersection point of the transversal midplane of the car, the rear axle reference plane and the reference plane. Direction "+Y" is pointing towards the passenger's side, being normal to the transversal midplane of the car. Direction "+Z" is normal to the reference plane, pointing towards the roof of the car.

2.25 Rear Modification Area

Defined as a cuboid having a rectangle as a base with one side extending 400 [mm] forward ("-X") and [300 [mm] rearward ("+X") from the "Y" axis in the rear axle coordinate system with its height constrained to 755 [mm] in "+Z" direction. In "Y" direction the length of the cuboid could extend no further than the start of the rear wheel arch area of the series production car chassis located within the area. Neighbouring surfaces of the rear modification area on the bodyshell floorpan could be changed to flat sheet metals.

2.26 RESS Subframe Pick-Up Point Modification Area

Defined by a cuboid, laying on the X-Y plane of the reference coordinate system with a 410x205 [mm] ("Y"x"Z") base, starting 275 [mm] from the origin of the reference coordinate system in "-X" direction and extending forward ("-X") to cover the mounting feet of the front safety cage members and a further 100 [mm]. The longitudinal axis of the cuboid must be located 630 [mm] transversally from the transversal midplane of the car. Directions are specified in the reference coordinate system.

2.27 Overhangs

- Front overhang: Defined by splitter front edge and front axle line position.
- Rear overhang: Defined by rear bumper, (including the diffuser) rear edge and rear axle line position.

2.28 Telemetry

The transmission of data between a moving car and the pit or to anyone connected with the entry of that car.

2.29 Mass Production

The minimum Production requested for eligibility of series production car models are 5000 pieces during 12 consecutive months.

2.30 Model of car

All the identical cars belonging to a family (see below) and to a production series distinguishable by an identical conception and identical external general lines of the bodywork, and by an identical mechanical conception of the engine and the transmission to the wheels.

2.31 Family of car

Different series models belonging to one and the same production series of the same manufacturer.

2.32 Certification

The ETCR Technical Form with all valid extensions is the official documentation of ETCR Cars certified by WSC.

Parts described in the present Technical Regulations which are subject to certification by WSC cannot be considered of free design.

During the 1st season of a new car model development it will be possible for manufacturers to apply for a Temporary Technical Form. Cars certified with Temporary Technical Form may be accepted on the grid by ETCR Promoters but will not mark points in ETCR Competitions, Series, Class or Championships until the ETCR Certification process is terminated. Cars certified with Temporary Technical Form may only be loaned by manufacturers to customer team, unless specifically authorised for sale by WSC Ltd.

2.33 Original Equipment Manufacturer (OEM)

OEM is a manufacturer of the series production cars and the supplier of the original spare parts.

2.34 Reference Part, Component or Unit

Certificated part or ETCR-Kit components which are deposited with the technical delegate and can be installed in the race cars on his/her decision at any time of the competition.

2.35 **OEM Part**

Component coming from any OEM produced series production car and in normal sale

2.36 **WSC Ltd.**

WSC Ltd. is the exclusive owner of the ETCR concept, ETCR Technical Regulations including and not limited to its appendices i.e.: ETCR Kit Technical Manual, Safety Appendix and all IP rights related to ETCR.

2.37 **Series Production Car (SPC)**

The Series Production Car (SPC) is a road legal, commercially sold, mass-produced model of car, on which the race car manufacturer's ETCR race car design is based.

2.38 **ETCR - Kit Drivetrain**

Group of main elements of the ETCR - Kit, containing: RESS, Motors, MCU.

2.39 **Race car Design Position (RCDP)**

The Race car Design Position is established as a standard general position in which the race car will be certified and homologated. In this position the ground clearance of the race car at the line of the front axle and at the rear axle must be equally 60 [mm].

2.40 **RESS Install Modification Area**

The RESS Install Modification Area is enclosing the RESS unit and defines the volume in which the series production car bodyshell could be modified to accommodate the RESS unit. The area is defined in the reference coordinate system and its bottom border is the reference plane. Dimensions are according to Figure 1.

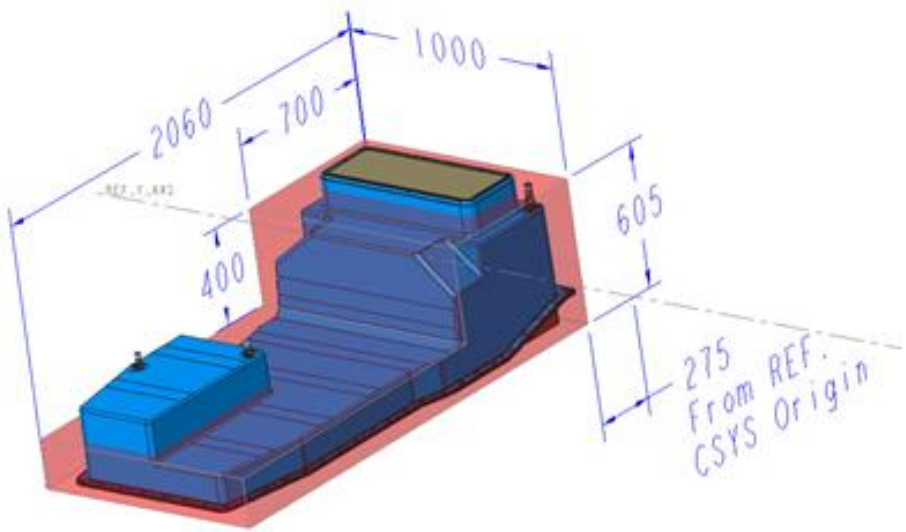


Figure 1

2.41 **FIA ETCR Technical Passport**

Unique document issued by the FIA to single ETCR cars that:
- features all the relevant technical information of a model of car according to the present technical regulations
- identifies a single car uniquely by its manufacturer's chassis number and an FIA identification number.

Any modification to the FIA WTCR Technical Passport is at the discretion of the FIA.

ART. 3 REGULATIONS

3.1 **Eligible cars**

Eligibility criteria for ETCR cars:
- The model of car is on the list of ETCR eligible cars for 2022, published by WSC.
- The cars correspond to FIA Homologation Criteria for Touring Cars (FIA Group A).
- The model of car is produced by an OEM and belongs to a mass-produced family.
- The car must have 4 or 5 doors.
- Minimum overall length 4.2 [m].
- Front wheel drive and rear wheel drive cars are acceptable.

WSC Ltd. reserves the right to accept other cars, when the general characteristics match with the ETCR concept. WSC Ltd. reserves also the right to approve or to refuse applications which might not be in compliance with the above criteria.

Without a WSC authorization only one Technical Form per car model will be accepted. The Technical Form Number and the certificating manufacturer will be documented on the WSC Ltd. List.

After the certification, the cars have to be available on the market with maximum 6 months delivery time, when the regional and national championship will be organized.

Each ETCR car, identified through the chassis ~~no.~~ number, will receive individually an original Technical Form (in printed and digital format).

Competitors, at the scrutineering, must present the original FIA ETCR Technical Passport stamped and signed for each car.

The FIA ETCR Technical Passport must be applied for by the competitor entered in the FIA ETCR eTouring Car World Cup to the FIA Technical Department, provided that the model requested is already certified by WSC and has a valid ETCR Technical Form.

In order to obtain the FIA ETCR Technical Passport, competitors must previously be:
- formally entered in the FIA ETCR eTouring Car World Cup.
- in possession of the ETCR Technical Form of their car.

The FIA ETCR Technical Passport will be valid only for the year of the present regulations.

3.2 Compliance with the regulations

All vehicles must be conform to these regulations, FIA ETCR Technical Passport and to all FIA Notification and Technical Bulletins.

All parts not mentioned in these regulations have to remain those from the basic production car or another production model of the same manufacturer and correspond to the Manufacturer's Parts Catalogue for the produced model and may not be modified in any way.

For specifying the homologated location of a given item, the manufacturer must designate a base point on the car and a reference point on the item in such a way that it enables the officials to cross-check the values in the technical from with the measurement taken on site of a competition.

All items in the ETCR Technical form must be accessible for the officials in order to check their certification. Access to parts and reference points could be granted by removable covers or disassembly.

In case of doubt about the conformity of any part, the Technical Delegate may ask the replacement with a reference part without any further explanation. All cost of such operations will be covered by the Competitor.

Manufacturers may be requested by the FIA to deposit certain parts of the car which will be used as a reference to assess compliance for the duration of the car in the FIA ETCR eTouring Car World Cup.

Teams will deliver on request to the FIA technical staff the following information regarding cars:
- Data from team's data logger
- Video footage from team's camera
- Any other technical documentation

Upon request, manufacturers will deliver to the FIA technical staff any technical information regarding the cars. FIA and WSC have the right

to archive all information regarding ETCR cars.

It is the duty of each competitor to assure the Scrutineers and the Stewards of the competition that his car complies with these regulations in their entirety at all times during a competition.

A car, the construction of which is deemed to be dangerous, may be prohibited by the Stewards.

If one or more of the protective seals on any ETCR–Kit component is broken by a Competitor, the FIA Technical delegate shall report this to the Steward of the meeting and the Competitor may be subject to penalties or exclusion as per Sporting Regulations of the Series. In this case WSC has the right to immediately retire such ETCR-Kit component for further investigation with the relative supplier.

3.3 Measurements

Unless, otherwise defined by this regulation, all cars measurements must be taken while the car is stationary on a flat horizontal surface in the location stated in the Sporting or in the Supplementary Regulations.

3.4 Material

Titanium or magnesium alloys, ceramic or exotic materials and sophisticated coatings are not permitted unless used for the production part or explicitly authorised by these regulations.

