



2023

MSA National Technical SSR's

Global Touring Car Championship

Version 3

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## REVIEW AND AMENDMENTS

Amendments and updates to the rules will be recorded in the Amendment Record, detailing the updated version, date of approval of the amendment and a short summary of the amendment.

## AMENDMENT RECORD

<b>Modified SSR / ART</b>	<b>Date applicable</b>	<b>Date of Publication</b>	<b>Clarifications</b>
ART 18.1	09.06.2023	09.06.2023	Regulation amendment
18.2	09.06.2023	09.06.2023	Regulation amendment
20.4	09.06.2023	09.06.2023	Regulation amendment
ART 15.2	12.05.2023	12.05.2023	Regulation amendment
ART 17.7	12.05.2023	12.05.2023	Regulation added
ART 18	12.05.2023	12.05.2023	Regulation amendment
ART 19.4	12.05.2023	12.05.2023	Regulation amendment
ART 20.6	12.05.2023	12.05.2023	Regulation amendment
ART 21.11.1 & 21.11.2	12.05.2023	12.05.2023	Regulation amendment
ART 21.13.1	12.05.2023	12.05.2023	Regulation amendment
ART 21.15.2	12.05.2023	12.05.2023	Regulation amendment
ART 22.1	12.05.2023	12.05.2023	Regulation amendment
ART 23	12.05.2023	12.05.2023	Regulation amendment

## Contents

1.	GENERAL .....	4
2.	TECHNICAL INSPECTION.....	4
3.	REFERENCE PLANES & COORDINATES.....	5
4.	VEHICLE DIMENSIONS .....	4
5.	AERODYNAMIC AIDS .....	4
6.	BODY & CHASSIS .....	4
7.	FASTENERS, HOSES & FITTINGS .....	5
8.	RESERVED.....	5
9.	RESERVED.....	5
10.	COCKPIT.....	6
11.	MIRRORS .....	6
12.	WINDSCREEN AND SIDEGLOSS .....	6
13.	FIRE EQUIPMENT.....	6

14.	ELECTRONIC SYSTEMS.....	7
15.	BOOST CONTROL.....	7
16.	WEIGHT CONTROL .....	8
17.	ECU CONTROLS .....	9
18.	SUSPENSION AND STEERING.....	11
19.	DAMPERS AND SPRINGS .....	11
20.	BRAKES AND BRAKE DUCTS.....	12
21.	ENGINE .....	12
22.	RADIATORS, COOLERS and AIR PIPES.....	15
23.	TURBO & WASTEGATE .....	16
24.	ELECTRICAL SYSTEM .....	16
25.	FUEL & FUEL SYSTEM .....	17
26.	EXHAUST .....	17
27.	CLUTCH ASSEMBLY.....	18
28.	PROPSHAFT and DRIVESHAFTS .....	18
29.	GEARBOX.....	18
30.	WHEELS .....	18
31.	TYRES.....	19

## 1. GENERAL

### 1.1 Eligibility:

Before commissioning the first unit of a new vehicle make, the entrant must receive the agreement in principle from the GTC Commission (GTC) by submitting a specification and sketches/photographs of the proposed vehicle. The entrant must elect a model of a vehicle in the production range on which the competition vehicle will be based, as well as the engine from the Manufacturer to be used. The details of the model of vehicle and engine will be entered in the Vehicle Technical Passport. Permission for a make or model to compete in GTC Championship racing may be withheld if it is felt acceptance would not be in the interests of GTC Championship racing.

### 1.2 Documentation will be done by completing in full all the required parameters in the Technical Passport document (TP). It is the duty of each competitor to satisfy the Controllers and the Stewards of the competition that his vehicle complies with these regulations in its entirety at all times during the competition.

### 1.3 Model of vehicle:

Vehicles belonging to a production-series distinguishable by a specific concept and external general lines of the bodywork and by an identical mechanical construction of the engine and the transmission to the wheels. To qualify as a model, the vehicle should have been produced and sold in commercial dealer outlets in South Africa. Bodywork variations concerning number of doors, hatchback or boot are permitted and will be considered to be of the same model range.

### 1.4 Safety will always be a top priority with the GTC, and unsafe vehicles, at the sole discretion of the GTC controllers will not be allowed to compete.

### 1.5 All components provided by the Series, an Authorized Manufacturer or Supplier must be used as provided, unless otherwise stated in these rules or in update circulars. All original manufacturer identification markings and/or tags must remain as supplied. For avoidance of doubt, these rules provide for no modification of any component.

### 1.6 Competitors are reminded that the onus rests on the entrant/competitor to ensure that the vehicle always complies in full with the Technical Regulations. Refer MSA GCR's 93. Ignorance of the law will be no excuse.

#### **GCR 226 INTERPRETATION OF REGULATIONS AND SPECIFICATIONS**

**In interpreting motorsport regulations and specifications "what is not specifically permitted is disallowed" is the normal concept in keeping with the French regulations on which all motor sporting regulations are based.**

Refer also GTC & Supacup Sporting SSR's art 1.2

### 1.7 The only binding means of communication shall be in writing.

### 1.8 Definitions: Refer to GTC National Sporting Regulations.

## 2. TECHNICAL INSPECTION

### 2.1 The responsibility remains with the Entrants to make sure cars conform to all rules throughout an event. All car parts and equipment must complete technical inspection as and when required by the TC, to be eligible for an event. Officials may inspect all items for conformity of the rules at any time. Completion of technical inspection does not guarantee against disqualification or other penalty if any violation is discovered during any subsequent inspection.

### 2.2 Officials may impound or confiscate a car, part, equipment, item or data associated with a car, driver or entrant, or exchange common parts between cars. In the event of damage or undue wear and tear on an exchange part, the previous owner will be liable for repair costs to bring the part back to serviceable condition.

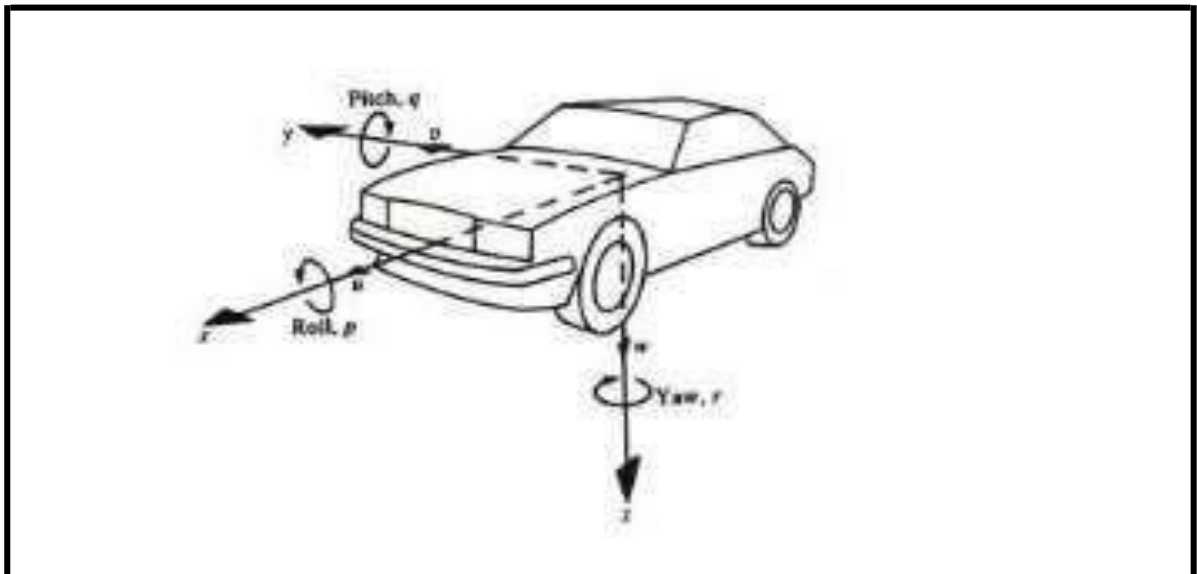
### 2.3 Certain components will be sealed or marked and registered by the Controllers, and may be inspected for regulatory conformance at a later date. Should the seal be broken or tampered with in any way without the Controller's approval, the competitor may be excluded from the event, and may lose all championship points backdating to the fitting of the seal. In the case of unmarked or differently marked components being found on a car which should have been

