

## 2020 TCR Technical Regulations

<b>ART. 1</b>	<b>GENERAL REMARKS</b>
	<p>WSC has developed and is the owner and promoter of the present TCR Technical Regulations.</p> <p>WSC is the owner of the TCR Trademark and of all related TCR Intellectual Properties. WSC is the exclusive holder of all TCR rights, including those relating to organisation, marketing television production and broadcast, merchandising note being intended that list in any way exhaustive.</p> <p>Unless otherwise defined in the present document, TCR Technical Regulations respect the following FIA rules:</p> <ul style="list-style-type: none"> <li>- FIA App. J, Art. 251, 252, 253, 277</li> <li>- FIA General Prescriptions applicable to International Series</li> </ul> <p>The present regulations point also to the FIA App. J, Art. 255 and 263.</p> <p>Manufacturers, represented at least at the level of the Brand or Motorsport Director, may delegate to an Engineering Company to develop a TCR car model and to represent the manufacturer's interests in relations with WSC.</p> <p>Manufacturers and/or Authorized Engineering Company must fulfil the TCR Application form, in order to request the start of certification (homologation) process for their car model. (Application form shall be requested to WSC directly).</p> <p>WSC is the only authority entitled to authorize any Manufacturers or Engineering Company to build a TCR cars under the present Technical Regulations.</p> <p>The TCR Certification process is defined by the solely WSC Ltd.</p> <p>The authorized Manufacturers and or Engineering Company must be the only one authorized to sell that new TCR certified car model to any potential customer.</p> <p>Once the Application form is sent to WSC, the certification process can start.</p> <p>The Technical Form has to be completed by the Manufacturer with all the requested information and will be common for all race cars of the model. Manufacturers or their representatives have to accept that the car of the make will be prepared according to TCR Regulations.</p> <p>Each certified car must include in its car name the "TCR" wording in both TCR Technical Form and official car name.</p> <p>WSC reserves the right to forbid the use of any part that is deemed outside of the TCR concept and to accept waivers to these regulations on request of Manufacturers.</p> <p>Any action related to the employed parts not explicitly allowed by these regulations is forbidden. Everything not expressly permitted, is prohibited.</p> <p>Any Manufacturer and or Engineering Company interested to build and certificate a TCR car must contact the WSC, TCR Technical department. Contact: &lt; <a href="mailto:technical@tcr-series.com">technical@tcr-series.com</a> &gt;.</p> <p>The generic concept of TCR Competitions defines events with sprint races using 1 (one) engine and 5 (five) turbos per car and season.</p>
<b>ART. 2</b>	<b>DEFINITION</b>
<b>2.1</b>	<p><b>Bodywork</b></p> <p>See App. J; Art. 251.2.5.2 Any air intake is considered to be part of the bodywork.</p>
<b>2.2</b>	<p><b>Chassis (Body shell)</b></p> <p>The main body of the car into which is fitted the engine, transmission, running gear, electrical systems, seats, controls, bodywork, etc.</p>
<b>2.3</b>	<p><b>Production (part)</b></p> <p>As fitted to the basic mass production car; the proof rests with the competitors.</p>
<b>2.4</b>	<p><b>Original</b></p> <p>As fitted to the WSC -certified car and in compliance with the TCR Technical Form.</p>
<b>2.5</b>	<p><b>Minimum Weight</b></p> <p>is the weight of the car without driver, with empty tanks of consumable fluids (fuel, wind screen wash &amp; drinking water, etc.) and with all other tanks filled at the working level. (Certification)</p>
<b>2.6</b>	<p><b>Minimum Racing Weight</b></p> <p>is 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 can vary following WSC decisions for BoP, Compensation Weight (CW) and the Success Ballast allocation. The minimum racing weight doesn't include the non-compulsory equipment.</p>
<b>2.7</b>	<p><b>Cockpit</b></p> <p>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).</p>

<b>2.8</b>	<b>Turbo Charging</b> Increasing the mass of the charge of the fuel/air mixture in the combustion chamber (over the weight induced by normal atmospheric pressure, ram effect and dynamic effects in the intake and/or exhaust system) using a turbo charger.
<b>2.9</b>	<b>Location</b> 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, engine compartment, wheel arches or any other area of the car.
<b>2.10</b>	<b>Position</b> The site defined by dimensions from the production car data, e.g. axles centre and centre line of the car. For position evaluation will be used a tolerance of $\pm 5$ mm.
<b>2.11</b>	<b>Telemetry</b> The wireless data transmission between a car and the pit or to anyone connected with the entry of that car.
<b>2.12</b>	<b>Mass Production</b> The Minimum Production requested for eligibility of car models and parts coming from other cars like engine, turbocharger, water cooler, intercooler, etc. is 5000 pieces / 12 consecutive months.
<b>2.13</b>	<b>Model of car</b> 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.
<b>2.14</b>	<b>Family of car</b> Different series models belonging to one and the same production series of the same manufacturer.
<b>2.15</b>	<b>Certification</b> The TCR Technical Form is the official documentation of TCR Cars certified by WSC.  The Technical Form may have Extensions: Variant Option (VO), Supply Variant (VF), Erratum (ER), Facelift (EV: minor mid-life amendments) and Addendum (AD: additional information for previously certified parts), issued by WSC only.  During the 1 <sup>st</sup> 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 TCR Promoters, but will not mark points in TCR Competitions, Series, Class or Championships until the TCR Certification process is not terminated, will be only loaned by manufacturers to customer team, however may be sold with specific WSC authorisation.  TCR Promoter shall secure that these rules are respected by their Sporting Regulations.
<b>2.16</b>	<b>OEM (Original Equipment Manufacturer)</b> OEM is a manufacturer of the mass-produced cars and the supplier of the original spare parts.
<b>2.17</b>	<b>Reference Part, Component or Unit</b> Certificated part, electronic control unit or aggregate listed by WSC, which are deposited with the technical delegate and can be installed in the race cars on his decision at any time of the competition.
<b>2.18</b>	<b>OEM Part</b> Component coming from any OEM mass produced car and in normal sale.
<b>2.19</b>	<b>WSC Ltd.</b> WSC Ltd is the exclusive owner of the TCR concept, TCR Technical Regulations and all IP rights related to TCR
<b>2.20</b>	<b>Catalogue Parts</b> Parts offered for sale as specified in the company's published commercial catalogues.
<b>2.21</b>	<b>Endurance Race</b> Races longer than 2h are considered as Endurance Race.
<b>ART. 3</b>	<b>REGULATIONS</b>
<b>3.1</b>	<b>Role of the WSC</b> The present Technical Regulations is reserved to any TCR Authorized Series, Cup-, Classes or Championships and is issued only by WSC Ltd.  The basic principles of the TCR Competitions, Series, Cup-, Classes or Championships are the respect of a Weight/Power Ratio and of Balance of Performance (BoP).  WSC will: - Certificate TCR cars

- Develop with specialised companies and offer to interested manufacturers different TCR Racing Components like Engine, Limited Slip Differential, Brake Parts, etc. to be used in the condition of present regulations.
- Ensure the BoP at the start of the any TCR Competitions, Series, Cup, Classes or Championships and take all necessary decision to keep it through the season. WSC will release the 1st official BOP and will communicate it to any TCR Promoter before the Competitions start.

All WSC decisions regarding the regulations will be communicated by means of TCR Technical Bulletins and TCR Notifications.

### 3.2

#### **Eligible cars**

Eligibility criteria for TCR Car:

- Only front-wheel drive cars are eligible.
- 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.
- 4/5 doors
- Minimum length 4.2m
- Mono turbo charged 4-stroke petrol mass production Engines with cylinder capacity from 1750cm<sup>3</sup> to maximum 2000cm<sup>3</sup>.
- Hybrid propulsion is not allowed.

WSC reserves the right to accept other cars, when the general characteristics match with the TCR concept. WSC 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 certifying manufacturer will be documented on the WSC List, accordingly to the TCR Certification Manual.

For certification of a new TCR car model, a Manufacturer must produce a minimum of ten (10) racing cars in the 12 consecutive months starting with the date of the Application.

Each order for TCR racing cars must be processed within 3 months from the release of the TCR Technical Form by WSC. Manufacturer must provide WSC within 3 months from the TCR car model certification, with their TCR Car model brochure and spare part list, detailed with costs and delivery time. WSC must approve those documents before any release. If the information received are not satisfactory and not received on time, WSC has the right to withdraw the certification of that TCR car Model without any further notice and the car model will be removed from the TCR Certified car list.

Each TCR car, identified through the chassis no., will receive individually an original Technical Form and will be included in the TCR Certified car list.

New race car models will be allowed to take part to TCR Competitions, Cup, Series, Classes or Championships Races before final certification for tests purposes without scoring points but being classified. The Draft of the Technical Form will be presented to WSC 30 days before the 1<sup>st</sup> entry in a TCR event.

### 3.3

#### **Compliance with the regulations**

All vehicles must be conformed to these regulations, TCR Technical Form, TCR Technical Passport (whenever applicable) and TCR Notifications 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.