All flexible supports (sub frames, etc.) may be replaced by stiffer brackets with same functional dimensions. If not otherwise defined by the present regulations the aggregate's position may not be modified. (Certification)

External bodywork parts may be repaired by adding material respecting the certified properties (minimum weight, functional shape, etc.). Such operation needs the approval of the technical delegate.

3.5 Period of Certification

WSC Ltd. will release 1 (one) Technical Form per model frozen for 1 (one) year starting from the date of the final certification. Each Competitor must have at the scrutineering the stamped and signed original ETCR Technical Form for each car. Form can be requested from the ETCR Technical Department.

Face lifts are not considered as new cars. It will be possible to change only the modified body shell parts on the production car. Technical Form's modification may be authorised during the season only for following reasons:

- Safety
- Reliability
- Obvious lack of performance
- Allowed Variant Options

3.6 Data logging

The ETCR-kit includes multiple data logging capable units as described in the TM. Adding any other data logging capable unit is not recommended. (Certification)

It is allowed to have onboard video capturing device. No external sensors can be connected to this device without the approval of the FIA Technical Delegate.

Public CAN 1 is a CAN bus that is part of the ETCR-kit. Basic system statuses, sensor values are transmitted on this bus. Every signal that is part of the Public CAN 1 is logged with the ETCR Public Data Logger (PDL). PDL logged data (with all signals) may be downloaded and used by the competitor. PDL data is used for Scrutineering purposes. Any alteration to PDL software that is not explicitly stated in TM is not permitted.
PDL and all other ETCR-kit data is property of WSC Ltd.

Competitors must place and maintain sensors on their vehicle to provide measurements for:

- Speed of all 4 wheels [kph]
- Longitudinal, lateral, vertical acceleration and Yaw rate
- Accelerator pedal position (two sensors for plausibility) [%]
- Front & Rear Brake pressure [mbar]
- GPS
- Steering wheel angle [°]
- Temp of critical electric component [°C]
- ADR unit

Details of sensors are part of the TM.

The use of following sensors is not allowed:

- Pitot tube
- Tyre pressure
- Tyre internal and external temperature including the running surface
- Ride height
- Additional Inertial platform
- Sensors using wireless data transmission
- Motor torque sensors
- Load cells, and strain gauges.

The connection of additional sensors is strictly defined by TM. (Certification)

3.7 Telemetry

The ETCR – Kit is equipped with telemetry capabilities. Adding any other component capable of Telemetry for competitor purposes is forbidden.

3.8 Driving aids

The driver must control the acceleration of the vehicle via a single foot accelerator pedal, a single foot brake pedal and a handbrake.

Accelerator pedal must be connected to the ETCR-Kit VCM as described in the ETCR-Kit Technical Manual. Any mechanical alteration which may help the drivers to hold in specific position (except the ends of the pedals travel) or any electrical manipulation of the pedal or brake pressure sensor signals is prohibited.

The ETCR-Kit is allowed to control requested torque for the power train, these features are called allowed driving aids and must be approved by WSC.

All allowed driving aids are implemented in the ETCR-Kit, and they are:

- Traction Control
- Pit Speed Limiter

Certain parameters of the allowed driving aids can be adjusted, but only by the driver, via control switches or knobs.

It is prohibited to use any actively controlled actuator in the brake lines.

The driver must control steering angle via a single steering wheel. Any active or passive alteration of this request is considered a driving aid. It is allowed to use power steering to assist steering force, but any alteration to driver requested steering angle is prohibited.

ART. 4 MODIFICATIONS AND ADJUNCTIONS ALLOWED OR MANDATORY

4.1 Chassis (Certification)

4.1.1 General

The chassis cannot be modified unless permitted by the present regulations.

All chassis modifications including the removal of unused supports have to be certified in the Technical Form.

Following condition must be respected:

- Width of bodywork: Maximum 1950 mm
- All chassis modifications must to be approved by WSC Ltd.
- If not otherwise defined by the present regulations any non-movable element must be attached with the use of tools.
- Wheel arch modifications allowed, for the sole purpose to accommodate race tyres.
- Front bulkhead may not be modified except for the purpose of RESS placement.
- No modification of strut turrets except for:
    - The purposes listed in art. 8.2.2.
    - Local reinforcement following the original shape and through metal ribs or fins as connection between turrets and front bulkhead for strengthening of strut mounting area. The series production car's reinforcements and openings may be locally reworked without weakening the structure to allow access to the strut.
- Seam welding replacing or reinforcing production part spot welding is authorized.
- Local modifications of the chassis or sub frames are permitted to provide clearance for transmission and suspension.
- Temporarily removal of the roof outer skin is permitted only to allow the safety cage's correct installation.
- Reinforcements and the removal of unused supports are permitted. (Certification)
- Strengthening of the suspended parts of the chassis / body shell through the addition of parts and/or material is allowed under the following conditions:
  The shape of the reinforcing part/material must follow the surface of the part to be reinforced, having a shape similar to it and the following maximum thickness, measured from the surface of the original part:
    - 4 mm for steel parts.
    - 12 mm for aluminium alloy parts.

Stiffening ribs are allowed but the making of hollow sections is forbidden. The reinforcing part/material must not have any other function than that of reinforcement.

Mountings and bearings of anti-roll bars: The main rails may be modified to integrate the anti-roll bar bearings. The new mountings of the anti-roll bars must not have any other function.

4.1.2 ETCR-kit Installation

In order to install the ETCR-kit and the rear suspension the bodyshell may be modified within the following limits:

- Longitudinally from the front bulkhead till the rear end.
- Vertically up to cover battery pack, electric motor, drivetrain.
- In the design space defined by the Rear Modification Area (art.2.25) and the RESS Install Modification Area (art. 2.40).

4.1.3 ETCR-kit Positioning

4.1.3.1 Motor-Reduction Gear Unit Positioning

The axis of the reduction gear output flange must be located within a cylindrical area with a radius of 20 [mm] viewed from "Y" direction of the reference coordinate system, with the centre of the area having the following coordinates in relation to the reference coordinate system: X: 64 [mm] Z: 258 [mm]

4.1.3.2 Inverter Positioning

The placement of the inverters is limited by the length and minimum bending radius of the high voltage cables used to connect them to the motors as given in the "ETCR-kit Technical Manual" supplied by WSC.

4.1.3.3 RESS Positioning

Position of the RESS is constrained to the reference coordinate system, by identifying reference points RESS_REF1_PNT, RESS_REF2_PNT & RESS_REF3_PNT. These points are defined by the corresponding mounting bore positions of the supplied RESS unit. The positioning of the reference points is constrained by coordinates specified in the reference coordinate system. A maximum deviation with a radius of 10 [mm] (except for "Z" direction where maximum deviation is ± 20 [mm]) from the reference point locations is allowed. See Fig. 2

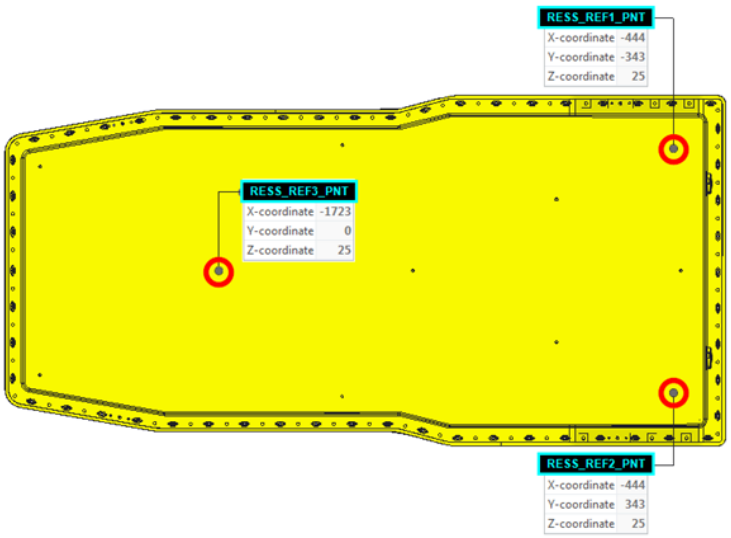


Figure 2

4.1.3.4 RESS Mounting

The RESS must be fixed to the chassis through a RESS subframe.

Location of the subframe to chassis pick-up points for proper positioning and the subsequent chassis modifications are allowed within the RESS Subframe Pick-Up Point Modification Area (art.2.26).

Regardless of any modifications the resultant subframe must still comply with the followings:

The minimum weight of the RESS subframe is 75 kg

Minimum tube cross sections sizes must be: 134 mm^2

Minimum wall thickness of tubes must be: 1.5 mm

Tube material must be: unalloyed carbon steel

All designs must be approved by WSC prior production and manufacturers must prove the safety of the installation according to FIA App. J, Art 253.18.4.1/d

4.1.4 Bonnet and Boot Lids

It must be possible to open them without use of tools.

The retaining springs (not the hinges) may be removed, but the car must have supports to hold the bonnet and the boot lid in open position, without the use of special external equipment (Certification).

Openings in the engine bay bonnet are allowed up to a maximum total surface of 1050 cm^2, including any original opening(s) but must be covered by wire netting with maximum mesh surface of 500 mm^2 (Certification).

Trims on the openings can be added to the bonnet provided that they do not protrude from the outer surface more than 15 mm outwards and 50 mm inwards (Certification).

Cut-outs in the original production bonnet for the trims are allowed up to a total surface of maximum 2350 cm^2 including any original cut outs. The production internal reinforcements may be removed in the opening zone. (Certification)

4.1.5 Engine & Luggage Compartments

The soundproofing, decorative, insulating material and parts may be removed.

4.1.6 Installation of Air Jacks

The bodywork may be modified over a maximum area of 100 [cm^2] to create housing for the air jack connector. The connector for the feeding of compressed air must be situated rearward of the B-pillar and must not protrude beyond the surface of the bodywork.

