

# 2026 FORMULA 1 POWER UNIT TECHNICAL REGULATIONS

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## Convention:

**Pink text:** changes from Issue 6, as approved by the WMSC on 11/06/2024

**Green text:** Comments and Explanations (non-regulatory)

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## ARTICLE 1: GENERAL PRINCIPLES

NOTE: These Technical Regulations primarily address matters related to Power Units that will be used in the FIA Formula One World Championship starting from 2026. In due course, the FIA will extend these Technical Regulations to include the full set of Technical Regulations (including matters not related to the Power Unit) applicable to the Championship, and also prescribe the conditions for participation in the 2026 Championship.

### 1.1 Formula One World Championship

1.1.1 The FIA will organise the FIA Formula One World Championship (the "Championship") which is the property of the FIA and comprises two titles of World Champion, one for drivers and one for constructors. It consists of the Formula One Grand Prix races which are included in the Formula One calendar and in respect of which the ASNs and organisers have signed organisation agreements with the FIA. All the participating parties (FIA, ASNs, organisers, Competitors, Power Unit (PU) Manufacturers, Suppliers and circuits) undertake to apply as well as observe the rules governing the Championship and, where applicable, must hold FIA Super Licences which are issued to drivers, competitors, officials, organisers and circuits, or register in accordance with the provision of the Regulations.

1.1.2 The Championship and each of its Competitions are governed by the FIA in accordance with the Regulations, as defined below.

### 1.2 Regulatory Framework

1.2.1 The regulations applicable to the Championship are the International Sporting Code (the "Code"), the Formula One Technical Regulations (the "Technical Regulations"), the Formula One Sporting Regulations (the "Sporting Regulations"), and the Formula One Financial Regulations (the "Financial Regulations"), as amended from time to time, together referred to as the "Regulations".

1.2.2 Subject to Article 1.2.3, these Regulations are issued by the FIA and apply to the whole calendar year referred to in the title and to the Championship taking place within that calendar year. Any changes made by the FIA for safety reasons may come into effect without notice or delay.

1.2.3 These Technical Regulations regard the FIA Formula One World Championship starting from 2026, and additionally outline various requirements that the PU Manufacturers and their Suppliers must satisfy in the period 2022-2025 in order to be able to homologate a Power Unit for the 2026 FIA Formula One World Championship.

### 1.3 Interpretation of and amendments to these Technical Regulations

1.3.1 The definitive text of the Technical Regulations shall be the English version which will be used should any dispute arise as to their interpretation.

1.3.2 Headings in this document are for ease of reference only and do not affect the meaning of the Technical Regulations.

1.3.3 Unless stated otherwise, references to "Articles" herein are to articles of these Technical Regulations.

1.3.4 In the sense of the Regulations, terms referring to natural persons are applicable to any gender.

1.3.5 Any terms not defined in these Technical Regulations have the meaning given to them in the "FIA 2022 Formula 1 Technical Regulations - Issue 12" (the "2022 Technical Regulations"). In the event that ascribing the meaning of a defined term in the 2022 Technical Regulations to

an undefined term in these Technical Regulations results in a significant impact to the design of the 2026 Power Unit, PU Manufacturers bound by these Technical Regulations may ask the FIA for guidance and the FIA will then issue guidance on the meaning of the relevant term. Such guidance will be communicated by the FIA to all PU Manufacturers.

- 1.3.6** Any amendments to these Technical Regulations that do not relate specifically to the Power Unit or that relate to matters of form rather than substance (such as re-numbering, reference corrections, etc.) will not be subject to the approval of the PU Manufacturers. Any amendments to these Technical Regulations that relate to substantive matters concerning the Power Unit will be subject to the prior approval of the PU Manufacturers in accordance with the 2026 F1 PU Governance Agreement, as referenced in Article 1.1 of Appendix 5.

## **1.4 Dangerous construction**

The stewards may prohibit the participation of a vehicle whose construction is deemed to be dangerous. Should the relevant information become apparent during a session, such a decision may apply with immediate effect.

## **1.5 Compliance with the regulations**

Formula 1 Cars must comply with these regulations in their entirety at all times during a Competition.

Should a Competitor or PU Manufacturer introduce a new design or system or feel that any aspect of these regulations is unclear, clarification may be sought from the FIA Formula One Technical Department. If clarification relates to any new design or system, correspondence must include:

- a. A full description of the design or system.
- b. Drawings or schematics where appropriate.
- c. The Competitor or PU Manufacturer's opinion concerning the immediate implications on other parts of the car of any proposed new design.
- d. The Competitor or PU Manufacturer's opinion concerning any possible long-term consequences or new developments which may come from using any such new designs or systems.
- e. The precise way or ways in which the Competitor or PU Manufacturer feels the new design or system will enhance the performance of the car.

## **1.6 New systems or technologies**

Any new system, procedure or technology not specifically covered by these Technical Regulations, but which is deemed permissible by the FIA, will only be admitted until the end of the Championship during which it is introduced. Following this the Formula One Commission will be asked to review the technology concerned and, if they consider (in their sole discretion) that such new system, procedure, or technology adds no value to Formula One in general, it may be specifically prohibited by the FIA.

## **1.7 Duty of Competitor and PU Manufacturer**

It is the duty of each Competitor to satisfy the FIA and the stewards that its Formula 1 Car complies with these regulations in their entirety at all times during a Competition. With regard to PUs used on a Formula 1 Car, this duty and responsibility also extends to the PU Manufacturer.

The design of the car, its components and systems shall, with the exception of safety features, demonstrate their compliance with these regulations by means of physical inspection of hardware or materials. Unless explicitly requested by an Article, no mechanical design may rely upon software inspection as a means of assessing compliance.

Due to their nature, the compliance of electronic systems may be assessed by means of inspection of hardware, software, and data.

CAD models may be requested by the FIA in order to check compliance with the Regulations. Such models should be supplied in a format and by a method specified by the FIA. In such cases, scanning technology will be used by the FIA to check that the physical car is the same as the inspected CAD models.

Each Competitor and each PU Manufacturer must ensure that all relevant personnel (whether employee, consultant, contractor, secondee or any other type of permanent or temporary personnel) associated with its participation in the Championship are appropriately informed with respect to the ways in which their areas of responsibility may impact the compliance of the Competitor and/or PU Manufacturer (as applicable) with the Regulations.

Each Competitor and each PU Manufacturer must ensure that the FIA ethics and compliance hotline with respect to the Regulations is clearly communicated to all relevant personnel.

## ARTICLE 5: POWER UNIT

### 5.1 Definitions ICE

#### 5.1.1 Power train

The power unit and associated torque transmission systems, up to but not including the drive shafts.

#### 5.1.2 Power unit (PU)

The internal combustion engine and turbocharger, complete with its ancillaries, the energy recovery system and all actuation systems and PU-Control electronics necessary to make them function at all times.

#### 5.1.3 Engine (ICE)

The internal combustion engine including ancillaries and actuator systems necessary for its proper function.

#### 5.1.4 Turbo Charger (TC)

The assembly of a compressor used for pressure charging of the engine, a turbine connected to the engine exhaust system used to drive the compressor, the drive system between the compressor and the turbine and their respective housings and bearings.

#### 5.1.5 Engine cubic capacity

The volume swept in the cylinders of the engine by the movement of the pistons. This volume shall be expressed in cubic centimetres. In calculating engine cubic capacity, the number Pi shall be 3.1416.

#### 5.1.6 Combustion chamber

An enclosed space in the engine cylinder controlled by the opening and closing of the poppet valves in which combustion takes place.

#### 5.1.7 In-cylinder pressure sensor

A sensor whose function is to measure the pressure in the combustion chamber.

#### 5.1.8 Knock sensor

A sensor whose sole function is to measure the knock intensity in the combustion chamber.

#### 5.1.9 Fuel injector

Any device or component that delivers fuel into an oxidiser.

#### 5.1.10 High pressure fuel pump

A mechanical device whose sole function is to pressurise the fuel to the pressure required for the high -pressure injection. It may be electronically controlled.

#### 5.1.11 Fuel Flow meter

A sensor whose function is to measure the flow of the fuel passing through it.

#### 5.1.12 Ignition Coil

Assembly including an induction coil that supplies the voltage to the spark plug.

#### 5.1.13 Ancillaries

A component whose function is to support the primary activities of a main system to allow it to operate.

#### **5.1.14 Pressure charging**

Increasing the weight of the charge of the fuel/air mixture in the combustion chamber (over the weight induced by normal atmospheric pressure, ram effect and dynamic effects in the intake and/or exhaust system) by any means whatsoever. The injection of fuel under pressure is not considered to be pressure charging.

#### **5.1.15 Compressor inlet**

A component containing a duct of closed cross section through which all air destined for combustion enters any compressor.

#### **5.1.16 Compressor outlet**

One or more components each of them containing a duct of closed cross section through which all air destined for combustion exits the compressor.

#### **5.1.17 Engine Plenum**

A pressurised vessel upstream of the combustion chamber containing all of the air destined for combustion. This vessel (or vessels) may be comprised of several components. Pipes, as generally understood, conveying air from the compressor to the engine are not part of the engine plenum.

#### **5.1.18 Main Oil Tank**

The main oil tank is a singular vessel directly connected to the engine oil feed at the inlet of the oil pressure pump.

#### **5.1.19 Auxiliary Oil Tank (AOT)**

An Auxiliary Oil Tank (AOT) is a singular vessel connected to the engine whose sole function is to hold engine oil for the replenishment of the engine lubrication system.

#### **5.1.20 Engine exhaust system**

Assembly of parts conveying the engine exhaust fluids from the cylinder head up to but not including the turbine and/or wastegate. It does not include the turbine or wastegate exit tailpipe(s). A set comprises left and right assemblies.

#### **5.1.21 Valve Stem**

The valve stem is the part of the component that slides within the valve guide during operation.

#### **5.1.22 Wastegate**

A device used to release exhaust fluids from the complete exhaust system, anywhere downstream of the exhaust valves and upstream of the turbine wheel.

#### **5.1.23 Pop-off valve**

A device used to release air from the engine intake air system, anywhere downstream of the compressor wheel and upstream of the intake valves, and to recirculate it upstream of the compressor wheel.

#### **5.1.24 Cylinder Liner**

A component installed into the crankcase whose primary function is to provide a durable surface on which the piston and piston rings run. There must be only a single cylinder liner per cylinder bore and the liner may also provide the sealing interface between the cylinder bore and the cylinder head.

#### **5.1.25 Insert**

An insert within a PU component is a non-dismountable part whose function is solely to locally support a function of this component.



#### **5.1.26 Top Deck (Appendix 2, Drawing 6)**

The single plane surface of the block, normal to the cylinder centreline coincident with the primary connection between the crankcase and the cylinder head.

#### **5.1.27 Deck Height (Appendix 2, Drawing 6)**

The distance on each bank between the crank axis and the top deck.

#### **5.1.28 Journal bearing diameter (Appendix 2, Drawing 7)**

The maximum diameter of the bearing journal across its entire width excluding fillet radii.

#### **5.1.29 Journal bearing width (Appendix 2, Drawing 7)**

The minimum width of the inner bearing surface at its minimum diameter. This excludes any additional bearing shell width resulting from edge chamfers, radii or any other relieving feature.

#### **5.1.30 Exclusivity agreement**

An exclusivity agreement is deemed to be any agreement concluded between the supplier of such parts (including any PU manufacturer) and any PU Manufacturer, which has the purpose and/or the effect of restricting or delaying the possibility for such a supplier:

- a. to consider any request from another PU Manufacturer; and/or
- b. to supply, under reasonable commercial conditions, a part meeting the applicant's specifications.

#### **5.1.31 Cylinder Head**

The Cylinder Heads are the components that close all the cylinders of each bank of the engine and form the structure between the combustion chambers and the camshaft bearings between at least the front of the forward cylinder bore and the rear of the rearward cylinder bore on each bank.

#### **5.1.32 Heat Shield**

A heat shield is a component or an assembly whose primary function is to shield components from thermal radiation and is not permanently attached to another component or assembly (such as by riveting, bonding, welding, brazing, or plating).

#### **5.1.33 Throttle**

A variable geometry device or arrangement which restricts the airflow into the ICE by means of a variable area restriction within the intake. The throttle may only comprise of one or more rotating butterfly valve or one or more rotating barrel valve.

#### **5.1.34 Thermal Insulation**

Thermal insulation is a part fitted adjacent to a component whose primary function is to reduce the heat transfer between that component and its surroundings.

#### **5.1.35 Trumpet**

A trumpet is a component(s) that extends the geometrical path of air destined for combustion directly into each individual cylinder. The trumpet(s) may also include any Throttle(s) permitted by 5.8.3.

### **5.2 Definitions ERS**

#### **5.2.1 Energy Recovery System (ERS)**

A system that is designed to recover energy from the car, store that energy and make it available to propel the car and, optionally, to drive any ancillaries and actuation systems necessary for its proper function.

#### **5.2.2 MGU-K Control Unit (CU-K)**

The bi-directional DC-AC power converter sits between the ES and the MGU-K. It is composed of power modules, DC-link capacitor(s), gate driver board(s), CUK logic board, and may contain other devices that perform functions related to the CU-K operation such as DC bus discharge circuits, sensors, Y-capacitors, housing, and cooling systems.

### 5.2.3 ES main enclosure (ESME)

External structure that encloses at least the elements listed in Article 5.19.7 and allows their installation inside of the ERS Reference Volume (RV-PU-ERS). It may be composed of elements rigidly linked to form a continuous closed volume.

### 5.2.4 Motor Generator Unit - Kinetic (MGU-K)

The Motor Generator Unit - Kinetic is the rotating electromechanical machine that converts electrical energy into mechanical energy (a 'motor') and vice versa (a 'generator').

### 5.2.5 MGU-K mechanical transmission

The MGU-K mechanical transmission is defined as the device that provides any mechanical speed reduction between the MGU-K and a rotating part of the ICE specifically and only for the MGU-K. If the MGU-K mechanical transmission connects to a shaft/component on the ICE that is already rotating at a speed above or below crank speed for other purposes, that existing gear ratio (driving some part of the ICE other than the MGU-K) is not included in the MGU-K transmission. The MGU-K mechanical transmission may be wholly mounted on the ICE or on the MGU-K or partly on both.

### 5.2.6 Energy Store (ES)

The part of ERS that stores energy, including its safety control electronics and a minimal housing.

### 5.2.7 DC-DC Converter

An electronic circuit or electromechanical device, only capable of consuming energy, that converts a source of direct current (DC) from one voltage level to another for use by the electrical and electronic components of the car and power unit.

### 5.2.8 DC-DC Unit

The unit containing the DC-DC(s) that converts from high to low voltage.

### 5.2.9 Power Box Unit

An electronic device used to drive the high pressure fuel pump, injection and ignition system.

### 5.2.10 Control Electronics - Power Unit (PU-CE)#

Any component used to control Power Unit sub-systems and containing programmable semiconductors or high-power switching devices.

It includes, but is not limited to, MGU-K control unit (CU-K), power box, DC-DC Unit, power distribution board.

It excludes any FIA Standard ECU, FIA sensors and ES safety control electronics.

### 5.2.11 ERS-K

The only part of the ERS allowed to propel the car. It is composed of the MGU-K, the CU-K and the ERS-K phase conductors.

### 5.2.12 Battery management system (BMS)

The BMS is a set of important safety systems of the ES. The main function is as a monitoring and a charge-balancing circuit to keep all cells under normal operating conditions, within the specified parameters e.g. voltage, temperature, current, state of balance, defined by the manufacturer.

#### **5.2.13 High Voltage**

Classification of an electrical component or circuit whose maximum working voltage is > 30 V AC rms or > 60 V DC.

#### **5.2.14 Hazardous electric shock**

Physiological reaction generated by an electrical current greater than 2mA passing through the human body.

#### **5.2.15 Car main ground**

The electrical reference potential of all conductive parts of the car, typically located on the ICE block.

#### **5.2.16 Exposed conductive part**

Conductive part of the electric equipment, which can be touched by a test finger according to IP2X and which is not normally live, but which may become live under single fault conditions.

#### **5.2.17 Live part**

Conductive part which belongs to a high voltage component or circuit in normal use and which has an insulation resistance lower than 100Ω/VDC and 500Ω/VAC.

#### **5.2.18 Basic insulation**

Insulation applied to live parts which provides protection against hazardous electric shock in case of contact.

#### **5.2.19 Supplementary insulation**

Independent insulation applied in addition to basic insulation for protection against hazardous electric shock in the event of a failure.

#### **5.2.20 Double insulation**

Insulation comprising both basic insulation and supplementary insulation. Double insulation is composed of two layers of insulators with two different failure modes. Those two layers can be tested separately.

#### **5.2.21 Reinforced insulation**

Insulation of hazardous-live-parts which provides a degree of protection against electric shock equivalent to double insulation.

#### **5.2.22 Maximum working voltage**

Highest value of AC peak voltage or of DC voltage that can occur under any normal operating conditions according to the manufacturer's specifications, disregarding residual variation of the DC voltage shorter than 100µs. Field weakening is considered as a normal operation, therefore a MGU with a maximum back-EMF higher than the maximum working voltage established by this technical regulation is allowed.

#### **5.2.23 Electronic Box**

Unit that contains at least 1 microcontroller.

#### **5.2.24 Breakout Box**

Unit used to perform low voltage looms adaptation.

#### **5.2.25 ES cell**

The elementary part of the ES that produces and stores electricity through electro-chemical reactions.

#### 5.2.26 Cell Tabs

Cell connection terminals which connect the cathode and anode electrodes to the external circuit.

#### 5.2.27 HV DC Bus

The set of electrical conductors which are not part of the ES or any PU-CE and that serves as the pathway to the electrical energy directly used to propel the car flowing between those elements.

#### 5.2.28 ERS Auxiliary Circuit

Any circuit inside or outside the ES and PU-CE elements which does not form part of the high voltage DC bus current flow path that connects the ES to the CUK and DCDC, and which is typically designed to monitor or to perform functionalities allowing the ERS to operate correctly and safely. Example of auxiliary circuits include, but are not limited to, voltage measurement circuits, insulation measurement circuits, contactor pre-charge circuits, battery (dis)charge connections, cable disconnect detection circuits.

#### 5.2.29 ERS-K Phase Conductors

The components allowing electrical current to flow between the CU-K and the MGU-K windings composed of conductors (e.g. busbars, cables or wires) and respective connection interfaces not part of the ESME or MGU-K.

### 5.3 Engine specification

5.3.1 Only 4-stroke engines with reciprocating pistons are permitted.

5.3.2 Engine cubic capacity must be 1600cc (+0/-10cc).

5.3.3 All engines must have six cylinders arranged in a 90° "V" configuration and the normal section of each cylinder must be circular.

All six cylinders must be of equal capacity.

5.3.4 Engines must have two intake and two exhaust valves per cylinder.

Only reciprocating poppet valves with axial displacement mechanically actuated by the camshafts are permitted.

The sealing interface between the moving valve component and the stationary engine component must be circular. The sealing surfaces on the stationary engine component must be either the cylinder head itself defined by 15.8.8 g), any coating on the cylinder head permitted by 15.7.2, or the conventional inserts permitted by 5.3.7 a).

5.3.5 Engine exhaust gases may only exit the cylinder head through outlets outboard of the cylinder bore centre line and not from within the "V" centre.

5.3.6 The crankshaft may only have three connecting rod bearing journals.

5.3.7 In a Cylinder Head, only inserts approved by the FIA Technical Department will be allowed. The total volume of the inserts listed in a. to c. below within the Cylinder Head cannot be more than 3% of the total volume of each Cylinder Head and these must be confined to:

- a. Conventional valve seat inserts
- b. Conventional valve guide inserts
- c. An insert concentric to the spark plug axis with a maximum outside diameter of 15mm

An additional allowance of 1% of the total volume of each cylinder head is permitted for inserts other than those mentioned above, but none of these inserts can be exposed to the combustion.

- 5.3.8 Unless specified otherwise, the total volume of inserts within an ICE component cannot be more than 10% of the total volume of the component. Inserts in other components are not restricted.