- marked as recorded, the above penalty may apply.
- 2.4 Attendance at any Technical check or strip and in any parc fermé will be restricted to the following people: the controllers, 1 technician from the required team and 1 nominated Team representative. Should an additional technician be required due to the work load, it may be allowed with the permission of the controllers. No other party may enter these restricted areas, and the allowed parties may only enter in the presence of the controllers, or a duly appointed official. It should be noted that no other parties will be allowed in the post race parc fermé and in the strip/technical check area. Transgression of this regulation may lead to exclusion by the Clerk of the Course. Refer GCR 252.
- 2.5 The Technical Passport as supplied by the GTC must be made available when requested by the TC
- 2.6 Officials may examine any car involved in a crash and determine if it is suitable for further participation and all members shall co-operate in the preparation of damage reports, photographs, video taping and impact recording analysis. Any entrant refusing to follow the prescribed inspection procedures may be penalized.
- 2.7 Decorative plating (chrome plating, galvanizing, anodizing, etc) may not be used on any structural metallic parts, unless supplied as such by GTC. All parts which are painted, plated or coated must be stripped before non-destructive testing and inspection.

### 3. REFERENCE PLANES & COORDINATES

- 3.1 All measurements shall be taken from the reference plane or origin of coordinates. These shall be established by GTC and cannot be modified. References will be measured using the following coordinates:
- 3.1.1 The X-axis is defined as the longitudinal axis front to rear. The zero X-coordinate is defined as the front face of the engine mounting vertical bulkhead in the chassis. The positive direction is forward from zero.
- 3.1.2 The Y-axis is defined as the lateral axis left to right. The zero Y-coordinate is defined on the longitudinal centreline of the car. The positive direction is to the right from zero.
- 3.1.3 The Z-axis is defined as the vertical axis from the ground upwards. The zero Z-coordinate is defined as the horizontal plane formed by the lower surfaces of the underfloor rectangular tubing frame. The positive direction is downwards from zero.
- 3.2 For purposes of technical inspection, the chassis reference planes and origin will be marked on each chassis where applicable. These reference points may not be modified in any way. Chassis damage will be addressed on a case-to-case basis.

#### 3.3 Vehicle Axes:



#### 4. VEHICLE DIMENSIONS

- 4.1 All dimensions are measured in mm and must remain within the following tolerances.
- 4.2 Length: 4686mm nominal (total of wheelbase + rear axle to rear edge of bumper + front axle to front of splitter)
- 4.3 Maximum body width: 1850mm (excluding external rear view mirrors)
- 4.4 Maximum track width - determined by maximum lower control arm(lca) length, std chassis upper and lower control arm mounting points, rim offset (no wheel spacers allowed). Ideally the upper half of all the wheels to be covered by the fenders in plan view in the straight ahead steering position and at racing ride height.
- 4.5 Wheelbase: 2726mm  $\pm$  20mm.
- 4.6 Roof height minimum: not less than 1115mm measured vertically from the top of the driveshaft tunnel to the highest point inside the roof.

#### 5. AERODYNAMIC AIDS

- 5.1 Both front splitter and rear wing must be run in the location and configuration as specified by GTC, including the mounting brackets. All dimensions are measured from the reference planes as specified in the GTC rear wing and splitter position drawings. Rear wing assy as supplied by GTC.
- 5.2 The controlling wing position dimensions are:
  - The vertical dimension wing height (normalised from chassis) will be 1210 $\pm$  10mm.
  - The horizontal dimension wing distance from suspension mount, parallel to floor plane, will be 1400 $\pm$ 10mm.
  - Both dimensions measured to the upper rear end of the wing centre, set at highest position ie. lowest drag. The stays may be modified to obtain the above dimensions.
- 5.3 Maximum underwing width: 1400mm inside end plates.
- 5.4 The TC will approve the position of the wing and splitter, as well as the material of splitter. The TC's decision is final.

#### 6. BODY & CHASSIS

- 6.1 All components listed in the official GTC parts list must be sourced from GTC.
- 6.2 Structural Repairs - Chassis/Safety Cage structural repairs may only be made with the written approval of a TC after inspection. The GTC Controller in his sole discretion will determine whether components are repairable or must be replaced, based on safety criteria. Once any component is deemed non-repairable it can no longer be used.
- 6.3 Repairs to body components not listed by GTC may be performed by Teams or by alternate repair companies provided the original shape and design criteria is maintained. The TC's decision is final.
- 6.4 Manufacturing of GTC listed components are not permitted. Completely re-skinning or manufacturing a new part from a mould is not permitted.
- 6.5 *Composite parts supplied by GTC, such as wheel arch extenders(spats), side sills, diveplanes, wings, splitters, intercooler air outlet duct and bonnet trims, etc., may be trimmed to suit the different car body shapes, but may not be replaced by non-GTC parts. OEM parts such as bumpers, fenders and grilles may be trimmed to suit the composite parts. Refer also GTC Technical SSR's art 6.11, art 20.6 and art 22.3*
- 6.6 Doors: inner door panels may be cut out to allow dent repairs. Only the portion of the inner panel marked by the TC may be removed, no other cut-outs or removals will be allowed. Cut-outs in doors to respect the size and position specified by GTC as recorded in the TP. Anti-intrusion bars in the front doors may not be removed. Door locks, door hinges and their mounting structures may not be modified.
- 6.7 Rear bumpers: Must remain completely standard complete with all components.
- 6.8 A metallic flat sheet "floor" may be fitted to replace the luggage compartment floor. The sheet

covers from the cockpit bulkhead to the rear panel, and from rear fender to rear fender. It is mounted on top of the rear upper chassis tubes. No additional structures allowed under the floor. The gearbox oil cooler as per SSR 22.1

- 6.9 Bonnet and Boot lids: - cooling air apertures in the bonnet to respect the size and position specified by GTC and recorded in the TP will be allowed. The aperture frames may not be higher than 40 mm above bonnet level.  
Weight reduction cut-outs in bonnet and boot lids to respect the size and position specified by GTC and recorded in the TP. Sufficient stiffness must remain in the surrounding framework to prevent floppiness in the bonnet and boot. Hinges and their mounting structures may not be modified. Lock pins must be mounted in sturdy structures.
- 6.10 To assist with cabin ventilation the following measures will be allowed:
- 6.10.1 **Rear window air outlets.**  
One horizontal slot may be cut in the centre bottom of the rear window. Size not to exceed 400 x 50mm. The bottom edge of the slot not more than 80mm above the lower edge of the window glass.  
OR  
Reverse transparent Naca ducts at the bottom of the rear window, one each side. Naca duct size not to exceed 200 x 200 x 30 mm.
- 6.10.2 **Transmission cooling.**  
Two Naca ducts may be fitted in the sides of each rear window to cool transmission components under floor. Naca duct size not to exceed 200 x 200 x 30 mm. Flex hoses from the Naca ducts with internal diameter not exceeding 76 mm will be allowed. No open holes in the interior rear floor will be allowed.
- 6.10.3 **Front doors.**  
One flex hose each side of the car through the rear view mirror base in the front door (not through the door panel) , internal diameter not exceeding 52mm to cool the driver, ECU and other components.  
OR  
The door windows front and rear may be lowered, not exceeding 50mm from fully closed, by fitting sturdy brackets to prevent the windows dropping down or flying out.
- 6.10.4 **Dashboard.**  
Parallel slots, not exceeding 5mm in width may be cut in the top of the dashboard above the ECU to provide additional ventilation.
- 6.11 *Appearance.* The installations must be neat and professional and as such approved by the TC, whose decision will be final. The modifications may be entered in the TP.
- 6.12 A cut-out in the floor in the rear seat area may be made directly above the gear selector and Shiftec to facilitate servicing and repair. The cut-out may not be in or through structural members. The cut-out must have a leakproof and flameproof removable cover to prevent fuel and flames to enter the driver's compartment.
- 6.13 The floor, the front and rear bulkheads of the driver's compartment, as well as the doors when closed, must be leakproof and flameproof to the satisfaction of the TC.