4.1.7 Reinforcement bars

Reinforcement bars may be fitted on the strut top mounting points to the body shell of the same axle, each side of the car's longitudinal centreline.

The distance between the strut top mounting and the anchorage point of the bar cannot be more than 150 mm, unless the bar is a transverse strut homologated with the safety cage.

Reinforcement bars must be removable.

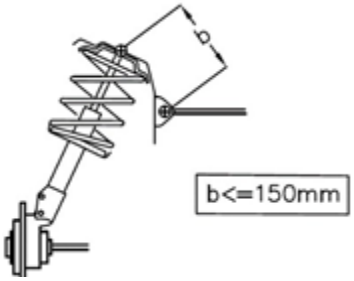


Figure 3

4.2 Bodywork External (Certification)

4.2.1 General

A maximum of 3 holes (maximum diameter of 12.5 mm) are permitted in order to use supplementary measuring devices (radio, temperature, pressure, and similar).

If a device is not used during a competition, the corresponding hole must be sealed off and the exterior of the bodywork must retain its original appearance.

The only body parts that can be replaced and changed in shape are:

- Bumpers
- Front fenders' lower edge behind the wheel may not be higher than front door's bottom border. (no louvres allowed)
- Side skirts (these may be added if not present in the production car)
- Rear wheel arch extensions
- Rear door bulge compatible with the rear arch extensions
- Wheel arch liners

External bodywork design must be approved by WSC prior to production.

It is not allowed to tape the joints or use self-made gaskets (foam, rubber, etc.) between bodywork panels or parts. The hood's and boot lid's original position may not be changed.

The use of wire mesh in air inlets without changing car's external appearance is permitted.

4.2.2 Wheel visibility

The upper part of the complete wheel (flange + rim + tyre) in straight ahead position and above the wheel's centre must be vertically covered by the bodywork.

4.2.3 Front and rear overhangs

Overhang dimension modifications compared to the *series production car's* values have to be certified in the Technical Form.

Front overhang must correspond to the series production car overhang +max. 35 [mm] (Certification)

4.2.4 Bumpers

- Shape of bumpers must resemble the original
- No dive planes allowed
- Openings for brake cooling are defined in section 6.2
- Rear bumper must include the diffuser (See section 4.3.3)
- Bumper designs must be approved by WSC prior production.

4.2.5 Flat floor

Flat floor, as one single plane, from 400 ±10 mm in front of the front axle to the diffuser is compulsory with 5 mm minimum thickness (except for the area of attachment points).

Could be constructed from multiple pieces, but when assembled, the parts must form one single plane at the race car's bottom with a planar tolerance of ± 2.5 mm.

Front and rear axle wheel housing cut-outs and flat floor dimensions (See Figure 4):

- Max. width = 1300 mm
- Min. width at the front axle = 1000 [mm]

- Min. width at the rear axle = 1000 [mm]
- Width behind the rear wheel housing cut-outs: same width as diffuser width (+0/-3) [mm] (This part of the flat floor could be omitted if rear wheel housing cut-outs reach the diffuser.)
- Width between front and rear axle: 1950 (+0/-3) [mm]
- Min. length of wheel housing cut-outs
    - At the front axle: from axle line -400 ±10 [mm], to axle line +370 ±10 [mm] in "X" direction
    - At the rear axle: from axle line -400 ±10 [mm] to axle line +380 ±10 [mm] rearward in "X" direction.
- Radius of cut-outs = 80 ±10 [mm].

Directions are defined in the rear axle coordinate system.

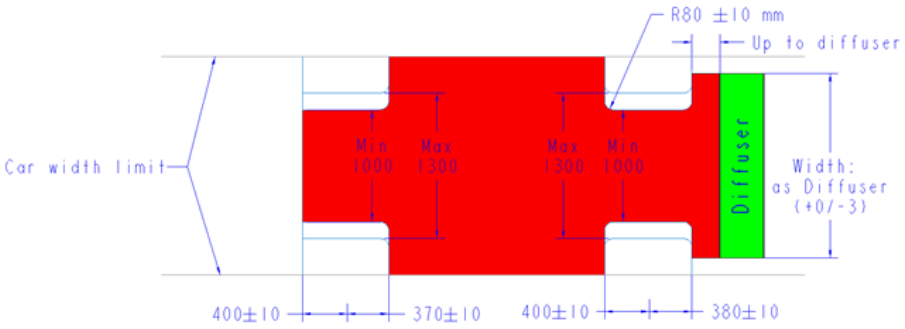


Figure 4

Apart from wheel housing cut outs other allowed openings are:

- Bores for the air jack pistons
- Circular bores with the sole function of providing access to fasteners over the flat floor. The diameter of the bores must be no bigger than the outside diameter of the necessary socket + 5 [mm]. The bores must be capped with removable caps. Caps must be removable only with the use of tools.
- One opening per rear brake assembly, not protruding from the surface of the flat floor with a sole function of brake cooling (see art.6.2).

Parts (covers, wheel arch liners, suspension linkage elements, etc) located in the area defined by the flat floor cut outs extending from the ground plane up to the sheet metals of the bodyshell must not have any primary or secondary function which in any way aids the aerodynamic performance of the race car.

Manufacturing tolerances for dimensions without prescribed tolerance: ± 3 [mm] The design of the flat floor must be approved by WSC prior to production.

Only one flat floor can be homologated for each model of car.

4.2.6 Tail Gate

The tail gate could only be modified to allow the attachment of rear wing brackets and the rain light. Modifications cannot have any secondary function which in any ways aid the performance of the race car.

4.2.7 Side skirts

Production car side skirts could be removed. Substitute racing side skirts could be used and must comply with the following:

- Their shape must be continuous, convex
- Bottom of the side skirts must be a single flat plane and in direct contact with the flat floor
- It is allowed to use manufacturing/bonding technology of the side skirt & flat floor, that makes impossible to separate parts for legality check purposes. In this case, the features of this joint part that are declared as flat floor, and features that are defined as side skirt, must be defined, so the resultant single part must comply both flat floor and side skirt rules.
- No air inlets or outlets are allowed on the side skirts apart from inlets for rear brake cooling only (see art.6.2).
- Skirts must respect the bodywork width limit and extend inward the transversal midplane up until the lowest welded flange
- Skirts must be located longitudinally between the front and the rear fender
- Side skirts cannot reach higher than the side skirts of the OEM series production car
- Side skirts must be single piece, made out of composite material.

Side skirt designs must be approved by WSC prior production.

4.2.8 Doors

The series production car door locks, door-hinges, anti-intrusion bars, external door handles must stay as original and in operation. It must be possible to open all doors from outside (original handles) and the front doors also from the inside. Controls for opening the rear doors from the inside may be removed.

The side window lifters must be removed.

The removal of door soundproofing material and decorative strips is allowed.

Original inner trim panels must be replaced and be made from plastics (including composite materials) at least 1 [mm] thick. The panels must totally cover the door, its handles, and locks.

Air inlets for driver cooling in the area of the external mirrors are accepted. (Certification)

4.2.9 Windscreen and Windows

Plastic glazing (polycarbonate or PMMA ensuring the same transparency as the original glass) with the same shape of the reference part is compulsory in case of the front windscreen, and for the side and rear windows. (Certification).

Minimum thickness for plastic glazing:

- Windscreen: 4.75 [mm]
- Side and rear windows: 4.5 [mm]

Anti-intrusion arm(s) or support(s) for Plastic Windscreen may be used. (Certification)

The addition of a maximum of 4 protective transparent films on its external face is permitted.

A windscreen demisting system is mandatory. Mass production AC & Heating Systems may be removed.

4.2.10 Side windows

Plastic side windows must be securely fixed in place but also quickly removable without the use of tools.

- Plastic front side windows must be removable from both the outside and inside
- Plastic rear side windows must be removable from the outside

It is permissible to equip the driver's side plastic window with a closable opening for the sole function of cockpit ventilation.

Openings on the rear plastic side windows are allowed with the sole function of cockpit ventilation. Protrusions from the outside window surface are not allowed.

Cooling ducts as separate parts attached to the rear ventilation opening could be used.

Secondary, non-opening windows in front of the C-pillar could be changed to non-transparent rigid panels for mounting purposes. (Subject to WSC approval.)