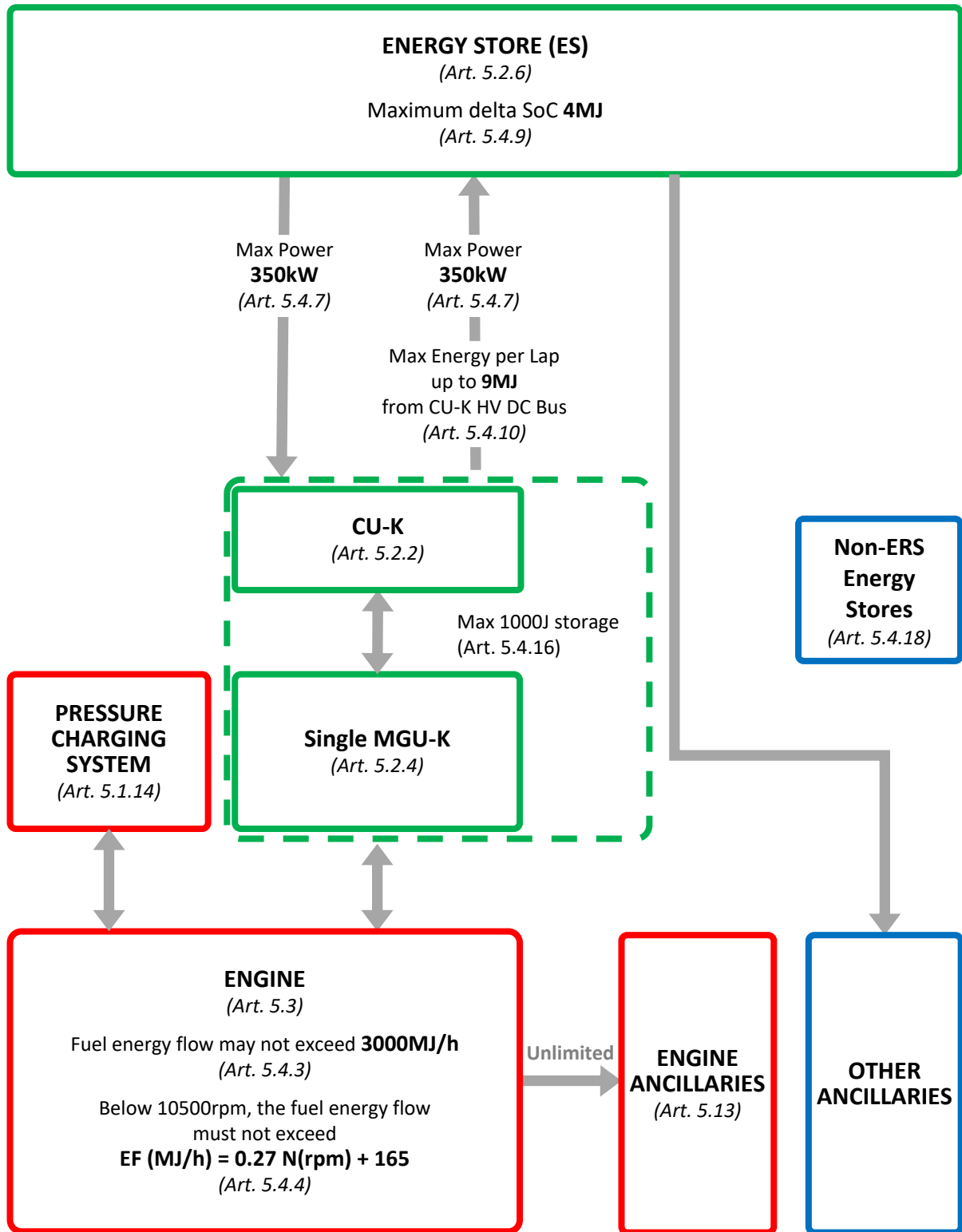
*[Note: Further discussions will take place to define exemptions to the limitation of inserts volume in ICE components.]*

- 5.3.9 All power unit breather fluids may only vent to atmosphere and must pass through a single orifice which is positioned behind  $X_R=0$ , inboard of  $Y=100$  and below  $Z=400$ . No breather fluids may re-enter the power unit.
- 5.3.10 With the exception of leakage through joints (either into or out of the system) all and only the air entering the compressor inlet must enter the combustion chambers.
- 5.3.11 The power unit may be equipped with a maximum of two wastegates and two pop-off valves. Only poppet valves with a circular sealing interface and axial displacement are permitted for the wastegate and pop-off valves.
- 5.3.12 Engine oil consumption must never exceed 0.30l/100km in normal operating conditions.
- 5.3.13 All wastegate exit fluids must pass through a wastegate tailpipe which must be connected to the turbine tailpipe, downstream of the turbine wheel.
- 5.3.14 For the purpose of component classification in Table 1 of Appendix 3, thermal insulation that is permanently attached to another component or assembly (such as by riveting, bonding, welding, brazing, or plating) will be considered part of that component or assembly.

## 5.4 POWER UNIT ENERGY FLOW

- 5.4.1 The use of any device, other than the engine described in 5.3 above, and the ERS-K, to propel the car and/or harvest energy, is not permitted.
- 5.4.2 Energy flows, power and ES state of charge limits are shown in the energy flow diagram below:

**2026 POWER UNIT ENERGY FLOW**  
 Legend: Engine – ERS – Other



When the car is on the track a lap will be measured on each successive crossing of the timing line, however, when entering the pits the lap will end, and the next one will begin, at the start of the pit lane (as defined in the F1 Sporting Regulations).

- 5.4.3 Fuel energy flow must not exceed 3000MJ/h.
- 5.4.4 Below 10500rpm the fuel energy flow must not exceed  $EF(MJ/h)=0.27*N(rpm)+ 165$
- 5.4.5 At partial load, the fuel energy flow must not exceed the limit curve defined below:
- $EF (MJ/h) = 380$  when the engine power is equal to or below -50kW
  - $EF (MJ/h) = 9.78 \times \text{engine power (kW)} + 869$  when the engine power is above -50kW

*[Note: Further discussions will take place to fully evaluate the benefits and consequences of art. 5.4.5 and whether modifications are necessary.]*

5.4.6 When assessing compliance with the above two articles, the fuel mass flow rates measured by the fuel flow meter will be converted in the SECU in fuel energy flow rates using the energy density and the LHV of the fuel as measured by the FIA. The procedure which will be used to determine these values may be found in the Appendix to the Technical and Sporting Regulations.

5.4.7 The absolute electrical DC power of the ERS-K may not exceed 350kW.

5.4.8 Additionally, the electrical DC power of the ERS-K used to propel the car may not exceed:

- i)  $P(kW) = 1800 - 5 * \text{car speed (kph)}$  when the car speed is below 340kph  
 $P(kW) = 6900 - 20 * \text{car speed (kph)}$  when the car speed is equal to or above 340kph  
 $P(kW) = 0$  when the car speed is equal to or above 345kph
- ii) In “override” mode up to:  
 $P(kW) = 7100 - 20 * \text{car speed (kph)}$  when the car speed is below 355kph  
 $P(kW) = 0$  when the car speed is equal to or above 355kph

The details of the “override” mode are specified in the Sporting Regulations.

5.4.9 The difference between the maximum and the minimum state of charge of the ES may not exceed 4MJ at any time the car is on the track.

5.4.10 The energy harvested by the ERS-K, as measured at the CU-K HV DC Bus, must not exceed 8.5MJ in each lap, subject to the following additional conditions:

- i) Exceptionally, this limit on energy harvested in each lap may be reduced to 8MJ at Competitions where the FIA determines that the maximum possible energy harvested per lap under braking and in partial load is no more than 8MJ. These Competitions and the vehicle fundamentals used for the calculation of maximum energy harvested will be provided in the Appendix to the Technical and Sporting Regulations.
- ii) Up to 0.5MJ additional energy may be harvested in each lap subject to the conditions specified in Article xxx of the Sporting Regulations.

5.4.11 The MGU-K mechanical torque magnitude may not exceed 500Nm. The torque will be referenced to the crankshaft speed and a fixed efficiency correction of 0.97 will be used to monitor the maximum MGU-K mechanical torque.

5.4.12 With the exception of cars starting or resuming the race from the pit lane, the MGU-K may only be used during a standing start once the car has reached 50km/h.

5.4.13 The amount of stored energy in any ES may not be increased by more than 100kJ whilst the car is stationary in the pit lane or garage during the Qualifying Session or during a Race pit stop.

#### 5.4.14 ERS Policing

- a. In order to verify that the energy and power requirements of the ERS are being respected, all cars must be fitted with two DC sensors. Those sensors may only be installed outside the sealed perimeter of any PU-CE and used as specified below:

One DC sensor must be connected to the ES high voltage negative DC pole to measure all electrical energy into and out of the energy store via the HV DC Bus.

The other DC sensor must be connected to the CUK high voltage positive DC pole to measure all electrical energy and power into and out of the ERS-K via the HV DC Bus.

The DC sensors voltage sense wire must be connected to the dedicated measurement point defined by the FIA Technical department.

- b. Electrical energy may not flow from or into the ES and CU-K without being directly measured by one of the two DC sensors, previously listed. This must be guaranteed by design and verifiable by inspection.
  - c. The design of the ERS and the installation of the two DC sensors must be approved by the FIA.
  - d. An airgap of 1mm must be present between the CU-K and any other consumer fitted inside the ES main enclosure. The links allowed to cross the airgap separation volume include, but are not limited to: the elements of the HV DC bus, ERS-K phase conductors, cooling system components, mechanical support(s), low voltage looms and connectors dedicated for communication lines, low voltage power supply, interlock loop systems, temperature sensors, MGU position sensors, EMC screening and any other sensor used by the ERS-K. Those links must be minimal and essential to the CU-K operation.
  - e. Details of each ERS auxiliary circuit and its connection to any pole of the ERS high voltage DC bus must be present in the technical dossier, as stated in Article 5.4.14.c. It shall include circuit diagrams and a table with maximum and minimum values of the electrical current that can flow from or into the HV DC bus under normal operating conditions.
  - f. With exception of auxiliary circuits, electrical energy with an instantaneous power higher than 2W may not flow from CU-K logic or driver boards (usually low voltage parts) into the CU-K power stage (usually HV). This must be guaranteed by design and verifiable by inspection.
  - g. The CU-K must exclusively perform functionalities related to the operation of any MGU-K sensor and to the power conversion between the CU-K DC poles input and the CU-K output going into the MGU-K.
  - h. A preliminary technical dossier must be submitted to the FIA before the 21<sup>st</sup> of March of the year preceding the year of introduction. It must include details justifying all the points mentioned in this article. They will be pre-homologated by the FIA. Any further modification following the pre-homologation must also be submitted to the FIA.
- 5.4.15** Cars must be fitted with homologated sensors which provide all necessary signals to the FIA data logger in order to verify the requirements defined in this article are being respected.
- 5.4.16** With exception of the ES, the cumulative amount of stored energy on ERS electronic components supplied by voltage sources should not be higher than 1000J.
- 5.4.17** When the car is on the track the maximum instantaneous electrical power linked to the operation of auxiliary circuits (5.2.28) connected on the ES side of the ESIVTNeg and drawn by the BMS directly from the ES cells must not exceed 50W in total. This must be guaranteed by design and verifiable by inspection.
- 5.4.18** With the exception of the ERS, the cumulative amount of energy stored in the Power Unit should not be higher than 300kJ. Additionally, no more than 20kJ can be recovered per lap at a rate greater than 2kW.
- 5.4.19** When the car is stationary on the grid prior to a standing start the MGU-K torque may only be negative (i.e. charging the ES) except for torque requested by an MGU-K active damping strategy whose sole purpose is to protect the MGU-K mechanical transmission.



## 5.5 Turbo Charger

5.5.1 Pressure charging may only be affected by the use of a sole single stage, single sided Turbo Charger compressor with a single inlet linked to a sole single stage Turbo Charger turbine by a shaft assembly. The compressor blades must be attached to a common hub surface and all air entering the combustion chamber must pass through the single exducer of these blades. The shaft must be designed so as to ensure that the shaft assembly, the compressor and the turbine always rotate about a common axis and at the same angular velocity. With the exception of incidental heat transfer from the Engine exhaust system to its surroundings, the use of the Turbo Charger turbine is the sole permitted means of extracting energy from the exhaust fluids and transferring energy into the rotating parts of the Turbo Charger. The energy of the rotating parts of the Turbo Charger turbine may not be transferrable to any other component.

Only parts approved by the FIA Technical Department may be used. Further to the provisions of the Article 18.3.5, the approval of the FIA Technical Department is conditional upon the PU manufacturer, intending to use such parts during a Championship season undertaking not to conclude any exclusivity agreement (as defined by Article 5.1.30) for the supply of such parts with the supplier of these parts. The approval request form must be sent by the PU Manufacturer to the FIA before the 1st of November of the preceding year.

- 5.5.2 Engine intake air pressure must be less than 4.8 barA at all times. The pressure of the air will be measured by two FIA approved and sealed devices through which all air destined for combustion must flow. These devices must be installed in FIA approved locations situated in the engine intake air system downstream of the charge air cooling system (as described in Article 5.25.2).
- 5.5.3 The axis of the turbocharger shaft must be parallel to Y=0, inboard of Y=25 and at an angle of 0 +/- 1 degree to X=axis.
- 5.5.4 The total mass of the turbocharger (TC) must be no less than 12kg.
- 5.5.5 Referring to Drawing 4 of Appendix 2, the turbocharger compressor and turbine must satisfy the following dimensional constraints. Only compressor and turbine wheels approved by the FIA Technical Department will be allowed:
- The compressor exducer blade outer diameter (A) must lie between 100mm and 110mm. For the avoidance of doubt, no part of the compressor wheel (including blades, hub and any blade/hub fillet radius) can have a diameter more than the upper limit and the maximum diameter of the compressor wheel (including blades, hub and any blade/hub fillet radius) cannot have a diameter smaller than the lower limit.
  - The compressor axial distance from the outside diameter of the inducer blade edge to rear plane of exducer, at its outer diameter (B) must lie between 30mm and 35mm
  - The turbine inducer blade outer diameter (C) must lie between 90mm and 100mm. For the avoidance of doubt, no part of the turbine wheel (including blades, hub and any blade/hub fillet radius) can have a diameter more than the upper limit and the maximum diameter of the turbine wheel (including blades, hub and any blade/hub fillet radius) cannot have a diameter smaller than the lower limit.
  - The turbine axial distance from the outside diameter of the exducer blade edge to forward plane of inducer, at its outer diameter (D) must lie between 35mm and 40mm
  - The maximum distance between the rear of the compressor exducer and the front of the turbine inducer (E) will be 175mm
- 5.5.6 The rotational speed of the turbocharger may not exceed 150,000rpm.
- 5.5.7 The compressor inlet must extend upstream of any part of any variable geometry device permitted by Article 5.9

## 5.6 Power unit geometrical constraints and dimensions

- 5.6.1 The cylinder bore diameter must be 80mm (+/- 0.1mm).
- 5.6.2 The cylinder bore spacing must be 101.0 +/-2mm.
- 5.6.3 No cylinder of the engine may have a geometric compression ratio higher than 16.0. The procedure which will be used to determine this value may be found in the Appendix to the Technical and Sporting Regulations.
- 5.6.4 Each cylinder centreline must pass through the crank axis +/-0.1mm.
- 5.6.5 The crankshaft centre line must lie at Y=0 and Z=90 (+/-0.5mm) and be parallel to the X axis. The power unit may only transmit torque to the gearbox by means of a single output shaft that must be co-axial with the crankshaft. The output shaft must rotate clockwise when viewed from the front of the car.
- 5.6.6 The crankshaft main journal bearing diameter, measured on the crankshaft, must be no less than 44.95mm. The main journal bearing width excluding chamfer must be no less than 18.95mm.  
The surface area of the main journal bearing, calculated using all surfaces within 0.06mm of the maximum radial thickness must be no less than 2500mm<sup>2</sup>. This will be verified by design.
- 5.6.7 The crankshaft crank pin journal bearing diameter, measured on the crankshaft, must be no less than 41.95mm. The crank pin bearing width excluding the chamfer must be no less than 17.95mm  
The surface area of the crank pin journal bearing, calculated using all surfaces within 0.06mm of the maximum radial thickness must be no less than 2200mm<sup>2</sup>. This will be verified by design.
- 5.6.8 The deck height must be a minimum of 168mm.
- 5.6.9 The connecting rod length measured between the centre of the crankshaft journal bore and the piston pin bore must lie between 119.5mm and 120.5mm.
- 5.6.10 Each piston must have three piston rings, two compression rings and one oil control ring.
- 5.6.11 The piston pin diameter must lie between 18.0 and 19.0mm.
- 5.6.12 The valve stem diameter must be no less than 4.95mm.
- 5.6.13 The intake valves' head diameter must lie between 32.5mm and 34.5mm. All intake valves must have an identical design.
- 5.6.14 The exhaust valves' head diameter must lie between 27.0mm and 29.0mm. All exhaust valves must have an identical design.
- 5.6.15 For each cylinder, the following three planes are defined (see Drawing 5 of Appendix 2):
- The "Lateral plane", which passes through the cylinder centreline and is normal to the crank axis
  - The "Longitudinal plane", which passes through both the cylinder centreline and the crank axis
  - The "Transverse plane", which is normal to the cylinder centreline and coincident with the top deck

Referring to the above-defined planes, the following conditions apply:

- a. The axes of the two intake valves must intersect the Transverse plane inboard of the Longitudinal plane, and be symmetrically arranged about the Lateral plane
- b. The axes of the two exhaust valves must intersect the Transverse plane outboard of the Longitudinal plane, and be symmetrically arranged about the Lateral plane

- c. The spark plug axis must intersect the Transverse plane within a quadrilateral defined by the four intersection points defined in points (a) and (b) above
- d. The injector axis must lie on the lateral plane, outside the longitudinal plane, and the angle between the injector axis and the cylinder centreline must be 70deg (+/- 5 deg).

5.6.16 All elements of the power unit specified in the relevant column of the table in Appendix 3 of these regulations must be installed in the Reference Volumes defined in Appendix 1 of these regulations and prefixed with **RV-PU-**. Elements must be installed entirely within the relevant Reference Volume. Where Reference Volumes intersect, elements from any of the intersecting volumes will be permitted within the intersection.

Referring to the "REFERENCE VOLUME" column of the Appendix 3:

- a. All the items listed as "ICE" must be installed within **RV-PU-ICE**
- b. All the items listed as "ERS" must be installed within **RV-PU-ERS**
- c. All the items listed as "TC" must be installed within **RV-PU-TC**
- d. All the items listed as "OT" must be installed within **RV-PU-OT**

Additionally, the following elements must be installed entirely within **RV-PU-ERS**:

- e. HV connections and ERS-K phase conductors.
- f. All elements within the ES main enclosure (defined in Article 5.19.7).

*[Note: Elements outside the PU Perimeter will be allowed in **RV-PU** volumes with the exception of:*

- *No part of the Survival Cell will be allowed behind  $X_{pu}=0$*
- *A minimum width requirement for the Survival cell will mean that the sides of the survival cell (radiator recesses) cannot enter **RV-PU-ERS***
- *No bodywork visible from below will be allowed inside **RV-PU-ICE** (with an additional allowance for bodywork thickness)]*

5.6.17 Engine (ICE) mountings may only comprise six M12 studs for connection to the survival cell and either four or six M12 studs for connection to the **transmission gearbox case**. These studs may be fitted on the survival cell, power unit or **transmission gearbox case**, their installed end must be M12 and their free end may be a different diameter.

The six mounting faces of the studs for connection to the survival cell must lie at  $[X_{PU}, Y, Z]=[0, \pm 270, 25], [0, \pm 360, 270]$  and  $[0, \pm 190, 440]$ . All six of these studs must be used.