In case of doubt about the conformity of any part the Technical Delegate may ask the opinion of the car's manufacturer or request the replacement with a reference part without any further explanation. All cost of such operations will be covered by the Competitor.

Teams will deliver on request to the TCR technical staff following information regarding TCR cars:

- Data from team's data logger
- Video footage from team's camera
- Any other technical documentation

Upon request, manufacturers will deliver to the TCR technical staff any technical information regarding TCR cars.

WSC has the right to collect and archive all information regarding TCR 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.

All costs of the technical checks will be supported by competitors.

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

### 3.4

#### **Measurements**

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.

**3.5****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 (engine, transmission, 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.

Any mechanical elements specified by mass catalogues for threaded fixations (e.g. bolts, studs, nuts, washers) may be freely used in respect of these regulations, maintaining the material, to assemble and correctly adjust different parts.

**3.6****Data logging**

The car must be fitted with the scrutineering data logging system providing following data (Certification):

- Speed of the 4 wheels
- Engine revs & timing
- Longitudinal acceleration
- Lateral acceleration
- Throttle pedal position
- Throttle valve position and of any other control element
- Engine load target & delivered Engine load (if the Throttle Valve doesn't follow the Throttle Pedal Position)
- Engine Water Temperature
- Team Inlet air temperature in the manifold
- 2<sup>nd</sup> Inlet air temperature in the manifold (monitored by an additional sensor)
- Boost pressure (monitored by an additional sensor)
- Front & Rear Brake Calliper pressure
- Lap trigger
- Team Lambda-signal
- 2<sup>nd</sup> Lambda-signal (monitored by an additional sensor with separate Lambda-module)
- Ignition angle timing
- Injection duration, start & end
- injection fuel pressure
- camshafts timing & positions
- GPS (TV or radio antennas must be at least 30cm away from the official GPS antennas. If necessary, antennas will be moved to guarantee correct GPS signal.
- Steering wheel angle
- Launch-control button
- Gear position

WSC will decide and communicate the list of stand-alone sensors or of other independent monitoring systems for each model. (Certification)

**For cars certified until 2019:**

The Scrutineering Data Logger system consisting of an "memotec" evo4 or evo5 box and a TCR kit (specific bracket, sensors and loom) must be installed corresponding to the instructions.

**Contact to: memotec GmbH:**

Bauwaldstrasse 1, 75031 Eppingen, Germany  
Phone: +49.7260.920440; Fax: +49.7260.920444  
Mail: < [info@me-mo-tec.de](mailto:info@me-mo-tec.de) >; Web: < [www.me-mo-tec.de](http://www.me-mo-tec.de) >

Manufacturers will offer for sale race cars equipped with scrutineering data logging system.

The collected data will remain at WSC disposal.

The scrutineering data logger may not be used as Team Data Logger and may not be accessed by the team. On request, competitors receive recorded data of their own scrutineering data logger, to verify own sensor values.

**For cars certified from 2020 onward** the Scrutineering Data Logger is integrated in Engine TCR ECU.

Fitting instructions for scrutineering data logger and basic configuration file for the integrated logger containing all official channels is provided by WSC Technical Department. Manufacturers are not allowed to remove or modified scrutineering channels, but they may use logged data and add their own channels to the configuration.

Only cars using the Engine TCR ECU may use the official air temperature sensor from the Scrutineering Data Logging System for the engine management.

The use of Team Data Logger is allowed. The Team will allow access to the TCR Technical Delegate to the data of Team Data Logger at any time.

Team Data Logger with removable memory devices are allowed.

The use of following sensors is not allowed:

- Pitot tube

- Tire pressure
- Tire internal and external temperature including the running surface
- Non-contact ground distance sensors (Suspension travel potentiometers are allowed)
- Inertial platform
- Turbine speed
- Combustion pressure
- Sensors using wireless data transmission
- Engine torque sensors
- Load cell on power train, running gear and suspension mounting points.
- non-contact sensors (temperature, distance, optical car speed sensors, dedicated yaw sensors, etc.)

**Allowed Sensor Technologies:**

- Electric-resistor-based sensors with direct contact to the measured item
- MEMS (micro electromechanical systems) sensors
- GPS up to 10Hz
- Magnetic field sensor
- Pressure sensors based on membrane technology
- Mass Production Sensor Cluster

**Not Allowed Sensor Technologies:**

- contactless distance and temperature sensors
- DGPS (Differential Global Positioning System)
- Piezo technology (exception: engine knock sensor)

**3.7****Telemetry**

The use of telemetry is forbidden.

For Endurance Events only it is allowed to use Catalogue Telemetry Systems working on public mobile phone network specified in the TCR Regulation for Endurance Races. Technical Delegates will have access to the telemetry systems and data.

**3.8****Driving aids**

Driving aids are not permitted.

If the race car using mass production engine management cannot be operated without the Driving Aids, the mass production systems including mechanical parts and Electronic Control Units [Anti-lock Braking System (ABS), Electronic Stability Program (ESP) & Traction Control System (TCS) not included] may be used on condition that the original hardware and software are maintained (only changes to the wiring are permitted). It is not allowed to the driver sitting in the car to change settings. The systems may be also switched off or removed (Certification).

The pit speed limiter and the launch control (as described below) are permitted. For the launch control 1 (one) additional engine rev-limiter is allowed. The rev-limiter is activated and stopped by the driver and is constant during the launch control phase. There is no closed loop control considering engine revs, wheel speed and clutch actuation allowed.

Other constant rev-limiter(s) is (are) permitted for imposed speed limits (pit speed, virtual safety car, circuit sections with speed limit, etc.). (Certification)

ABS as Endurance Option is permitted. (VO Certification at any time)

**3.9****Balance of Performance (BoP)**

All Manufacturers must communicate the requested specific numbers for the definition of the numeric model for the BoP evaluation.

Manufacturers will present certified TCR cars at all BoP tests sessions at TCR invitations.

Parameters which may be modified for BoP at any time of the season:

- Minimum Racing Weight; max. penalty 70kg; max. weight reduction 10kg
- Engine performance level implemented by monitored electronic components (90%, 92.5%, 95%, 97.5%, 100% and 102.5% named level "1" to "6")
- Smaller boost pressure steps implemented between the aforementioned engine performance levels
- Minimum Ride Height (set-up range 80mm ±20mm)
- Compensation Weight (CW) calculated with automatic formula communicated by Technical Bulletin.
- The Minimum Racing Weight's upper limit is 1,365 kg.

All engine performance relevant parameters will be monitored related to engine speed according to methods defined by Technical Bulletins.

WSC reserves the right to take further measures in order to guarantee proper BOP and to release different BOP for Endurance Competition.

**3.10****Period of Certification**

WSC will release 1 (one) Technical Form per model frozen for 3 (three) years starting from the date of the final certification.

Each Competitor must have at the scrutineering the original stamped and signed TCR Technical Form for each car.

TCR Technical Form can be requested at < [form@tcr-series.com](mailto:form@tcr-series.com) >.

Face lifts are not considered as new cars. It will be possible to change only the modified body shell parts on the production car.

For the 2016 certified cars the 3 years period will start also 2017.

Technical Form's modification will be allowed during the season only for following reasons:

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

**ART. 4****BODYWORK****4.1****Chassis (Certification)**

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 1950mm
- All chassis modifications have to be approved by WSC.
- 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 a modified passage of the gearshift control, electrical loom(s), brake lines, fuel lines and extinguisher lines.
- No modification of McPherson turrets except of 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. Production 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 to the exhaust system, transmission and suspension.
- Temporarily removal of the roof outer skin is permitted only to allow the safety cage's correct installation.

Sub frames may not be modified for the fixation on the body shell or for the attachment of suspension elements. All sub frame modifications have to be approved by WSC. 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.

Passage for the gearshift control: Local modifications are authorised.

Mountings and bearings of antiroll 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.

Mounting of pedal box and master cylinders: Modifications are authorised provided they have no other function than to allow the fixing of the master cylinders and/or the pedal box.

Central tunnel and/or floor on the driver's side to allow Driver's seat installation for correct driver's position:

Local modifications to the central tunnel and/or the floor on the driver's side are authorised with no other purpose than correctly installing the compulsory racing seat according to this regulation.

Panel on top of fuel tank area for Fuel tank ancillaries' installation: Local modifications of the area situated on top of the fuel tank are authorised with no other purpose than creating a flat surface to install fuel tank ancillaries.

**4.1.1****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. (Certification)

Openings in the engine bay bonnet are allowed up to a maximum total surface of 1050cm<sup>2</sup>, including any original opening(s) but must be covered by wire netting with maximum mesh surface of 500mm<sup>2</sup> (Certification). Trims on the openings can be added to the bonnet provided that they do not protrude from the outer surface more than 15mm outwards and 50mm inwards (Certification). Cut-outs in the original production bonnet for the trims are allowed up to a total surface of maximum 2350cm<sup>2</sup> including any original cut outs. The production internal reinforcements may be removed in the opening zone. (Certification)

#### 4.1.2 Doors

The production door locks, door-hinges, anti-intrusion bars, external door handles, and the driver side window lifters 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 other side window lifters may be removed, but the side windows must be locked in place and secured from all movement.