4.3 Aerodynamic Devices (Certification)

4.3.1 Rear Wing with Brackets

The original car's devices must be removed and must be replaced with one compulsory rear wing made up of:

- One aluminium extruded wing profile (WSC delivery corresponding to the profile defined below)
- Specific part produced following exactly the WSC rear wing dimensions and functions
  - Material: aluminium or fibre reinforced plastic
  - Production drawings corresponding to the WSC 3D model will be delivered for certification.
  - Scrutineering jigs will be delivered on request.
- Rear wing definition & Dimensions:
- Straight, adjustable, single piece with no flap
- Type BE 183-176 +/- 0.5 [mm]
- Chord = 250 +/-1 [mm]
- Width = 1380 +0/-1 [mm]
- Trailing edge thickness = 2 [mm] +/-0.5 [mm]

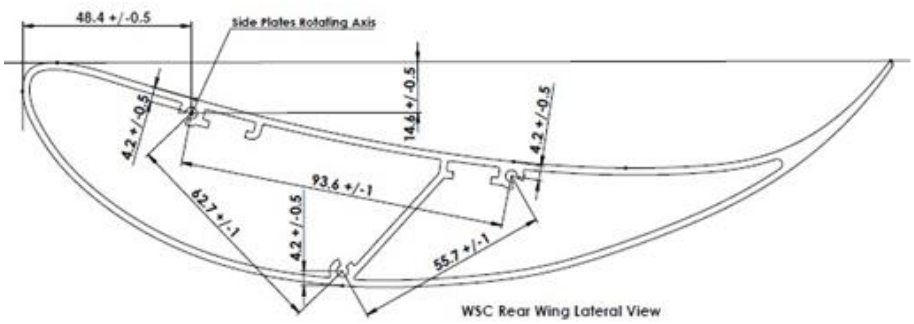


Figure 5

Be 183-176														Ro = 2.69	Xo = 2.69	-Yo = 2.79
x %	**0**	**1.25**	**2.5**	**5**	**7.5**	**10**	**15**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**95**	**100**
-Yv	2.79	0.53	0.07	0.1	0.62	1.32	2.86	4.35	6.79	8.8	10.02	11.4	11.95	11.8	9.03	5.58	0.1
-Yo	2.79	7.31	9.4	12.52	14.95	16.94	20.05	22.3	25.01	25.98	25.65	24.39	21.44	17.43	11.43	6.63	0.2

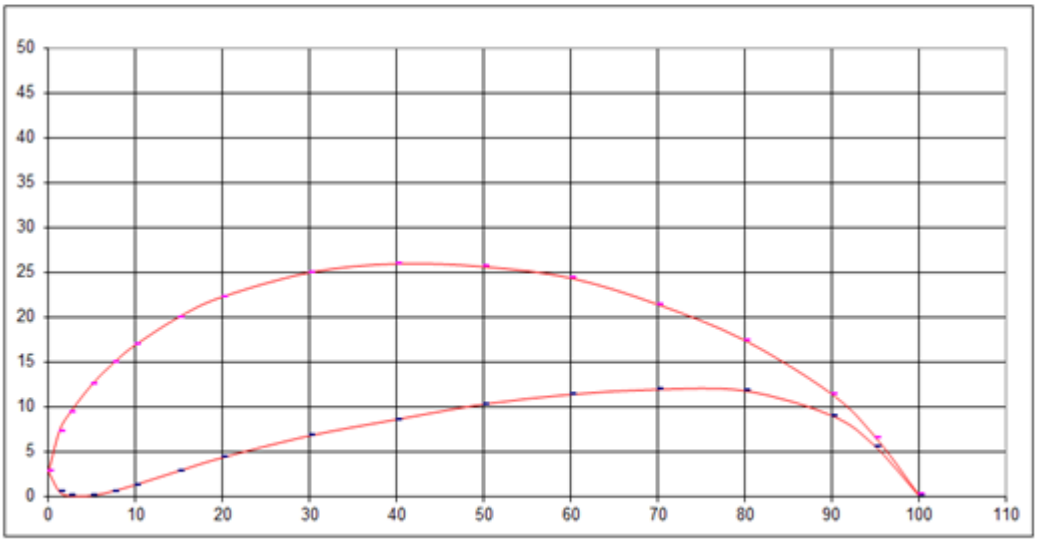


Figure 6

Rear wing brackets:

- Minimum number of brackets: 2 (two)
- Dismountable, flat, plane surface perpendicular to wing profile surface.
- Mounted on the boot lid or on the rear window and to the lower or to the upper wing profile surface.
- Min. transversal distance between both supports and between supports and side plates = 100 [mm]
- The leading edge must be rounded with a constant radius.
- The trailing edge may be chamfered to a max. of 20 [mm] (min. thickness at the trailing edge = 2 [mm]).

No element of the rear wing including side plates and brackets may be located beyond the following limits:

- X = 1050 [mm] from rear axle centreline.
- Z = Highest point of roof.

4.3.1.1 Side Plates

2 side plates (one on each side) must enclose the rear wing profile laterally. Side plate design must be according to the reference design as seen on Figure 7 (WSC delivery or Specific parts).

- Side plates must be dismountable, flat, continuous surface perpendicular to profile centreline.
- Side plates may rotate with respect to the wing profile.
- This device must be rigid and offer no possibility for the penetration of air (groove, hole, opening, etc.).
- Material: aluminium, plastic
- All edges will be rounded with at least R3 [mm]

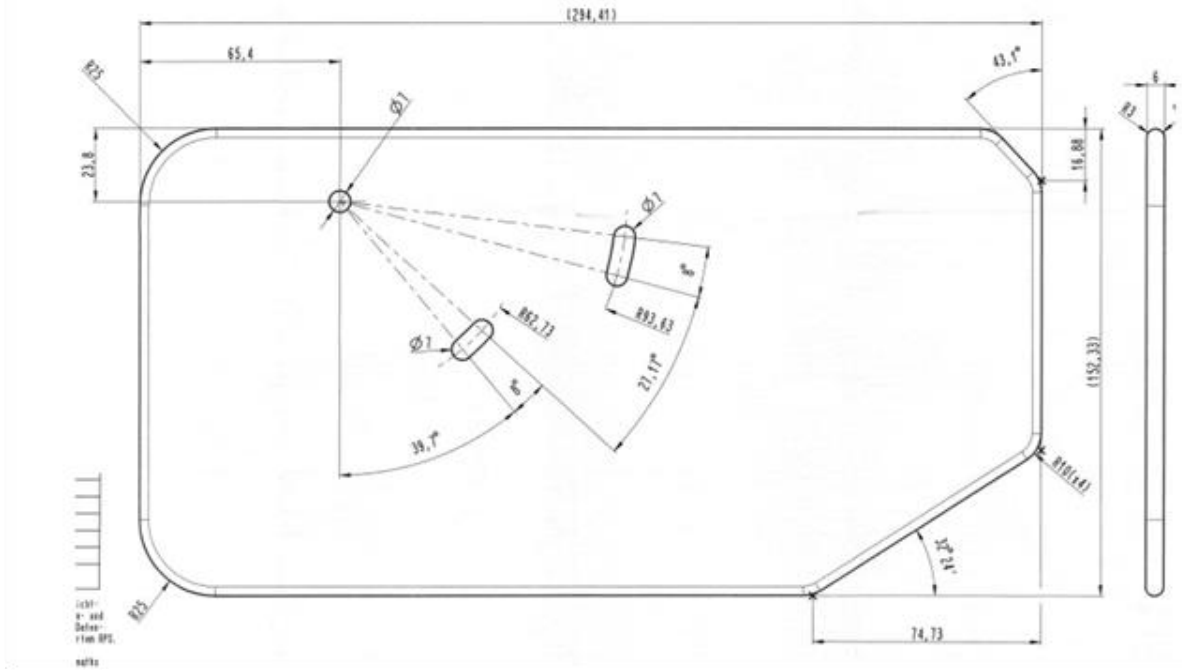


Figure 7

4.3.2 Front Splitter

A reference design of the front splitter is delivered by WSC. Manufacturers must produce and install their own splitter corresponding to the reference design with respect to the following (all directions, measurements and axes are defined in the rear axle coordinate system):

- The front splitter must start directly in front of the flat floor. Maximum longitudinal gap between the front splitter rear contour line and the front contour line of the flat floor is 5 [mm], inspected in the race car design position.
- The bottom plane of the front splitter must lay on the same plane as the bottom plane of the flat floor. (Authorised planar deviation: ± 5 [mm])
- It is possible to scale the splitter in "X" direction in order to meet the front overhang requirements
- The manufacturer's own splitter must be a specific part following exactly the WSC CAD model front splitter's dimensions (length, width and angles, front overhang, vertical projection, sections of areas touched by the airstream, see Drawings) with the exception of the authorised modifications
- The distance between the splitter's front contour line vertical projection and bumper to splitter contact contour line is limited as follows:
    - The foremost edge (in the line of the splitter's symmetry axis) must be no further from the vertical projection of the bumper contour than 35 [mm]
    - In the middle area (± 400 [mm] from "X" axis) must be between 35 and 85 [mm].
    - Outside of the middle area (further than 400 [mm] from "X" axis) the distance is limited to max. 210 [mm]
    - In the transition area to the wheel arches the distance is limited to max. 45 [mm].
- The layout of the areas covered by the bumper is free.
- The areas next to wheel arches must be flat.
- Splitter should be made of fibre reinforced plastic.
- Scrutineering shape jigs for external contour, leading edge and lower face will be delivered on WSC request.
- WSC may approve justified waiver.

The splitter design must be approved by WSC prior production.

Note: in case of doubts, the WSC CAD 3D model overrides the drawings.

The design of the front splitter brackets and mounting devices are free. (Certification)

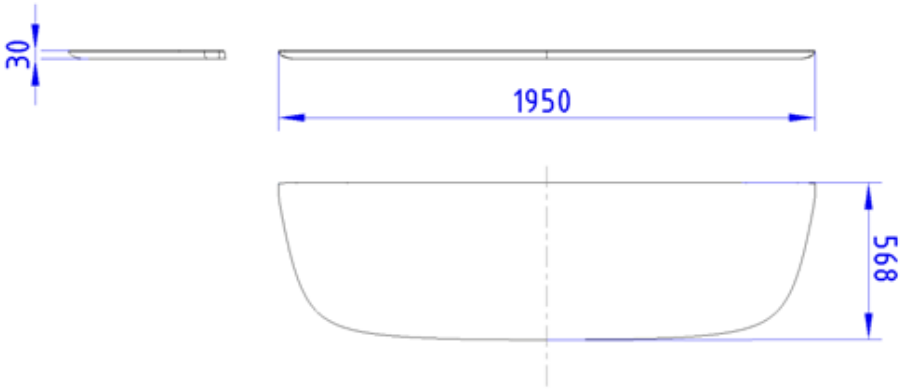


Figure 8

4.3.3 Rear Diffuser

One single plane between a vertical plane from the flat floor rear contour line and the bumper's vertical projection

- Maximal width: 1650 [mm]
- Angle between the flat floor plane and the diffuser plane must be: 25 (+0/-2) [°]
- Transition radius between the flat floor plane and the diffuser plane must be 20 (+0/-1) [mm]
- Allowed longitudinal gap in "X" direction between the diffuser leading edge and the rear contour line of the flat floor: max. 5 [mm]
- Diffuser must be included in the rear bumper
- No gaps are allowed between the rear bumper and the diffuser contour line
- No air circulation allowed over the diffuser
- No strakes are allowed
- Diffuser plane must be closed by endplates on each side. Endplates must have the following attributes:
    - Must be single plane
    - Endplate plane must be normal to the diffuser plane and parallel to the transversal midplane
    - Cannot protrude from the rear bumper contour line viewed from any directions
    - Endplates are considered to be parts of the diffuser

Mass production flexible skirts reducing the ground clearance may be removed. (Certification) The ground clearance check will consider these parts as bodywork.