The four mounting faces of the studs for connection to the **transmission gearbox case** must lie at  $[X_{PU}, Y, Z]=[480, \pm 125, 25]$  and  $[480, \pm 265, 360]$ . All four of these studs must be used. Optionally, an additional two studs may be used, provided their coordinates are at  $[X_{PU}, Y, Z]=[480, \pm 150, 140]$ .

A tolerance of +/- 0.2mm will be permitted on all of the above dimensions, all dimensions refer to the centre of the studs. All dimensions in this Article refer to studs fitted symmetrically about the car centre plane.

Any part which provides ~~an~~ additional load path, **aside from the path through the studs defined above, from the survival cell to the ICE or from the ICE to the gearbox case from the survival cell to the gearbox, with a connection to the power unit,** is prohibited unless ~~may~~ **only do so if** this is incidental to its principal purpose. Furthermore any such part may provide no greater structural connection between these pairs of assemblies than is reasonable for the safe and reliable fulfilment of its purposes.

5.6.18 No part of **RV-PU-ERS** that lies above  $Z=51$  may lie forwards of **RS-FWD-FUEL-LIMIT**.

*[Note: this item may be moved to the Chassis Regulations at a future date.]*

## 5.7 Mass and centre of gravity

**5.7.1** ~~The overall mass of the ICE must be a minimum of 130 kg.~~

Depending on where the MGU-K mechanical transmission (as defined in item 26 of Appendix 3 to these Regulations) is located, the overall mass of the ICE "PU Mass group" elements as referred to in Appendix 3 to these regulations must be no less than the values defined below:

- a) If all of the speed ratio of the MGU-K mechanical transmission resides in the MGU-K the total mass of the ICE must be no less than 130.0kg.
- b) If all of the speed ratio of the MGU-K mechanical transmission resides in the ICE the total mass of the ICE must be no less than 134.0kg.
- c) If part of the speed ratio of the MGU-K mechanical transmission is situated in the MGU-K and part in the ICE the total mass of the ICE must be no less than 132.0kg.

**5.7.2** The overall mass of the PU must be a minimum of **185 kg**.

**5.7.3** The centre of gravity of the power unit must be above Z=200. The parts considered are listed as "ICE" and "TC" in the "PU MASS GROUP" column of Appendix 3, with the exception of items 6 (ICE intake air system components), 20 (ICE-mounted electrical components), 27 (MGU-K Torque sensor), 38 (Powerbox), 39 (General electrical devices) 65 and 66 (PU air valve system equipment).

**5.7.4** The mass of a piston (with piston -pin, piston -pin retainers and piston rings) may not be less than 350g.

**5.7.5** The mass of a connecting rod (with fasteners, small and big end bearings) may not be less than 320g.

**5.7.6** The mass of the complete crankshaft assembly between the mid positions of the front and rear main bearing journals (including balance masses, bolts, bungs, O-rings between the boundaries), may not be less than 5800g. See drawing 1 in Appendix 2.

**5.7.7** When establishing conformity with Articles 5.7.1, 5.7.2, 5.7.3 and Appendix 4 of these Regulations, the homologated power unit perimeter will be defined in accordance with the table shown in Appendix 3 of these regulations.

## **5.8 Engine intake air**

**5.8.1** With the exception of incidental leakage through joints or cooling ducts in the engine intake air system (either into or out of the system), all air entering the engine must enter the bodywork through a maximum of two inlets which are located on a single X plane between XC= -850 and XR= -500 and above Z=200.

Furthermore, any such inlets must be visible in their entirety when viewed from the front of the car without the driver seated in the car and with the secondary roll structure and any parts attached to it removed (see Article 12.4.2).

**5.8.2** The addition of any substance other than fuel, as described in Article 5.11.3, into the air destined for combustion is forbidden. Exhaust gas recirculation is forbidden.

**5.8.3** There must be no more than one butterfly or rotating barrel, as described in Article 5.1.33, in the geometrical path of air exiting the compressor outlet and going to any cylinder.

## **5.9 Variable geometry systems**

**5.9.1** With the exception of wastegates, variable geometry exhaust systems are not permitted. No form of variable geometry turbine (VGT) or variable nozzle turbine (VNT) or any device to adjust the gas throat section at the inlet to the turbine wheel is permitted.

**5.9.2** Variable valve timing and variable valve lift profile systems are not permitted.

5.9.3 Moveable trumpets are not permitted, and any geometry conveying the air from the compressor outlet to the cylinder inlet must be fixed, except the throttles and the pop off valves.

## 5.10 Exhausts

5.10.1 With the exception of incidental leakage through joints (either into or out of the system) and power unit breather fluids, all and only the fluids entering the compressor inlet and fuel injectors must exit from the engine exhaust system.

5.10.2 All turbine exit and all wastegate exhaust fluids must pass through the “tailpipe” defined in Article 3.8.2.b of the 2023 Technical Regulations.

5.10.3 A minimum wall thickness of 1.0mm of the exhaust pipe is required for all exhaust pipes from the cylinder head to the turbine and wastegate.

5.10.4 The engine must be equipped with lambda sensors either fitted into each exhaust secondary, one per cylinder bank, or a single lambda sensor fitted into the turbine tailpipe. These lambda sensors must be connected to the FIA Standard ECU in a manner specified by the FIA and their measurement must be supplied to the FIA at all times.

## 5.11 Fuel systems

5.11.1 The pressure of the fuel supplied to the fuel injectors may not exceed 350barG.

5.11.2 There may only be one fuel injector per cylinder and no fuel injectors are permitted upstream of the intake valves or downstream of the exhaust valves. Bespoke injector nozzle designs are permitted.

5.11.3 All cars must be fitted with a fuel flow meter, wholly within the fuel tank. This sensor may only be installed and used as specified by the FIA Technical Department. Furthermore, all fuel delivered to the power unit must pass through this homologated sensor and must all be delivered to the combustion chambers by the fuel injectors described by Article 5.11.2.

5.11.4 Homologated sensors which directly measure the pressure and temperature of the fuel supplied to the fuel injectors must also be fitted, these signals must be supplied to the FIA data logger.

5.11.5 Any device, system or procedure the purpose and/or effect of which is to increase the flow rate or to store and recycle fuel after the measurement point is prohibited. Additional measurements in each sub-circuit of the fuel system may be requested in order to check compliance. When fuel flow rate is above 90% of the maximum fuel flow defined in 5.4.3, fuel pressures must remain constant in each sub-circuit.

5.11.6 A maximum of 0.25 litres of fuel may be kept outside the survival cell, but only that which is necessary for the normal running of the engine.

5.11.7 The High pressure fuel pump may only be driven by one of the camshafts actuating the intake or exhaust valves

## 5.12 Ignition systems

5.12.1 Ignition is only permitted by means of a single ignition coil and single spark plug per cylinder. No more than one spark per cylinder per engine cycle are permitted.

5.12.2 Only conventional spark plugs that function by electrical potential discharge across an exposed gap are permitted.

Spark plugs are not subject to the materials restrictions described in Articles 15.7 and 15.8.

5.12.3 The spark energy per ignition is limited to a maximum of 120.0mJ.

### 5.13 Ancillaries

5.13.1 Unless specified otherwise, ancillaries must be mechanically or electrically driven. Any electrically driven ancillary cannot be linked mechanically to any drivetrain, including the Power Unit. Ancillaries cannot be used to propel the car.

5.13.2 With the exception of batteries of less than 100 kJ total capacity used for safety and control purposes during ERS start-up and shut-down operations, which must be prevented from supplying energy under normal ERS operation; electrical energy may not flow from any ancillary in the direction of any DC pole of the ERS high voltage DC bus. This must be guaranteed by design and verifiable by inspection.

5.13.3 For the ICE and the TC, all fuel pumps delivering more than 10 barG, coolant pumps, oil pumps, scavenge pumps, oil/air separators and hydraulic pumps must be mechanically driven directly from the engine and/or MGU-K with a fixed speed ratio.

5.13.4 For the ESME, the MGU-K and the PU-CE, all ancillaries (including pumps) may be mechanically or electrically driven

### 5.14 Power unit torque or power demand

5.14.1 The only means by which the driver may control acceleration torque to the driven wheels is via a single foot (accelerator) pedal mounted inside the survival cell.

5.14.2 Designs which allow specific points along the accelerator pedal travel range to be identified by the driver or assist him to hold a position are not permitted.

5.14.3 At any given engine speed the driver torque demand map must be monotonically increasing for an increase in accelerator pedal position.

5.14.4 At any given accelerator pedal position and above 4,000rpm, the driver torque demand map must not have a gradient of less than – (minus) 0.045Nm/rpm.

5.14.5 At any given engine speed, the minimum torque in the driver torque demand map must be a value achievable with the power unit when the ERS-K power is 0.

5.14.6 Except for conforming to Article 5.4.7, the electrical DC power of the ERS-K must be a minimum of 200kW for 1s at the start of any full throttle period.

5.14.7 The driver maximum power demand cannot be increased during any full throttle period, except when the overtake mode, as specified in the Appendix to the Regulations, is selected by the driver.

5.14.8 The driver maximum power demand must not be reduced at any greater than the rates defined below:

a) 50kW in any 1s period at Competitions where the FIA determines that the power limited distance exceeds 3500m. These Competitions and the vehicle fundamentals used for the calculation of the power limited distance may be found in the Appendix to the Technical and Sporting Regulations.

b) 100kW in any 1s period at all other Competitions.

Furthermore, the total power reduction is limited to a maximum of 450kW and the resulting electrical DC power of the ERS-K must remain above -100kW.

5.14.9 The electrical DC power of the ERS-K may not be reduced at rates greater than those specified in Article 5.14.8, unless:

- the theoretical MGUK power resulting from reduction at rates equal to those specified in Article 5.14.8 is negative;
- the ICE power is negative and the ERS-K power needs to be reduced further to achieve the driver demand;
- the ERS-K power needs to be reduced further to achieve the maximum power permitted by Article 5.4.8;
- the driver power demand is negative;
- a gearshift is in progress.

*[Note: Further discussions will take place to fully evaluate the benefits and consequences of art. 5.14.9 and whether modifications are necessary, with the aim of preventing by-pass of article 5.14.8 without being too penalising from an energy point of view]*

**5.14.10** Details of the implementation in the FIA Standard ECU of the application and monitoring of Article 5.14 may be found in the Appendix to the Technical and Sporting Regulations.

## **5.15 Power unit control**

**5.15.1** The maximum delay allowed, computed from the respective signals as recorded by the FIA ADR or FIA Standard ECU, between the accelerator pedal position input signal and the corresponding output demands being achieved is 50ms.

**5.15.2** Teams may be required to demonstrate the accuracy of the power unit configurations used by the FIA Standard ECU.

**5.15.3** Power unit control must not be influenced by clutch position, movement or operation.

**5.15.4** The idle speed control target may not exceed 4,000rpm.

**5.15.5** A number of power unit protections are available in the FIA Standard ECU.

A minimum of nine seconds hold time should be configured for the power unit protections enabled during qualifying and race. The configuration of the air tray fire detection and throttle failsafe are exceptionally unrestricted in order to allow each team to achieve the best level of safety.

**5.15.6** The power unit must achieve the torque demanded by the FIA standard software.

**5.15.7** Regulatory torque sensors must be fitted to measure the following output torques:

- a) The PU torque output (Ref Appendix 3 Item 21)
- b) The MGU-K torque output (Ref Appendix 3, item 27)

The installation and the connectivity of each of these torque sensors to the FIA Standard ECU must be approved by the FIA.

For reference, torque sensors will also be fitted to each driveshaft. These will be defined in future versions of 2026 Technical Regulations that also cover the 2026 car.

**5.15.8** Engine plenum air temperature must be more than ten degrees centigrade above ambient temperature. When assessing compliance, the temperature of the air will be the lap average recorded, by an FIA approved and sealed sensor located in an FIA approved location situated in the engine plenum, during every lap of the qualifying practice session and the race. The first lap of the race, laps carried out whilst the safety car is deployed, laps with a time at least 20% greater than the fastest lap of the session, pit in and out laps and any laps that are obvious anomalies (as judged by the FIA) will not be used to assess the average temperature. The ambient temperature will be that recorded by the FIA appointed weather service provider. This information will also be displayed on the timing monitors.

- 5.15.9 Any pressure sensor used to measure pressure of any fluid necessary to ensure the power unit functions correctly at all times (including but not limited to coolant, oil, fuel and air) will be classified as a regulatory sensor (reference item 22 Appendix 3).
- 5.15.10 With the exception of exhaust temperature sensors and temperature sensors embedded in electronic boxes, any temperature sensor used to measure temperature of any fluid necessary to ensure the power unit functions correctly at all times (including but not limited to coolant, oil, fuel and air) will be classified as a regulatory sensor (reference item 22 Appendix 3).
- 5.15.11 A maximum of one knock sensor per cylinder is permitted. This sensor must be an accelerometer-type.
- 5.15.12 No sensor of any kind, designed or installed to measure or infer internal cylinder pressure, temperature, or to determine the heat release characteristics will be permitted, with the exception of the standard knock sensors permitted by Article 5.15.11 with standard signal processing by the FIA Standard ECU.  
Any other sensor which is incidentally capable of measuring or inferring internal cylinder pressure, temperature, or determining the heat release characteristics must have an attenuation of no less than 40dB above 1kHz at any point in the measurement chain and will be subject to the homologation required by Article 8 (TR 2023).

## 5.16 Engine high rev limits

Engine high rev limits may vary for differing conditions provided all are contained within a band of 750rpm. However, a lower rev limit may be used when:

- a. The gearbox is in neutral.
- b. Stall prevention is active.
- c. The driver clutch request is greater than 95% of the total available travel of the driver clutch actuation device, used only to protect the engine following a driver error.
- d. An engine protection is active.
- e. The bite point finder strategy is active.
- f. The safety car is deployed or during the formation lap.

Except for the above conditions, power unit actuators may not be used to artificially control the power unit speed or alter the power unit response in a rev range more than 750rpm below the final rev limit.

## 5.17 Starting the engine

The car must be fired up with its on-board system (MGU-K) at any time.

## 5.18 Stall prevention systems

If a car is equipped with a stall prevention system, and in order to avoid the possibility of a car involved in an accident being left with the engine running, all such systems must be configured to stop the engine no more than ten seconds after activation.

The sole purpose of such systems is to prevent the engine stalling when a driver loses control of the car. If the car is in second gear or above when the system is activated multiple gear changes may be made to either first gear or neutral, under all other circumstances the clutch alone may be activated.

Each time such a system is activated the clutch must be fully disengaged and must remain so until the driver de-activates the system by manually operating the clutch with a request greater than 95% of the total available travel of the drivers clutch actuation device.

## 5.19 Energy Recovery System (ERS)



**5.19.1** The system will be considered shut down when no high voltage will be present on the portion of the HV DC Bus located on the CU-K side of the ES main contactors, across any capacitor belonging to the CU-K or outside of the RV-PU-ERS.

It must be possible to shut down the ERS via the following means:

- a. The switch required by Article 8.8.1 of the 2023 Technical Regulations.
- b. The switches required by Article 8.8.2 of the 2023 Technical Regulations.
- c. The switch or button required by Article 9.4 of the 2023 Technical Regulations.

The shutdown process must take no longer than two seconds from activation and must be started immediately when the electrical circuits to the ignition are cut off by any of the means described in articles 8.8.1 and 8.8.2 of the 2023 Technical Regulations.

**5.19.2** The ERS must shut down when the FIA Standard ECU initiates an anti-stall engine shut off.

**5.19.3** All cars must be fitted with two ERS status lights which:

- a. Have been supplied by an FIA designated manufacturer and fitted to the car in accordance with the instructions in the Appendix to the Technical and Sporting Regulation.
- b. Are in working order throughout the Competition.
- c. Must remain powered for at least 15 minutes following the start of the shutdown process. The FIA ADR internal battery will be responsible for power supply to those lights once the ERS is shutdown.
- d. Are marked with a "HIGH VOLTAGE" symbol according to ISO3864 of at least 30mm along the triangle side and no more than 50mm away from the lights.

**5.19.4** All cars must be fitted with one ERS Status Buzzer unit which:

- a. Have been supplied by an FIA designated manufacturer and fitted to the car in accordance with the instructions in the Appendix to the Technical and Sporting Regulation.
- b. Are in working order throughout the Competition.
- c. Remains powered for at least 15 minutes following the start of the shutdown process. The FIA ADR internal battery will be responsible for the power supply to the unit once the ERS is shutdown.

**5.19.5** All cars must provide signals regarding the current car operating safety status to the FIA ADR in order to facilitate control of the ERS status lights and ERS Status Buzzer unit. The status of the car must be based at least on the insulation measurement, cells voltage, cells temperature, contactors and the systems defined in 5.23.4. The systems which provide these signals managed by the BMS must remain powered and working 15min after the shutdown process has been started.

**5.19.6** The maximum working voltage on the car must never exceed 1000V.

**5.19.7** The following elements of the power unit must be fitted inside the ES main enclosure installed within the ERS Reference Volume (RV-PU-ERS):

- a. ES elements as defined in items 32 (ES) and 35 (HV elements) of Appendix 3 to these regulations.
- b. The HV safety elements and sensors defined in items 33 (DC sensor, IMD) and 34 (safety devices) of Appendix 3 to these regulations.
- c. The DC-DC Unit and its connection to the ES HV DC bus. Includes active parts, enclosure, brackets and supports.
- d. CU-K. Includes active parts, enclosure, brackets and supports.

- e. HV DC connections between ES and CU-K/DC-DC Unit. Includes all conductors, insulation, EMC screening, mechanical and thermal shielding.

5.19.8 In addition to the components listed in Article 5.19.7, the following elements may also be fitted within the ES main enclosure:

- a. Low voltage Power Distribution Board (PDB).
- b. PU Electric pump Driver units and non ICE-mounted ERS cooling systems as defined in item 54 of Appendix 3 to these regulations.
- c. Low Voltage systems passive protection devices - Fuse box.
- d. Low Voltage looms exclusively used: for PU functionalities or power supply to non-PU devices.
- e. Any Electronic Box devices exclusively used for PU functionalities.

With the exception of wiring or any mechanical supports for these components, no additional elements may be fitted in the ES main enclosure.

5.19.9 The minimum mass for the ES Main Enclosure PU Mass group elements as defined in Appendix 3 to these Regulations is 35.0kg. The procedure which will be used to determine this value may be found in the Appendix to the Technical and Sporting Regulations.

## 5.20 MGU-K

5.20.1 The MGU-K must be mechanically fixed to the survival cell, the ICE or both.

5.20.2 Under normal operating conditions all MGU-K rotating parts must be permanently mechanically linked to the ICE with a fixed speed ratio to the crankshaft. The MGU-K and its drive axis must be parallel to the crankshaft axis.

5.20.3 All mechanical power to and from the MGU-K must pass through a single shaft to the MGU-K transmission. The connection to the ICE crankshaft must be ahead of  $X_{PU}=100$ .

5.20.4 An in-line, passive, dissipative energy torque limitation device may be incorporated in this link which temporarily allows the speed ratio to change for the sole purpose of protecting the components from dynamic torque overshoots. This device may only act above 520Nm when referred to crankshaft speed.

5.20.5 The relative rotational speed between any two parts of the MGU-K may not exceed 60,000rpm.

5.20.6 The thickness of the stack magnetic soft alloy laminated sheets may not be less than 50µm.

~~5.20.7 The total mass of the MGU-K as defined in items 21-25 (MGU-K) and 29 (ERS-K phase conductors) of Appendix 3 to these regulations must be no less than 16.0kg.~~

Depending on where the MGU-K mechanical transmission is located, the total mass of the MGU-K "PU Mass group" elements as referred to in Appendix 3 to these regulations must be no less than the values defined below:

- a) If all of the speed ratio of the MGU-K mechanical transmission resides in the MGU-K the total mass of the MGU-K must be no less than 20.0kg.
- b) If all of the speed ratio of the MGU-K mechanical transmission resides in the ICE the total mass of the MGU-K must be no less than 16.0kg.
- c) If part of the speed ratio of the MGU-K mechanical transmission is situated in the MGU-K and part in the ICE the total mass of the MGU-K must be no less than 18.0kg.

