



2021

MSA National Technical Regulations

Global Touring Car



Version 3

19 May 2021

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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

<i>Modified SSR / ART</i>	<i>Date applicable</i>	<i>Date of Publication</i>	<i>Clarifications</i>
ART 31,2, 31.3, 31.4	Immediate	19 May 2021	Tyre use amended
ART 31.2, 31.3, 31.6	Immediate	8 April 2021	Tyre use amended

**GLOBAL TOURING CAR
CHAMPIONSHIP**

**2021 STANDING SUPPLEMENTARY REGULATIONS
Part 2: GTC TECHNICAL REGULATIONS**

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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 automobile 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 quantities exceeding 500 in one year 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 and 176. 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.
- 1.7 The only binding means of communication shall be in writing.
- 1.8 Definitions: Refer to GTC National Sporting Regulations.

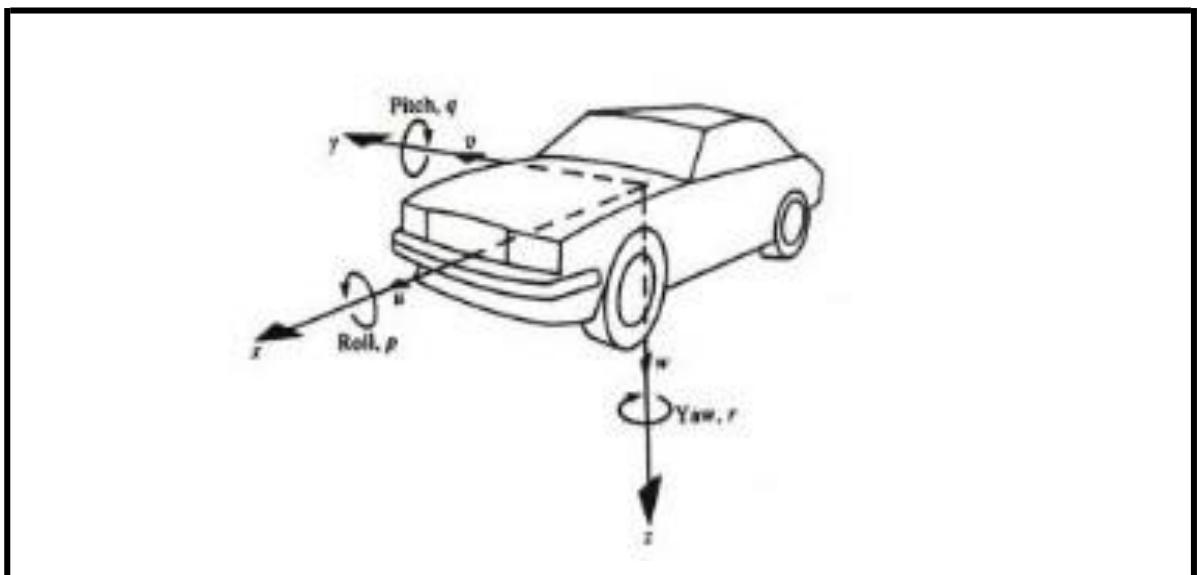
2. TECHNICAL INSPECTION

- 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 Controllers 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 instruction and supervision, the competitor will be excluded from the event, and will 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 exclusion penalty will 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 submitted to technical inspection at the start of any on-track event for the chassis entered.
 - 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 wing + 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 and in the straight ahead steering position.
- 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's will approve the position of the wing and splitter, as well as the material of splitter. Their decision is final.

6. BODY & CHASSIS

- 6.1 All chassis and body 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 specific 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. Fender spats may be blended neatly into the body without changing the shape. 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 Reserved.
- 6.6 Doors: inner door panels may be cut out to allow dent repairs. Only the portion of the inner panel marked and approved by the controllers 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 gear box 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.

a) 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 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.

a) 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.

6.10.5 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.

6.11 A cut-out in the floor under the rear seat area may be made directly above the gearbox 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.

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. WEIGHT

Refer: **2021 GTC SSR's Part 1: Sporting Regulations**

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 8853/98 technical list 24, 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 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.

12. WINDSCREEN AND SIDEGLOSS

- 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.
The correct acrylic glass(PMMA) for side and rear windows, 3mm thick minimum, may be obtained from ACES Plastics, Potchefstroom.
Tel nos: 018 294 3077; 082 893 5583; aces@yebo.co.za
The windscreen may not be changed to acrylic, and must remain OEM certified Safety Glass as indicated by the OEM mark on the windscreen.