Rear diffuser and rear bumper design must be approved by WSC prior production.

4.4 Interior

4.4.1 Equipment Permitted in the Cockpit

The only components which can be added in the cockpit are:

- Safety equipment and structures
- Seat, instruments and any other controls necessary for driving including the brake balance adjuster
- Electronic and electrical equipment; it is permitted to channel air towards the electronic equipment on condition that the ventilation devices comply with the present regulations.
- Team communication radio
- Driver cooling and ventilation equipment
- Ballast
- Braking and clutch system hydraulic lines with properly secured connectors
- Pneumatic jacks and their pipes
- Auxiliary Battery
- ETCR - Kit elements, according to installation layout, defined by ETCR - Kit technical manual

None of the above items may hinder cockpit exit or the driver's visibility.

The above components must be covered where necessary by a rigid protective material to minimise injury, and their mountings must be able to withstand 25 [g] deceleration.

One air duct for driver's cooling through the bulkhead with a maximum diameter of 51 [mm] in fire wall quality is allowed. (Certification)

4.4.2	Dashboard Trims; Centre Console (Certification)
	Trims situated below the dashboard and which are not parts of it may be removed. It is permitted to remove the part of the centre console. (Certification)
	Dashboard (Certification) - General shape, appearance, mounting points and position must remain similar to series production car part. - Thermoplastic or Fibre Glass plastic materials are free. - Minimum weight: 2 [kg] including ducting and fixation elements.
4.4.3	Instruments (Certification)
	Display and indicators can be freely fixed on the dashboard or to the steering column. The installation shall not interfere with the driver's vision or safety.
4.4.4	Switches (Certification)
	Standard switches may be replaced by switches of different design (robust and reliable) and may be fitted at different locations on the dashboard or on the centre console. Any opening resulting from this must be covered.
	Switches in the cockpit related to safety features and functions must have rigid fixing.
4.4.5	Pedal Box (Certification)
	The use of off-the-shelf pedal box (hanging or floor mounted) is permitted.
	In case the use of standard series production car pedal box metallic pedals may replace the production plastic parts. New master cylinders and new arrangement in the engine bay may be used. (Certification)
	Master cylinders in the cockpit: Modifications are authorised provided they have no other function than to allow the fixing of the master cylinders and/or the pedal box (Certification).
	Modifications are authorised provided they have no other function than to allow the fixing of the master cylinders and/or the pedal box (Certification).
4.4.6	Cockpit Exit Time
	The driver, seated in his normal driving position, must be able to get out from the cockpit in 7 seconds through the driver's door and in 9 seconds through the passenger's door.
	For the purposes of these tests, the driver must be wearing all normal driving equipment, the seat belts must be fastened, the steering wheel must be in place, and the doors must be closed.
ART. 5	**WEIGHT**
5.1	**Minimum Racing Weight**
	The rear axle load proportion must fall between 57% (minimum) and 60% (maximum).
	The target minimum racing weight (with driver) is 1800 [kg]
	The Minimum Racing Weight will not include non-compulsory items like driver cooling, team camera, radio, etc.
5.2	**Ballast, Success Ballast (Certification)**
	Ballast, including success ballast, must be made from metallic plates or blocks and must be fixed in the cockpit and/or in the boot, and must be visible.
	It is permitted to complete the weight of the car with ballast.
	The metallic blocks or plates must be fixed by means of tools, with the possibility of affixing seals.
	The ballast must be attached to the bodyshell/chassis with bolts of at least 8.8-class with a minimum diameter of 8 [mm], with counter plates, according to the principle of the following figure.
	The minimum area of contact between bodyshell /chassis and counter plate is 40 [cm2] for each fixing point.
	Any movable ballast system is forbidden.

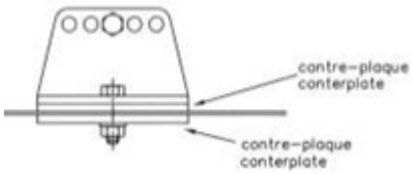


Figure 9

The ballast and success ballast will be declared as such at the scrutineering. Each type of ballast must be marked, and it must be possible to remove separately.

The ballast fixing system must allow to the Technical Delegate to seal the bolts. The ballast must be designed such, that tools are required for its removal.

Ballast location is fixed. (Certification)

5.3 **Liquids**

The weight may be checked at any time during the competition with the quantity of liquids in the tanks, except after the race and qualifying when the car may be emptied of all the consumable liquids before weighing.

ART. 6 COOLING

6.1 **ETCR – Kit Cooling**

ETCR - Kit contains three separate cooling circuits, for cooling the:

- RESS
- Motors
- MCUs

The cooling system of the ETCR cars must be designed and implemented according to the ETCR Kit Technical Manual.

Modification of cooling components which are part of the ETCR Kit are allowed only as specified in the Technical Manual with the approval of WSC.

It is recommended that cooling lines are routed outside of the cockpit.

Connections inside the cockpit must have threaded, crimped, or self-sealing connectors.

6.2 **Brake Cooling (Certification)**

Ducts may be metallic (steel or aluminium sheet), flexible hoses or be made in composite material. (Certification) Certified apertures in the bodywork may be used to bring the cooling air to the brakes.

The connection of the air ducts to the certified apertures in the bodywork is free. (Certification)

Two supplementary openings in the front bumper may be done with no other function (Certification):

- The connection parts to the bumper will have an internal diameter of maximum 120 [mm], will not protrude more than 15mm above bumper's outer surface having transition radius to the bumper shape max 10 [mm].
- Flexible or firm air ducts with maximal inside dimensions of nominal 120 [mm] diameter for circular versions or the corresponding inside area for non-circular versions may be used.

Two supplementary openings on the flat floor, or one opening on each side skirt may be done for cooling the rear brakes, but with no other function; see art. 4.2.5 and Art. 4.2.7 (Certification):

- The connection parts to the opening will have an internal diameter of maximum 80 [mm], will not protrude beyond the flat floor's surface
- Flexible or firm air ducts with maximal inside dimensions of nominal 80 [mm] diameter for circular versions or the corresponding inside area for non-circular versions may be used.

6.2.1 **Brake Disc Cooling**

Ducts must channel air towards the inner face of the brake disc and brake disc bell only and must not be bigger than the disc diameter.

6.2.2 **Brake Calliper Cooling**

Ducts may wrap the calliper up to a maximum of 20 [mm] around it.

Tape on the external air inlets to regulate the brake temperature is allowed (in car colour).

ART. 7	**ELECTRICAL EQUIPMENT**
7.1	**Windscreen Wiper**
	Any production wiper motor system may be used with at least 1 (one) original working wiper blade to clear the screen directly in front of the driver. (Certification)
	The windscreen washer tank may be modified (free position) or removed. Complete rear window wiper and washer system may be removed.
7.2	**Lighting Equipment (Certification)**
7.2.1	Exterior Lighting Equipment
	Must at least ensure the following functions: headlights, front and rear direction indicators, stop lights, rain light (see art.7.2.2) and rear taillights and must be in working order at all times of the competition.
	The exterior surface and appearance of the other lights cannot be modified but the interior elements may be removed. (Certification). Exception for the fender indicators which are free.
7.2.2	**Rain Lights**
	Rain Light is compulsory. (Certification)
	Following arrangement may be used: - One rain light (Technical List n°76) in compliance with FIA Standard 8874-2019 located in the tail gate, boot lid or replacing the 3rd brake light placed on the car's centre line. - Production 3rd brake light in combination with the production rear fog light(s).
7.3	**Auxiliary Battery (Certification)**
	The Auxiliary Battery must be located and installed according to FIA App. J - Art. 255.5.8.3.
	If it is not possible to mount the battery to the bodyshell floor, a metal battery console structure must be installed to enable the fulfilment of battery mounting requirements of FIA App. J - Art. 255.5.8.3.
	Mounting the battery or the battery console to the RESS casing is strictly prohibited. Minimum clearance between the RESS housing and the battery mounting is 5 [mm].
	The Auxiliary Battery must supply power to the ETCR-Kit components and all other electrical components, with a maximum voltage of 16V. The power requirement for the ETCR-Kit can be found in the ETCR-Kit Technical Manual.
	It is allowed to charge the Auxiliary Battery via the DCDC converter. It is not permitted to charge the RESS via the Auxiliary Battery.
	The Auxiliary battery must be sized to be able to power the vehicle in Full load condition in the case where the DCDC is not supplying power to the Auxiliary Power Circuit for at least 15 minutes.
7.3.1	Auxiliary Battery Fuse (Certification)
	Battery protection against accidental short-circuiting between the battery plus pole or the power supply cable and ground (vehicle body) fitted closest possible to the battery on the ground cable or on both battery cables is mandatory. (Certification after testing according to WSC test method)
	Allowed reaction time in the ETCR car: less than 3 sec.
7.4	**Charging Port Location**
	The charging port for connecting the external charger to the race car must be located behind the B-column of the chassis, inside the car, on the right side, attached to a safety cage member by a custom bracket or console.
	Access to the charging port must be provided only by opening the rear right-side passenger door.
ART. 8	**AXLES, SUSPENSION AND STEERING**
8.1	**Generals**
8.1.1	Wheelbase (Certification)
	Nominal wheelbase of the race car must not exceed the nominal wheelbase of the series production car + 85 [mm] with the following constraints: - The front wheels can only be moved towards the front by 30 [mm] maximum. - The rear wheels can only be moved towards the rear by 55 [mm] maximum. - This measurement must be taken from a datum-point on the body shell. (Certification) - Tolerance on race car wheelbase ± 10 [mm]. - Axle line translation and datum point definition must happen in the production car standard position of the bodyshell.