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 1mm thick. The panels must totally cover the door, its handles, locks and window winding mechanisms.

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

#### 4.1.3 Engine & Luggage Compartments

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

#### 4.2 Windscreen and windows

The use of the mass production windscreen is permitted.

The use of electric heated glass windscreen of artisanal production is allowed. (Certification)

Plastic windscreen (polycarbonate or PMMA ensuring the same transparency as the original glass) with the same shape of the reference part, with or without heating with minimum thickness 5.85mm is allowed. (Certification)

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.

The original heating system may be removed but a demister system must be installed. (Certification)

Plastic rear window min. 3.85mm is allowed.

The internal face of side and rear glass windows as well as that of glass rear-view mirrors must be covered with a transparent and colourless plastic safety film with a maximum thickness of 0.1mm in order to avoid the shattering and spraying of glass in the event of an accident. It must be fitted in a manner that facilitates checking.

#### 4.3 Exterior

Bodywork - General

A maximum of 3 holes (maximum diameter of 12.5 mm) are permitted for the team in order to use supplementary measuring devices (radio, temperature, pressure, and similar). Other up to 4 similar holes are allowed for promoter use.

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:

- Front bumper; Shape resemble the original without bolted license plate support(s), must be approved by WSC prior to production; no dive planes allowed.
- Front fenders' lower edge behind the wheel may not be higher than front door's bottom border. Shape must be approved by WSC prior to production (no louvres allowed).
- Side sills (these may be added if not present in the production car)
- Rear wheel arch extensions; Shape must be approved by WSC prior to production.
- Rear door bulge compatible with the rear arch extensions
- Rear bumper; Shape resemble the original must be approved by WSC prior to production.
- Wheel arch liners

No flat floor behind the vertical plane tangent to the back side of the front wheels and the foremost point of the rear bumper. Engine bay protection panel between the frame rails is permitted. (Certification)

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.

Door and bonnet seals may be removed.

Installation of air jacks

The bodywork may be modified over a maximum area of 100 cm<sup>2</sup> to create housing for the air jack connector.

The connector for the feeding of compressed air must be situated rearward of the rear axle centreline and must not protrude beyond the surface of the bodywork.

Roof Hatch installation without structural parts' modification for access to the cockpit is permitted. (Certification)

The use of mesh in air inlets without changing car's external appearance is permitted. For Endurance Events only, the mesh installation in front of air inlets is allowed.

## 4.4

### Aerodynamic devices

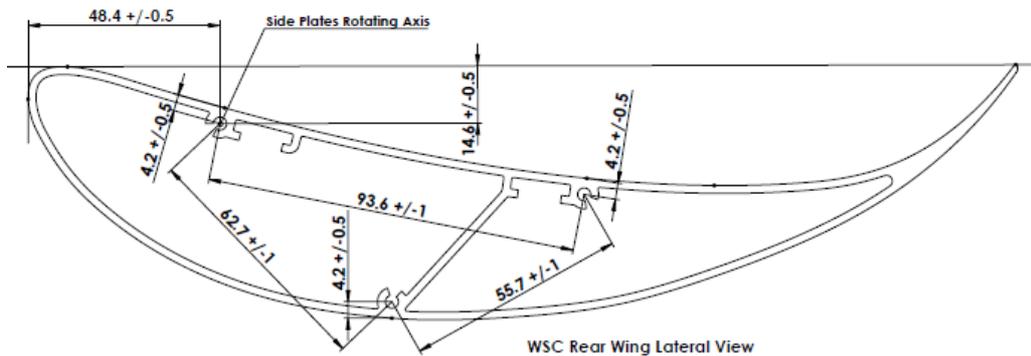
#### Rear wing with brackets (Certification)

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.

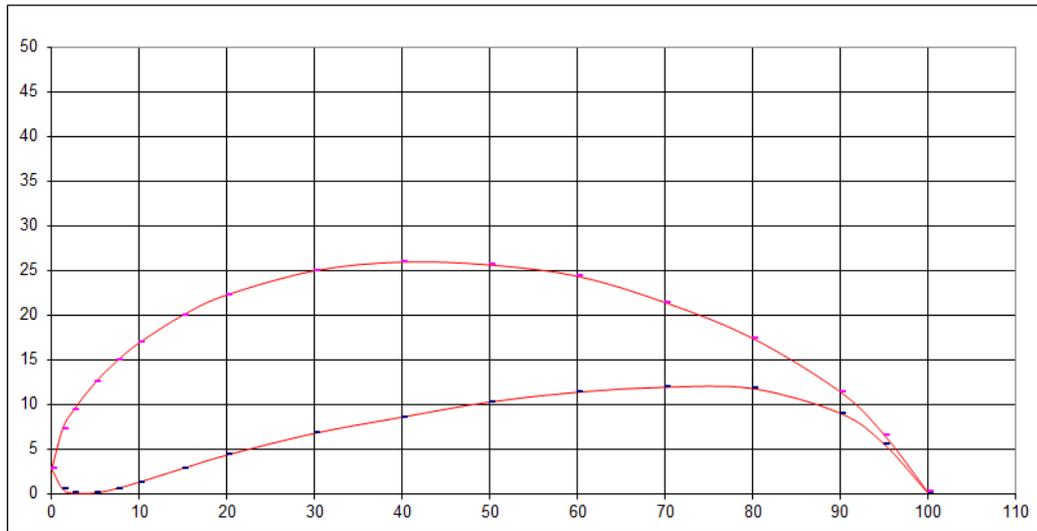
#### Rear wing definition & Dimensions:

- Straight, adjustable, single piece with no flap
- Type BE 183-176 +/- 0.5mm
- Chord = 250 +/- 1 mm
- Width = 1380 +/- 1 mm
- Trailing edge thickness = 2mm +/- 0.5 mm



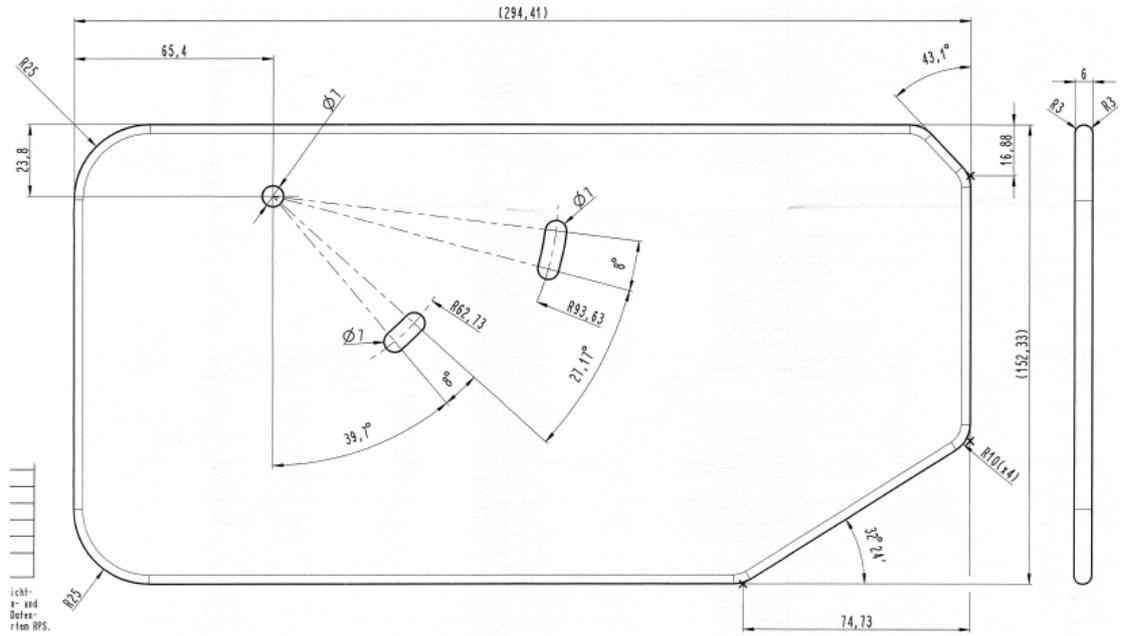
WSC Rear Wing Lateral View

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		



#### - 2 Brackets

- 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 = 100mm.
- 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).