The total mass of any shaft passing across the ICE/MGU-K boundary must be allocated to either the MGU-K or the ICE to assess compliance with this article and article 5.7.1.

~~5.20.8 The MGU-K mechanical transmission including any shaft passing across the ICE/MGU-K boundary will be assigned a mass of 4kg.~~

- ~~If part of the speed ratio is situated in the MGU-K and part in the ICE, 2kg will be added to each the minimum masses defined in 5.7.1 and 5.20.7 to assess conformity with those articles.~~
- ~~Should all of the speed ratio reside in the ICE, 4kg will be added to the minimum mass defined in 5.7.1 to assess conformity with that article~~
- ~~Should all of the speed ratio reside in the MGU-K, 4kg will be added to the minimum mass defined in 5.20.7 to assess conformity with that article.~~

- 5.20.8** All rotating parts of the MGU-K and its mechanical transmission must have a fixed inertia by design. Any system other than that permitted by article 5.20.4, the effect of which is to vary the inertia, is prohibited.
- 5.20.9** The elements defined in item 28 (MGU-K torque sensor shaft) of Appendix 3 to these regulations must be dismountable from their respective PU elements without breaking any FIA permanent seal.

## 5.21 Energy Store

- 5.21.1** Only cells approved by the FIA Technical Department may be used in the ES. Subject for provision of the Article 18.3.5, the approval of the FIA Technical Department is conditional upon the PU manufacturer, intending to use such parts during a Championship season undertaking not to conclude any exclusivity agreement (see definition article 5.1.30) for the supply of such parts with the supplier of these parts. The approval request form must be sent by the PU Manufacturer to the FIA before the 1st of November of the preceding year.
- 5.21.2** Solely a single specification of cell may be homologated, including the same exiting position of the cell connection terminals (cell tabs - Article 5.2.26). The cell tabs may have different shapes for integration purposes inside the ES.
- 5.21.3** Any non-ERS energy storage and components supplied by it will be considered an ancillary and subject to Article 5.13.1.
- 5.21.4** A diode must be fitted, in series, at the DC-DC Unit positive high voltage pole to ensure that electrical energy cannot flow from the DC-DC Unit into the ES. This must be guaranteed by design and verifiable by inspection.
- 5.21.5** The DC-DC unit HV DC Bus branch must have a DC-DC unit fuse, and, additionally, DC-DC unit relay(s) if connected on the ES side of the ES Main contactors. Those protective devices will insulate the DC-DC unit from the HV DC Bus DC+ and DC- poles and protect the installation in case of short circuit.

The DC-DC unit relay(s) must provide a dielectric strength:

- a. between the relay control circuit and any of the high voltage contacts and;
- b. across high voltage contacts, when the high voltage circuit is open.

For each of (a) and (b) above:

- c. A dielectric withstanding voltage test must be performed with a DC voltage at least equal to the ES maximum DC voltage plus 1200V. The device must withstand the DC voltage for 60 seconds with a leakage current lower than 1mA and without flashover. The test must be performed on both HV terminals polarities if solid-state relays are used.
- d. The electrical resistance measured by applying a DC voltage of 500VDC when the circuit is open must be higher than 50MΩ.

Once commanded to open, the DC-DC unit relays must be able to keep the DC-DC unit insulated from the ES HV DC Bus branch.

- 5.21.6** With the exception of the ES safety systems, the ES cells defined in 5.2.25 are the only energy storage source allowed in the ES.

## 5.22 ES design and installation

- 5.22.1 High voltage must not be present or accessible by any reasonable means between the ES main enclosure and any ES off-board charging connector when the off-board charger is not connected.
- 5.22.2 No high voltage is permitted outside of the RV-PU-ERS, except:
- . For the high voltage inside the power box where the boost converter can generate up to 80V DC.
  - . When an off-board charger is connected to charge or discharge the ES.
- 5.22.3 The ES must be equipped with a BMS which:
- Must detect internal faults and must trigger power reduction delivered from/to the battery or shutdown the ERS if it considers that the ES is operating unsafely.
  - Must be capable of reducing the voltage dispersion between each cell to its minimal level without breaking any FIA seal.
  - Must only be capable of consuming energy and cannot transfer energy from any PU-CE into the ES. This must be guaranteed by design and verifiable by inspection.
- 5.22.4 The ES must be equipped with a fuse to protect the system in case of a short circuit. The fuse shall be located as close as possible to the cells.
- The fuse must be tested and demonstrated to work in realistic load cases.
- 5.22.5 The ES must have at least two contactors, one per positive and negative pole. Those ES main contactors must insulate the CU-K from the high voltage parts of the ES once the shutdown process is completed.
- Contactors must provide a dielectric strength:
- between the contactor's control circuits and any of the high voltage contacts and;
  - across high voltage contacts, when the high voltage circuit is open.
- For each of (a) and (b) above:
- A dielectric withstanding voltage test must be performed with a DC voltage at least equal to the ES maximum DC voltage plus 1200V. The device must withstand the DC voltage for 60 seconds with a leakage current lower than 1mA and without flashover.
  - The electrical resistance measured by applying a DC voltage of 500VDC when the circuit is open must be higher than 50MΩ.
- Once commanded to open, contactors must be able to keep the high voltage circuit open.
- The contactors must be tested and demonstrated to work in realistic load cases, as described in the Appendix to the Technical and Sporting Regulations.
- 5.22.6 Only Fuses and Contactors for ERS application approved by the FIA Technical Department will be accepted. The approval of the FIA Technical Department is conditional upon such parts being available on a non-exclusive basis and under normal commercial terms to all Competitors. The approval request form must be sent by the **component ~~sensor~~ supplier** to the FIA before the 1st of November of the **year preceding the year of introduction**.
- 5.22.7 In addition to the contactors mentioned in 5.22.5, the ES HV DC+ and DC- poles must be capable of being isolated from the PU-CE(5.2.10) consumers by means of a manual action(s). The operator must be able to perform the manual operation(s) before opening any ERS-K phase conductors connection or interface giving access to live parts while the ERS is fitted to the car.
- 5.22.8 Interfaces must be present on the ESME and may be present on the MGU-K to allow the connection of the ERS-K Phase Conductors between the ESME and the MGU-K. Should such interfaces not be present on the MGU-K then the parts that fulfil the function of the ERS-K Phase Conductors will be considered to be part of the MGU-K.

- 5.22.9** The ES main enclosure must be equipped with a gas evacuation system which in case of ES cell(s) venting or electronic components explosion prevents irreversible mechanical damage to the ESME. The design and operating conditions of such a system are of responsibility of each PUM and must be detailed in their respective FMEA. This venting system must be approved by the FIA Technical Department before the 21st of March of the year preceding the year of introduction.
- 5.22.10** The ES main enclosure material(s) must satisfy a minimum fire protection equivalent of UL94 V0 unless the ES cells are proven to not be susceptible to self-heating phenomenon. A document demonstrating compliance with this article must be included in the PU Manufacturer homologation dossier. Guidance on how to demonstrate that ES cells aren't prone to thermal runaway behaviour may be found in the Appendix to the Technical and Sporting Regulations.
- 5.22.11** The ES must have only two poles, the ES HV DC+ and ES HV DC-, that are connected to the HV DC Bus. Additionally, the CU-K, the DC-DC Unit and any other PU-CE may only be connected to the HV DC bus via the ES HV DC+ and ES HV DC- poles.

## **5.23 ERS General electrical safety**

### **5.23.1 Principles**

- a. A single point of failure of the electric system or ERS cannot result in a person being exposed to a live part.
- b. The components used cannot cause injury under any circumstances or conditions, whether during normal operation or in reasonably foreseeable cases of malfunction.
- c. If a single fault can predictably generate multiple failures, they must be considered as a single point of failure.

### **5.23.2 Protection of cables, lines, connectors, switches, electrical equipment**

The following design practices must be adhered to for all electrical parts external to the ES main enclosure or accessible and which operate at high voltage:

- a. Protection against electrical shock via basic insulation combined with equipotential bonding, double insulation or reinforced insulation
- b. Protection against risks of mechanical damage
- c. Parts should be secured with cable guides, enclosures and conduits if exposed to stress (mechanical, vibration, thermal)
- d. Each cable must be rated to the respective circuit current and must be insulated adequately for the environment and operating conditions
- e. Sections of looms containing high voltage wiring must be coloured orange
- f. Connectors must be IP2X when not connected and IP65 when mated
- g. A connector plug must physically only be able to mate with a single correct socket of any sockets within reach
- h. Comply with creepage and clearance distances according to IEC-60664. Connectors which are opened in the garage must be considered PD3 or higher. Clearance and creepage requirements can be verified by safety tests proposed in IEC-60664-1 session 6.
- i. If, under the provisions of Article 5.20.1, the MGU-K is fixed to the ICE, the PU manufacturer must provide proof that the ERS-K phase conductors and connectors would not lead to exposed high voltage in case of foreseen damage conditions.

- 5.23.3** The ES main enclosure, MGU-K and any HV box residing outside the ES main enclosure must be marked with a "Danger High Voltage" symbol according to ISO 7010. In addition to that, the ES main enclosure must be orange coloured.

- 5.23.4 All ERS high voltage conductors outside of the ES main enclosure must be equipped with:
- A system to prevent high voltage on the CU-K side of the ES contactors when ERS-K phase conductors are not connected or incorrectly mated. In the event of detection of any of those conditions, actions must be immediately taken to ensure safe operation. The list of actions must be pre-defined in a Failure Mode and Effect Analysis provided to the FIA by each competitor. To avoid spurious detections a software debounce of maximum one second may be used.
  - A system to allow detection of insulation faults or damaged high voltage lines by an isolation monitoring device.
- 5.23.5 To mitigate the risk failure mode where a high voltage is AC coupled onto the car's low voltage system, bonding is required for any system component to which a wire, cable or harness connects, or passes in close proximity, and which is able to conduct current by means of AC coupling.
- The bonding must protect against short circuit currents generated by an insulation failure and low currents generated by capacitive coupling. It can be achieved using wires or conductive parts of an appropriate dimension.
- Any components that require equipotential bonding will be connected to the car main ground and the resistance of potential equalization paths must not exceed 5.0  $\Omega$ .
- In addition, the resistance measured between any two exposed conductive parts of the high voltage system must not exceed 0.1  $\Omega$ .
- 5.23.6 An insulation monitoring device must be used to measure the insulation resistance between the car main ground and the entire conductively connected high voltage system. The insulation monitoring device (reference item 33 Appendix 3) will be used as the primary source of measurement and the DC sensor connected to the ES high voltage negative DC pole as a backup source. They must be connected on the ES side of the contactors.
- 5.23.7 The UN38.3 energy store transportation certification must be shared with the FIA during the homologation of each Energy recovery system specification.

## 5.24 Replacing power unit parts

Refer to the Article 2.1.10 of the Sporting Regulations.

## 5.25 Oil and coolant systems and charge air cooling

- 5.25.1 **Coolant header tanks:** Any header tank used on the car must be fitted with an FIA approved pressure relief valve which is set to a maximum of 3.75 barG, details of the relief valve may be found in the Appendix to the Technical and Sporting Regulations. If the car is not fitted with a header tank, an alternative position must be approved by the FIA.
- 5.25.2 **Cooling systems:** The cooling systems of the power unit, including that of the air destined for combustion, must not intentionally make use of the latent heat of vaporisation of any fluid with the exception of fuel for the normal purpose of combustion in the engine as described in Article 5.11.3.
- 5.25.3 **Main oil tank:** All cars must be fitted with a main oil tank.
- 5.25.4 **Main oil tank level measurement:** The main oil tank must be fitted with an oil level sensor. The measurement of the oil level in the main oil tank must be supplied to FIA at all times.
- 5.25.5 **Oil injection:** The use of active control valves between any part of the PU and the engine intake air is forbidden.
- 5.25.6 Engine Oil (reference item 75 Appendix 3), as defined in Article 16 of the Technical Regulations, may only be contained by the main oil tank defined in 5.25.3, lines associated with it and the engine.

## **5.26 Component Classification**

**5.26.1** All components belonging to the power unit (PU) are listed in Appendix 3. Their classification (“SSPUC”, “DSPUC”, “LPUC”, “OSPUC”), as defined in Article 18 of the Technical Regulations, is listed under column “COMPONENT CLASSIFICATION”.

## ARTICLE 6: FUEL SYSTEM

### 6.1 Fuel tanks

- 6.1.1 The fuel tank must be a single rubber bladder conforming to or exceeding the specifications of FIA Standard FT5-1999, the fitting of foam within the tank however is not mandatory. A list of approved materials may be found in the Appendix to the Technical and Sporting Regulations.
- 6.1.2 With the exception of the fuel out of the survival cell permitted under Article 5.11.6, all fuel on board the car must be stored within the following limits:
- Ahead of  $X_{PU}=0$ .
  - Rearward of **RS-FWD-FUEL-LIMIT**.
  - Inboard of  $Y=400$ .
- 6.1.3 No fuel bladders shall be used more than 5 years after the date of manufacture.

### 6.2 Fittings and piping

- 6.2.1 The total area of apertures in the fuel bladder must not exceed 35 000mm<sup>2</sup>.  
Circular apertures smaller than 35mm diameter may be closed with a fitting, secured with a single threaded fastener on the full diameter of the opening, provided that this threaded fastener is provided with mechanical secondary locking.  
All other apertures in the fuel bladder must be closed by hatches or fittings which must:
- Be secured to metallic bolt rings bonded to the inside of the bladder.
  - Have bolt hole edges no less than 5mm from the edge of the bolt ring, hatch, or fitting.
  - Attach directly to the fuel bladder and have no part of the survival cell structure included in the closure.
  - Be secured with multiple fasteners in such a way that the absence of any single fastener does not compromise the security of the closure.
- 6.2.2 Where the fuel bladder is attached to the survival cell, fixings must be designed so that if it is pulled away from the survival cell, the attachment will fail without compromising the integrity of the fuel bladder. For this assessment, the pull-out load for any fitting will be calculated from the clamp area between the fitting and the bladder (on one face of the bladder). Between a clamp area of 1650mm<sup>2</sup> and 9 500mm<sup>2</sup>, the load will be a linear interpolation between points (1650mm<sup>2</sup>, 11kN) and (9 500mm<sup>2</sup>, 37.5kN). Below a clamp area of 1650mm<sup>2</sup>, the load will be taken as 11kN. Above a clamp area of 9 500mm<sup>2</sup>, the load will be taken as 37.5kN. No fitting may have a clamp area of less than 600 mm<sup>2</sup>.
- 6.2.3 All fuel lines between the fuel tank and the engine must have a self-sealing breakaway valve. This valve must separate at less than 50% of the load required to break the fuel line fitting or to pull it out of the fuel tank.
- 6.2.4 No lines containing fuel may pass through the cockpit.
- 6.2.5 All lines must be fitted in such a way that any leakage cannot result in the accumulation of fuel in the cockpit.
- 6.2.6 All components containing fuel at a pressure greater than 10barG must be located outside the fuel tank.



### 6.3 Fuel tank fillers

Fuel tank fillers must not protrude beyond the bodywork. Any breather pipe connecting the fuel tank to the atmosphere must be designed to avoid liquid leakage when the car is running, and its outlet must not be less than 250mm from the cockpit opening.

All fuel tank fillers and breathers must be designed to ensure an efficient locking action which reduces the risk of an accidental opening following a crash impact or incomplete locking after refuelling.

### 6.4 Refuelling

6.4.1 A cover must be fitted over any refuelling connector at all times when the car is running on the track. The cover and its attachments must be sufficiently strong to avoid accidental opening in the event of an accident.

6.4.2 The fuel in a car must not be colder than the lowest of: ten degrees centigrade below ambient temperature, or ten degrees centigrade, at any time when the car is running after leaving the Competitor's designated garage area.

When assessing compliance:

- a. The ambient temperature will be that recorded by the FIA appointed weather service provider one hour before any practice session or three hours before the race or sprint session. and will be displayed on the timing monitors.
- b. The temperature of the fuel (TFFMFuel) will be that recorded in the car by the Fuel Flow Meter.

6.4.3 The use of any device on board the car to decrease the temperature of the fuel is forbidden.

6.4.4 Fuel may not be added to nor removed from a car during a race.

6.4.5 Any refuelling procedure must respect the provisions of Article XX of the Sporting Regulations.

### 6.5 Fuel draining and sampling

6.5.1 Competitors must provide a means of removing all fuel from the car.

6.5.2 Competitors must ensure that a 0.70 litre sample of fuel may be taken from the car at any time during the Competition.

After a practice session, if a car has not been driven back to the pits under its own power, it will be required to supply the above-mentioned sample plus the amount of fuel that would have been consumed to drive back to the pits. The additional amount of fuel will be determined by the FIA.

6.5.3 All cars must be fitted with a -2 'Symetrics' male fitting in order to facilitate fuel sampling. If an electric pump on board the car cannot be used to remove the fuel an externally connected one may be used provided it is evident that a representative fuel sample is being taken. If an external pump is used it must be possible to connect the FIA sampling hose to it and any hose between the car and pump must be -3 in diameter and not exceed 2m in length. Details of the fuel sampling hose may be found in the Appendix to the Technical and Sporting Regulations.

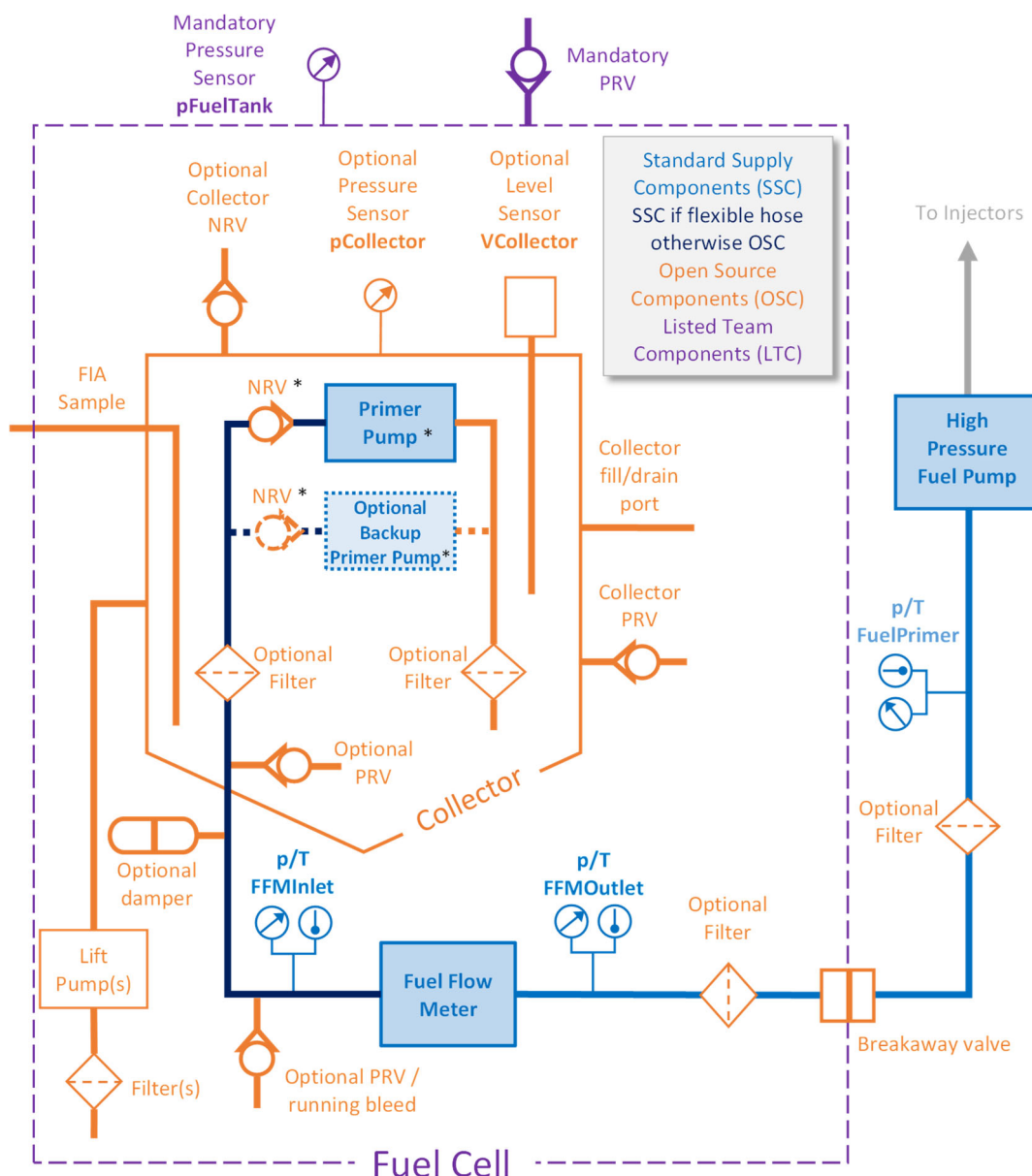
6.5.4 The sampling procedure must not necessitate starting the engine or the removal of bodywork (other than the nosebox assembly and the cover over any refuelling connector).