## 7. FASTENERS, HOSES & FITTINGS

- 7.1 All fasteners must be in place and operational, and must conform to the required specifications.
- 7.2 Tape is not permitted as a single source of attachment for any component. Cable ties may only be used for non-structural applications.
- 7.3 Hoses and fittings of acceptable specification may be individually sourced by teams.
- 7.4 Oil hose diameters may not be downsized from the GTC specification.

## 8. RESERVED

## 9. RESERVED

## **10. COCKPIT**

- 10.1 Seats and seat supports must conform to FIA standard 8862-2009 tech list no 40, and installed as per FIA app J, art 253.16 requirements. All seats and supports will be inspected and approved by GTC before use and are subject to re-inspection at any time.
- 10.2 An FIA approved seat belt with a turnbuckle release mechanism must be used as specified in FIA standard 8853/16 and 8854/16 technical list 57, and installed as per FIA app J, art 253.6 requirements. The life of the belts shall not exceed 5 years and must be date stamped by the manufacturer.
- 10.3 Seat belts must be worn in such a manner that they are tight and pass around the pelvis at a point below the anterior superior iliac spines.
- 10.4 Seat belts must not pass over the sides of the seat. They must pass through the seat at the bottom on each side thereby wrapping and holding the pelvis over the greatest possible area.
- 10.5 Helmets compatible with FHR systems which conform to FIA standard 8858-2010 as per FIA Technical List no 41 must be worn as specified.
- 10.6 Frontal Head Restraint (FHR) systems must conform to FIA standard 8858-2010 as per FIA technical list no 29 and must be worn as specified.

## **11. MIRRORS**

- 11.1 The standard OEM door rear view mirrors must be used.
- 11.2 The inside rear view mirror as specified by GTC and supplied by ATS is mandatory.  
Longacre Mirror Kit 14" 2-5.5x1.75

## **12. WINDSCREEN AND SIDEGLASS**

- 12.1 Standard OEM glass to be used all round with its standard OEM fitment methods. or:
- 12.2 A weight reduction process may be followed, in which acrylic glass (PMMA) may be specified for side and rear windows. The lightweight windows must be shaped to original form, and fitted by standard OEM fitment methods to retain the OEM appearance. The replacement windows must be approved by the TC's and recorded in the TP.
- 12.3 The windscreen may not be changed to acrylic, and must remain OEM certified Safety Glass as indicated by the OEM mark on the windscreen.
- 12.4 The correct acrylic glass (PMMA) for side and rear windows, 3mm thick minimum, may be obtained from ACES Plastics, Potchefstroom. Tel no: 018 294 3077; 082 893 5583; aces@yebo.co.za

## **13. FIRE EQUIPMENT**

- 13.1 Fire equipment provided by the car manufacturer must remain in the designated locations. The piped on-board extinguisher must remain active.
- 13.2 Fire Extinguishers  
All vehicles must be fitted with a minimum of one on-board piped fire extinguisher and one handheld fire extinguisher. The on-board fire extinguisher as supplied by ATS is mandatory and shall comply with FIA Art 283-2014, article 7 and technical list no 16 as fitted. A Firewire detection system may be fitted as an option.  
The handheld fire extinguisher is to be fitted in the crew compartment in a place accessible to the driver seated with safety harness buckle undone. The handheld fire extinguishers shall comply with SABS 1910 for the extinguisher cylinder with a minimum capacity of 1,5kg DCP (dry chemical powder) extinguishant. The extinguishant shall be MAP (mono-ammonia- phosphate), containing a minimum of 70% MAP in the DCP (Note the 70% is higher than the industry standard 40% and is available from ATS). The DCP shall comply with SANS 1522.  
All extinguishers must be secured by a minimum of 2 screw-locked metallic straps and the securing system must be able to withstand a deceleration of 25 g in the three normal directions. Only quick-release metal fastenings with metal straps will be accepted.

The following information must be visible on each handheld extinguisher:

- type of extinguishant
- weight or volume of the extinguishant
- date the extinguisher must be checked, which must be no more than one year after either the date of filling or the date of the last check, or corresponding expiry date. Checking to be done by SANS approved fire extinguisher service agents.
- each extinguisher must be equipped with a pressure gauge to check the pressure of the contents.

**Note:** Powder fire extinguishers in vehicles should ideally be checked every six months, as the extinguishant can compact with road vibration. Turn upside down and shake to loosen the powder.

## **14. ELECTRONIC SYSTEMS**

14.1 Life Racing is the only approved Engine Management and Data Logging supplier as administered by GTC. This includes engine ECU and datalogger, chassis and data looms, and dash display. Components must be used as supplied without modification.

14.2 The approved sensor list, *but not limited to*, for use during GTC race events is as follows:

- Damper pots (4)
- Steering pot (1)
- GPS speed sensor(1)
- Brake pressure sensors (2)
- Engine coolant pressure sensor (1)
- Gear position sensor (1)
- Gearbox oil temperature sensor (1)
- Clutch pressure sensor (1)
- Gearbox oil pressure sensor (1)
- Throttle position sensor (1)
- Engine oil pressure sensor (1)
- Engine coolant temperature sensor (1)
- Engine inlet manifold air temperature sensor (1)
- Engine inlet manifold absolute pressure sensor (1)
- Barometric pressure sensor (1)
- Wheel speed sensors (4)

The data from the above sensors may be logged and downloaded, but may not be incorporated into car feedback loops other than that specified in Life Racing systems.

14.3 *All wheel speed sensors shall be visibly and operationally disconnected and non-functional during qualifying and races. Refer articles 17.5 and 17.8*

14.4 Steering wheel - free, but must be of the quick removable type and supplied by a reputable motor sport manufacturer. No modifications allowed. The TC's decision is final.

14.5 *Important data sensors may be listed with detail specifications which will be obligatory. Listings to be done by MSA Circular.*

## **15. BOOST CONTROL**

The TC's reserve the right to specify and monitor the maximum boost pressure on all forced induction engines. Each team is responsible for controlling the boost pressure its competing car produces, which must be below that specified in the SSR's for the car in question.

Refer SSR 15.2

### **15.1 GTC BOOST MONITOR METHOD**

The GTC Life Data Logging system, or any other system specified by GTC, will be the sole measure of boost considered for technical compliance for the particular vehicle it is fitted to at the time. The boost pressures as recorded are the only pressures that will be considered when checking boost pressure conformity. Boost pressure must be within the specified limits at all times from pit lane exit or red lights off to pit lane entry during qualifying and racing.

- a) Boost pressure will be determined as follows:
  - a 3-second rolling average logged at 50 Hz will be calculated to measure maximum absolute manifold pressure compliance.
- b) Additional external boost monitors may be fitted if the TC's require such.
- c) The TC's may check the calibration of boost pressure sensors fitted on the cars if required.
- d) The maximum absolute manifold boost pressure may be changed in a MSA Circular issued not later than seven days prior to the race meeting, should conditions require such.
- e) The TC decisions will be final.