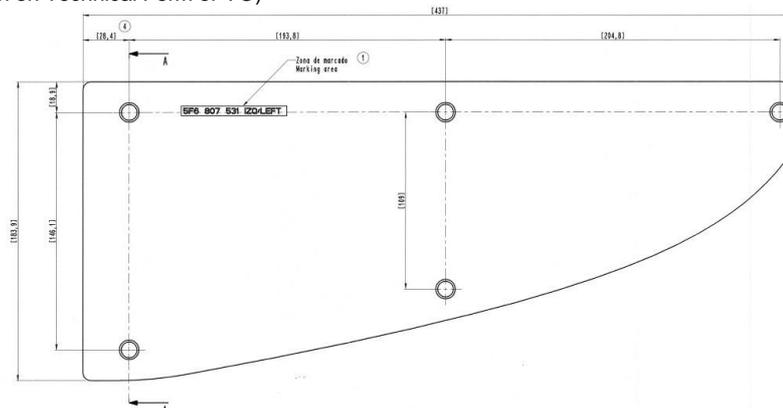
- 2 side plates (WSC delivery or Specific parts); All edges will be rounded with at least R3mm (Safety)
- Dismountable, flat, continuous surface perpendicular to profile centreline.
- Side plates may rotate with respect to the wing profile.
- This device must be rigid and offer no possibility for the penetration of air (groove, hole, opening, etc.).
- Material: aluminium, plastic

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

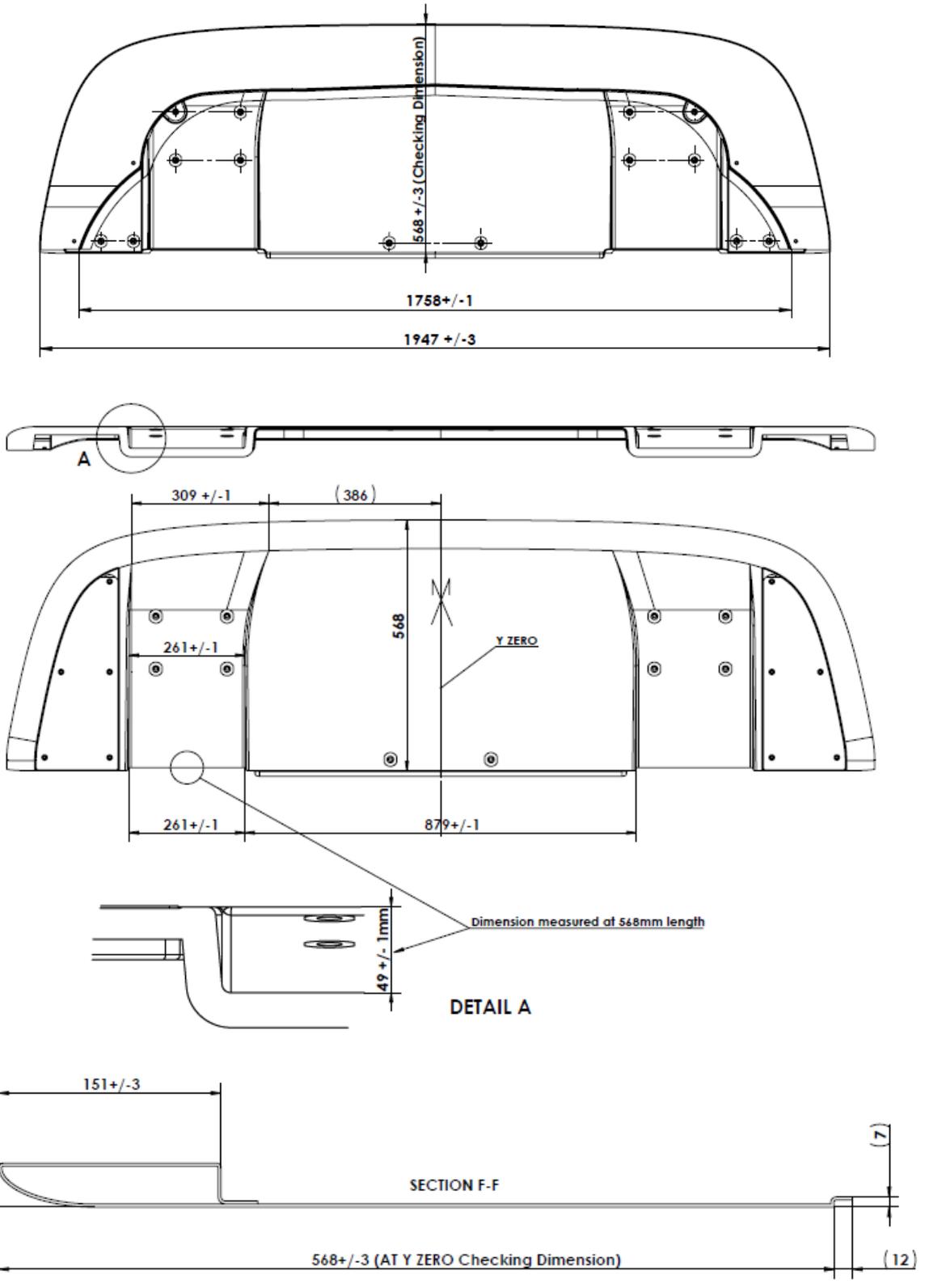
- X = 1050 mm from rear axle centreline.
- Z = Highest point of roof.

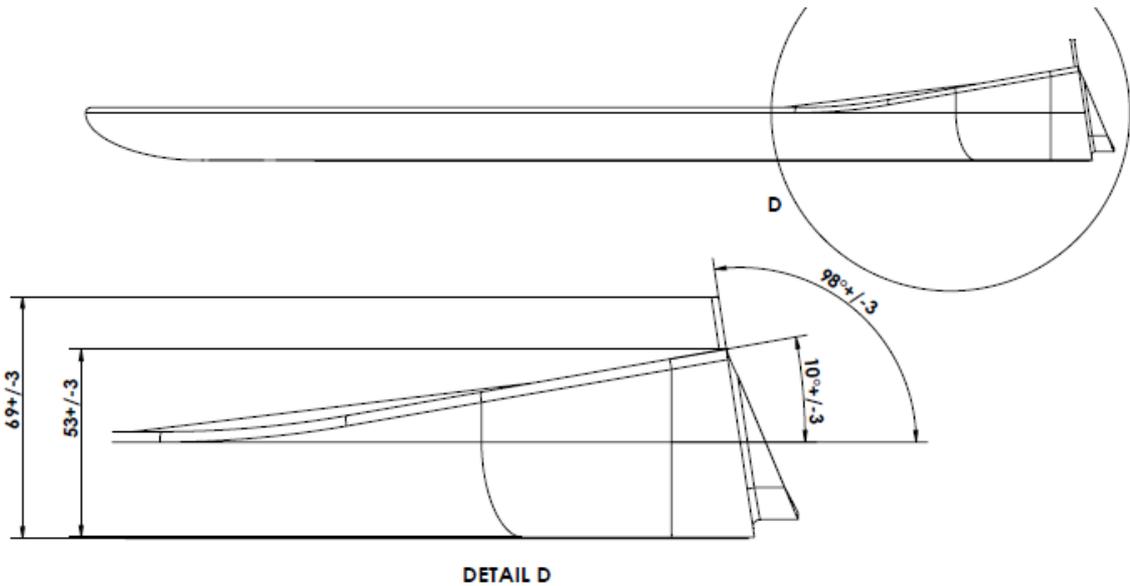
The front splitter (Certification):

- WSC delivered and adapted to each car; It will also be possible to reduce the front splitter's protrusion into the wheel arch in case of collision with the front tire's enveloping curve.
- 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)
  - lateral prolongation in "x" for cars with bigger front overhang is allowed (max. width in "y" 50mm)
  - The distance between splitter's contour vertical projection and bumper contact area on the front splitter is limited as follows:
    - In the middle area ( $y = \pm 400$  mm) will be between 35 and 85mm.
    - Outside  $y = \pm 400$  mm is limited to max. 210mm.
    - In the transition area to the wheel arches is limited to max. 45 mm.
  - The layout of the areas covered by the bumper is free.
  - The areas next to wheel arches (Detail D) may remain flat.
  - production drawings will be delivered for certification
  - material: 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.
  - Note: in case of doubts, the WSC CAD 3D model overrides the drawings.
  - 2 embedded skid pads, Steel,  $1.2 \pm 0.1$ mm; max. Area: 600cm<sup>2</sup> each (shape and fixations are free, Certification on Technical Form or VO)



The foremost edge of the front splitter at y=0 will protrude the bumper contour by max. 35mm in vertical projection.





Front Splitter Brackets' design is free. (Certification)

Rear diffuser included in the rear bumper: (Certification)

- One single plane between a vertical plan minimum 380mm behind the rear axle centre line and the bumper's vertical projection
- Open downwards hollow area for the exhaust end pipe(s) allowed
- Maximal width: 1650mm
- Max inclination to the doors' lower edge: 25°
- No air circulation over the diffuser
- Fins or other air guiding surface are not allowed.

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

#### 4.5

##### Interior

Dashboard trims; Centre console

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)

Dash board (Certification)

- General shape, appearance, mounting points and position must remain similar to production part.
- Thermoplastic or Fibre Glass plastic materials are free.
- Minimum weight: 2kg including ducting and fixation elements.