### 6.6 Fuel System Hydraulic Layout

6.6.1 Parts listed in Appendix 5 sections 6A and 6E are classified as OSC.

- 6.6.2 The primer pump(s) and fuel flow meter are SSC, the high pressure fuel pump and the pressure and temperature sensors are SSPUC; as mandated by the FIA and specified in the Appendix to the Technical and Sporting Regulations.
- 6.6.3 All flexible pipes and hoses and their fittings between the primer pump and the high pressure fuel pump are SSC, as mandated by the FIA. The specification and permitted lengths are given in the Appendix to the Technical and Sporting Regulations. Rigid pipes and manifolds and their fittings may be used instead of flexible pipes and hoses up to the inlet of the Fuel Flow Meter.
- 6.6.4 The hydraulic layout of the fuel system must functionally conform to the schematic given in the drawing below. Additional components (such as collector pressurisation system) are permitted, subject to the approval of the FIA if they are deemed necessary for the proper behaviour of the system.

Furthermore, fuel cell components, such as fuel cell pressurisation system and fill/drain hoses, are permitted provided they do not functionally interfere with the system shown.



- 6.6.5 If a fuel pressure damper is fitted it must be fitted upstream of the Fuel Flow Meter described in article 5.11.3.

- 6.6.6** The pressure of the fuel inside the collector may be increased relative to the pressure in the fuel cell volume by the lift pumps and/or either:
- i. air pressure acting on the free surface of the fuel,
  - ii. or hydraulic oil or air pressure acting on a piston.

In all cases the increase in pressure in the collector must be for the sole purpose of maintaining the primer pump(s) inlet pressure above the cavitation point. And it must be demonstrated to the satisfaction of the FIA that any fluid used for this purpose cannot be used to change to composition of the fuel.

\* The primer pump(s), the NRV(s), the damper, the filter and PRV downstream of the NRV(s) may be installed inside or outside the Collector.

## ARTICLE 15: MATERIALS

### 15.1 Definitions

#### 15.1.1 Commercially Available material

A material that:

- a. Is available on a non-exclusive basis and under normal and equivalent commercial terms to all Competitors.
- b. Is not supplied to a specification tighter than the standards listed in Article 15.3 (where applicable) with a primary aim of improving the baseline mechanical properties. Additional specifications concerned with process control and/or quality control are permissible.
- c. Has no restrictions or agreements in place that prevents the supplier from openly marketing it.

#### 15.1.2 Shape Memory Material

A material that is configured to move reversibly between two (or more) different shapes when it is subjected only to a non-mechanical uniform stimulus (thermal, electrical, magnetic, optical, etc.), or exhibits a reversible phase change when subject to an applied stress. For clarity, this does not include consequential geometric changes that result solely from the effects of thermal expansion.

#### 15.1.3 Foil Metallurgy

A process by which a material or component is made by the consolidation of metallic foils (by co-forging, welding etc.) which increases the mechanical properties of the material with respect to those of a bulk material. For this definition, a foil is considered a material with a thickness of less than 1mm.

#### 15.1.4 Metallic Materials Used for Additive Manufacture

A group of materials in powder form used for manufacturing near-net shape components from a digital model processed in separate layers and joined by either selective melting, bonding, or sintering.

**15.1.5 X Based Alloy (e.g., Ni based alloy)** – X must be the most abundant element in the alloy on a %w/w basis. The minimum possible weight percent of the element X must always be greater than the maximum possible of each of the other individual elements present in the alloy.

**15.1.6 X-Y Based Alloy (e.g., Al-Cu based alloy)** – X must be the most abundant element as in Article 5.16.1 above. In addition, element Y must be the second highest constituent (%w/w), after X in the alloy. The mean content of Y and all other alloying elements must be used to determine the second highest alloying element (Y).

**15.1.7 Intermetallic Materials (e.g., TiAl, NiAl, FeAl, Cu<sub>3</sub>Au, NiCo)** – These are materials where the material is based upon intermetallic phases, i.e. the matrix of the material consists of greater than 50%v/v intermetallic phase(s). An intermetallic phase is a solid solution between two or more metals exhibiting either partly ionic or covalent, or metallic bonding with a long-range order, in a narrow range of composition around the stoichiometric proportion.

**15.1.8 Composite Materials** – These are materials where a matrix material is reinforced by either a continuous or discontinuous phase. The matrix can be metallic, ceramic, polymeric or glass based. The reinforcement can be present as long fibres (fibre length greater than 13mm) or short fibres, whiskers and particles (discontinuous reinforcement). Nanoscale reinforced materials are to be considered as composites. (a reinforcement is considered to be nanoscale if any dimension of the reinforcement is less than 100nm)

- 15.1.9 Metal Matrix Composites (MMC's) – These are composite materials with a metallic matrix containing a minimum ratio of 0.5% volume/volume of other ceramic, metallic, carbon or intermetallic phase which is not soluble in the liquid phase at 100°C above the melting point of the metallic matrix.
- 15.1.10 Ceramic Materials (e.g. Al<sub>2</sub>O<sub>3</sub>, SiC, B<sub>4</sub>C, Ti<sub>5</sub>Si<sub>3</sub>, SiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub>) – These are inorganic, non-metallic solids.
- 15.1.11 Nanomaterials – These are purposely created objects that have one or more dimensions (e.g., length, width, height, diameter) which is less than 100nm. (1nm = 1 x 10<sup>-9</sup> metres) as defined in ISO 80004-1:2023.
- 15.1.12 Surface Texturing: Modification of a component surface to obtain a defined patterning to enhance the tribological performance
- 15.1.13 Coating: a covering that is applied to the surface of an object, referred to as the substrate
- 15.1.14 Polymeric material: any thermoplastic or composite thermoset material.
- 15.1.15 The whole percentage range of an element, as declared in the applicable international standard for a specific alloy, shall be inside all the limits set in these Technical Regulations.

## 15.2 General Principles

- 15.2.1 Materials used in the construction of the Formula One car – excluding the power unit are limited to those defined in Article 15.3 and to the specific exceptions in article 15.5.
- 15.2.2 Materials and processes used or prohibited in the power unit are defined in Articles 15.7 to 15.10.
- 15.2.3 All materials used must be commercially available.
- 15.2.4 No parts of the car may be made from metallic materials that have a specific modulus of elasticity greater than 40GPa / (g/cm<sup>3</sup>). Tests to establish conformity will be carried out in accordance with FIA Test Procedure 03/03, a copy of which may be found in the Appendix to the Technical and Sporting Regulations.
- 15.2.5 Competitors or PU Manufacturers may submit a proposal to the FIA to add or to remove a material from this article. The proposal should include mechanical characteristic, cost, and supply considerations. The proposal will be considered by the TAC or PUAC after the ~~teams~~ Competitors or PU Manufacturers have reviewed the proposal.
- 15.2.6 Materials that are a direct equivalent to permitted materials may be added by presenting justification to the FIA, who may at its absolute discretion ask more information or tests to be carried out to support the claim.
- 15.2.7 Competitors or PU Manufacturers are required to make submissions of the materials that they will use on the car as part of their annual homologation submission. These shall be listed according to the categories in Article 15.3. This information will be compiled, anonymised, and circulated to ~~all teams~~ the relevant group.
- 15.2.8 Unless explicitly permitted otherwise for a specific application, only material approved by the FIA Technical Department may be used on the power unit. The approval of the FIA Technical Department is conditional upon the material concerned being available on a non-exclusive basis and under normal and equivalent commercial terms to all Competitors. The approval request form must be sent by the PU Manufacturer to the FIA before the 1st of November of the preceding year. This information will be compiled, anonymised, and circulated to all Competitors or PU Manufacturers by the end of March of the same year.

## 15.3 Permitted Materials (Components Outside the PU Perimeter)

*[See Draft Chassis Regulations]*

With the exception of materials specifically permitted for certain components, as listed in Article 15.5, only the following materials may be used:

### ~~15.3.1 Metallic Materials – Not Used for Additive Manufacture~~

- ~~a. Iron Alloys: any~~
- ~~b. Aluminium Alloys:
  - ~~i. Aluminium based alloys from the 1xxx, 2xxx, 3xxx, 4xxx, 5xxx, 6xxx and 7xxx series containing less than 1% Lithium.~~
  - ~~ii. In addition, the specific alloys 2099, 2199, 2050 and 2055 are permitted.~~~~
- ~~c. Ni or Co-based Superalloys:
  - ~~i. UNS N06625; W.Nr.2.4856 Inconel 625~~
  - ~~ii. UNS N07718; W.Nr.2.4668 Inconel 718~~
  - ~~iii. UNS N07001; W.Nr.2.4654 Waspaloy~~
  - ~~iv. UNS R30035; W.Nr.2.4999 MP35N~~
  - ~~v. UNS R30159 MP159~~~~
- ~~d. Titanium Alloys:
  - ~~i. Low alloy titanium alloys containing at least 97.5% Ti and less than 1% of any other element.~~
  - ~~ii. Grade 9 Ti3Al2.5V~~
  - ~~iii. Grade 5; grade 23 TiAl6V4, Ti64~~
  - ~~iv. UNS R54620, Ti6242, Ti6242Si~~
  - ~~v. UNS R56260 Ti6246~~
  - ~~vi. UNS R56410 Ti10-2-3~~
  - ~~vii. UNS R58153 Ti15-3-3-3~~
  - ~~viii. UNS R58640 Allvac 38-644~~
  - ~~ix. Ti-5Al-5Mo-5V-3Cr Ti5553~~
  - ~~x. Ti-15Mo-3Nb-3Al-0.2Si Timetal Ti-21S~~
  - ~~xi. Timetal Ti1100~~
  - ~~xii. Ti-6Cr-5Mo-5V-4Al~~~~
- ~~e. Copper Alloys containing less than 2.5% Beryllium~~
- ~~f. Tungsten Alloys: any~~

### ~~15.3.2 Metallic Materials Used for Additive Manufacture~~

~~Components produced by additive manufacture can be made from materials in the following list. A full list of applicable standards and criteria for acceptance of metals under the provisions of Article 15.2.5 in this list is given in the Appendix to the Technical and Sporting Regulations.~~

- ~~a. Aluminium Alloys; AlSi10Mg, AlSi7MG, Al-CI-30AL, P339-AM, EOS Aluminium 2139-AM~~
- ~~b. Aluminium Alloys with particulate reinforcing, A20X, 2024-RAM2, 6061-RAM2~~
- ~~c. Aluminium-Magnesium Alloys; Scalmalloy~~
- ~~d. Titanium Alloys; Grade 1, Grade 2, Ti6Al4V, Ti6Al4V-ELI, Ti-5553, Ti-6242.~~

- ~~e. Iron-based Alloys; 316, 304, MS1, 15-5PH, 17-4PH, 300M, 4140.~~
- ~~f. Copper Alloys not containing Beryllium.~~
- ~~g. Superalloys; Inconel 625, Inconel 718, Cobalt-Chrome.~~

~~Furthermore, the finished mass of a component made by additive manufacture should be no less than 60% of the mass of the printed component, excluding support structures.~~

### ~~15.3.3 Permitted Polymer Composite Materials~~

~~**Matrix Systems:** the matrix system utilised in all polymer composite materials must be based on one of the following:~~

- ~~a. Epoxy~~
- ~~b. cyanate ester~~
- ~~c. bismaleimide~~
- ~~d. phenolic~~
- ~~e. polyurethane~~
- ~~f. polyester~~
- ~~g. Thermoset resins not derived from petrochemicals—subject to approval.~~

~~**Reinforcing:** unidirectional or planar reinforcing is permitted using the following materials:~~

- ~~a. Carbon fibres manufactured from polyacrylonitrile (PAN) precursor, which have:
 
  - ~~— A nominal tensile modulus  $\leq 550$  GPa~~
  - ~~— A nominal tensile strength  $\leq 7100$  MPa (i.e. up to and including that of Toray T1100 or Mitsubishi MR70).~~
  - ~~— A density  $\leq 1.92$  g/cm<sup>3</sup>~~~~
- ~~b. Aramid fibres.~~
- ~~c. Poly(p-phenylene benzobisoxazole) fibres (e.g. “Zylon”).~~
- ~~d. Polyethylene fibres.~~
- ~~e. Polypropylene fibres.~~
- ~~f. Glass fibres.~~
- ~~g. Natural Fibres (i.e. flax, hemp, linen, cotton, bamboo)~~

~~**Core Materials:**~~

- ~~a. Aluminium Honeycomb~~
- ~~b. Meta-Aramid Honeycomb (e.g. Nomex or equivalent)~~
- ~~c. Polymer foams~~
- ~~d. Polymer syntactic foams~~
- ~~e. Balsa wood~~

### ~~15.3.4 Permitted Polymer Materials~~

- ~~a. Thermoplastics—monolithic, particulate filled, or short fibre reinforced with fibre length less than 13mm~~
- ~~b. Thermosets—monolithic, particulate filled, or short fibre reinforced with fibre length less than 13mm~~

## 15.4 Specific Prohibitions (Components Outside the PU Perimeter)

*[See Draft Chassis Regulations]*

~~15.4.1 Notwithstanding the list of permitted materials in Article 15.3, the following materials or processes are forbidden:~~

- ~~a. Metal Matrix Composites, except where allowed under article 15.3.2~~
- ~~b. Shape Memory Materials except for piezoelectric materials used in electrical sensors.~~
- ~~c. Titanium alloys may not be used for fasteners with a male thread less than 15mm diameter.~~
- ~~d. Additive manufactured materials containing Beryllium.~~
- ~~e. Three dimensional fibre reinforcement of Polymer Composite Materials.~~

~~15.4.2 Notwithstanding the list of permitted materials in Article 15.3, the following materials or processes are forbidden unless listed in Article 15.5:~~

- ~~a. Alloys where the combined weight of Platinum, Ruthenium, Iridium, Rhenium and Gold is more than 5%~~
- ~~b. Components produced by foil metallurgy.~~
- ~~c. Intermetallic alloys.~~

## 15.5 Specific Exceptions (Components Outside the PU Perimeter)

*[See Draft Chassis Regulations]*

~~The following materials, components or processes do not have to comply with articles 15.2 or 15.3 but may be subject to restrictions elsewhere in these regulations:~~

- ~~a. Monolithic Ceramic Materials may be used for: rolling elements of rolling element bearings, high pressure fuel pump elements, electrical components, thermal insulation, clutch friction materials and spherical bearings.~~
- ~~b. Ceramic Matrix Composites may be used for: friction materials, seals and thermal insulation.~~
- ~~c. Carbon carbon composites may be used for friction materials.~~
- ~~d. Materials used in any electrical component (e.g., control boxes, wiring looms, sensors).~~
- ~~e. All seals and rubbers (e.g., rubber boots, O-rings, gaskets, any fluid seals, bump rubbers).~~
- ~~f. Fluids (e.g., water, oils).~~
- ~~g. Tyres.~~
- ~~h. Coatings and platings (e.g., DLC, chroming) whose primary purpose is not thermal or electrical insulation and provided the total coating thickness does not exceed 25% of the section thickness of the underlying base material in all axes. In all cases, the relevant coating must not exceed 0.8mm.~~
- ~~i. Paint.~~
- ~~j. Adhesives.~~
- ~~k. Thermal insulation (e.g., felts, reflective foils or heat shields).~~
- ~~l. Any currently regulated materials (e.g., fuel bladder, headrest, extinguishant, padding or plank).~~
- ~~m. Materials used in any component that is supplied to an FIA Single Supply Contract.~~
- ~~n. Z-pinning is allowed in composite components.~~
- ~~o. Magnesium alloys may be used for inserts in composite components~~



- ~~p. Nano particles are permitted when part of a commercially available polymer or polymer resin.~~
- ~~q. UNS R30016 (Stellite 6) and UNSR30012 (Stellite 12) may be used on or above Z=0 (i.e., not in RV-PLANK)~~

## 15.6 Prescribed Laminates (Components Outside the PU Perimeter)

*[See Draft Chassis Regulations]*

~~The following are the prescribed laminates referred to in other articles of these regulations.~~

~~15.6.1 The materials referred to in Article 15.6.2 are defined below:~~

- ~~a. CC200 Woven carbon cloth, fibre weight 200gsm, epoxy prepreg.~~
- ~~b. CC100 Woven carbon cloth, fibre weight between 50gsm and 150 gsm, epoxy prepreg~~
- ~~c. KC60 Woven aramid cloth, fibre weight 60gsm, epoxy prepreg~~
- ~~d. KC170 Woven aramid cloth, fibre weight 170gsm~~
- ~~e. R135 135gsm elastomeric material~~
- ~~f. R350 350gsm elastomeric material~~
- ~~g. CC280UHS Woven carbon cloth, fibre weight 280gsm,  $E_{tu} > 6500\text{MPa}$ , epoxy prepreg~~

~~15.6.2 The prescribed laminates in use throughout the Technical Regulations are listed below:~~

- ~~a. **PL-HALO**: [KC60, CC100, KC60] stacking sequence is free.~~
- ~~b. **PL-ANTI-SPLINTER** may be one of the three specifications listed below:
 
  - ~~i. **Laminate Type A** a laminate where more than 50% by weight of the reinforcing is: aramid, poly(p-phenylene benzobisoxazole) (e.g. "Zylon"), polyethylene, polypropylene or natural fibres. In this case, no additional precautions are required.~~
  - ~~ii. **Laminate Type B** Laminates not covered by **A** and with areal weight of reinforcing up to 1000gsm: [B/2, R135, B/2] where B/2 is half the laminate  $\pm 1$  ply.~~
  - ~~iii. **Laminate Type C** Laminates not covered by **A** and with areal weight of reinforcing is greater than 1000gsm: [C/2, R350, C/2] where C/2 is half the laminate  $\pm 1$  ply.~~~~
- ~~c. **PL-SUS-FAIRING**: [CC100, KC170, CC100] or [CC100, KC60, KC60, KC60, CC100]~~
- ~~d. **PL-HEADREST**: [KC60, KC60]~~
- ~~e. **PL-CHASSIS-SIDE**: A laminate homologated to "Side Intrusion Test Procedure 02/05" defined in the Appendix to the Sporting and Technical Regulations with one additional ply per skin (two total) of CC280UHS cloth using the same resin system as the homologated laminate. The orientation of the additional ply in each skin should be the same as the least numerous ply orientation in that skin.~~
- ~~f. **PL-LWT-FAIRING** [CC200, (Optional Aramid core), CC200]  
The edge of the laminate may be reinforced with a further 2 plies of CC200 (1 either side of the core, if applicable) which may extend no further than 20mm in from the perimeter of the fairing.~~

## 15.7 Materials, processes and construction – General (Components inside the PU Perimeter)

15.7.1 Unless explicitly permitted for a specific application, the following materials may not be used on the power unit:

- a. Magnesium based alloys.
  - b. Metal Matrix Composites (MMC's) containing more than 2.0% volume/volume of other ceramic, metallic, carbon or intermetallic phase which is not soluble in the liquid phase at 100°C above the melting point of the metallic matrix.
  - c. Intermetallic materials.
  - d. Alloys containing more than 5% by weight of Platinum, Ruthenium, Iridium or Rhenium.
  - e. Copper based alloys containing more than 2.2% Beryllium
  - f. Any other alloy class containing more than 0.25% Beryllium.
  - g. Tungsten base alloys.
  - h. Ceramics and ceramic matrix composites.
  - i. Aluminium based alloys containing more than 1.0% weight Lithium (Li).
  - j. Materials which at least one element during production is a nanomaterial.
  - k. Thermal insulation containing unbound nanomaterials.
  - l. Material with a density exceeding 18,400 kg/m<sup>3</sup>.
  - m. Aluminium based alloys containing more than 1.0% weight Silver (Ag).
  - n. Polymer composite material not listed in 15.3.3 except Metallic reinforced polymer.
- 15.7.2** For coatings, the restrictions in Article 15.7.1 do not apply to coatings provided the total coating thickness must not exceed 25% of the section thickness of the underlying base material in all axes.  
In all cases, other than under Article 15.7.3(b), the relevant coating must not exceed 0.8mm. Where the coating is based on Gold, Platinum, Ruthenium, Iridium or Rhenium, the coating thickness must not exceed 0.035mm.  
Graphene is not permitted in any coating.
- 15.7.3** The restrictions in Article 15.7.1(h) do not apply to the following applications:
- a. Any component whose primary purpose is for electrical or thermal insulation.
  - b. Any coating whose primary purpose is for thermal insulation of the outside of the exhaust system.
- 15.7.4** For Aluminium-based alloy, in addition to the restrictions in article 15.7.1(b), TiB<sub>2</sub> is only permitted up to a maximum of 0.3% v/v. *Additionally AMS 4471A, AMS 4482 and AMS 7033 are authorized.*
- 15.7.5** The creation of a textured surface using an energy beam (e.g., electron or laser beam) or photo-chemical etching may not be used on the power unit, except for part marking purposes.
- 15.7.6** For all seals and rubbers, the restrictions in Article 15.7.1 do not apply (e.g., rubber boots, O-rings, gaskets, any fluid seals, bump rubbers).
- 15.7.7** An approach aiming to respect the REACH and ROHS standards shall be actively pursued by the manufacturers.