## 15.2 GTC BOOST LIMITS

The maximum absolute manifold pressure as measured on the Life Data logging system, or any other data logging system as specified by GTC, shall not exceed the following in qualifying and the races:

GTC Car	Maximum Absolute Manifold Pressure (mBar)
Toyota	2100
Volkswagen	2100
Audi	<del>2140</del> 2200
Ford	2140
BMW	2100

## 15.3 PENALTIES

The penalty for exceeding the manifold boost pressure limit, or for no data recorded is:

- a) In qualifying: drop 5 grid places for race 1 start.
- b) In a race: 20 seconds added to race time.
- c) A Joker system will be applied in the GTC class. Each entry gets three Jokers for the year. A Joker allows an over-boost of 30 mBar maximum in a race or qualifying, as measured on the Life Data Logging system, or any other boost logger system specified by GTC. The TC will record the Jokers used.
- d) The TC's decision will be final.

## 16. WEIGHT CONTROL

The TC's will use the allocation of appropriate base weight to each make and model of vehicle accepted for the series to control the race performance of that model. The TC's reserve the right to vary base weight at reasonable intervals to ensure all competitors have the opportunity to be competitive. MSA will publish the initial information in this regard before the start of each season and publish variations seven (7) days before each race meeting, as it considers necessary. The weight of the car as raced must be not less than that stipulated below. The minimum weight may be changed in a MSA Circular issued not later than seven days prior to the race meeting, should conditions require such.

### 16.1 MINIMUM WEIGHT

The specified minimum weight includes the driver and all safety equipment, fuel, lubricants and coolant. At any time during a race meeting (except practice), a car may be weighed. Any car found to be underweight following qualifying or a race shall be penalised as per art 16.4 Minimum weight is as follows:

GTC Car	Minimum Weight (kg)
Toyota	1370
Volkswagen	1370
Audi	1400
Ford	1370
BMW	1370

## 16.2 THE OFFICIAL SCALE

The official scale used at each circuit will be the sole weight measure for the event. Should there be a problem with the circuit scales, the TC may appoint a different set of scales as "the scales of the day". The onus is on each competitor to ensure their car weighs correctly on the circuit scale or scale of the day. Minimum weight shall be no less than that specified for the vehicle.

## 16.3 BALLAST

It is permitted to complete the weight of the car by the addition of one or several units of ballast, provided that they are strong unitary blocks, fixed by means of tools, and must be able to take dia. 2mm seal cables. The ballast must *be* placed on the floor of the cockpit or the luggage compartment. The ballast must be attached to the shell/chassis with at least two M8 grade 8.8 bolts, and steel counter plates minimum 2mm thick. The minimum area of contact between shell/chassis and counter plate is 40cm<sup>2</sup> for each fixing point. Proper mounting of the ballast is safety critical and must be done to the satisfaction of the TC's.

## 16.4 PENALTIES

Competitors found to be under the weight limit will be penalised as follows:

- a) If the weight is up to 2kg below the minimum weight allowed, the Joker system will be applied. Each entry gets three Jokers for the year. Thereafter the penalties in article b) will be applied. The TC will record Jokers used.
- b) More than 2 kg below the minimum, the penalty will be as follows:  
In qualifying: drop 5 grid places for race 1 start.  
In a race: 20 seconds added to race time.
- c) The TC's decision will be final.

## 17. ECU CONTROLS

### 17.1 Ignition Timing GTC:

The maximum ignition angle, **ignFinalPri1** (LifeView), shall apply as follows:

GTC Car	ignFinalPri1 (LifeView)
Toyota (BMW Engine)	14
Volkswagen	16 (1, 2, 3, 4 gear) 18 (5 and 6 gear only)
Audi (VW Engine)	16
Ford (BMW Engine)	14
BMW	14

### 17.2 Ignition Offset GTC:

The following **Crank Reference Tooth Angle (ATDC)** (LifeCal) will apply:

VW/Audi: Crank Reference Tooth Angle = 291.50 degrees

BMW: Crank Reference Tooth Angle = 258.00 degrees

### 17.3 Engine rpm limit GTC:

The engine rpm limit will be **7200** rpm maximum, as set and recorded on the Life ECU and data logger system. This is the "hard" limiter called Limiters - Rev Cut in Lifecal.

The following parameters apply:

- Limiters - Rev Cut - Engine Speed Measure = AVERAGED
- Limiters - Rev Cut - Engine Speed = 7200 rpm
- Limiters - Rev Cut - Engine Speed Hysteresis = 0
- Limiters - Rev Cut - Instant Fuel Cut = YES
- Limiters - Rev Cut - Instant Ignition Cut = YES
- Limiters - Rev Cut - Omit Ignition Cut = NO

#### 17.4 Anti-lag control: GTC:

The following ECU anti-lag parameters are mandatory for GTC cars:

Calibration Switches - Anti Lag Calibration Select - "OFF" (all cells to be set to "OFF")

Calibration Switches - ALS Enable Switch - "OFF" (all cells to be set to "OFF")

Anti-lag System - overall enable - "DISABLED"

#### 17.5 Traction Control GTC:

Traction control is not allowed. Only the following Life Racing ECU options may be activated:

K - knock control

G - gearbox control

I - direct injection

E - drive by wire

#### 17.6 Boost Map Calibration GTC:

##### LifeCal -> IO Configuration -> Pin Assignments

Inputs: Manifold Absolute Pressure 1A - AN #08 (GEN)

Inputs: Manifold Absolute Pressure 1B – Not Connected

Inputs: Manifold Absolute Pressure 2A - Not Connected

Inputs: Manifold Absolute Pressure 2B – Not Connected

##### LifeCal -> Sensors -> Defined Sensors and Trip Setups -> Barometric absolute pressure

###### **i) Barometric Pressure sensor**

Default sensor reading: 2000 mBar

###### **ii) Key-on**

Enable: ENABLED

Source: MAP 1A

Delay: 2000 ms

Minimum reading: 770 mBar

Maximum reading: 1100 mBar

Stability: 30 mBar

- Barometer Absolute Pressure (BAP) settings for the 2022 season will be as follows:

> 980 mBar – Killarney, Aldo Scribante, East London.

> 830 mBar – Zwartkops Raceway, Kyalami, Red Star Raceway, Phakisa.

- The Barometer Absolute Pressure (BAP) reading will be set by adjusting the linearisation graph of the Manifold Absolute Pressure Sensor 1A on all GTC cars at a specified time each day of an event.

- Each team will nominate a representative who will carry out this function together with the TC.

- Once the Barometric Absolute Pressure (BAP) reading is set, the calibration of the Manifold Absolute Pressure Sensor 1A may not be changed in any way unless instructed to do so by the TC, whose decision is final.

- **The settings may be checked for drift and reset by the TC's through the day.**

##### LifeCal -> Sensors -> Defined Sensors and Trip Setups -> Manifold Absolute Pressure:

###### **iii) Manifold Absolute Pressure Sensor 1A**

Input Configuration: 5V

Default Voltage High: 4.90V

Default Voltage Low: 0.10V

Filter Constant: 95.00%

Failure Rate: 100.00%/s

Recovery Rate: 20.00%/s

Linearisation:

The Manifold Absolute Pressure Sensor 1A linearisation graph must be linear with a slope of 1000mBar/Volt and the graph must pass through the

Barometer Absolute Pressure (BAP) value as detailed above for the relevant circuit being used.