8.1.2 Wheel Hubs (Certification)

The wheel hubs may be re-machined using similar wheel fixation (number of fixation points), to allow the use of a stronger mass production wheel bearing. Mass production wheel hubs may be used. (Certification)

8.1.3 Wheel Attachment (Certification)

Wheel fixations by bolts may be changed to stud fixations respectively knurled-head screws and steel nuts, provided that the number of fixation points, as mentioned above, remains unchanged. (Certification

8.1.4 Bearings (Certification)

Production bearing on suspension arms may be replaced by uniballs or bush bearings (Certification). No rolling contact bearings accepted.

8.1.5 Springs (Certification)

Cylindrical, linear steel springs are free; the combination of one helper with one suspension spring is allowed. The spring seats are free. (Certification)

Bump stops and packers are free.

8.1.6 Shock Absorbers (Certification)

Only commercial hydraulic 2-way adjustable shock absorbers are allowed. (Certification)

All original internal parts offered by the manufacturer of the certified shock absorber in its commercial catalogues and available on the market are allowed.

Inertial shock absorbers and rolling contact bearings are forbidden.

Manufacturers may apply for different shock absorber brands and /or commercial designations at any time (VO Certification)

8.1.7 Anti-roll Bars (Certification)

Anti-roll bars made from ferrous material, their bearings and their actuation are free. Adjustable lever arms (no turning blades) may be used without adjustment from the cockpit. (Certification)

If the production axle is not fitting anti-roll bar, it may be added. (Certification) The anti-roll bars may be disconnected but must remain in the car.

For mounting instructions see art.4.1.1.

8.1.8 Minimum Ride height

The minimum ride height has to be respected at any time during the event.

For checking the minimum ride height, if the tire pressure is less than 1.5 bar, the tire pressure shall be increased to the value of 1.5 bar

Minimum Ride Height: 60 [mm].

8.2 Front Axle (Certification)

8.2.1 Front Subframe

The standard series production car front subframe to chassis pick-up point positions which are not conflicting with the RESS could be relocated within a 20 [mm] radius in respect to their original position.

The standard series production car front subframe to chassis pick-up point positions which are conflicting with the RESS could be relocated freely.

The minimum weight of the modified front subframe should be the same as the original unmodified series production car front subframe

The modified subframe must be one-part tubular spaceframe structure including all the fixation points

- Minimum tube cross sections sizes must be: 134 [mm2] (only circular profile is allowed)
- Minimum wall thickness of tubes must be: 1.5 [mm]
- Tube material must be unalloyed carbon steel

All subframe modifications have to be approved by WSC.

8.2.2 Front Suspension

The working principle and the number of pivot points on the wishbones/upright/struts and on the chassis/subframe have to be the same as on the series production car. The parts are free. (Certification)

Double-wishbone axle may be changed to triangular control arm axle. (Certification)

The standard production front suspension top mount pick-up point position can be relocated within a 40 [mm] radius in respect to the original position.

The standard production front suspension to subframe pick-up point positions can be relocated within a 20 [mm] radius in respect to their original position. For setup reasons all mounting point locations could be adjusted within a cubic area having 40 [mm] long edges, centred on the certified mounting point locations. Two face of the cubic area must be parallel to the ground plane, and two faces must be parallel to the transversal midplane.

8.3 Rear Axle (Certificati

8.3.1 Rear Subframe

It is also authorised to mount a rear subframe onto the shell but must have a maximum of 4 mounting points, and these points must be situated in the rear modification area defined by a cuboid defined in article 2.25.

- The rear subframe must be removable.
- A maximum of 5 lower mounting points for the suspension are authorised on each side of this subframe as defined in art.8.3.2.
- For a given wheel, these 5 mounting points must be situated on the same side as the wheel in relation to the longitudinal axis of the car.
- All the additional mounting point on the shell must be reinforced so that, under all circumstances, they can withstand the loads caused by the modification to the suspension, independently of the safety cage.
- The subframe must be a one-part, tubular space frame structure, including all the fixation points.
- Machined brackets for attaching components to the rear subframe are allowed but must be approved by WSC prior production.
    - The minimum weight of the rear subframe is 8.5 [kg]
    - Tube material must be unalloyed carbon steel.

Only one rear subframe can be certified.

8.3.2 Rear Suspension

Type of rear suspension must be double wishbone suspension. The location of the suspension mounting points on the subframe are constrained by the reference mounting point locations. In this section all modification areas, directions and dimensions are given in relation to the rear axle coordinate system.

Rear suspension mounting points should be located inside a design area originated from the reference mounting points

8.3.2.1 Wishbones

Wishbone to Chassis mounting point denominations are defined on Figure 10 Wishbone to Chassis mounting point reference coordinates are defined in Table 1.

Wishbones should be constructed as steel tubular spaceframe structure or machined out of thick sheet metal (excluding magnesium, titanium or composite materials).

Multi-link suspension and virtual attachment points are prohibited. For each wishbone two physical attachment points are authorised for chassis connection, and one physical attachment point is authorised on the upright.

Mounting point area is defined by a cylinder with an axis connecting the reference wishbone mounting points (see Figure 10) and having a diameter of 60 [mm], and the intersecting spherical spaces around the reference mounting point locations with a diameter of 60 [mm].

For setup reasons mounting points locations could be adjusted within a cubic area having 40 [mm] long edges, centred on the certified mounting point locations. Two face of the cubic area must be parallel to the ground plane, and two faces must be parallel to the transversal midplane.

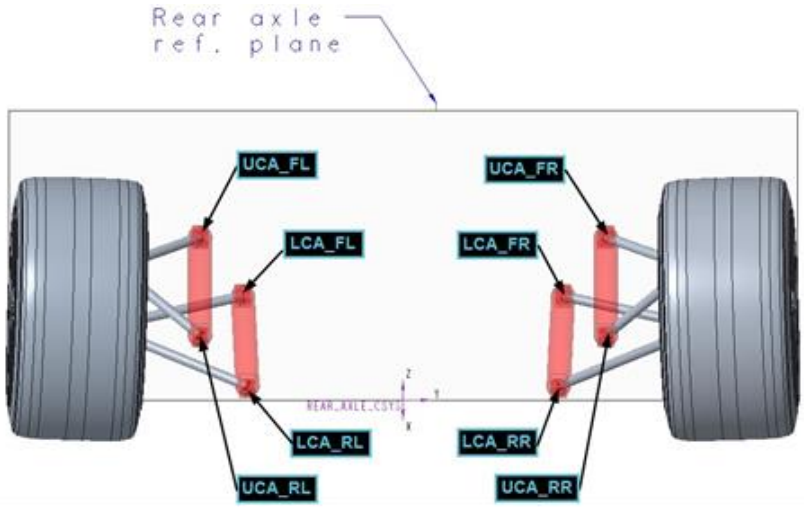


Figure 10

Wishbone reference mounting point locations [mm]

Wishbone-to-Chassis Mounting Point	X	Y	Z
LCA_FL	-183.3	-396.1	180.5
LCA_RL	105.3	-384.8	154.7
UCA_FL	-173.2	-502.1	395.9
UCA_RL	191.1	-502.1	417.3
LCA_FR	-183.3	396.1	180.5
LCA_RR	105.3	384.8	154.7
UCA_FR	-173.2	502.1	395.9
UCA_RR	191.1	502.1	417.3

Defined in *rear axle reference coordinate system*

Table 1

8.3.2.2 Tie rod

Chassis mounting point should be located inside a box with a dimension of 400x300x180 [mm], with its centre point coinciding with the reference tie rod mounting point location. See Figure 11, and Table 2.

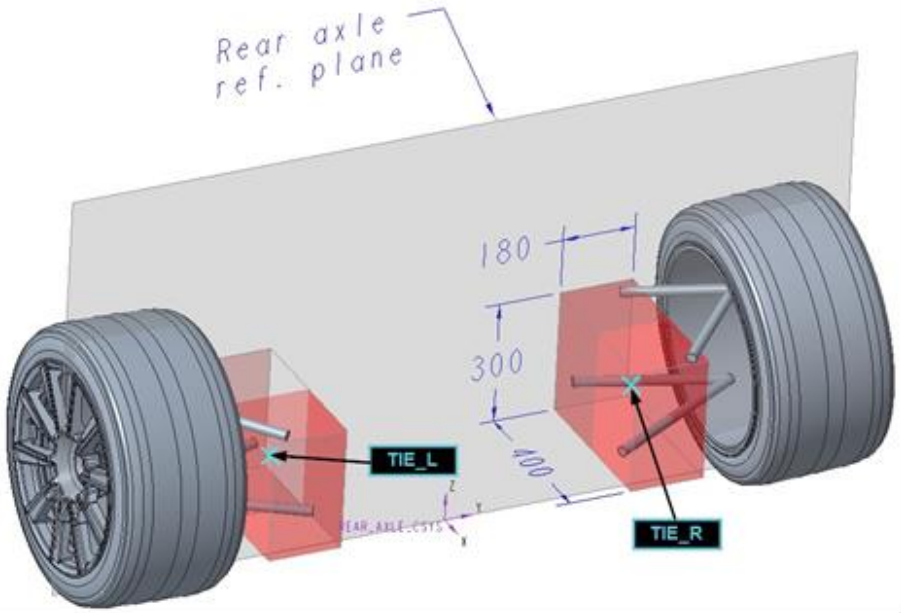


Figure 11

Reference tie rod mounting point locations [mm]

Tie rod-to-Chassis Mounting Point	X	Y	Z
TIE_R	5	450	260
TIE_L	5	-450	260

Defined in *rear axle reference coordinate system*

Table 2

8.3.2.3 Damper Top Mounting Points

Damper to chassis mounting point should be located inside the rear modification area, within a square prism, having the dimensions of 200x200x400 [mm] ("X"x"Z"x"Y"). The longitudinal axis (in "Y" direction) of the top mount location prism must be 25 [mm] in front of the rear axle reference plane. One side of the prism must coincide with the top plane of the rear modification area, and the base of the prism must coincide with the side plane of the rear modification area. See Figure 12.