Instruments (Certification)

Display and indicators can be freely fixed on the dash board or to the steering column. The installation shall not interfere with the driver's vision or safety.

Switches (Certification)

Standard switches may be replaced by other control elements and may be fitted at different locations on the dashboard or on the centre console. Any opening resulting from this must be covered.

Allowed switchable functionality affecting engine ECU on the steering wheel or switch panel while engine running (allowed positions are on/off): Full Course Yellow, Pit Speed Limiter, Launch Control, GBX neutral and reverse gear. It is not allowed to place any other switches (push or rotary type) affecting engine ECU behaviour within driver's reach, when he sits in the racing seat.

Production Pedal Box: metallic pedals may replace the production plastic parts. New master cylinders and new arrangement in the engine bay may be used. (Certification)

Of shelf pedal box (hanging or floor mounted) and 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).

The original heating & air condition systems may be removed. Bulk head openings must be closed. (Certification)

The wind screen demisting system is mandatory. Mass production AC & Heating Systems may be removed. (Certification)

#### ART. 5

##### WEIGHT

##### 5.1

##### Minimum Racing Weight

The target minimum racing weight (with driver) is 1,265 kg.

The minimum front axle load proportion is 59% to be respected in any conditions during the event. (not applicable for Endurance Events)

The Minimum Racing Weight will not include non-compulsory items like driver cooling, team camera, radio, etc.

**5.2 Ballast, Success Ballast**

Ballast, including success ballast, must be made from metallic plates or blocks and must be fixed in the cockpit and/or in the boot.

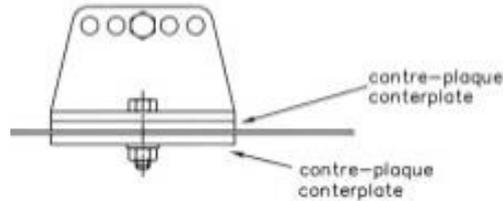
It is permitted to complete the weight of the car with ballast.

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 body shell/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 Drawing.

The minimum area of contact between body shell /chassis and counter plate is 40cm<sup>2</sup> for each fixing point.

Any movable ballast system is forbidden.



The ballast and success ballast will be declared as such at the scrutineering. The success 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.

**5.3 Liquids**

The weight may be checked at any time during the competition with the quantity of liquids in the tanks.

**ART. 6 ENGINE**

**6.1 Engine generals**

Turbo charged mass production engines without modifications.

- The make and type of the spark plugs are free.
- It is allowed to change the injectors with OEM parts similar dimensions. (Certification)
- The mass production high pressure fuel pump from the TCR certified engine cannot be modified. (Certification)
- The electric loom and connection(s) may be modified to improve durability. (Certification)
- Cylinder head gasket may be changed with another one with identical dimensions. (Certification)
- All crankshaft bearings may be changed with another one with identical dimensions. (Certification)

Engine position: Production; The crankshaft's axis within a cylinder with R=20mm

The use of a different standard engine coming from another mass production car of the same group or of the TCR Race Engine is allowed. (Certification)

Position of the replacement engine in engine bay (Certification):

- The crankshaft's axis will be within a cylinder with R=20mm relative to the position of the original engine in the production car of the TCR model.
- The inclination (defined by the cylinder sleeve axis) corresponds to the inclination of the replacement engine in its original car.
- The y-position is free for TCR models with transversal engine.

Only sealed engines by the manufacturers are eligible for TCR Events. (Certification)

The engine will have the possibility to seal the oil sump and the cylinder head cover by the Technical Delegate. (Certification)

It is not allowed to put ice or any other cooling system in the intake pipes or in front of the intercooler.

Indicative Engine Performance (ECE-R 85-5 Norm):

- Maximum Torque around 410Nm
- Maximum Power around 340HP

**6.2 Engine Cooling**

Intercooler

Mass production intercooler from another OEM (maximum core volume 8 litres) may be used (Certification).

Air Ducts: free between air inlet and intercooler core (Certification)

The position and brackets are free without any modification of the bodywork. Air hoses and water pipes are free (Certification)

Water Cooling

Radiator: mass production part free provided that the radiator is fitted in the production location without any modification to the bodywork (see exception below), brackets, water hoses and water pipes are free (Certification)  
Thermostat: free (Certification). The use is optional.  
Electric & mechanic fans for radiator cooling: free (Certification on Technical Form or as VO)  
Air Ducts: free between air inlet and cooler core (Certification)  
In justified cases, Manufacturers may apply for removal or modifications of the upper radiator cross members without negative effects for rigidity of the chassis structure (WSC approval and Certification).

#### Engine oil cooling

The type of the used oil cooler (air/oil radiators or water/oil heat exchanger) and their connections are free. No modifications to the bodywork are allowed. The parts have to be situated within the perimeter of the bodywork in safe position. (Certification)

It is allowed to put tape in the grilles of the front bumper to regulate the engine cooler temperature (in car colour).

Only ambient air may be used for heat dissipation.

### 6.3

#### **Lubrication**

Following is allowed:

- Pressure accumulator (Certification)
- Baffles and deflectors in production oil wet sump; The distance between the planes of the oil sump gasket on the engine block and on the oil sump may not be increased by more than 6mm. (Certification)

If the lubrication system includes an open type sump breather, it must be equipped in such a way that the oil flows into a catch tank. (App. J, Art. 255. 5.1.14)

### 6.4

#### **Engine control unit**

If the car's Power Box communicates to the engine, its software must be certified on the programming code level, identifiable and frozen. (Certifications)

Anti-Lag System is allowed. The system may be switched on/off automatically by Full Course Yellow, Speed Limiters or when race car is driven at part throttle (steady throttle pedal position under 60% for out / in lap, safety car, etc.) In case of automatic switching a delay of at least 5s between initiating switching and applying has to be guaranteed. Automatic switching has to be signalled to the scrutineering data logger. Each realization of an Anti-Lag functionality may only have two levels: on/off. (Certification)

Every manufacturer will have to provide 6 (six) engine mappings with differing power outputs: 90%, 92.5%, 95%, 97.5%, 100% and 102.5% named level "1" to "6" (Certification).

For cars certified until end 2019:

The choice of the engine Electronic control unit (ECU), engine control software, sensors and engine loom are free. (Certification)

The software and all data sets are frozen and cannot be overwritten. ECU box will be sealed by the Manufacturer and the access to modify software and parameters will be closed to prevent manipulation.

Manufacturers will deposit on request by the technical delegate free of charge for the duration of participation of their cars to TCR Competitions, Series, Class or Championships Engine Electronic Control Unit(s) (ECU) for all registered engine performance level(s) defined for BoP purposes.

The WSC Technical Delegate may at any time oblige the competitor to use the reference unit registered with the WSC by the Manufacturer.

Any manipulation, modification or disconnection of any certified sensor is forbidden. The Competitor is responsible for the quality of the sensor signals.

The software and the map(s) for the all certified engine performance level(s) are frozen and cannot be modified without WSC agreement. (Certification)

Every manufacturer has to provide software tools (free of charge and without limitations concerning the required number of copies and licenses) to allow to the TCR Technical Delegate to monitor the engine control software. The interface cable, that is needed to access the engine control unit while it is installed in the car, has to be provided for the TCR Technical Delegate by all participating competitors free of charge. The engine control software and the datasets have to be provided in a binary format to the TCR Technical Delegate by the manufacturer

The software tools have a minimum functionality of:

- Upload/Download program software and data sets
- Calculate Checksum of program software and datasets after uploading them

Car certified from 2020 onward

The TCR ECU (Magneti Marelli, model: SRG-141) must be ordered from manufacturer and used as is, i.e. no modifications to the base software of the ECU are allowed. The TCR ECU must be mounted as specified by its manual.

Detailed specification of requirements for the 6 mappings can be found in WSC BoP documentation. Power levels will be selected via the TCR Power Level Rotary Switch delivered on order by Magneti Marelli and will be sealed by the technical delegate following BoP Table.

The ECU will act as a scrutineering data logger for the TCR Technical Delegate. Software licenses are provided by Marelli. Hardware interface, i.e. connector with correct pinout to connect a laptop via Ethernet (RJ-45) must be provided by each manufacturer using the "Scrutineering Connectors Kit" from Magneti Marelli.

## 6.5 Intake system

One (1) supplementary opening in the front bumper without protrusion above bumper's exterior surface can be made. (Certification)

The maximum boost pressure will be defined during BoP test and will be communicated per Technical Bulletin. The boost monitoring will be defined smoothing peaks and eliminating the upshifting discrepancies.

The air filter housing and the air filter element may be replaced with a catalogue part (Certification). The air feed pipes to the air filter housing and from the filter housing to the turbo are free. (Certification)

1 (one) different mass production Mono Turbo Charger coming from engines with cylinder capacity smaller than 2000cm<sup>3</sup> may be used. (Certification)

It is allowed to change the impeller in case the Turbo Charger is integrated in the exhaust manifold. (Certification)

The turbo charger must be sealed by the manufacturers and must have the possibility to be sealed by Technical Delegates. (Certification)

For TCR cars without certification for turbocharger sealing the above prescription will be valid starting 1.01.2021.