## **15.8 Materials and construction – Components (Components inside the PU Perimeter)**

- 15.8.1** Pistons must be produced from one of the following iron-based alloys: AMS 6487, 15cdv6, 42CrMo4, X38CrMoV5-3.
- 15.8.2** Piston pins must be manufactured from an iron-based alloy and must be machined from a single piece of material.

- 15.8.3** Connecting rods must be manufactured from iron or titanium-based alloys and must be machined from a single piece of material with no welded or joined assemblies (other than a bolted big end cap or an interfered small end bush).
- 15.8.4** Crankshafts must be manufactured from an iron-based alloy.  
No welding is permitted between the front and rear main bearing journals.  
Crank counterweights assembled to the crankshaft may be manufactured in a Tungsten based material.
- 15.8.5** Camshafts must be manufactured from an iron-based alloy.  
Each camshaft and lobes must be machined from a single piece of material.  
No welding is allowed between the front and rear bearing journals.
- 15.8.6** Valves must be manufactured from TiAl intermetallic materials or from alloys based on Iron, Nickel, Cobalt, Titanium. Hollow valves (e.g., sodium, or similar, filled for cooling) are permitted for the exhaust only, but the main cavity created must be a cylindrical feature of constant diameter. Machined features to facilitate manufacture and assembly are allowed above and below the main cavity, however such features must not create a volume that extends beyond a virtual plain cylinder positioned on the valve centreline with a diameter which is 1.0 mm greater than that of the main cavity.  
  
In addition, the restrictions detailed in Articles 15.7.2 and 15.2.4 do not apply to the intake and exhaust valves.
- 15.8.7** Reciprocating and rotating components:
- Reciprocating and rotating components must not be manufactured from graphitic matrix, metal matrix composites or ceramic materials, this restriction does not apply to the clutch discs and any seals.
  - Rolling elements of rolling element bearings must be manufactured from an iron-based alloy or from a ceramic material.
  - All timing gears between the crankshaft and camshafts (including hubs) must be manufactured from an iron-based alloy.
  - High pressure fuel pump elements may be manufactured from a ceramic material.
  - Torsional damper elements may be manufactured in a Tungsten based material.
- 15.8.8** Static components:
- Other than inserts within them, engine crankcases including sump, cylinder heads and cylinder head cam covers must be manufactured from aluminium or iron-based alloys.
  - On the crankcase including sump, cylinder head and cylinder head cam cover, composite or metallic materials are permitted for local repairs to components following damage or failure and after consultation with all PU manufacturers. The total area should in any case not exceed 100cm<sup>2</sup> and the thickness is limited to 3mm. Composite repairs must not be present on the components used during the following Championship season.
  - Any metallic structure whose primary or secondary function is to retain lubricant or coolant within the engine must be manufactured from an iron-based alloy or an aluminium alloy.
  - All threaded fasteners must be manufactured from Waspaloy, Rene 41, Inconel 718, A286, PH 13-08Mo, 35NiCrMo16, 30NiCrMo16, AISI H11, 17-4PH, 42CrMo4 or any steel covered by the ISO 898-1 and ISO 898-2. Additional materials are authorized for the following three functions:

- i. Fasteners whose primary function requires them to be an electrical insulator may be manufactured from ceramic or polymeric materials.
  - ii. Fasteners that are used in electronic control units may be manufactured from aluminium or copper-based alloys or polymeric (plastic) materials.
  - iii. Fasteners used between the cylinder head and crankcase, crankcase upper and lower, conrod and crankshaft counterweight bolts may be manufactured from AMS5758, AMS5844, AMS5845 and AMS5937 materials.
- e. Valve seat inserts, valve guides and any other bearing component may be manufactured from metallic infiltrated pre-forms with other phases which are not used for reinforcement.
  - f. Ballast may be manufactured in a Tungsten based material.
  - g. Only one cylinder head is permitted for each bank and each cylinder head must be made from a single piece of material with the exception of inserts defined in Article 5.3.7 and must include inlet ports, exhaust ports and all water cores and/or water passages above the top deck.
  - h. The plenum must be made from polymer composite material with the exception of inserts.

### **15.9 Materials and construction – Pressure charging and exhaust systems (Components inside the PU Perimeter)**

- 15.9.1** All components of the Engine exhaust system, turbine, turbine housing and wastegate exit housing that are in contact with the main exhaust gas flow must be manufactured from an Iron or Nickel based alloy.
- 15.9.2** Static components that are neither in the exhaust system nor in the compressor line must be manufactured from iron-based alloys, aluminium alloys or titanium alloys.
- 15.9.3** The restrictions detailed in article 15. 7.1 i) do not apply to the compressor housing (from compressor inlet to compressor outlet(s)) which must be manufactured from aluminium-based alloy containing up to 2.5% weight Lithium.
- 15.9.4** The restrictions detailed in article 15.7.1 i) do not apply to the compressor wheel, which must be manufactured from aluminium-based alloy containing up to 2.5% weight Lithium or from Titanium.
- 15.9.5** Measures must be taken to ensure that in the event of failure of the turbine wheel any resulting significant debris is contained by and within the turbine housing, except in the case of an axial failure where this debris must be contained within the turbine housing and/or tailpipe assembly.
- 15.9.6** Nickel Alloys limited to Inconel 625, 625 LCF and 718 on the exhaust primaries / secondaries / flange / brackets / turbine housing
- 15.9.7** Additive manufacture is only permitted in three areas within the exhaust assemblies as defined in 5.1.20 (see drawing 8 in Appendix 2 is a representation of these constraints, included for reference only):
  - a. One stub/flange element per primary at the connection to the cylinder head. The maximum dimension of this additive element in any direction is 150mm.
  - b. One 3-into-1 element per bank joining the primaries to the secondary. The maximum dimension of this additive element in any direction is 230mm.
  - c. One connection between the secondary and the TC per bank. The maximum dimension of this additive element for transition to TC and wastegate mounting in any direction is 150mm.

15.9.9 exhaust insulation may not use ceramic matrix composite (CMC) or polymer composite material (PMC).

#### **15.10 Materials and construction – Energy recovery, storage systems and electronic systems (Components inside the PU Perimeter)**

15.10.1 All metallic casings for the energy recovery and storage systems must be manufactured in aluminium-based alloy and must comply with all aspects of Article 15.7 except for power electronic cooling base plate where metal matrix composite may be used.

15.10.2 All casings for electronic systems, including break up boxes, with exception of the ERS and storage system must be manufactured from polymeric material or aluminium based alloys.

15.10.3 Energy storage devices are not subject to Articles 15.7.1a), b), c) and h) nor to 15.7.2.

15.10.4 Permanent magnets in electrical machines are not subject to Articles 15.7.1 a), b), c) or h) nor to Article 15.7.2.

15.10.5 Soft electromagnetic materials used in electrical machines are not subject to Articles 15.7.1 a), b), c) or h) nor to Article 15.7.2. Cobalt concentration is limited to 10% on soft magnetic alloys. Concentration up to 49% is permitted providing that all end-of-life cobalt is recycled. In addition, any cobalt used must come from an ethical source.

15.10.6 Electronic components contained inside electronic units are not subject to any material restriction.

15.10.7 ES Cells materials are not subject to Article 15.7.1 j).

## ARTICLE 16: FUEL AND ENGINE OIL

### 16.1 Basic principles

- 16.1.1** The purpose of this Article is to ensure that the fuel and engine oil used in Formula One correspond to what these terms are generally understood to mean.
- 16.1.2** With regard to fuel, the detailed requirements of this Article are intended to ensure the use of Advanced Sustainable (AS) fuels comprising solely AS components, that are composed of certified compounds and refinery streams and fuel additives and to prohibit the use of specific power-boosting chemical compounds. Co-processing of these certified compounds or refinery streams is not permitted. All AS components and fuels must be segregated from non-sustainable components and fuels at all times. The final, blended fuel must achieve a greenhouse gas (GHG) emissions savings, relative to fossil-derived gasoline, of at least that defined for the transport sector in the EU Renewable Energy Directive RED<sup>(1)</sup>, which was current on January 1st in the year prior to the relevant Formula One Championship. The GHG savings calculation takes into account any net carbon emissions from land-use change, the energy used in harvesting and transporting the biomass and the production and processing of the advanced sustainable component. In any process where sustainable energy is used, this must be surplus to the local domestic requirements. Where available, GHG emission savings will be taken from the current EU Renewable Energy Directive (RED) or other equivalent, internationally recognised sources. The use of these compounds and refinery streams in F1 fuel will be dependent on evidence indicating that the supplier is genuinely developing these compounds for use in commercial fuels and that they are available from plants capable of producing at least 5m<sup>3</sup> per year or are commercially available at similar volumes from a third party. Acceptable compounds and compound classes are defined in 16.2 and 16.4.3. In addition, to cover the presence of low-level impurities, the sum of components lying outside the 16.2 and 16.4.3 definitions are limited to 1% max m/m of the total fuel.
- <sup>(1)</sup> Article 29, Section 10(c) of Directive (EU) 2018/2001 for biofuels, and Article 25, Section 2 for RFNBO
- 16.1.3** Only approved fuel (Article 16.5) may be released into the engine combustion chamber by the fuel injector (5.1.12).
- 16.1.4** Only ambient air may be mixed with the fuel as an oxidant.
- 16.1.5** The function of an engine oil is to lubricate moving parts, to improve the overall efficiency of the engine by reducing friction and to reduce wear. It also cleans, inhibits corrosion, improves sealing, and cools the engine by carrying heat away from moving parts. Engine oils should not enhance the properties of the fuel nor energize the combustion. The presence of any component that cannot be rationally associated with the defined functions of the engine oil will be deemed unacceptable.
- 16.1.6** Any fuel or engine oil, which appears to have been formulated in order to subvert the purpose of this regulation, will be deemed to be outside it.
- 16.1.7** All Competitors must be in possession of a Material Safety Data Sheet for each type of fuel or engine oil used. This sheet must be made out in accordance with EC Directive 93/112/EEC and all information contained therein strictly adhered to.

### 16.2 Fuel Definitions

- 16.2.1 Paraffins** Straight chain and branched alkanes.
- 16.2.2 Olefins** Straight chain and branched monoolefins and diolefins.  
Monocyclic monoolefins (with five or more carbon atoms in the ring) with or without paraffinic side chains.

- 16.2.3 Diolefins** Straight chain or branched or monocyclic hydrocarbons (with five or more carbon atoms in any ring) with or without paraffinic side chains, containing two double bonds per molecule.
- 16.2.4 Naphthenes** Monocyclic alkanes (with five or more carbon atoms in the ring) with or without paraffinic side chains.
- 16.2.5 Aromatics** Monocyclic and bicyclic aromatic rings with or without paraffinic side chains.
- 16.2.6 Oxygenates** Organic compounds containing oxygen.
- 16.2.7 Additive** An additive is a component added to the fuel at low concentration to improve a particular property of the fuel. These include (but are not limited to) antioxidants, antiknock agents, antistatic additives and deposit control additives.
- 16.2.8 Advanced Sustainable component** An Advanced Sustainable (AS) Component is one that is certified to have been derived from a renewable feedstock of non-biological origin (for example, a RFNBO), municipal waste, or non-food biomass. Such biomass includes, but is not limited to, lignocellulosic biomass (including sustainable forest biomass), algae, agricultural residues or waste, and dedicated non-food energy crops grown on marginal land unsuitable for food production. RFNBOs are considered renewable when the hydrogen component is produced in an electrolyser that uses new renewable electricity generation capacity. Pre-commercial plants producing RFNBOs do not need to use electricity from new renewable electricity generating capacity. Pre-commercial plants, producing AS fuel or AS fuel components from RFNBOs, municipal waste or non-food biomass, may use renewable energy certificates and/or low-carbon hydrogen guarantees-of-origin certificates to improve their GHG emission reduction. Biocomponents from food crops can be regarded as an advanced sustainable component only if they have already fulfilled their food purpose (e.g. waste vegetable oil because it has already been used and is no longer fit for human consumption). Furthermore, the biomass, from which the advanced sustainable component was made, must not originate from land with high biodiversity such as undisturbed primary forest or woodland, land designated for nature protection or highly biodiverse grassland, and were in this state in or after January 2008. Additionally, the biomass must not originate from any land with high-carbon stock such as wetlands and peatlands.
- 16.2.9 Metals** are defined as alkali metals, alkaline earth metals, transition metals, actinides, lanthanides, post-transition metals and metalloids.
- 16.2.10 Alkali Metals** Group 1 elements, excluding hydrogen.
- 16.2.11 Co-processing** is the procedure of processing feedstocks blended of sustainable and non-sustainable origin.
- 16.2.12 Denaturant in this instance is a toxic and/or unpalatable adulterant added to ethanol making it unsuitable for human consumption.**
- 16.2.13 A Pre-commercial plant** is one that has a total maximum production capacity of all AS products of 40,000m<sup>3</sup> per year.
- 16.2.14 Municipal Waste is household waste and waste similar in nature and composition to household waste. For the purposes of this article, only solid, non-toxic, non-hazardous waste material that cannot be re-used, re-covered or recycled, meeting the principles of the waste hierarchy, is considered suitable source material for AS components or AS fuel production.**

### 16.3 Fuel properties

The only fuel permitted is petrol having the following characteristics:

Property	Units	Min	Max	Test Method
RON		95.0 <sup>(1)</sup>	102.0 <sup>(1)</sup>	ISO 5164/ ASTM D2699

Sensitivity (RON-MON)			15.0 <sup>(1)</sup>	ISO 5164/ ASTM D2699 ISO 5163/ ASTM D2700
LHV	MJ/kg	38.0	41.0	GC
Density (at 15°C)	kg/m <sup>3</sup>	720.0	785.0	ISO 12185/ ASTM D4052
Methanol <sup>(2)</sup>	% v/v		3.0	EN 1601 or EN 13132 or EN ISO 22854
Oxygen	wt%	6.70	7.10	Elemental Analysis
Nitrogen	mg/kg		500	ASTM D 5762
Benzene	wt%		1	GCMS
DVPE	kPa	45	68	EN130161
Lead	mg/l		5	ASTM D 3237 or ICPOES
Manganese	mg/l		2	ASTM D 3831 or ICPOES
Metals (excluding alkali metals)	mg/l		5	ICPOES
Oxidation Stability	minutes	360		ASTM D 525
Sulphur	mg/kg		10	EN ISO 20846
Electrical conductivity	pS/m	200		ASTM D 2624
Distillation Characteristics:				
At E70°C	% v/v	20.0	52.0	ISO 3405/ ASTM D86
At E100°C	% v/v	40.0	80.0	ISO 3405/ ASTM D86
At E150°C	% v/v	75.0		ISO 3405/ ASTM D86
Final Boiling Point	°C		210	ISO 3405
Distillation Residue	%v/v		2	ISO 3405
(1) A correction factor of 0.2 for MON and RON shall be subtracted for the calculation of the final result in accordance with EN 228: 2012				
(2) A stabilising agent must be added				

The fuel will be accepted or rejected according to ASTM D 3244 with a confidence limit of 95%.

## 16.4 Composition of the fuel

16.4.1 The composition of the petrol must comply with the specifications detailed below:

Component	Units	Min	Max	Test Method
Aromatics	wt%		40	GCMS
Olefins	wt%		17	GCMS
Total diolefins	wt%		0.1	GCMS
Total styrene and alkyl derivatives	wt%		0.1	GCMS

In addition, the fuel must contain no substance which is capable of exothermic reaction in the absence of external oxygen.

16.4.2 The total of individual hydrocarbon components present at concentrations of less than 5% m/m of the total fuel must be at least 30% m/m of the hydrocarbon component of the fuel.

16.4.3 The only oxygenates permitted are paraffinic monoalcohols and paraffinic monoethers with a final boiling point below 210°C.

16.4.4 An additive package **from non-sustainable sources**, comprising additives (as defined in Article 16.2.7), **and denaturants (as defined in Article 16.2.12)** from non-sustainable sources may be used, at a **total combined** concentration of no more than 1.0% m/m of the blended fuel. The presence of any **non-sustainable** component that cannot be rationally associated with the defined functions of the additive package **or the denaturant** will be deemed unacceptable.



## 16.5 Fuel approval

16.5.1 Before any fuel may be used in the Formula One Championship:

- a. The supplier must comply with the requirements set in Appendix 4, Paragraph 1.2 of the Technical Regulations.
- b. Two separate five litre samples, in suitable containers, must be submitted to the FIA for analysis and approval.
- c. Certification must be presented to the FIA, from a recognised body, assuring the origin and the calculated GHG reduction of each AS compound and AS refinery stream blended into any Formula One fuel blend submitted to the FIA for approval.
- d. The fuel must be shown to be compatible with the fuel bladder and seal materials used by all Competitors or PU Manufacturers that will be using the fuel by passing the tests specified in The Appendix to the Technical and Sporting Regulations.

16.5.2 No fuel may be used in a Competition without the prior written approval of the FIA.

## 16.6 Fuel sampling and testing at a Competition

16.6.1 All samples will be taken in accordance with the FIA Formula One fuel sampling procedure, a copy of which may be found in the Appendix to the Technical and Sporting Regulations.

16.6.2 Fuel density will also be checked and must be within 0.15% of the figure noted during preapproval analysis.

16.6.3 Fuel samples taken during a Competition will be checked for conformity by using a gas chromatographic technique, which will compare the sample taken with an approved fuel. Samples which differ from the approved fuel in a manner consistent with evaporative loss, will be considered to conform. However, the FIA retains the right to subject the fuel sample to further testing at an FIA approved laboratory.

16.6.4 GC normalised peak areas of the sample will be compared with those obtained from the reference fuel. Variations in any given normalised peak area (relative to those of adjacent peaks of a similar size) which are greater than 12%, or an absolute amount greater than 0.10% for compounds present at concentrations below 0.8%, will be deemed not to comply.