Dampers must be directly actuated by wishbone movement. Actuation via the means of push rod or rockers is prohibited.

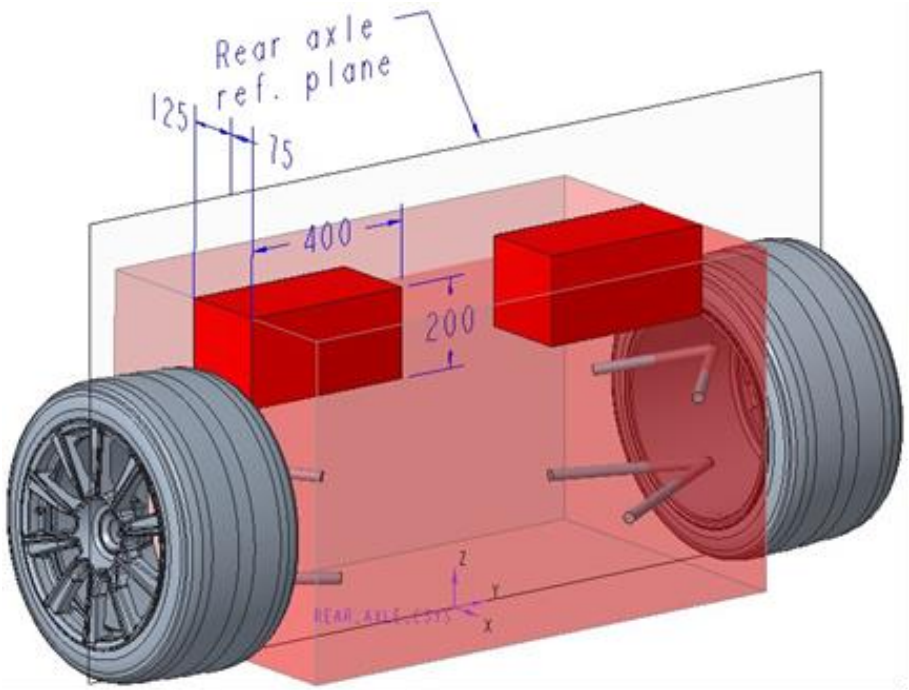


Figure 12

8.3.3 Drive Shaft

Drive shaft length is free.

8.4 **Steering (Certification)**

The steering lock must be dismounted and the column adjusting system must be locked with tools. Steering column brackets may be replaced. The new brackets may be connected to the chassis or to the safety cage (Certification)

A catalogue closed steering wheel can be used. The steering wheel must be fitted with a quick release system. (Certification) The fitting of displays, switches and control lights on the steering wheel is allowed (Certification)

It is possible to certificate a new steering rack. All components of the new one must be of OEM mass production origin with minimal modifications for race usage and parts matching. (Origin has to be proved). Chassis firewall could be locally modified to adapt new routing for steering column. Steering column could be modified to be adapted to new steering rack spline. (Certification)

For cars fitted with an automatically variable power steering the Technical Delegate may at any time oblige the competitor to use the reference unit WSC registered by the Manufacturer.

In case of using different steering rack the correspondent assistance principle can be used with parts of OEM mass production origin. (Certification)

8.5	**Brakes (Certification)**
	The brake system, must completely fulfil the art. 253-4 of the Appendix J.
	Master cylinder(s) are free; The type and make will be certified.
	Max brake disc diameter 380 [mm] (width free); certified diameter and bells Steel brake discs (no ceramic coating allowed)
	Max 6 pistons front calliper (Certification) Max 4 pistons rear calliper (Certification)
	The brake callipers must be made from aluminium materials with a modulus of elasticity no greater than 80 [GPa]. (Certification) Simple brake effort repartition system(s) (hydraulic or/and mechanic) is (are) allowed. (Certification)
8.5.1	Brake Fluid Reservoirs
	The brake fluid tanks will be fixed in the front compartment. The brake fluid hoses may pass through the cockpit. (Certification)
8.5.2	**Parking Brake**
	The parking brake working on the brake system (not on the transmission) is mandatory.
	The series production car parking brake may be removed or replaced by a hydraulic valve or master cylinder operated manually by the driver without any intermediate system. (Certification)
8.6	**Wheels and Tyres**
	The tyre types will be decided by WSC.
	Any system allowing the car to be driven without pressure in the tyres is forbidden.
	Pressure and temperature sensors are forbidden.
	Tyre pressure control valves on the wheels are forbidden.
8.6.1	**Wheel and Rim Specification (Certification)**
	Wheels (Certification): - Dimensions of the front and rear wheels are not identical. - Allowed rim sizes: Front: 10.5”x18”; Rear: 12”x18” - Complete wheel including tyre: Maximum width at 2 [bar] relative inflation pressure: Front: 295 [mm], Rear: 335 [mm] - The diameters at inner and outer rim edges must be identical with a tolerance of ±2.0mm. - Wheel’s minimum weight: Front: 11 [kg], Rear: 12 [kg] - Wheel’s material: homogeneous, metallic - Wheel’s Construction: Single unit - Metal inserts are allowed for the passage of the drive to the wheel. - Air extractors are forbidden. - Dry and wet weather tyres have similar dimensions.
	Manufacturers may apply for different interchangeable wheels at any time (VO Certification)
ART. 9	**DRIVETRAIN**
9.1	**General**
	The ETCR – Kit (see art. 2.8 and2.38) assumes the role of drivetrain system. See ETCR – Kit Technical Manual for further details
ART. 10	**SAFETY EQUIPMENT**
10.1	**Fire Extinguisher (Certification)**
	A system in accordance with Article 253-7.2 and 18.23 of Appendix J is compulsory
	All cars have to be equipped with an extinguishing system in compliance with one of the following FIA Standards: - 8865-2015 (FIA Technical List 52) - recommended - Fire Extinguisher Systems in Competition Cars (1999) (Technical List 16) – forbidden from 2023
	Only the following extinguishing mediums are allowed for the powertrain compartment and cockpit: Novec 1230; FX G-TEC FE36
	The nozzles that are fitted in the cockpit must be installed according to the manufacturer’s instructions.
	Nozzles intended for usage in the engine compartment must be installed in the powertrain compartment of ETCR cars and must be installed according to the manufacturer’s instructions.
	No nozzle shall be pointed to the RESS.
	Fire extinguisher external switch type must be pilot toggle switch with red "aircraft" style safety cover.

The wiring requirement for the switches can be found in the ETCR-Kit Technical Manual. Wiring must also comply with the fire extinguisher supplier requirements.

Location and marking requirement for the switches can be found in Art. 10.5.

10.2 Safety Belts (Certification)

The safety belts must comply with

- FIA Standard N°8853/98. (FIA Technical List n°24) (Forbidden from 01.01.2023)
- FIA Standard 8853-2016 (FIA Technical List n°57)

Safety belt installation must conform~~ing~~ to the specifications of Article 253-6 of Appendix J.

10.3 Driver's Seat (Certification)

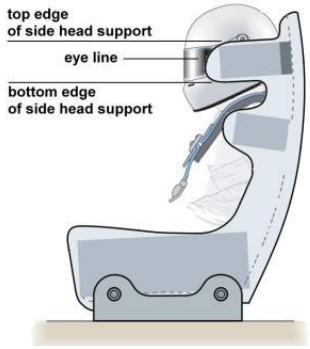
The seat must be in compliance with 8862-2009 FIA standard (FIA Technical List 40).

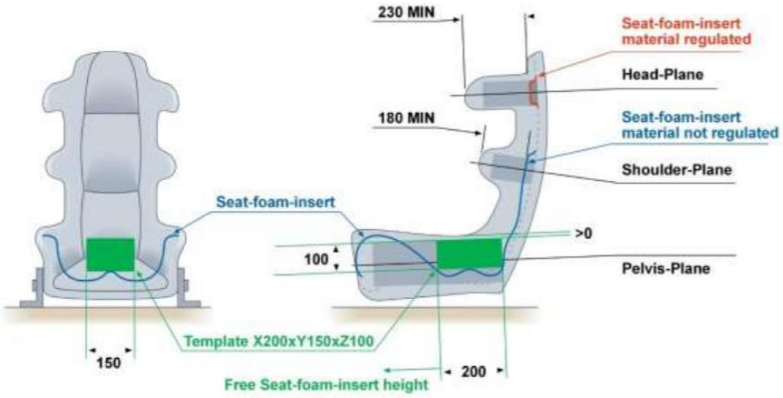
The seat, anchorage points and supports must be conforming to the specifications of Article 253-16 of Appendix J.

Maximum thickness of any cushion used between the driver and the homologated seat = 50 mm.