No fresh air connection pipes between inlet and exhaust manifolds are allowed. Antipollution air circulation parts have to be removed and the connection ports must be closed. (Certification)

## 6.6 Exhaust

The exhaust system is free downwards the turbo charger and its regulating system. It will fit FIA homologated catalytic converter(s) (FIA List no. 8), will have nominal wall thickness minimum 1.2mm and will have the exit(s) at the car's rear end below the rear bumper. (Certification)

If a different turbo charger is certified an adapter between this and exhaust manifold may be used, (Certification).

The sound level must not exceed 110 dB(A) at 6000 rpm, measured in conformity with the FIA noise-measuring method.

Manufacturers may apply for option (VO) for exhaust muffler system for low noise circuits. (Certification)

Certified parts may be used following events specific noise limit.

## 6.7 Fly-wheel assembly (Certification)

Flywheel: production part or modified respecting following conditions:

- Fly wheel can be re-manufactured solely to allow for a replacement clutch.
- Minimum weight 6kg (without fasteners)
- Machined from a single block of steel (no weight reduction bores, pockets or cut-outs)
- The starter gear must have same or bigger dimensions.

## ART. 7 FUEL SYSTEM

### 7.1 Fuel tanks

The fuel cell(s), the filling and ventilation systems must be separated from the cockpit by a fireproof and liquid-proof protective device and must comply with App. J, Art. 253. (Certification)

The total fuel volume in the car is max. 100 litres (Certification).

Designs have to be WSC approved before implementation.

External refuelling can be used (Art. 253). (Certification). Several refuelling systems for different sporting regulations can be certificated (VO at any time).

For fuel tanks with one filler neck FIA homologated non-return valve is mandatory (App. J. Art. 253.14). (Certification)

For endurance races the filler hole(s) must be situated outside the cockpit. All bodywork joints in the vicinity of the refuelling connections must be designed in such a way as to prevent any leakage of fuel into cockpit and/or boot during refuelling. For refuelling systems with FIA or ASN authorized leak-proof couplings FIA or ASN authorized fuel cell safety valves must be used. (Certification)

In-board fuel tank filler must be protected by a fireproof and liquid-proof fire-wall. (Certification)

a) FIA Safety Fuel Cells will satisfy the following conditions (Certification):

- be conform or exceed the specifications of FIA/FT3 1999, FT3.5 or FT5
- Comply with the prescriptions of App. J, Art. 253.14

- The fuel tank must be contained in a close-fitting flameproof and liquid-proof lower (external) housing that has no other mechanical function including a crushable structure on all surfaces except the one in contact with the body shell.
- The crushable structure must be a honeycomb sandwich construction based on a fire-resistant core of a minimum crushing strength of 18N/cm<sup>2</sup>. The sandwich construction must include two skins of 1.5 mm thickness having a tensile strength of minimum 225N/mm<sup>2</sup> and must have minimum thickness of 10 mm.
- Located within the safety cage, forward of the centre line of the rear wheels, no more than 65cm from the vertical plane through the longitudinal axis of the car
- Fuel cell cover's lowest surface should have similar area and position in the car as the production fuel cell. (WSC approval)
- The rest of the fuel cell including its cover has to be higher than 40mm in respect to production fuel cell's lowest surface.
- Simple tunnel (no closed opening through fuel cell) for exhaust tube is allowed.
- The level of the fuel cell lowest (external) surface including its housing has to respect the level of the production fuel cell's lowest surface.
- Floor pan cut above the original fuel cell compartment exclusive for the installation of the supplementary fuel cell volume in the cockpit is permitted. Structural panels cannot be cut or modified.
- The upper (internal) housing may be of mild steel or aluminium 1.5mm minimum nominal thickness bolted or welded to the body shell or be crushable structure with similar properties as the lower housing.
- Fuel cell housing fixation to the body shell will be made using at least 6 (six) fixing points with M8 grade 8.8 bolts installed according to the FIA Drawing 253-65. WSC approved fixing systems with equivalents solidity may be used. (Certification)
- An add-on fuel cell (FT3 1999, FT3.5 or FT5) on the top of the main fuel cell and installed in a housing corresponding to this regulation may be used up to the total maximal fuel volume. (Certification)

b) It is also possible to use a catalogue rectangular shaped FIA Safety Fuel Cell coming from an FIA-approved manufacturer (FIA FT3 1999 minimum specifications). (Certification).

The Fuel Cell must be fitted as follows:

- located within the safety cage
- forward of the centre line of the rear wheels
- behind the vertical plane tangent to the most rear point of the driver's seat back
- no more than 65cm from the vertical plane through the longitudinal axis of the car
- Installed in a fabricated mild steel housing 1.5mm minimum nominal thickness bolted or welded to the body shell; or in a housing corresponding to the point a) of this article bolted to the body shell. The housing will follow the fuel tank's shape and will not have any other function. (Certification)
- Cut-out of the floor pan is permitted.
- Lower surface of the tank housing at least 100mm above road (measured by ride height of 80mm).
- mild steel 1.5mm minimum nominal thickness fuel cell cover bolted or welded to the body shell (fire wall) (Certification)
- An add-on fuel cell (FT3 1999, FT3.5 or FT5) on the top of the main fuel cell and installed in a housing corresponding to this regulation may be used up to the total maximal fuel volume. (Certification)
- In case of bolting (fuel cell housing or cover) minimum M6 8.8 bolts spaced at max. 200mm must be used. Different designs have to be WSC approved before implementation.

## 7.2 Fuel circuit

### Fuel lines:

Mass Production Fuel Lines may be used outside the cockpit. The protection will correspond to Appendix J, Art. 253.3.1.

Other fuel lines must correspond to the prescriptions of Article 253-3 of Appendix J.

The installation is free provided that the prescriptions of Article 253-3 of Appendix J are respected

### Fuel sampling connector

The car must be fitted inside the engine compartment with a FIA approved self-sealing connector for fuel sampling (Technical list n°5) on the fuel feed line directly before the fuel high pressure pump.

The competitors will provide to the Technical Delegate on his request a connection hose to this connector.

## 7.3 Electric Fuel Pumps (Certification)

All Electric Fuel Pumps must stop by stalling engine.

# ART. 8 ELECTRICAL EQUIPMENT

## 8.1 Windscreen wiper

Any mass production wiper motor system may be used with original number of working wiper blades (Certification)

The windscreen washer tank may be modified (free position) or removed.

Complete rear window wiper and washer system may be removed. (Certification)

## 8.2 Engine Starter

The production starter must be fitted and must be in working order at all times of the competition.

The driver must be able to operate the starter when seated normally.

Manufacturers may apply for alternative OEM Starter. (Certification)

### 8.3 Lighting equipment

8.3.1 The exterior lighting equipment must at least ensure the following functions: headlights, front and rear direction indicators, stop lights, rain light (see 8.3.2) and rear tail lights and must be in working order at all times of the competition.

The exterior surface and appearance of the mass production lights cannot be modified but the interior elements may be removed. (Certification). Exception for the fender indicators which are free.

Endurance spot lights are free however body work modifications have to be certified (VO at any time).

Cars must be prepared to activate at promoter decision Low Beam Lights Flashing at 2Hz - 4Hz at any speed limiter mode.

### 8.3.2 Rain lights:

Rain Light is compulsory. (Certification)

Following arrangement may be used:

- One FIA approved unit (Technical List n°19) located in the tail gate, boot lid or replacing the 3<sup>rd</sup> brake light placed on the car's centre line.
- Production 3<sup>rd</sup> brake light in combination with the production rear fog light(s).

### 8.4 Starter Battery

Only 1 (one) dry starter battery is allowed.

Type: certified (Li-Ion or other exotic types will not be accepted).

Capacity: free (certified)

Make: free as far as the certified capacity, location, protection and fixation are used.

Location: In the production location, boot or in the cockpit. If in the cockpit, it must be situated behind a vertical and transversal tangent plane to the rearmost point of driver's seat or in the rear passengers' foot well. (Certification)

Fixation: Should the battery be moved from its production position App. J, Art.255.5.8.3 applies.

Insulating cover: The terminals must be electrically protected with an insulating cover.

It must be possible at all times to start the engine with the energy of the battery transported on board the vehicle.

### 8.5 Electric loom (engine, car & data logger)

Production or racing loom (Certification).

### 8.6 Belt drive, alternator

The belt drive may be modified by removing not used belt driven aggregates and by repositioning the alternator. (Certification).

The alternator may be replaced with another mass production one. The alternator pulley, belt and the bracket are free. (Certification).

The alternator must be operational at any time.

## ART. 9 TRANSMISSION

### 9.1 Transmission system

For cars fitted with a paddle shift and/or a power-driven clutch with electronic or pneumatic control, the Technical Delegate may at any time oblige the competitor to use in competition the reference unit(s) registered with the WSC by the Manufacturer.