If a peak is detected in a fuel sample that was absent in the corresponding reference fuel, and its peak area represents more than 0.10% of the summed peak areas of the fuel, the fuel will be deemed not to comply.

If the deviations observed (above) by GC indicate that they are due to mixing with another Formula One fuel, which has been approved by the FIA for use by the team, the fuel sample will be deemed to comply, provided that the adulterant fuel is present at no more than 10% in the sample. Any systematic abuse of mixed fuels will be deemed not to comply.

## 16.7 Engine oil definitions

Engine oil (serving the purpose stated in Article 16.1.4) must comprise base oils and additives as defined below.

Base Oil General:

- a. A base oil is a base stock or blend of base stocks.

b. A base stock is a lubricant component that is produced by a single manufacturer. Base stocks may be manufactured using a variety of different processes including but not limited to distillation, solvent refining, hydrogen processing, oligomerization, esterification, and rerefining.

All base stocks are divided into five general categories:

- a. Group I base stocks contain less than 90 percent saturates and/or greater than 0.03 percent sulphur and have a viscosity index greater than or equal to 80 and less than 120 using the test methods specified in the table below.
- b. Group II base stocks contain greater than or equal to 90 percent saturates and less than or equal to 0.03 percent sulphur and have a viscosity index greater than or equal to 80 and less than 120 using the test methods specified in the table below.
- c. Group III base stocks contain greater than or equal to 90 percent saturates and less than or equal to 0.03 percent sulphur and have a viscosity index greater than or equal to 120 using the test methods specified in the table below.
- d. Group IV base stocks are polyalphaolefins (PAO).
- e. Group V base stocks include all other base stocks not included in Group I, II, III, or IV.

The Analytical Methods for Base Stock are defined below:

Property	Test Method
Saturates	ASTM D2007
Viscosity index	ASTM D2270
Sulfur (use one listed method)	ASTM D1552 ASTM D2622 ASTM D3120 ASTM D4294 ASTM D4927

Additives are defined as the chemical compounds added to the base oil in small concentrations in order to improve the performance characteristics of the engine oil.

## 16.8 Engine oil properties

The engine oil must comply with the following characteristics:

Property	Units	Min	Max	Test Method
Kinematic Viscosity (100°C)	cSt	2.8		ASTM D445
HTHS Viscosity at 150°C and Shear Rate of $10^6 \text{ s}^{-1}$	mPa.s	1.4		ASTM D4741
Initial Boiling Point	°C	210		ASTM D7500
Flashpoint	°C	93		ASTM D3828

The oil will be accepted or rejected according to ASTM D 3244 with a confidence limit of 95%.

## **16.9 Composition of the engine oil**

- 16.9.1** In the event that the initial boiling point test (ASTM D7500) suggests the presence of compounds with a boiling point of less than 210°C the sample will be further analysed by GCMS. The total of any components with boiling points less than 210°C must not exceed 0.5% m/m.
- 16.9.2** The engine oil must not contain any organometallic petrol additives or other octane boosting petrol additives.

## **16.10 Engine oil approval**

- 16.10.1** Before any engine oil may be used in the Formula One Championship:
- a. The supplier must comply with the requirements set in Appendix 4, Paragraph 1.2 of the Technical Regulations.
  - b. Two separate one litre samples, in suitable containers, must be submitted to the FIA for analysis and approval.
- 16.10.2** No engine oil may be used in a Competition without the prior written approval of the FIA.
- 16.10.3** In addition to the engine oils approved for use in a Competition, one type of dyno engine oil may be approved by the FIA.

## **16.11 Sampling and testing at a Competition**

- 16.11.1** Each Competitor must declare, prior to every Competition, which oil will be used in each of their engines during the Competition.
- 16.11.2** For reference purposes, before any oil may be used at a Competition, a sample must be submitted to the FIA together with the oil reference number.
- 16.11.3** Engine oil samples taken during a Competition will be checked for conformity by using a Fourier transform infrared (FTIR) technique, which will compare the sample taken with that submitted at the start of the Competition. Samples which differ from the reference engine oil in a manner consistent with fuel dilution, engine fluids contamination and oil ageing as a result of normal engine operation, will be considered to conform. Samples which differ from the reference engine oil in a manner consistent with the mixing with other engine oils, which have been approved by the FIA for use by the team at a Competition, will be deemed to comply, provided that the adulterant oils are in total present at no more than 10% in the sample. This tolerance will also be applicable for the mixing with the approved dyno engine oil but only for a new engine during the competition at which it is first used. However, the FIA retains the right to subject the oil sample to further testing at an FIA approved laboratory.

## **16.12 Recycling of Engine Oil**

- 16.12.1** All used engine oils must be collected for recycling.

## ARTICLE 18: POWER UNIT COMPONENTS' CLASSIFICATION

### 18.1 Definitions

In this Article 18:

**“Associate”** means, with respect to a PU Manufacturer in the Championship (and any entity representing that PU Manufacturer):

- a. any other person or entity (including any corporate or unincorporated body) that (directly or indirectly):
  - i. owns share capital or business assets of the PU Manufacturer; or
  - ii. has the power to exercise voting rights in relation to the PU Manufacturer; or
  - iii. has the power to appoint members of the supervisory board, board of directors or bodies legally representing the PU Manufacturer; or
  - iv. has the power to conduct the affairs of the PU Manufacturer by constitutional documents or agreement or otherwise; and
- b. any other person or entity in the same legal group structure as the PU Manufacturer from time to time; and
- c. any agent, contractor (or sub-contractor) or other person or entity (including any corporate or unincorporated body) that is set up or used by a PU Manufacturer to circumvent the requirements of this Article 18.

**“Outsourcing”** and **“Outsourced”** means procuring or procured goods or services by contract with an external supplier.

**“Design Specification”** means, in respect of a component all design (including three-dimensional geometry, tolerances, materials, surface finishes and design standards), manufacturing, installation and operational information related to that component.

And for the purposes of these Technical Regulations, including in this Article 18:

**“Intellectual Property”** means:

- a. patents, rights to inventions, designs, copyright and related rights, database rights, trademarks and trade names, rights in get-up and related goodwill and the right to sue for passing off or unfair competition (in each case whether registered, registerable or unregistered);
- b. proprietary rights in domain names;
- c. rights to use, and protect the confidentiality of, trade secrets, know-how and confidential information;
- d. applications, and rights to apply for and be granted registrations, including extensions and renewals of, such rights; and
- e. all other rights of a similar nature or having an equivalent effect anywhere in the world.

**“PU component”** means any component listed as “ICE”, or “EXH”, or “TC”, or “MGU-K”, or “ES”, or “PU-CE” in Table 1 of Appendix 3 under the column “PU ELEMENT (Art. 5.1.2)”.

**“External PU Manufacturer”** means a person or entity (including any corporate or unincorporated body) that (directly or indirectly): (i) was registered to supply Power Units in the Championship and has withdrawn for any reason; or (ii) a power unit manufacturer that is undertaking development work to supply Power Units but has not yet registered with the FIA to supply for the Championship. This definition does not include third parties undertaking development work in accordance with these Regulations on behalf of the instructions of a PU Manufacturer unless that third party ceases to have a contract or other arrangement with a PU Manufacturer.

### 18.2 General Principles

**18.2.1** Classification:

- a. All Power Unit components used in Formula One cars shall be classified as:
  - i. a Listed Power Unit Component (LPUC);
  - ii. a Standard Supply Power Unit Component (SSPUC);
  - iii. an Open-Source Power Unit Component (OSPUC); or
  - iv. a Defined Specification Power Unit Component (DSPUC),each as defined in Articles 18.3-18.6 (inclusive).
- b. Unless otherwise specified, or determined by the FIA, such components/equipment will be classified as LPUC.
- c. In cases of doubt, the FIA should be consulted and shall determine the classification of a particular PU component or piece of equipment, should that differ from the default classification mentioned in Article 18.2.1(b) above.

**18.2.2** For the purposes of the remaining provisions of this Article 18, any reference to any PU Manufacturer shall include any Associate of such PU Manufacturer; and (b) any external entity (i) working on behalf of a PU Manufacturer or (ii) working for its own purposes and subsequently providing the results of its work to a PU Manufacturer.

**18.2.3** For the purposes of the remaining provisions of this Article 18, any reference to a “component” may also refer to complete assemblies.

**18.2.4** A PU Manufacturer must not use movement of personnel (whether employee, consultant, contractor, secondee or any other type of permanent or temporary personnel) from or to another PU Manufacturer (*or an External PU Manufacturer*), either directly or indirectly via an external entity, for the purpose of circumventing the requirements of this Article 18.

**18.2.5** From time to time the FIA may request that a PU Manufacturer shares certain information in connection with this Article 18 with the FIA, but only for the following purposes: (a) so that the FIA may share such information with the other PU Manufacturers for safety reasons only, or (b) to assist the FIA in considering future amendments to the Technical Regulations, subject in each case to the relevant PU Manufacturer receiving an appropriate undertaking of confidentiality from the FIA.

**18.2.6** Except as otherwise expressly permitted by these Technical Regulations or by the FIA, a PU Manufacturer must not  
..... (a) directly or indirectly disclose or transfer (by any means) any Intellectual Property to another PU Manufacturer,  
..... or (b) directly or indirectly obtain (by any means) any Intellectual Property from another PU Manufacturer.

**18.2.7** The following will constitute a breach of this Article 18:

(a) the knowledge sharing, Intellectual Property transfer/receipt, merger or joining forces of:

- (i) two (or more) PU Manufacturers,
- or (ii) one or more PU Manufacturers and one or more External PU Manufacturers,

or (b) the acquisition by one PU Manufacturer of part or whole of the company of another PU Manufacturer (or an External PU Manufacturer),

or (c) two PU Manufacturers entering into a services or other arrangement to support the other in delivering all or part of its supply.

In the event that a PU Manufacturer is unable to continue its participation in Formula 1 for any reason, the Intellectual Property, components or business of that External PU Manufacturer must not be acquired in part or in whole by a PU Manufacturer including by

way of the External PU Manufacturer entering into an agreement to provide manufacturing or other support to the PU Manufacturer.

The FIA may, at its sole discretion, take any measures it considers appropriate in order to ensure that no PU Manufacturer obtains an unfair advantage from such an eventuality.

**18.2.8** Where a PU Manufacturer is made responsible under these Technical Regulations for raising or reporting any issues of safety, incompatibility and/or reliability of a component that it uses on its Power Units, it shall not make any claim against any other party that is inconsistent with that responsibility.

**18.2.9** PU Manufacturers must not share any test facilities or equipment with another PU Manufacturer unless such facilities or equipment are commercially available to all PU Manufacturers. If PU Manufacturers are using commercially available facilities or equipment, they must put in place relevant processes to ensure there is no transfer of Intellectual Property or knowledge through common personnel (or otherwise) leading to the performance enhancement of an LPUC (contrary to Article 18.3.3), or an OSPUC (contrary to Article 18.5.11), or a DSPUC (contrary to Article 18.6.7).

All PU Manufacturer' Intellectual Property (including any data) available through shared facilities or equipment shall only be available to the PU Manufacturer requesting such access to the test facilities or equipment and shall fully and exclusively remain its property.

**18.2.10** This Article 18 and these Technical Regulations shall not restrict the normal business as usual including but not limited to mergers or acquisitions by Associates of PU Manufacturers, or investments, that are not relevant to Formula 1.

### **18.3 Listed Power Unit Components (LPUC)**

**18.3.1** “Listed Power Unit Components” (LPUC) are PU components whose design, manufacture and Intellectual Property is owned and/or controlled by a single PU Manufacturer or its agents on an exclusive basis (including, without limitation, the PU components identified as such in Appendix 3).

**18.3.2** A PU Manufacturer must only use LPUC in its PUs that it has designed (including, for the avoidance of doubt, its three-dimensional shape and the evolution history leading to it, any preliminary designs, simulations, dynamometer tests, and analysis) and manufactured itself. However, this does not prevent the PU Manufacturer Outsourcing any R&D, engineering and/or CAD design and/or the manufacture of any LPUC to a third party (including, for the avoidance of doubt, an Associate of such PU Manufacturer) provided that:

- a. the PU Manufacturer retains the exclusive right to use the LPUC in Formula One for so long as it participates in Formula One;
- b. the third party to whom design and/or manufacture of the LPUC is Outsourced must not be another PU Manufacturer or an Associate of another PU Manufacturer; and
- c. In the case the third party to whom design and/or manufacture of the LPUC is Outsourced is not another PU Manufacturer or an Associate the provisions of Article 18.3.5 apply.

**18.3.3** A PU Manufacturer must not, either directly or indirectly via a third party or otherwise:

- a. pass on any information in respect of its LPUC (including but not limited to data, designs, drawings, or any other Intellectual Property) to another PU Manufacturer or receive any information from another PU Manufacturer in respect of that PU Manufacturer’s LPUC; or
- b. receive consultancy or any other kind of services from another PU Manufacturer in relation to LPUC, or supply any such services to another PU Manufacturer; or
- c. pass on any methodology that could be used by another PU Manufacturer to enhance the performance of LPUC (including but not limited to simulation software, analysis tools, etc.) to another PU Manufacturer, or receive any such methodology from another PU Manufacturer.

- 18.3.4** In determining whether and to what extent a PU Manufacturer is to be held liable for a breach of Article 18.3.3 that has occurred via a third party, the FIA may take into account amongst other things the extent to which the PU Manufacturer: (i) took steps to prevent the breach in question; and (ii) took steps to remedy and negate the consequences of the breach immediately upon becoming aware of the breach.
- 18.3.5** A PU Manufacturer (or its agents) must have exclusive ownership of (or the PU Manufacturer must have the exclusive right to use in the Championship) any and all rights, information or data of any nature (including but not limited to all aspects of the design, manufacturing, know-how, operating procedures, properties and calibrations) in respect of the LPUC in its PUs. However, notwithstanding the foregoing:
- a. The use of specialist Intellectual Property or technology of third parties is permitted in respect of LPUC, provided that this Intellectual Property or technology is commercially available to all PU Manufacturers. The detailed specifications of such LPUC must in any case be determined by the PU Manufacturer and must not be available to other PU Manufacturers;
  - b. Similarly, the use of commercially available sub-components or sub-assemblies in respect of LPUC is permitted, provided such sub-components or sub-assemblies are commercially available to all PU Manufacturers and are not specifically listed as LPUC. The FIA may request PU Manufacturers to provide a list of such sub-components and/or sub-assemblies and their technical specification. The FIA may classify such sub-components or sub-assemblies as LPUC if it deems, in its sole discretion, that they are being contrived to circumvent the purpose of this Article 18.
  - c. Similarly, the use of services from a third-party supplier which assist the PU Manufacturer in the design or development of its LPUCs is permitted, provided such services are commercially available to all PU Manufacturers on similar commercial terms. When two or more PU Manufacturers use the services from a given third-party supplier, full details must be made available to the FIA to demonstrate that such activity does not constitute a means to transfer, directly or indirectly, information from one PU Manufacturer to another. The services covered by this Article include but are not limited to: the use of test facilities, and the use of software.

## **18.4 Standard Supply Power Unit Components (SSPUC)**

- 18.4.1** “**Standard Supply Power Unit Components**” (SSPUC) are PU components whose design and manufacture will be carried out by a supplier appointed by the FIA, to be supplied on an identical technical and commercial basis to each PU Manufacturer (including, without limitation, the PU components identified as such in Appendix 3).
- 18.4.2** In certain cases, determined by the FIA in its sole discretion, more than one configuration of an SSPUC may be made available by the appointed supplier, in order to address installation differences between different PUs. In such a case, the FIA will require that any differences between the available configurations are kept to a minimum by the supplier.
- 18.4.3** Should the FIA’s selection process fail to lead to the appointment of a supplier of a PU component classified as an SSPUC, or should the arrangement with such supplier be terminated for whatever reason, the FIA reserves the right to re-classify the SSPUC as an LPUC, OSPUC or DSPUC and to introduce appropriate technical rules in the relevant Article of these Technical Regulations in order to control the technical specification and cost of this such PU component.
- 18.4.4** PU components supplied as SSPUC must not be modified, and they must be installed and operated exactly as specified by the supplier, except for minor changes explicitly permitted in the Appendix to the Technical and Sporting Regulations. However, each PU Manufacturer is responsible for directly and promptly informing both the FIA and the relevant SSPUC supplier, of any issues of compatibility, reliability or safety in respect of a SSPUC. This may include submitting proposals for modifications to the SSPUC that a PU Manufacturer considers should be made to ensure the necessary levels of safety, compatibility and reliability while at all times having due regard to cost and performance implications. In consultation with the

relevant SSPUC supplier, the FIA will consider in good faith all issues raised (and modifications proposed) during the consultation process and shall determine in its sole discretion whether or not to take any action. In exceptional circumstances, where a PU Manufacturer establishes that a SSPUC is critically incompatible, unreliable or unsafe, the FIA may, at its sole discretion, authorise such PU Manufacturer to carry out modifications to the SSPUC in question or use an alternative PU component in order to resolve the compatibility, reliability or safety issue. Permission for such a modification or usage of an alternative PU component will be communicated by the FIA to all PU Manufacturers, and will continue to apply until the relevant supplier introduces a new specification that resolves the reliability, compatibility or safety issue.

- 18.4.5 The use of an SSPUC is mandatory and the particular function of that SSPUC must not be by-passed, replaced, duplicated or complemented by another PU component. This provision also applies to any TCC (as defined in the Sporting Regulations). In exceptional circumstances, the FIA may, at its sole discretion may authorise the use of alternative PU components.
- 18.4.6 A PU Manufacturer must not, either directly or indirectly via a third party or otherwise pass to another PU Manufacturer, any information (including but not limited to data, know how, operating procedures, properties and calibrations) or methodology (including but not limited to simulation software, analysis tools, etc.) that could which can be used by another PU Manufacturer to enhance the performance of a SSPUC to another PU Manufacturer, or receive any such information or methodology from another PU Manufacturer.

## 18.5 Open-Source Power Unit Components (OSPUC)

- 18.5.1 **“Open-Source Power Unit Components”** (OSPUC) are PU components whose Design Specification and Intellectual Property is made available to all PU Manufacturers through the mechanisms defined in this Article 18.5 (including, without limitation, the PU components identified as such in Appendix 3).
- 18.5.2 For all OSPUC in use by all PU Manufacturers, the Design Specification must reside on a designated server specified by the FIA and be accessible by all PU Manufacturers. Details of the server, access credentials and file naming and format conventions may be found in the Appendix to the Technical and Sporting Regulations.
- 18.5.3 Any PU Manufacturer who designs a new OSPUC or modifies the Design Specification of a previous OSPUC must upload the new Design Specification to the designated server as specified in the Appendix to the Technical and Sporting Regulations.
- 18.5.4 Any PU Manufacturer who creates a new, or modifies an existing, Design Specification of an OSPUC or who manufactures any OSPUC manufactured to a Design Specification must grant an irrevocable, royalty-free, non-exclusive, worldwide licence to all other PU Manufacturers to use and modify any of its Intellectual Property subsisting in such OSPUC s or Design Specifications to the extent contemplated by these Technical Regulations.
- 18.5.5 Any PU Manufacturer wishing to access the designated server referred to in Article 18.5.3, or to exercise its rights under the licence described in Article 18.5.4, may only do so if it has agreed to be bound by the terms of the terms and conditions applicable to the FIA's designated server, by accepting the FIA Open-Source Power Unit Component Licence (“FOSPUCL”), as provided by the FIA from time to time.
- 18.5.6 In the event the OSPUC or the Design Specification of any OSPUC contains proprietary information and/or Intellectual Property of a third-party supplier, this must be made clear by the PU Manufacturer when uploading the Design Specification of the OSPUC to the designated server. Use of the uploaded Design Specification (and any OSPUC manufactured to that Design Specification) by any other PU Manufacturer exercising its rights in accordance with these Technical Regulations must be approved in writing by the third-party supplier, with a copy of such approval to be made available by the PU Manufacturer to the FIA on request. Should it become necessary for a PU Manufacturer to remove any confidential or commercially sensitive information from the Design Specification prior to its upload on the designated server, then the uploaded Design Specification must nevertheless contain:
  - a. Contain a clear reference to the third-party supplier in question.