13. FIRE EQUIPMENT

- 13.1 Fire equipment provided by the chassis 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.
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 electronics supplier unless otherwise specified. This includes but is not limited to engine ECU, chassis and data looms, data acquisition, sensors, steering wheel and display. All cars must use data recorders as supplied by GTC. Components must be used as supplied without modification.
- 14.2 The approved sensor list for use during GTC race events is as follows:
- Damper pots (4)
 - Steering pot (1)
 - GPS speed sensor(1)
 - Brake pressure sensors (2)
 - Coolant pressure sensor (1)
 - Gear position sensor (1)
 - Gearbox temperature sensor (1)
 - Exhaust gas temperature sensor (1)
 - Clutch pressure sensor (1)
 - Gearbox pressure sensor (1)
 - Throttle position sensor (1)
- 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 Wheel speed sensors and wireless data download will not be allowed during qualifying and races, but may be used during practice. Equipment must be visibly disconnected or removed for qualifying and races. Wireless equipment must be mounted in the driver's compartment where it is clearly visible for the TC's and officials to see if it is disconnected.
- 14.4 Steering wheel - The steering wheel must be used as supplied . Modifications to the steering wheel are not permitted. Position of controls may be changed to suit driver preferences. The TC's decision is final.
- 14.5 Exhaust gas temperature sensor to be sourced by competitors.
- EGT: Thermon part no. USTA1SX-KY3868A (U) D3 obtainable from Toni.Zeeman@thermon.com 021 762 8995
 - EGT weld-on fitting: Swagelok part no. SS-3M0-1-2W obtainable from Nangamso.Mnguni@Johannesburg>Swagelok.com - 011 609 7925
 - EGT to be fitted in exhaust manifold between 20 to 40 mm from Turb V-band flange.

15. Reserved

16. Reserved

17. Reserved

18. SUSPENSION AND STEERING

- 18.1 All suspension components as provided by GTC must be used without modification. Adjustment using the adjustable rod-ends is free, provided there is always more than 1½ diameter of thread used, not counting the lock-nut. The following "Motor Sport" bearings may be used as an option:

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 Φ12 GE 12 MTE
- v) Spherical Bearing Φ15 GEH 15 MTE

FK Bearings:

- i) Spherical bearing φ 5/8" WSSX10T
- ii) Rodend ½"-20 tpi JMX -8T
- iii) Rodend 5/8"-18 tpi JMX-10T
- iv) Rodend 5/8"-18 tpi, ½"pin RSMX-8T

NMB Bearings:

i) Rodend 5/8"-18 tpi, ½"pin ARHT8ER

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 they are within the chassis manufacturer's suspension specifications. Top hats with shims are free.
- 18.3 Shim type toe adjusters for the rear toe-rods will be supplied by GTC as an option.
- 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 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 must be used as supplied and specified 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, and will be serviced by GTC only. The damper specification for all GTC cars is: GTC Specification Card OHLINS TTX36IL version 1, dated 01/03/2016, and obtainable from GTC.
- 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.
- 19.4 Front Springs on Front and Rear Springs on Rear.

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

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 Master cylinder bore sizes are a team sourced option.
- 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. Ducting subject to the approval of the TC's.

21. ENGINE

- 21.1 The engine as supplied by the manufacturer will be in Group N specification with dry sump and water pump modifications and any other specifications stipulated by GTC. The engine must be used as supplied, without any additional modifications or additions whatsoever, unless specified in a circular. Any variation from specifications regarding installation, oil pump, oil sump, oil tank, oil and filters, fuel, turbocharger, exhaust or waste gate will 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 will 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.

- 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 The ECU is provided, controlled and administered by GTC. Software changes will take place under the direction of GTC only. Once set, the ECU will be locked selectively by the TC or appointee.
- 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 or 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 standard bore:
 - 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 standard bore:
 - Piston part no - Carillo SC 7633
 - Connecting rod part no - Carillo VW_BTISI_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 Flywheel and crankshaft damper:
 - 21.12.1 The BMW N20 engine may use a steel flywheel fitted to the crankshaft with external diameter not exceeding 210 mm, and width not exceeding 20 mm. Mass not less than 4,6 kg including bolts. Refer drawing VM Innovations GTC-FLW-01-01. The BMW N20 OEM balance shafts are optional. The standard crank oil pump drive gear teeth may be removed.
 - 21.12.2 The VW EA888 CJX engine may use a steel flywheel fitted to the crankshaft with external diameter not exceeding 200 mm, and width not exceeding 20mm. Mass not less than 5,85 kg with integral adapter and bolts, and mass not less than 4,2 kg without adapter. Refer TMR drawings dated 31/03/2017. The VW EA888 OEM balance shafts are optional. The standard crank oil pump drive gear teeth may be removed.
 - 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: 2400 g

21.13 Dry sump oil pump system:

21.13.1 Pump and crankshaft drive pulleys:

- 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. Also 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. This component is required to prevent the pump moving when a belt weight 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.

All the above changes are optional for BMW N20 as well as VW EA888 engines.

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:

- 1) Compression ratio not to exceed 9,6:1 (standard CR is 9,3:1)
- 2) The unused gear teeth of the OEM oil pump may be removed from the crankshaft.
- 3) 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.
- 4) 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.
- 5) 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.
- 6) 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.
- 7) The combustion chamber and ports shall remain standard OEM, but a combustion chamber volume of not less than 43,5cc will be allowed.