### 9.2 Clutch

The clutch has to be the mass production one or certified under following conditions:

- Racing Catalogue pressed-type multi-discs sinter-cerametalllic; cushion clutches are not allowed.
- Minimum Discs Dia. 183mm (7¼")
- Clutch Control System hydraulic or mechanic actuated by the driver's foot
- Clutch release bearing is free (catalogue parts).

### 9.3 Gearbox

Mass production gearbox coming from the production model or from another car of the same group may be used (Certification). In the latter case a gear box adapter to the engine and gearbox brackets may be used. (Certification)

The mass production gearbox will be certified and used under following conditions:

- Mass production ratios
- 1 (one) reverse gear, selectable at any moment by the driver while the engine is running and the car is stopped
- Every gear must be able to be engaged and in working order.
- Gear changes must be made mechanically or using Paddle Shift (after-market or catalogue part).
- Interference to Engine Control for shifting allowed (Ignition cut or power reduction)
- Each individual gear change must be separately and solely initiated and commanded by the driver.

The target minimum racing weight (with driver) for cars using mass production gearbox is 1,230kg.

The use of paddle shift on mass production gearbox using catalogue (after-market) parts may be certified. The gear box control unit will be sealed and may be at any time be replaced by the technical delegate with the reference part. It is not allowed to alter the certified operating data. Manufacturers will provide to the technical delegate free of charge for the duration

of participation of their cars to TCR Competitions, Series, Class or Championships Transmission Electronic Control Unit(s) (ECU).

One catalogue racing sequential gearbox with one set of ratios may be certified under following conditions:

- A maximum of 6 (six) forward gears
- 1 (one) reverse gear, selectable at any moment by the driver while the engine is running and the car is stopped
- Every gear must be able to be engaged and in working order.
- Gear changes must be made mechanically or using Paddle Shift (catalogue part).
- Interference to Engine Control for shifting allowed (Ignition cut or power reduction)
- Each individual gear change must be separately and solely initiated and commanded by the driver.
- Any system that permits more than one gear pair to be engaged to the drive train at any time is prohibited.
- Instantaneous gearshifts are forbidden.
- Gearshifts have to be distinct sequential actions where the extraction of the current dog gear is subsequently followed by the insertion of the target dog gear.
- The dog gear is considered extracted when its position is not able to transmit any torque.
- Catalogue limited slip differential

A 2<sup>nd</sup> catalogue racing sequential gearbox can be certified at any time as option VO using similar technical parameters:

- Interchangeability (same clutch, starter, etc.)
- Similar lubrication principle
- Total ratios in each gear (deviation  $\pm 3\%$ )
- Weight (deviation  $\pm 2\text{kg}$ )
- Catalogue limited slip differential

Car models using mass production gearbox and/or sequential gearbox(es) will certify only 1 (one) GBX type per car (Chassis no.) and are not allowed to change back and forth between different certified variants. GBX changes may be requested by Certification Extension (Erratum) of the Technical Form.

A new gearbox cooling using catalogue parts (pump, filter, cooler, lines, thermostat, etc.) may be certified. Mass Production Gearbox Cooling may be used without modification. Modified mass production gearbox cooling must be also certified.

Each car will have to keep declared transmission.

#### 9.4 Final Drive

The final drive may be production or new (Certification).

For each certified gear box one new final drive ratio or one new final drive ratio pair (for transmission using two final gear pairs for gearboxes with 2 lay shafts) in the certified housing may be certified.

Final drive cooling using catalogue parts (pump, filter, cooler, lines, thermostat, etc.) may be certified.

#### 9.5 Limited Slip Differential

Any mass production limited slip differential may be used in mass production gearbox with production parameters but the settings cannot be modified during driving. (Certification)

The mass production differential fitted in the mass production gearbox may be replaced by a catalogue mechanical limited slip differential inside the drive unit housing (Certification).

It is permitted to remove material from the inside of the production housing. It must at all times be possible to clearly recognize the housing as the certified standard housing. (Certification)

Only one (1) catalogue mechanical limited slip differential may be offered for each racing sequential gearbox. (Certification).

For each mechanical limited slip differentials 4 (four) pairs of pressure angles machined on one or several pressure rings pairs may be certified. Control jigs for the pressure angles will be made available on WSC request.

The use of metallic friction plates & disks is mandatory (no carbon friction plates / disks or CFRP plated parts allowed).

#### 9.6 Drive shafts

For each certified gear box different drive shafts may be certified. Principle of the joint on the wheel side joint must be original.

Drive shaft's length is free.

### ART. 10 AXLES, SUSPENSION AND STEERING

#### 10.1 Generals

Wheelbase: Nominal wheelbase of the race car must not exceed the nominal wheelbase of the original car + 60 mm with the following constraints:

- The wheels can only be moved towards their end (i.e. front wheel towards the front) by 30 mm maximum.
- This measurement must be taken from a datum-point on the body shell. (Certification)
- Tolerance on race car wheelbase  $\pm 10$  mm.

Front and Rear overhangs

- Front: Defined by front bumper & Front splitter position.
- Rear: Defined by rear bumper position.
- These measurements must be taken from a datum-point on the body shell. (Certification)

No modifications of the chassis for new suspension pick up points

- The position of the new pick-up points is free; max  $\pm 20\text{mm}$  adjustment in all directions (Certification)
- Bolted brackets for suspension elements are free (Certification)

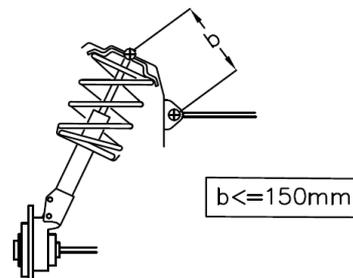
Position of the front and rear axles, wheel base and overhangs correspond to the production car. (Certification)

Reinforcement bars (Certification)

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

The distance between the McPherson top mounting and the anchorage point of the bar cannot be more than 150 mm (Drawing 255-4), unless the bar is a transverse strut homologated with the safety cage.

Reinforcement bars must be removable.



The mounting bracket may be welded or bolted to the body shell.

If bolted, a maximum of three (3) holes (maximum diameter of 10.5 mm) are authorised on each side.

The reinforcement bar must not be mounted elsewhere on the body shell or any mechanical part.

## 10.2 Wheel Hubs and Bearing

The wheel hubs may be re-machined using similar wheel fixation (number of fixation points, same bolt PCD and thread), to allow the use of a stronger mass production wheel bearing. Mass production wheel hubs may be used. The rim centring on the hub may be modified. (Certification)

## 10.3 Bearings, Silent blocks, Rubber bearing

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

Any elastokinematic elements (rubber, metallic spring, etc.) allowing defined modification of suspension parameters (toe, camber, etc.) under lateral or longitudinal forces are forbidden.

## 10.4 Front wishbones/upright/struts

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

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

## 10.5 Rear suspension

Production suspension parts may be reinforced or modified. Suspension arms may be replaced by new parts (Certification)

Twist beam may be changed into double trailing arm, keeping the same external pivot points and adding two additional points on chassis. (Certification)

## 10.6 Anti-roll bars

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, maximum 3 sets for front and rear axle)

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.

## 10.7 Springs

Cylindrical, linear steel springs are free; the combination of one helper with one suspension spring is allowed.

The spring seats are free. (Certification)

Rubber bump stops and packers are free.

## 10.8 Minimum Ride height

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

For the checking of the minimum ride height, the pressure of the tyres must not be less than 1.5bars.

Reference Minimum Ride Height: 80mm.

**10.9 Shock absorbers**

Only commercial hydraulic 2-way adjustable shock absorbers (one per wheel) fitted in the same location and similar position like in the basic mass production car are allowed. (Certification)

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

The use of following technical solutions is forbidden:

- Rolling contact bearings
- Inertial shock absorbers (J-Damper)
- Floating-piston for amplitude/frequency depending damping
- Hydraulic bump-stops
- Connection between shock absorbers (mechanic other than antiroll bars, hydraulic, or electronic)
- Set-up modification from cockpit
- Set-up modification by moving car by computer control (active damping)
- Motion sensing valves (G-valves)
- Electro valves
- Solid-materially additives to the damper-oil

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

**10.10 Steering**

The steering lock must be dismantled 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)

The production locking system of the steering column adjustment may be used for endurance events. (Certification)

A catalogue closed steering wheel can be used. The fitting of displays, switches and control lights on the steering wheel is allowed if offered by the steering wheel supplier. (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)

The steering wheel must be fitted with a quick release system. (Certification)

**10.11 Power steering**

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)

**ART.11 BRAKES**

**11.1 Generals**

Master cylinder(s) dimensions are free; The type and make will be certified.