The **MAP** values may be calibrated by a GTC pressure calibration jig. All GTC Life Data Logging systems must read the same pressure values as the GTC pressure calibration jig readout.

iv) **Manifold Absolute Pressure Sensor 1B**  
Linearisation - All values set to Zero

v) **Manifold Absolute Pressure Sensor 2A**  
Linearisation - All values set to Zero

vi) **Manifold Absolute Pressure Sensor 2B**  
Linearisation - All values set to Zero

## 17.7 Additional Parameters:

### **Crankshaft position sensor A**

Sensor type	- thermistor
Input filter	- off
High trigger threshold	- $f(rpm) = 3v @ all rpm$
Low trigger threshold	- $f(rpm) = 2v @ all rpm$
Signal trigger edge	- falling
Reference angle adder	- 0 @ all rpm

## 17.8 Penalties for all ECU control transgressions:

The penalty for exceeding the specified limits are:

- In qualifying: drop 5 grid places for race 1 start.
- In a race: 20 seconds added to race time.
- The TC's decision will be final.

## 18. SUSPENSION AND STEERING

18.1 All suspension components as provided by GTC must be used without modification. Adjustment using the adjustable rod-ends and different length tophats is free, provided there is always a minimum of 1½ times rod diameter thread — screwed into the control arm insert, not counting the lock-nut. Also refer art 4.4

The following "Motor Sport" bearings may be used as an option:

### Rod-end and spherical bearing specifications

NO	PART	BEARING	MAKE	PART NO	NOTES
1	Lower control arm	Rod-end	FK	RSMX 8 T	5/8" 18 tpi x 1.625" thread, 1/2" pin
		Spherical	FK	WSSX 10 T	5/8" pin, 1.1875" (30,16mm) OD, outer ring width 0.567" (14,41mm)
		Spherical	SKF	GEH 15 C*	15mm pin, 30mm OD, outer ring width 10 mm
2	Castor rod	Rod-end	FK	RSMX 8 T	5/8" 18 tpi x 1.625" thread, 1/2" pin
3	Upper wishbone	Rod-end	SKF	SAKB 12 F	M12 x 1,75 x 32mm thread, 12mm pin
		Spherical	SKF	GE 12 C*	12mm pin, 22mm OD, outer ring width 7 mm
4	Damper push rod	Rod-end	?*	?*	
		Rocker bearing	SKF	HK2012	
5	Anti-roll bar links	Rod-end	SKF	SAKB 10 F rh	M10 x 1,5 x 28mm thread, 10mm pin

		Rod-end	SKF	SALKB 10 F lh	M10 x 1,5 x 28mm thread, 10mm pin
6	Steering tie rods	Rod-end	AURORA	MMF-M12T rh	M12 x 1,25 x 33mm thread, 12mm pin

**NOTE:** The above table is an interim specification for current control arms. Next generation control arms will have standardised thread and diameters, and some above options\* will be deleted.

**a) — Aurora Bearings:**

i)	Rodend M12x1,25 RH male	MMF-M12T
ii)	Rodend M12x1,25 LH male	MBF-M12T
iii)	Rodend M12x1,75 RH male	MM-M12T
iv)	Spherical Bearing Ø12	GE 12-MTE
v)	Spherical Bearing Ø15	GEH 15-MTE

**b) — FK Bearings:**

i)	Spherical bearing $\phi$ 5/8"	WSSX10T
ii)	Rodend 1/2" 20 tpi	JMX-8T
iii)	Rodend 5/8" 18 tpi	JMX-10T
iv)	Rodend 5/8" 18 tpi, 1/2" pin	RSMX-8T

**c) — NMB Bearings:**

i)	Rodend 5/8" 18 tpi, 1/2" pin	ARHT8ER
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The minimum necessary suspension component modifications to fit the rod-ends will be allowed, provided there are no geometry changes. Cross bars already fitted to some lower front wishbones will be allowed until they have to be replaced, **but no new cross bars because of the welding risk.**

- 18.2 Toe, camber and castor may be adjusted, provided **the control arm welded assemblies and all** suspension mounting points are within the chassis manufacturer **and the rod-end manufacturer specifications.** **Different length tophats are free. The lower control arm length when measured between rod-end centre and spherical bearing centre when fitted in the car may not exceed 450 mm. The castor rod length when measured between rod-end centre and spherical bearing centre when fitted in the car may not exceed 580 mm. These dimensions apply to all four lower wishbones.**

Also refer art 4.4

- 18.3 The steering column assembly must be installed and used as supplied by GTC. No modifications.
- 18.4 Anti-roll bars must be used without modification as supplied by GTC. They may be adjusted or disconnected, but no parts may be removed.
- 18.5 Suspension rockers must be run as supplied by GTC without modification.
- 18.6 The steering rack **and hydraulic pump** must be used as supplied and specified by GTC. The position of the steering rack must remain in the centre of the car or as specified by GTC.
- 18.7 Uprights, hub assemblies and wheel nuts must be used as specified and supplied by GTC. Front and rear, left and right upright components and assemblies are interchangeable and may be used as required. Wheel bearings as provided by GTC. Hybrid and/or ceramic bearings are not allowed.

## 19. DAMPERS AND SPRINGS

- 19.1 The only approved damper which may be used are the Ohlin Dampers as specified and supplied by GTC. The dampers must be run without modification as supplied by GTC. The dampers will be marked and sealed. The damper specification for all GTC cars is: GTC Specification Card OHLINS TTX361L version 1, dated 01/03/2016, and obtainable from GTC.

*The benchmark damper dynamometer will be the WCT Ohlin dyno. Teams will be required to run all dampers on this dyno to obtain dyno sheets per damper.*

The damper specification sheet can be downloaded at the following link:

[Click here to download and view the specification sheet](#)

- 19.2 Damper configuration is specified and may not be changed. The dampers have external adjusters

on the damper body, which may be set by the teams.

- 19.3 Only linear rate steel springs are permitted, and only the rates as specified by GTC.

Front Springs on Front and Rear Springs on Rear.

- 19.4 Front springs: 01093-64/160 Rear springs: 21040-39/110  
01093-69/170 21040-44/120  
01039 93-74/180 21040-49/130

- 19.5 No packers, bump rubbers or any other elastic devices to modify the spring rate will be allowed.

## 20. BRAKES AND BRAKE DUCTS

- 20.1 Brakes must be used in its entirety as supplied by GTC.

- 20.2 Brake calipers must be used as supplied. Any devices designed to push or pull back pistons (other than knock back springs) are not permitted. Caliper seals must be used as supplied by GTC without modification.

- 20.3 The brake pads as supplied by GTC must be used without modification.

- 20.4 TILTON pedal box as specified must be used:

Tilton 2-Pedal Assembly (Overhung) Aluminium, Part no: TE/BRAK/72608

**To be phased out and replaced by:**

**Tilton 2-Pedal Assembly (Overhung) Aluminium, Part no: 72-808**

Tilton and AP Racing Master cylinders are team options.

- 20.5 Brake fluid is a team sourced option.

- 20.6 The front brake ducts, in the bumper as well as on the uprights, are mandatory and must be used as supplied by GTC without modification. The brake duct hose diameter may not exceed 76 mm. Tape is the only approved method for regulating airflow into the brake ducts. No additional cutouts may be made in the front bumper/grille assembly and front fenders to allow for additional brake cooling air. As an option steel backplates may be fitted to the uprights to assist with ducting air into the brake disc for cooling purposes. *The composite duct mounted on the upright may be replaced by an aluminium fabricated part made to the same main dimensions as the composite part.* Ducting subject to the approval of the TC's.