21.15.2 BMW N20 engine:

- 1) Compression ratio not to exceed 10,1:1 (standard CR is 10,05:1)
- 2) The unused gear teeth of the OEM oil pump may be removed from the crankshaft.
- 3) 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.
- 4) Cylinder head gasket thickness. Standard compressed is 1,0 mm with Carillo pistons (std N20 engine is 0,7 mm). Non-standard gaskets with thickness up to 1,3 mm maximum compressed will be allowed.
- 5) 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.
- 6) 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.
- 7) 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.

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 VM Innovations /vic@vminnovate.co.za
- 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 to the GTC cylinder head specification.

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

- 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 diameter 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 layout to the approval of the TC.
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 may be fitted. No outlet ducts will be allowed. 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 Sporting Regulations
- 22.3 The following charge air intercooler core 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. Aluminium tanks to be fabricated to suit. The inlet and outlet 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 Turbo Direct (Chris Kambouris / 011 3925195 / chris@turbodirect.co.za / leigh@turbodirect.co.za) . These are the only the turbochargers approved by GTC and must be used without modification.

- Complete Turbocharger:
- Garrett GTX3071R Gen II AR61 V-band in & out.
 - Assy Part no: 856801-5018S.
 - Compressor part number: 851154-5002S. 0,60 AR
 - Turbine part number: 740902-0036. 0,61 AR
- Wastegate:
- Xcell Performance 50mm water-cooled 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.

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 approved 90 A and 120 A alternators are supplied by GTC, or may be team sourced with written approval from the TC's. The alternator drive belt must always be connected and the alternator operational.
- 24.3 The GTC supplied starter motors must be fitted. Alternatively lower cost local starter motors may be team sourced with written approval from the TC's.
- 24.4 The Life PDM may be doubled to allow 20 channels if required and supplied by GTC only.
- 24.5 Battery - The only battery approved for use is the one provided by GTC.
- 24.6 The external emergency shutoff switch must be clearly marked using the decal supplied by GTC.

25. FUEL & FUEL SYSTEM

- 25.1 The only approved fuel is 110 octane petrol supplied by AMTEC fuels & Lubricants. See GTC Sporting Regulations and Specifications para 9. Fuel must be stored and used at ambient temperature and no additives whatsoever may be used. Fuel may be sampled and subjected to testing at any time.
- 25.2 The fuel system must remain as supplied by GTC. This includes the fuel pump and filter specifications.
- 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 hole/s 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 leaks into the interior compartments 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 as far as the valves described below 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 with a maximum overpressure of 200 mbar, working when the float chamber ventilation valve is 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 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.
- 27.2 The clutch master cylinder bore size is a team choice.

28. PROPSHAFT, DRIVESHAFTS & HUBS

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

28.1 Propshaft: The propshafts are under development and a work-in-progress. The current fabricated and machined propshafts must be maintained and run as effective as possible until further notice.

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 with the written approval of the TC.

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 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 1.13
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

- 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. They are 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:

31.1.1 Dunlop 280/680R18 S slick soft GTC.

31.1.2 Dunlop 280/680R18 D92 rain tyre.

31.1.3 order directly from ATS.

31.2 Tyre use:

A total of 56 tyres for the season may be used. The season starts with the first race and ends with the last race. The pro-rata number from the Port-Elizabeth event onwards will be 40 tyres

31.2.1 Sprint Race Weekend:

Qualifying: four new scanned tyres must be used. These tyres must be ID scanned, and recorded before qualifying.

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

Practice: four new scanned and recorded, and/or previously scanned and recorded, used tyres may be used.

Race damaged tyres: previously scanned and of equivalent condition used tyres as approved and recorded by the TC.

31.2.2 Endurance Race Weekend: (as classified in the event SR's > 30 minute races)

Qualifying: four new scanned tyres must be used. These tyres must be ID scanned, and recorded before qualifying.

Races 1, 2 and 3(where applicable): The four tyres from qualifying must be used. The four new scanned tyres used in practice may also be used if required.

Practice: Four new scanned and recorded, and/or previously scanned and recorded, used tyres may be used.

Race damaged tyres: previously scanned and of equivalent condition used tyres as approved and recorded by the TC.

31.2.3 Rain tyres: not part of the 56 allocated tyres. Only to be used after declared a wet race.

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

31.3 The 56 new tyres will be scanned, allocated and recorded per car by ATS on delivery. ATS will keep record of the allocated tyres for the season. Additional markings may be added at the race circuit. Scanning by the supplier or the the TC may be done at any time during the event. No tyre swapping between cars or teams.

31.4 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 may will result in the exclusion of the offending competitor from the session or race concerned application of penalties to the competitor from the session or race concerned. The penalty for using tyres unidentified or incorrectly identified are for each tyre

i) In practice: 5 seconds added to qualifying time

ii) In qualifying: back of the grid for race 1 start.

iii) In a race: 30 seconds added to race time.

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

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

31.7 Teams must not chemically treat or alter the tyres.

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