Max brake diameter 382mm (width free); certified brand, diameter and bells

Steel brake discs (no ceramic coating allowed)

Max 6 pistons front calliper (Certification)

Max 2 pistons rear calliper (Certification)

The brake callipers must be made from aluminium materials with a modulus of elasticity no greater than 80Gpa. (Certification)

Simple brake effort repartition system(s) (hydraulic or/and mechanic) is (are) allowed. (Certification)

**11.2 Brake fluid tanks**

The brake and clutch fluid tanks will be fixed in the engine bay. The brake fluid hoses may pass through the cockpit. (Certification)

**11.3 Brake cooling**

Ducts may be metallic (steel or aluminium sheet), flexible hoses or be made in composite material. (Certification)

Original apertures in the mass production bodywork may be used to bring the cooling air to the brakes. (Certification)

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 110mm, or the correspondent area for non-circular sections, will not protrude more than 15mm above bumper's outer surface having transition radius to the bumper shape max 10mm.

- Flexible or firm air ducts with maximal inside dimensions of nominal 115mm diameter for circular versions or the corresponding inside area for non-circular versions may be used.

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.

Brake calliper cooling:

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

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

**11.4 Parking brake**

The parking brake working on the brake system (not on the transmission) is mandatory.

The production parking brake may be removed or replaced by a hydraulic valve or master cylinder operated manually by the driver without any intermediate system. (Certification)

**ART. 12 WHEELS AND TYRES**

**12.1 Generals**

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.

**12.2 Dimensions**

Wheels: (Certification)

- Dimensions of the 4 wheels: identical
- Rim's maximum dimensions: 10"x18" (width x diameter)
- Complete wheel: Maximum width at 2bars: 280mm
- The diameters at inner and outer rim edges must be identical with a tolerance of  $\pm 2.0$ mm.
- Wheel's minimum weight: 11kg
- Wheel's material: Cast aluminium alloy
- 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 will have similar dimensions.

Manufacturers may apply for different interchangeable wheels at any time (VO Certification)

**12.3 Wheel visibility**

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

**12.4 Wheel attachment**

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)

Certified wheel spacers are allowed.

Manufacturers may apply for endurance wheel attachment studs and nuts. (Certification)

**12.5 Pressure control valves**

Pressure control valves on the wheels are forbidden.

**ART. 13 COCKPIT**

**13.1 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
- Ballasts
- Braking and clutch system hydraulic lines with properly secured connectors
- Pneumatic jacks and their pipes
- Battery
- Fuel, hydraulic lines with properly secured connectors (App. J. Art. 253.3.2)

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 25g deceleration.

One air duct for driver's cooling from one of the engine cooling air boxes through the bulkhead max dia. 51mm in fire wall quality is allowed. (Certification)

### 13.2 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.

### 13.3 Test for helmet removal

With the driver seated in his normal driving position in the car with which he is entered, wearing a frontal head restraint system according to FIA Standard 8858-2010 (FIA List No. 29) appropriate to his size and with the seat harness tightened, it must be possible, that the helmet which the driver will wear in the race can be gently removed from his head without bending his neck or spinal column.

## ART. 14 SAFETY EQUIPMENT

### 14.1 Fire extinguishers

All cars must be equipped with an extinguishing system homologated by the FIA in accordance with Article 253.7.2. (FIA Technical List nos. 16 and 52). The Technical List no. 52 (FIA Standard 8865-2015) is mandatory for cars certified from 2020 on. (Certification)

Manufacturers may apply for alternative fire extinguishers system using the same fixing points on the car. (Certification)

In case of supply problems TCR promoters may ask for WSC waivers for different FIA homologated extinguisher with similar qualities under the responsibility of own Technical Delegate.

### 14.2 Safety belts

The safety belts must comply with FIA Standard N°8853/98 (FIA Technical List 24) or FIA Standard N°8853/2016 (FIA Technical List no. 57) and have to use the certified fixing points. FIA Standard N°8853/2016 is mandatory for cars certified after 2020.

### 14.3 Rear view mirrors

The car must be fitted with 2 (two) production external rear view mirrors.

### 14.4 Driver Seat

The driver's seat must be FIA homologated and not modified:

- FIA Standard 8855-1999 (FIA Technical List 12) using exclusively WSC certificated seat brackets. (Certification)  
Several homologated seizes of the certified seat model may be used with certificated seat brackets (Certification)
- FIA Standard 8862-2009 (FIA Technical List 40)

Maximum total thickness of cushions used between the driver and the homologated seat is 50mm.

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. (Certification)

The seat must be mounted by means of at least four (4) M8 bolts of at least 10.9 quality.

Seat position

- Transversally: Seat centreline must not be less than 270mm from the car's centreline.
- 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)

### 14.5 General Circuit Breaker

The driver, when seated normally at the steering wheel with the safety belts fastened, must be able to cut off all the electrical circuits and switch off the engine by means of a spark-proof breaker switch.

The switch must be positioned on the dashboard or in any other place easily accessible and must be able to be handled from inside the car by the driver seated and secured by his safety belts.

An exterior General Circuit Breaker must be installed and clearly identified by a symbol showing a red spark in a white-edged blue triangle in conformity with FIA App. J, Art 253.13.

- Recommended location: at the lower part of the driver's side windscreen pillar.
- Location following FIA Art 253.13 will be also accepted.

<b>14.6</b>	<b>Protection Nets</b> <p>A protective window net is compulsory. (Certification)</p> <p>It must meet the following specifications:</p> <ul style="list-style-type: none"><li>- the net must be made up of woven strips at least 19mm (3/4") wide;</li><li>- the meshes must be a minimum of 25 x 25mm and a maximum of 60 x 60mm. The woven strips must be non-flammable and sewn together at each point of crossing. The net must not be of a temporary nature.</li><li>- viewed from the side, it must reach from the centre of the steering wheel to the B-pillar.</li></ul> <p>Fixation:</p> <p>The net must be attached either to the safety cage or to the chassis, above the driver's window, by means of a rapid release system that will function even if the car turns over.</p> <p>The net must open from the top downwards when car is on wheels.</p> <p>The use of "Velcro" lock is not permitted.</p> <p>It must be possible to detach the net with one hand. To this end, the handle or lever must have coloured markings ("dayglo" orange).</p> <p>A push-button release system is authorised provided that it respects the prescriptions of this article.</p> <p>The push-buttons must be visible from the outside, be of a contrasting colour and be marked "press".</p> <p>Racing nets according to FIA 8863-2013 standard (Technical list n°48) may be certified as VO. Fixation: Racing nets must be attached to the certified mounting points following FIA specifications.</p>
<b>14.7</b>	<b>Towing devices</b> <p>All cars will be equipped with certified rear and front towing devices. It will be clearly visible and coloured in yellow, red or orange.</p> <p>The towing devices must be within the perimeter of the bodywork as viewed from above.</p> <p>It must allow the passage of a cylinder with a diameter of 60mm.</p> <p>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 <math>\pm 15^\circ</math> to the longitudinal centreline of the car.</p> <p>The car must be fitted with the control dry weather tyres.</p> <p>Flexible towing devices must be always in good condition without abrasions or kinks.</p>
<b>14.8</b>	<b>Fuel system</b> <p>Fuel lines Flexibles lines inside the cockpit must be of aviation quality (App. J, Art. 253.3.2). The installation is free provided that the prescriptions of App. J, Art. 253.3 are respected.</p> <p>Manufacturers may apply for alternative fuel cell ventilation valve with similar connections. (Certification)</p>
<b>14.9</b>	<b>Hydraulic pressure lines</b> <p>App. J, Art. 253.3.2 applies.</p>
<b>14.10</b>	<b>Side Protection Panel</b> <p>A side protection panel, made of composite material, fixed to the body shell or the safety cage may be optionally used. (Certification).</p>
<b>14.11</b>	<b>FIA Car Lifting Device</b> <p>Manufacturers may apply for options (VO). (Certification)</p>
<b>14.12</b>	<b>Battery fuse</b> <p>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)</p> <ul style="list-style-type: none"><li>- Reaction time in the TCR car: less than 3 sec.</li></ul>
<b>14.13</b>	<b>Medical Lights</b> <p>Cars using TCR Engine ECU will be prepared to activate Medical Lights at promoter's decision. (Certification)</p>
<b>ART. 15</b>	<b>SAFETY STRUCTURES</b> <p><b>Safety cage</b></p> <p>The safety cage must be homologated or certified by an ASN (App. J, Art. 253.8.1.b). For Static Load Tests or for Arithmetical Proofs the weight of the car will be the Target Minimum Racing Weight.</p> <p>Regarding the protective paddings on safety cage tubes which may come in contact with the driver Art. 253.8.4 of the App. J applies.</p>

**ART. 16****FUEL****16.1****Fuel specification**

The organiser will specify the fuel provider(s). The fuels correspond to FIA App. J, Art. 252.9 in guaranteed Super Plus Quality (98 RON, 88 MON) with maximum 5% ethanol content (EN228).

The fuel must comply with the official samples at any time of the competition. Additives of any kind are forbidden.

The fuel temperature may not be more than 20°C lower than the ambient temperature.

**16.2****Air**

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

**ART. 17****FINAL TEXT**

The binding text of these regulations is the English version.