*As an option the composite brake duct as supplied by GTC may be replaced by a similar duct made in aluminium, and supplied by GTC.*

## 21. ENGINES

- 21.1 The race engine shall be from a mass produced production car sold through dealer outlets and in Gp N trim to start off with. The Gp N engine may be modified to dry sump and other specifications as specified in these technical regulations. The regulations may be updated by MSA circular as and when required. The engine must be used as specified, without any additional modifications or additions whatsoever. Any variation from specifications regarding installation, oil pump, oil sump, oil tank, oil and filters, fuel, turbocharger, exhaust or waste gate, etc, may result in race exclusion and loss of championship points. Teams are to follow operating instructions as provided by the controllers, who will seal all race engines. Broken seals without a TC's approval may result in exclusion and loss of championship points. Should a team want to open an engine for repair, the TC should be contacted, and arrangements may have to be made for a TC to be present when the seals are removed. The TC may then check engine specifications if so required. The TC will reseal the engine after repair. The onus is on the Team to ensure the engine is to specification, sealed and recorded. Refer Art's 2.1 and 2.3. The correct engine number must always be recorded in the TP. *The Fast Development engine dynamometer will be the benchmark engine dyno where engines may be compared for BoP purposes.*

- 21.2 The engine's drive belts must always be connected and operational.

- 21.3 The engine installation position is as specified in the GTC technical specifications, and may not be modified. Any variation from specifications regarding installation position will result in race exclusion and loss of championship points.

- 21.4 Anti-freeze containing glycol will not be allowed in the coolant water due to the additional fire risk and motor cycle regulations when racing on the same day.

- 21.5 Reserved

- 21.6 The inlet air filter as supplied by GTC must be used without modification.

- 21.7 The lubrication breather system must be equipped in such a way that the overflow oil flows into an oil catch tank. The tank must have a capacity of 2 litres for cars with a cubic capacity up to 2000 cc. The

container must be made either out of transparent plastic (oil temperature resistant) or metal which must include a transparent window.

- 21.8 Valve lift: engines with variable valve lift shall be locked in the maximum lift position. The hydraulic valve lifters must remain standard OEM and may not be modified.
- 21.9 The EWP 150 alloy water pump part no 8060 may be used as an alternative to the BMW 150 liter/min electrical pump.
- 21.10 The BMW N20 engine may only use the steel fabricated exhaust manifold made to the GTC jig. The tube size on the cylinder head side is ID 37,5 ± 1mm. The flange on the turbo side mates to the Garrett AR 61 V-band turbo flange.
- 21.11 Conrods and Pistons:  
The following connecting rods and pistons may be used in addition to the standard OEM components as a reliability option. The standard OEM bore and stroke must be retained.
- 21.11.1 BMW N20 engine standard bore:  
*Standard bore and stroke: 84,0 x 90,1 mm*  
Piston part no: Carillo SC 7700  
Connecting rod part no: Carillo BM\_BN20\_OHS\_5683B6S  
The cylinder bores may be re-sleeved to standard OEM bore size.
- 21.11.2 VW EA888 CJX engine standard bore:  
*Standard bore and stroke: 82,5 x 92,8 mm*  
Piston part no: Carillo SC 7633  
Connecting rod part no: Carillo VW\_BTSL\_3HS\_5670B66  
Main bearing cap stud part no: ARP 204-5408  
The cylinder bores may be re-sleeved to standard OEM bore size.
- 21.12 Crankshaft, Flywheel and crankshaft damper:
- 21.12.1 The BMW N20 engine may use a steel flywheel fitted to the crankshaft with external diameter not less than 210 mm, and width not less than 20 mm. Mass not be less than 5,50kg including bolts and hub. The crankshaft may not weigh less than 14,6kg, including drive hub and bolts. Grinding of the crankshaft journals and fitting commercially available oversize bearings will be allowed with the approval of the TC. The BMW N20 OEM balance shafts are optional.
- 21.12.2 The VW EA888 CJX engine may use a steel flywheel fitted to the crankshaft with external diameter not less than 198 mm, and width not less than 20mm. Mass not less than 6,85kg with integral adapter and bolts. Mass not less than 4,2kg without adapter. The crankshaft may not weigh less than 14,8 kg, including trigger wheel, without bolts and adapters. Grinding of the crankshaft journals and fitting commercially available oversize bearings will be allowed with the approval of the TC. The VW EA888 OEM balance shafts are optional.
- 21.12.3 The VW EA888 engine may use a hydraulic crankshaft vibration damper fitted to the nose of the crankshaft. "Fluidamper" part no 551231. Weight ≈2,4 kg.
- 21.13 Dry sump oil pump system:
- 21.13.1 Pump and crankshaft drive pulleys:
- *the engine oil pump, StockCarProducts part no SCP -201, 3 stage dry sump pump, oil tank, brackets, pulleys, pipes and fittings must be used as supplied by GTC.*
  - fit the pump pulley retainer as per GTC drawing GTC-OP-01 (+ GTC-OP-02 optional) to prevent the pulley moving forwards and backwards on the shaft, preventing loss of the drive belt.
  - both the drive pulleys have to be reworked to fit the drive belts. The outer diameter (narrow "teeth") of the pulleys have to be decreased slightly to allow the belt to carry the load on the rounded portion of the teeth without the belt touching the narrow ends of the teeth. The best way to do this is to clamp the pulley in a lathe chuck and run fine emery tape over the outside diameter. Take care not to make a cone shape. It only requires 0,1 to 0,2 mm material removal, as well as deburring or slight chamfering of the narrow teeth outer corners. Put a belt around the pulley, pull tight by hand, hold against a light. A sliver of light should be visible between belt and narrow ends of teeth, whilst no light should be visible through the rounded parts. Engineer's blue can also be used to check. Always inspect the inside of the belts for undue wear on the narrow flat portion between the rounded teeth, as well as in the corners between the narrow flat portion and the rounded teeth.
  - Wear on the two sides of the belt indicate mis-alignment between the two pulleys.

- Inspect for stone damage. Small stones kicked up and getting caught between belt and teeth can punch through the belt backing and cause failure. Belts should always be inspected after a trip into the kitty litter.

#### 21.13.2 Pump stay:

Fit the pump bracket stay from the back of the pump housing to the engine block as per GTC drawing no tba This component is required to prevent the pump moving when a belt load is applied. The pump movement may lead to belt mis- alignment and loss of the drive belt.

#### 21.13.3 Dry Sump:

The original BMW dry sump may be used, or the upgraded dry sump may be used.

The upgraded oil sump as supplied by GTC to increase the scavenge oil flow is as follows:

- The windage tray drains increased in size by knife-edging the upper edge and chamfering the lower edge. The no 4 cylinder drain extended to coincide with no 4 big end bearing.
- The three jig ribs lowered by 10mm to lower the oil level if collecting on the windage tray. The ribs must also be scalloped at the block mounting face sides to allow free oil flow from the cylinder head drains.
- The mesh in the oil galley may be removed and replaced by hydraulic in- line mesh filters.
- The bottom cover plate may be recessed by 4mm to increase oil volume. The cover bolt holes may be counter- bored by 4mm to fit Allen cap screws in place of countersink screws.
- Fit a grub screw in the BMW N20 block oil gallery to blank off the oil flow where the original oil pressure control valve was located.
- Remove the blank-off in the scavenge pump outlet, and fit a second -12 return hose to the oil tank. The second return fitting to be fitted on the tank must be fitted to direct the oil flow in the same tangential direction as the original return fitting. This is to ensure centrifugal downflow on the tank sidewall to assist with de-aeration.

21.14 The Volkswagen EA888 CJX engine may optionally disconnect the long-short inlet tract butterfly system in the inlet manifold, and accordingly remove the splitter blades in the inlet ports.

#### 21.15 Engine static volumetric compression ratio:

This specification is intended to keep engines racing at minimum cost, and not as a performance enhancer. Please treat as such.