The lateral distance between the helmet and the side head support (measured at 150 mm from the forward face of the side head support) must not be greater than 40 mm and may be adjusted by means of additional foam.

The material of the foam extension must be the same as the one in the head support of the given seat.





Drawing taken from " 253_2021_wmsc_2021.06.28_evote_corrected_2021.09.03.pdf" 2021.09.03

10.3.1 Seat Supports and Mountings

The use of the seat brackets (supports) homologated with the seat is compulsory.

If the original seat attachments points on the body shell are changed, the new attachments points for seat or seat supports must comply with the provisions of App. J, Art. 253-16.2 (Certification)

Seat position:

- Transversally: Seat centreline must not be less than 270 [mm] from the car's centreline (measured transversally).
- Longitudinally limit: No part of the seat may be situated beyond the vertical and transverse plane defined by the front edge of the original back seat. The most rear seat position will be documented in the Technical Form related to the chassis. (Certification)

10.4 General Circuit Breakers

All vehicles must be equipped with a General Circuit Breaker (Appendix J – Article 251-3.1.14.3) of a sufficient capacity.

The General Circuit Breaker is part of the ETCR-Kit, type and wiring must comply with ETCR-kit TM for safe operation.

10.5 Emergency Stop Switch (ESS) & Extinguisher Switch

Three Emergency Stop Switches must be used.

Emergency switches must be installed at three different locations:

- Inside the cockpit: the driver must be able to activate the ESS when seated normally with the steering wheel attached and the seat belts fastened.
- External location 1 - at the bottom of the windscreen, on the right-hand side of the cowl panel.
- External location 2 - on the left side of the vehicle, behind the rear door opening, higher than the top of the rear wheel.

At each location an ESS switch and a combined Fire extinguisher & ESS must be installed.

Switches must be directly accessible and activated by hand without the use of tools. All switches must be protected against unintentional activation.

Emergency switches must be directly marked at their position in a way that the markings are clearly distinct from their surroundings with respecting the following:

Combined Fire extinguisher & ESS push button: marked by a red “E” letter in a white circle with red edge indicating its location. See Figure 13 for reference.

Emergency Stop Switch: marked by a red spark within a blue triangle, having a base of at least 12 [cm]. See Figure 13 for reference.

Figure 13

The wiring requirement for the switches can be found in the ETCR-Kit Technical Manual.

10.6 High Voltage Safety Indicator Light

High Voltage Safety Lights are supplied as part of the ETCR - Kit. Car must be equipped with four safety indicators as prescribed in the FIA App. J Art. 253-18.22.

- One safety indicator light must be positioned behind the front windscreen, directly below the line of the upper windscreen stripe/sun strip no further than 10 [cm] from the transversal midplane of the car. This must be visible from standing in front of the car.
- Two safety indicator lights must be positioned symmetrically behind the rear side windows, around the driver’s start number, one on each side of the car.
- One must be located on the driver’s control panel, visible to the driver.

Further information regarding safety lights is included in the ETCR - Kit Technical Manual.

10.7 Racing Net

They are compulsory and must be homologated according to FIA 8863-2013 Standard (Technical List n°48).

They must be attached to the homologated mounting points (see the homologation form of the car) and must be installed in accordance with the installation specifications published by the FIA.

Usage of protective window net is allowed.

Quick release systems of both nets must be able to be opened by both the driver when seated in racing position with tightened seatbelts as well as by rescue crews.

10.8 Lifting device

To enable safe and secure lifting of damaged race cars, minimum two dedicated lifting points are mandatory on the roof of the car. As an option it is permitted to install two additional lifting points, increasing the total number of lifting points to four. It is the responsibility of the manufacturer to prove that the number of lifting points and their installation enable the safe lifting of the race car.

Lifting will be done by the means of self-locking lifting pins (type: Norelem 07780-2520x50). It is compulsory to use the corresponding adapter bush for the lifting pin (type: Norelem 07781-2050). The adapter bush must be in place, inserted into the roof structure of the race car by the manufacturer during all times of the competition.

The lifting points should comply with the following:

- The adapter bushes must be integrated into the structure of the bodyshell/safety cage in such a way, that they enable safe and secure lifting and lifted transportation of the race car in an altitude of 1.5 [m].
- In case of having only two lifting points the location centres of the points must be at equal "X" coordinates measured in the rear axle coordinate system. "X" position must be determined by the fact that the car body cannot tilt more than 20[°] when lifted through the lifting points with a lifting boom, unassisted by marshals.
- Each pair of lifting bushes must be placed in such a way that their relative distance accommodates to the size of the lifting boom: 850-1150 [mm].
- Bushes must be accessible by marshals from the outside of the roof.
- Lifting point location must be marked by a 5 (± 1) [mm] thick circular line around its centre on the top of the roof and arrows pointing directly to the location of the lifting points on each side of the car.
- Lifting point location markings must be quickly and unambiguously identifiable by trackside personnel, having ultra- bright neon colour.
- The opening bore of the bushes must be covered by a sticker in such a way that it prevents the accumulation of debris and foreign material which would prevent the correct insertion of the lifting pin, but the covering must be easily removable by marshals/could be penetrated by the lifting pin.
- Rigid coverings are forbidden.

Lifting point design must be approved by WSC prior to production. A lifting test will be part of the certification process.

Lifting pin insertion into the adapter bushes is the duty of the track marshals (equipped with the pin) in case the need for lifting the race car arises.

10.9 Towing Devices (Certification)

All cars will be equipped with certified rear and front towing devices. It will be clearly visible and coloured in yellow, red or orange. The towing devices must be within the perimeter of the bodywork as viewed from above.

It must allow the passage of a cylinder with a diameter of 60 [mm].

It must allow moving the car with blocked wheels using the cars braking system on a dry surface (concrete or asphalt) by applying traction on a plane parallel to the ground, with an angle of ±15 [°] to the longitudinal centreline of the car.

The car must be fitted with the control dry weather tyres.

Flexible towing devices must be always in good condition without abrasions or kinks.

10.10 Hydraulic Pressure Lines

App. J, Art. 253.3.2 applies.

10.11 External Douse Ports

Two external douse ports must be integrated to the race car's bodywork to enable trackside safety personnel to flood the RESS casing with water in case of fire from an external fire extinguisher. (The external fire extinguisher device will be available at the events and operated by trackside safety personnel.)

The external douse ports must connect to the RESS douse ports with extension hoses. The hoses must be rated to a minimum of 15 [bar] pressure and feature an outer braid resistant to abrasion and combustion.

Additional technical prescriptions and parameters about the RESS douse ports and extension hoses listed in the ETCR Kit - Technical Manual must be respected.

External douse port installation requirements:

- STAUBLI N 009 162 98 connectors must be used
- Connectors must be securely installed and must not protrude beyond the surface of the bodywork.
- One port must be installed at the bottom of the windscreen, on the right-hand side of the cowl panel.
- One port must be installed on the left side of the vehicle, behind the rear door opening, higher than the top of the rear wheel.
- Each port must be positioned next to the nearest fire extinguisher emergency switches specified in art.10.5 at least 10 [cm] away and no further than 30 [cm].
- Trackside safety personnel must be able to directly access the ports.
- Trackside safety personnel must be able to connect and disconnect the hoses of the external fire extinguisher device without the use of tools, by hand.
- Extension hoses from RESS douse ports to external douse ports must be routed in a way that they do not hinder driver exit from the cockpit in case of emergency.
- Connections must have threaded, crimped or self-sealing connectors.

10.12 Rear View Mirrors

The car must be fitted with 2 (two) external rear view mirrors according to FIA Art. 253-9.

10.13	**Equipotential Bonding (Certification)**
	To guarantee the safety requirements about the equipotential bonding, the vehicle must comply with FIA App. J 253 Art. 18.8. The grounding conditions of the components contained in the Technical Manual of the ETCR kit must be respected. In case of conflict, the most restrictive condition will apply. The equipotential critical points of the vehicle must be defined by the manufacturer and will represent the reference list (Certification) for any equipotential checks which must be performed.
ART. 11	**SAFETY STRUCTURES**
11.1	**Safety Cage (Certification)**
	The safety cage must be Homologated or Certified by an ASN according to the FIA homologation regulations for safety cages. Regarding the protective paddings on safety cage tubes Art. 253.8.3 of the App. J applies.
11.2	**Roof hatch for access to the cockpit (Certification)**
	Roof Hatch installation without modification of structural parts for access to the cockpit is compulsory as prescribed in FIA App J 257A-14.8 (Certification) The cover of the opening must be removable only towards the outside and made of a rigid material. It is permitted for safety cage members to pass in front of the opening as long as free passage of hands through the roof hatch to secure the driver's head in case of emergency is ensured.
11.3	**Side Protection Panel (Certification)**
	A side protection panel, made of composite material, fixed to the body shell or the safety cage may be optionally used. (Certification).
11.4	**Firewall (Certification)** - The High-Voltage cabling must be separated from the cockpit with rigid component(s) made of fire resisting material. - Cooling hoses must be routed in such a way that passage of fluids into the cockpit is prevented. Additionally, the driver must never be able to come in contact with any component which has a surface temperature above 60[°C]. - Respecting general electric safety measures according to FIA App. J. - Art. 253-18.1; and 18.2; is compulsory. - HV cable routing and cockpit separation must comply with FIA App. J. - Art. 251-3.1.14.6 in a way that direct access to the service switch is not blocked. - Designs aimed to meet the prescribed safety measures must be approved by WSC prior to production.
11.5	**High Voltage Battery Anti-Penetration Panels**
	Additional protection of the RESS unit, when assembled in the car is required. Refer to section "High Voltage Battery Anti-Penetration Panels" in the TM for instruction and technical details.