##### 21.15.1 Volkswagen EA888 CJX engine:

- i) Compression ratio not to exceed 9,6:1 (standard CR is 9,3:1)
- ii) The unused gear teeth of the OEM oil pump may be removed from the crankshaft.
- iii) Cylinder block height measured from block deck to sump face: 278,0 mm standard. Deck skim 0,15 mm allowed to 277,85 mm minimum.
- iv) Cylinder head gasket thickness. Standard compressed is 0,8 mm. Non- standard gaskets with thickness up to 1,1 mm maximum compressed will be allowed.
- v) Piston protrusion above block deck will be allowed, but squish must be a minimum of 0,6mm without machining the piston crown or the combustion chamber.
- vi) Any of the above specified combinations of head skim, block skim and gasket thickness will be allowed so as to remain within the 9,6:1 CR maximum and respect the minimum squish. The 9,6:1 CR is the primary parameter in this regulation.
- vii) The combustion chamber and ports shall remain standard OEM, but a combustion chamber volume of not less than 43,5cc will be allowed.
- viii) *The camshafts shall remain OEM standard.*

##### 21.15.2 BMW N20 engine:

- i) Compression ratio not to exceed 10,1:1 (standard CR is 10,05:1)
- ii) The unused gear teeth of the OEM oil pump may be removed from the crankshaft.
- iii) Cylinder block height measured from block deck to sump face: 221,60 mm standard. Deck skim 0,50 mm allowed to 221,10 mm minimum.
- iv) Cylinder head gasket thickness. Standard compressed is **1,0 0.7** mm with Carillo pistons (std N20 engine is 0,7 mm). Non-standard gaskets with thickness up to 1,3mm maximum compressed will be allowed.
- v) Piston protrusion above block deck will be allowed, but squish must be a minimum of 0,8 mm without machining the piston crown or the combustion chamber.

- vi) Any combination of head skim, block skim and gasket thickness will be allowed so as to remain within the 10,1:1 CR maximum and the minimum squish. The 10,1:1 CR is the primary parameter in this regulation.
- vii) The combustion chamber and ports may be modified to the specified standard by van der Linde Systems. Valve sizes must remain standard. A combustion chamber volume of not less than 40,0 cc will be allowed.
- vii) *The standard engine crankcase closed breather system has small vacuum passages in the cylinder inlet ports. These passages may be blanked off by tight-fitting grub screws.*
- viii) *The camshafts shall remain OEM standard.*

#### 21.16 Cylinder head:

21.16.1 To improve engine reliability the following specialised studs will be allowed to replace the cylinder head bolts as an option:

- BMW N20 engine: designed and supplied by GTC.
- VW EA888 CJX engine: ARP 204-4302

21.16.2 BMW and VW cylinder heads to be built and maintained by van der Linde Systems.

21.16.3 The VW EA888 engine may alternatively use the uprated valve springs to stop valve float.

- inlet: 94 lbs at installed height 36,6 mm
- exhaust: 100 lbs at installed height 35,6 mm

### 22. **RADIATORS, COOLERS and AIR PIPES**

22.1 Only the approved radiators, charge air intercoolers and oil coolers as specified by GTC may be used without modification. Water, oil and intercooler pipes must remain generally as supplied. Combustion air pipe ID not to exceed the nominal throttle body ID. The standard OEM throttle body and inlet manifold pressure sensor mounted where it is easy to reach and visible. Position and lay-out to the approval of the TC.

BMW N20 throttle body ID at butterfly valve: **63.7mm**

VW EA888 CJX throttle body ID at butterfly valve: **56.7mm**

The specified water radiator must be fitted in the designed position in the front clip on top of the splitter. The specified engine oil cooler may be fitted in front of, or behind the water radiator. Oil pipe sizes as specified by GTC. The specified gearbox air to oil cooler must be fitted at the rear of the car in the position on the chassis brackets as specified by GTC. The specified cooling air inlet duct with pipes from the interior as per art 6.10.2 may be fitted. No outlet ducts will be allowed. *A tube and fin steering oil cooler may be fitted in front of, or behind the water radiator, size not to exceed 285 x 70 x 50 x 8 tube rows.* All subject to the approval of the TC's.

22.2 The fitting of a micro water spraying system in front of the radiators will be allowed. A 10 liter (max) water tank may be fitted with an electric pump controlled by a driver actuated on-off switch, or temperature and/or boost controlled switch actuated by the ECU. The sprayers may not be positioned to spray water into the engine combustion air inlet in any way. The TC's will approve the position of the sprayers, and their decision is final. Only clean water, suitable for human consumption, may be used. NO additives will be allowed. No weight compensation will be allowed. The minimum race weight remains as per the Weight Regulations

22.3 The following charge air intercooler cores must be used:

GTC supplied core - CSF 8047 12 fin rows, size 560 x 218 x 90. Alternatively the JCW Mini F56 charge air cooler core, part no. 175 176 176 00 may be used. Aluminum tanks to be fabricated to suit. The outlet and inlet tube sizes in the tanks not to exceed 63,5 (2½ inch) and 50,8(2 inch) mm OD respectively. The tank design is free, but must be approved by the TC's. The intercooler must be fitted on top of the water radiator as approved by the TC's. An intercooler air exit may be made in the bonnet as per clause 6.9 Ducting of air to the water radiator, oil cooler and charge air cooler is free, provided no additional cutouts are made in the chassis, body, grille or bumper. Ducting subject to the approval of the TC's and recorded.

### 23. **TURBO & WASTEGATE**

Turbochargers are provided by GTC and must be used without modification. Complete Turbocharger:

- Garrett GTX3071R Gen II ~~AR61~~ V-band in & out.

*Car no 40, GTC VW Golf 8, is given dispensation to use the ex-Moss Precision Turbo water-cooled wastegate converted to air-cooled, for the remainder of the 2023 racing season, or when it has to be replaced, whichever is shorter.*

- Assy Part no: 856801-5018S.
- Compressor part number: 851154-5002S. 0,60 AR
- Turbine part number: 740902-0036. 0,61 AR

Wastegate:

- Precision Turbo and Engine PW46 External Wastegate, Part no PBO 085-2000
- Precision Turbo PW 46 water-cooled waste gate. Part no PBO 085-2200
- Tial MV-R water-cooled waste gate.
- Turbosmart WG45HP Hypergate 45 mm 14 psi waste gate. Part no TS-0506-1040/1

Blow-off valve:

- Excell Performance 38 mm dump valve.
- Tial Sport QRJ 38 mm.
- Precision Turbo SN- 000003307 50 mm part no PB 0083-2005.

## **24. ELECTRICAL SYSTEM**

- 24.1 Only the GTC approved electrical systems may be fitted in the cars. No modifications, additions or deletions are allowed.
- 24.2 The alternators are Team sourced but has to fit in the specified position on the gearbox without modifications to the gearbox or body. The alternator drive belt must always be connected and the alternator operational.
- 24.3 The starter motors are Team sourced but has to fit in the specified position on the gearbox without modifications to the gearbox or body. The starter motor has to be capable of starting a hot engine stalled on the track without a slave battery.
- 24.4 The Life PDM may be doubled to allow 20 channels if required and supplied by GTC only.
- 24.5 Battery - Team sourced.
- 24.6 The external emergency shutoff switches must be clearly marked using the decal as specified in the GCR's.

## **25. FUEL & FUEL SYSTEM**

- 25.1 The only approved fuel is 110 octane petrol supplied by AMTEC fuels & Lubricants. Fuel must be stored and used at ambient temperature and no additives whatsoever may be used. Fuel may be sampled and subjected to baseline testing at any time. Fuel in sealed drums may be required to be stored in a lock-up fuel store at the circuits for random dispensing by the TC's. The Teams are responsible for delivering the fuel to the store before the race, and collecting after the race.
- 25.2 The fuel system must remain as supplied by GTC. This includes the fuel pump and filter. FT 3-1999 fuel cells may be fitted as an option.
- 25.3 Plumbing of the fuel lines are free, provided the internal hose diameters are not changed. When flexible, these lines must have threaded, crimped or self-sealing connectors and an outer braid cover, resistant to abrasion and flame (does not sustain combustion). The hoses must be clamped to the car at regular intervals to prevent abrasion and pinching.
- 25.4 Lines containing fuel or hydraulic fluid may pass through the cockpit, but without any connectors inside except on the front and rear bulkheads according to FIA Drawings 253-59 and 253-60, and on the braking circuit and the clutch fluid circuit.
- 25.5 The fuel tank, fuel pumps and fuel filters must be separated from the driver by a bolted and sealed liquid-proof and fireproof protection.
- 25.6 There must be at least two 10mm holes in the tank compartment floor at the rear on each side to drain any fuel which may have leaked from the tank and fittings.
- 25.7 All the fuel pumps must only operate when the engine is running, and during the starting process.
- 25.8 The position and the dimension of the fuel filler hole as well as that of the cap may be changed as long as the new installation does not protrude beyond the bodywork and guarantees that no fuel may leak into the interior compartment of the car.
- 25.9 If the filler hole is situated inside the car, it must be separated from the cockpit by a liquid-proof and fireproof protection.

- 25.10 The ventilation line of the fuel cell must have the same specifications as those of the fuel lines, and must be fitted with a system complying with the following conditions:
- Gravity activated roll-over valve
  - Float chamber ventilation valve
  - Blow-off valve which opens at a maximum overpressure of 200 mbar, fitted in parallel to the gravity activated and float chamber valves when closed.
- 25.11 If the internal diameter of the fuel tank breather venting tube is greater than 20 mm, a non- return valve homologated by the FIA and as defined in Article 253-14.5 must be fitted.

## 26. EXHAUST

The exhaust system basic lay-out and position must remain as specified by GTC. Tubes may only be steel, round and the maximum diameter is 77 mm. To limit heat damage to components, removable heat insulating wrapping of the inlet air and exhaust ducting, including turbocharger will be allowed. Removable heat shields may be added. Ceramic and other coatings will not be allowed. All subject to the approval of the TC's.

## 27. CLUTCH ASSEMBLY

- 27.1 The GTC specified clutch is the Tilton 3 plate, 5½", metallic clutch assy. Available from ATS.  
Tilton Clutch Assy 67-003HG OT-III 5.5" 3-plate. Part no: TE/PCLH/67003HG Tilton Disc Pack 64140-9-ACC- 36 3 discs. Part no: TE/DISC/64140
- 27.2 The clutch master cylinder bore size is a team choice. Refer art 20.4

## 28. PROPSHAFT and DRIVESHAFTS

Only parts provided by GTC are permitted. These must be used as supplied without modification.

- 28.1 The fabricated tube and splined end propshaft assembly is GTC supplied.
- 28.2 The driveshafts and CV joints are GTC supplied.

## 29. GEARBOX

- 29.1 Use of the Albins ST 6 gearbox system as supplied by GTC is mandatory.
- 29.2 The gearbox position must remain as per GTC specification and may not be changed.
- 29.3 Coatings of any kind or Super Finishing is not permitted
- 29.4 Shiftec is the only GTC approved shift mechanism. This must be used without modification and as supplied by GTC. The Motec shift compressor may also be used as an alternative.
- 29.5 All six (6) speeds must remain in the gearbox during on-track activity. Reverse must be functional at all times during the race, and the driver must be able to engage it from the cockpit.
- 29.6 The locked differential must be run as supplied, and to the GTC specification.
- 29.7 Accessories - filters, screens and magnetic plugs are allowed provided they serve no other purposes.
- 29.8 The bell housing must be used as designed and supplied without modification.
- 29.9 The only gearbox internals approved for use are as follows:

RATIOS	
INPUT	1.000
DROP GEAR	1.091 or 1.1304
1ST	2.357
2ND	1.824
3RD	1.474
4TH	1.238
5TH	1.043
6TH	1.000
Final Drive	3.273
Diff Ramps	locker

Drop gear ratio long - 23:23 teeth. 1.091:1  
- gear part numbers Albins P13810 and P13811

Drop gear ratio short - 23:26 teeth. 1.1304:1

- gear part numbers Albins P13808 and P13809

NOTE: do not swop the 23 teeth gears. The tooth shape is not the same.

### 30. WHEELS

GTC will supply the only approved wheels permitted to be used during all race weekends, series open tests and promotor test days. Wheels may not be modified, and may only be repaired with the approval of GTC.

### 31. TYRES

31.1 Only the following tyre compounds and construction can be used by GTC:

- i) Dunlop 280/680R18 S slick soft GTC.
- ii) Dunlop 280/680R18 D92 rain tyre.
- iii) Order directly from ATS.

31.2 Tyre use:

31.2.1 A total of 60 slick tyres for the *year* may be used. The *year* starts on 1 January and ends on 31 December. Three new sets of slick barcoded tyres must be bought for the first event. 1 new set must be used for each of the 2 practice sessions at Kyalami. The third new barcoded set must be used for Qualifying and Races 1 and 2. The balance of 48 new slick tyres is for the 6 events (8 new tyres per event). Should events be added or cancelled, a pro-rata adjustment will be made. The 60 slick tyres per car will be barcode scanned and allocated to a specific car for the *year* as the scanned slick tyres for that car during events. No other tyres may be fitted at any time during a GTC event.

31.2.2 Between *events* tyres are free. The free tyres will not be GTC barcoded and may not be used as scanned slick tyres for practice in *GTC events*.

31.2.3 Race Weekend:

Qualifying: four new slick tyres must be used. These tyres must be barcode scanned, and *checked if* recorded before qualifying.

Races 1 and 2: the four slick tyres from qualifying must be used.

Practice: four new scanned slick tyres must be used for *the entire duration* of practice 2. Previously scanned used slick tyres must be used for practice 1 and 3.

Race damaged tyres: previously scanned used slick tyres of equivalent condition, approved and recorded by the TC. The replacement tyre must be from the barcoded batch for the same car as the damaged tyre.

31.3 Rain tyres: not part of the 60 allocated tyres. Only to be used after declared a wet race. Refer GCR circuit Racing SSR's art 44 Wet Weather Start (p94). Competitors wishing to scrub new wet weather tyres in practice, may do so with the permission of the CoC.

31.4 Tyres for longer distance races to be advised if any changes.

31.5 The 60 new tyres will be scanned, allocated and recorded per car by ATS on delivery. ATS will keep record of the allocated tyres for the *year*. Additional markings may be added at the race circuit. Scanning by the supplier or the TC may be done at any time during the event. No tyre swapping between cars or teams.

31.6 It is the responsibility of the competitor / entrant to ensure that the tyre markings remain on the tyres, as the use of incorrect or unmarked tyres will result in the application of penalties to the competitor from the session or race concerned. The penalty for using tyres unidentified or incorrectly identified are:

- i) In practice: 5 seconds added to qualifying time *for each incorrect tyre*.
- ii) In qualifying: back of the grid for race 1 start for one or more incorrect tyres.
- iii) In a race: 30 seconds added to race time *for each incorrect tyre*.

31.7 Only Nitrogen or air may be used to inflate tyres.

31.8 Pressure controlling devices / valves and inserts, solid or liquid, in the tyres are not allowed.

31.9 Teams must not chemically treat or alter the tyres.

31.10 Tyre blankets, tyre warming devices and heaters are not allowed.