- b. Contain sufficient information to enable another PU Manufacturer to order an identical OSPUC from the third-party supplier.
  - c. Contain all the necessary information to permit another PU Manufacturer to install the OSPUC in its own PU.
- 18.5.7** All PU Manufacturers are obliged to declare to the FIA the version of each OSPUC that gets used in their PU. This information will be made available by the FIA to all PU Manufacturers.
- 18.5.8** The complete responsibility for the installation and operation of an OSPUC (including any matters related to its function, performance, reliability, compatibility or safety) resides with the PU Manufacturer who uses this version of the OSPUC. Notwithstanding this provision, any PU Manufacturer who encounters a functionality, reliability, compatibility or safety issue with a particular version of an OSPUC must promptly disclose that issue to the FIA and all other PU Manufacturers via the designated server.
- 18.5.9** For any year (N) where a PU component is designated as OSPUC for the first time, PU Manufacturers in the preceding year (N-1) must upload to the designated server the design of the equivalent PU component in use during that preceding Championship (N-1), no later than 15 July of that year (N-1), regardless of the suitability of that PU component to the Technical Regulations of the following year (N).
- 18.5.10** PU Manufacturers supplying Power Units for the 2022 Championship must upload to the designated server the design of the equivalent OSPUC component in use during that Championship, no later than 31 December 2022, regardless of the suitability of that PU component to the 2026 Technical Regulations.
- 18.5.11** A PU Manufacturer must not, either directly or indirectly via a third party or otherwise pass to another PU Manufacturer any information (including but not limited to data, know how, operating procedures, properties and calibrations) or methodology (including but not limited to simulation software, analysis tools, etc.) that could be used to by another PU Manufacturer enhance the performance of an OSPUC, or receive any such information or methodology from another PU Manufacturer.

## **18.6 Defined Specification Power Unit Components (DSPUC)**

- 18.6.1** “**Defined Specification Power Unit Components**” (DSPUC) are PU components whose overall technical specification is defined by the FIA, which can be either (a) manufactured by the PU Manufacturer; or (b) supplied to the PU Manufacturer by one or more third party suppliers, who own and control the design, manufacture, and Intellectual Property of the PU components they supply (including, without limitation, the PU components identified as such in Appendix 3).
- 18.6.2** A PU Manufacturer may be the supplier of a DSPUC, provided there is compliance by that PU Manufacturer with all of the provisions of this Article 18.6 are respected and the DSPUC in question is made available to all other PU Manufacturers on an equitable basis.
- 18.6.3** The technical specification of a DSPUC (to its required level of detail) will be defined by the FIA and communicated to all PU Manufacturers via relevant documents in the Appendix to the Technical and Sporting Regulations. Changes to the specification for year (N) will be defined by the FIA before 1 January of year (N-2) and will require the consent of the FIA and at least 50% of the PU Manufacturers registered to compete in year (N). Changes to the specification after that date and before 1 January of year (N-1) will need the consent of the FIA and at least 75% of the PU Manufacturers registered to compete in year (N).
- 18.6.4** A third-party supplier that would like to supply a DSPUC for year (N) must provide the FIA with a full dossier containing complete technical description and commercial terms for the DSPUC before 30 June of year (N-2). The commercial terms must include any formulas for the adjustment of the supply price as a function of quantity ordered by a PU Manufacturer, or external parameters, such as inflation, material cost, etc. The supplier of the DSPUC may decide to lower the supply price at any time. The FIA will examine the dossier in consultation with the PU Manufacturers and decide, within 30 days of its receipt, whether to add the

DSPUC component in question to the list of approved DSPUCs, which will be set out in the Appendix to the Technical and Sporting Regulations.

- 18.6.5** An approved DSPUC supplier may make only one technical specification and design of a DSPUC. Such technical specification and design must be made available by the supplier to all PU Manufacturers on identical commercial terms. With the exception of changes to the technical specification and design of the DSPUC that are necessary for reliability or cost reasons, the technical specification and design of the DSPUC must remain unchanged for at least three complete calendar years. Any subsequent changes must follow the approval process and timescales described in Article 18.6.4. Changes to the technical specification or design that are necessary for reliability or cost reasons are subject to the prior approval of the FIA and must be communicated to all PU Manufacturers.
- 18.6.6** The DSPUC used by a PU Manufacturer must remain unchanged for at least two complete calendar years. During that period, a change of supplier for that DSPUC will only be permissible in the event of significant reliability issues and is subject to prior approval by the FIA.
- 18.6.7** A PU Manufacturer must not, either directly or indirectly via a third party or otherwise pass to another PU Manufacturer any information (including but not limited to data, know how, operating procedures, properties and calibrations) or methodology (including but not limited to simulation software, analysis tools, etc.) that could be used by another PU Manufacturer to enhance the performance of a DSPUC, or receive any such information or methodology from another PU Manufacturer.

## **18.7 List of LPUC, SSPUC, OSPUC and DSPUC**

A complete list of the PU components' classification, as well as a definition of the perimeter of each assembly can be found in Appendix 3.

PU components that are part of an assembly will assume the classification status of that assembly unless otherwise specified.

# APPENDIX 1: REGULATION VOLUMES

## 1 General Definitions

- 1.1 This Appendix defines the construction of CAD reference sections, reference surfaces and reference volumes used throughout the Regulations in order to assess legality. conjunction with Article 3. However numerous further usages of such definitions are used in other Articles.
- 1.2 Unless otherwise stated, only the declared reference section, reference surface or reference volume from each Article can be used to assess legality. All other geometry used during the construction of these sections, surfaces or volumes must be considered for reference purposes only.
- 1.3 In cases where an object (surface or volume) is trimmed using a surface, this must be performed by first finding the intersection between the object and the surface and then partitioning the object into two, by separating it at this intersection. One of these two parts is then discarded according to the relevant Article and the residual of the trimmed object is all that remains after the operation.
- 1.4 All volumes are implicitly symmetrical about the car centre plane.
- 1.5 The prefix “RV-“ always refers to a Reference Volume, whereas the prefix “RS-“ refers to a Reference Surface.
- 1.6 The CAD models of all the volumes and surfaces listed in this Appendix are available for Competitors or PU Manufacturers to download with a standard range of parameters. The FIA will provide Competitors or PU Manufacturers with a specific model on request.
- 1.7 Should an inconsistency arise between a volume generated manually using the process outlined in this Article, or a volume that has been downloaded by the process outlined in Article 1.6 of this Appendix, the FIA will adjudicate on a case-by-case basis the volume that will be applicable and correct the one that will be judged to have an inconsistency or error.

## 2 Legality Volumes or Surfaces Defined by CAD Models

- 2.1 The legality volumes and surfaces listed below are defined exclusively by CAD data and are available to download from the FIA’s CAD Portal. Unless otherwise stated, the volumes must be positioned with the origin of the model at the coordinates given and with the model axes parallel to, and in the same direction as the corresponding car axes.

Volume or Surface	CAD Part No	Revision	Notes
RV-PU-ICE	FIA-LEG-0076	B	Positioned at $[X_{PU}=0, 0, 0]$
RV-PU-OT	FIA-LEG-0075	A	Positioned at $[X_{PU}=0, 0, 0]$
RV-PU-TC	FIA-LEG-0077	A	Positioned at $[X_{PU}=0, 0, 0]$
RS-PU-FWD-ERS	FIA-LEG-0101	A	Positioned at $[X_{PU}\leq -360, 0, 0]$
RS-FWD-FUEL-LIMIT	FIA-LEG-0010	C	Positioned at $[X_C=0, 0, 0]$

### 3 ERS Reference Volume (RV-PU-ERS)

**RV-PU-ERS** is composed of the following elements:

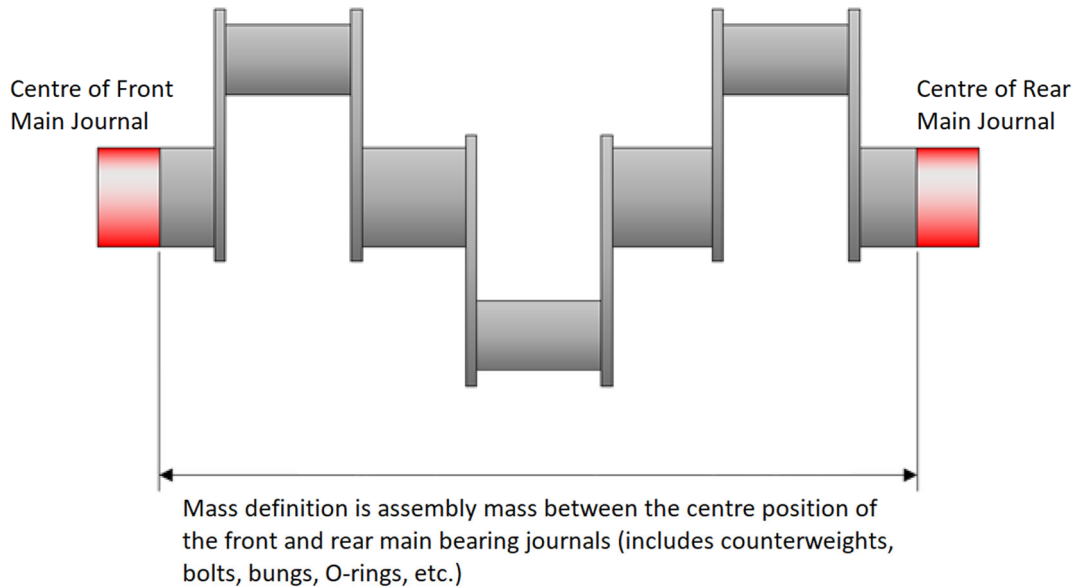
- 3.1 The reference surface **RS-PU-FWD-ERS** must be positioned with the origin of the model at  $[X_{PU} \leq -360, 0, 0]$ .
- 3.2 On the plane  $X_{PU}=0$ , a surface bounded by a polygon created by connecting the following points in sequence  $[Y, Z]$ :
  - a.  $[0, 1]$
  - b.  $[240, 1]$
  - c.  $[280, 4.1]$
  - d.  $[280, 51]$
  - e.  $[230, 51]$
  - f.  $[230, 380]$
  - g.  $[0, 380]$
  - h.  $[0, 1]$
- 3.3 Once the surface in Article 3.2 is fully defined, it must be extruded in the direction  $[-1, 0, 0]$  up to the plane  $X_{PU}=-1500$ .
- 3.4 Once the volume in Article 3.3 is fully defined; it must be trimmed by the surface **RS-PU-FWD-ERS** with all of the parts of the volume ahead of this surface being discarded.
- 3.5 The fully defined volume in Article 3.4 is **RV-PU-ERS**

## APPENDIX 2: DRAWINGS

Drawing 1



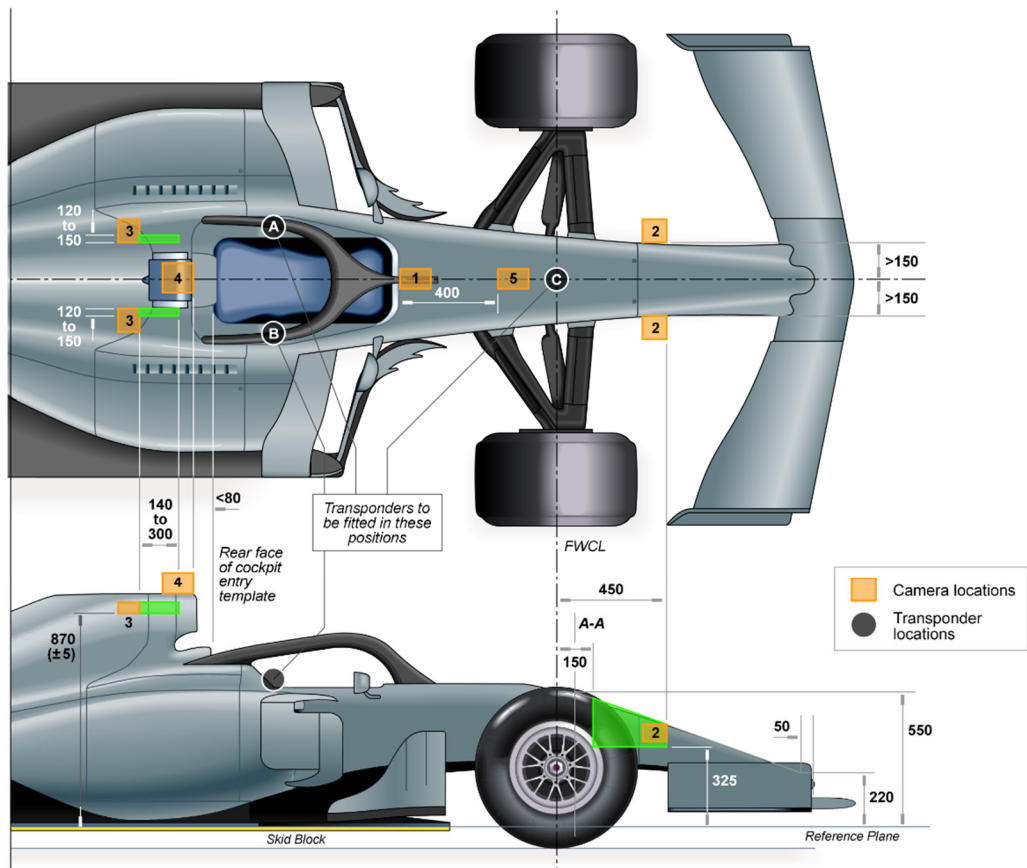
Crankshaft Mass

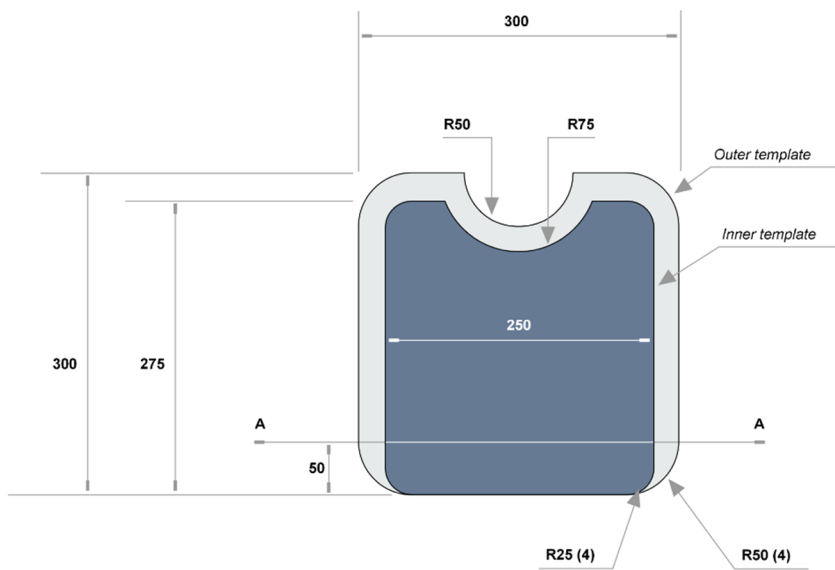


Drawing 2

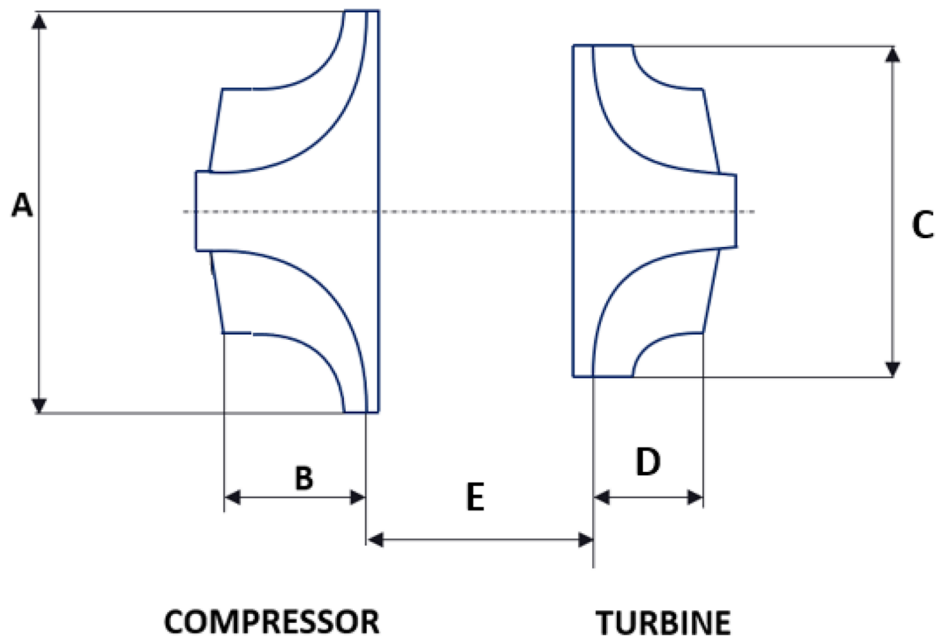


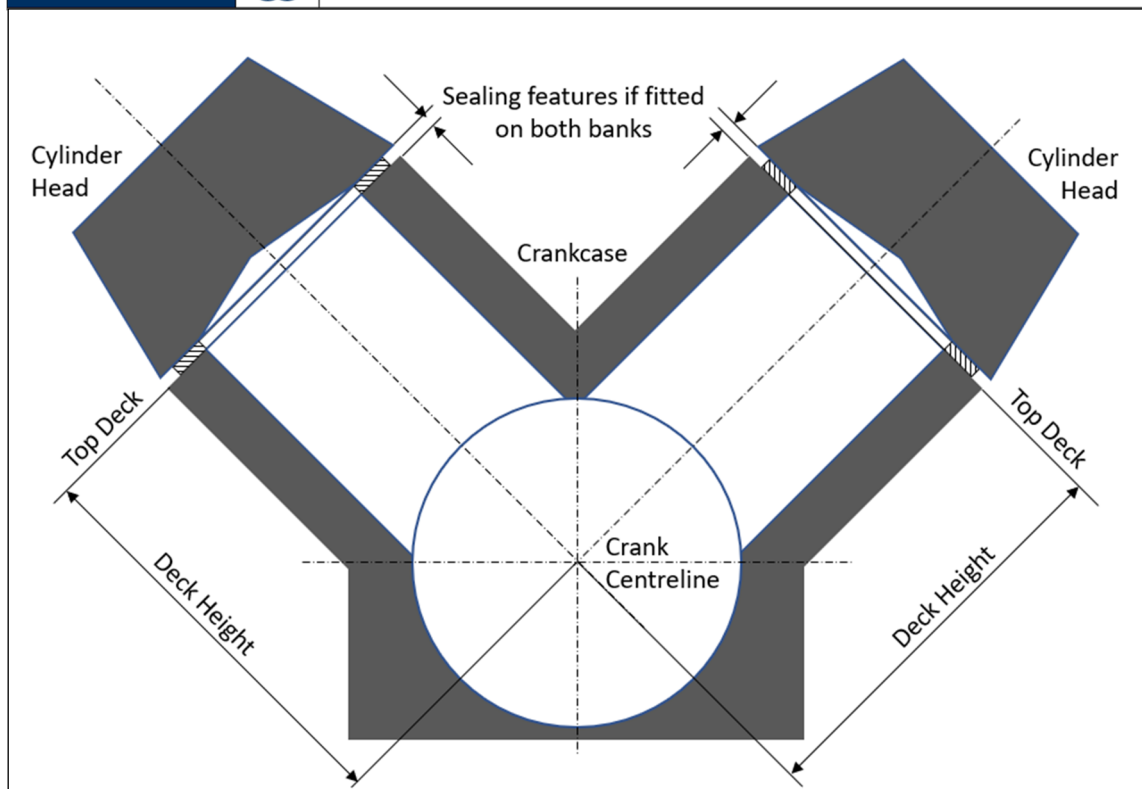
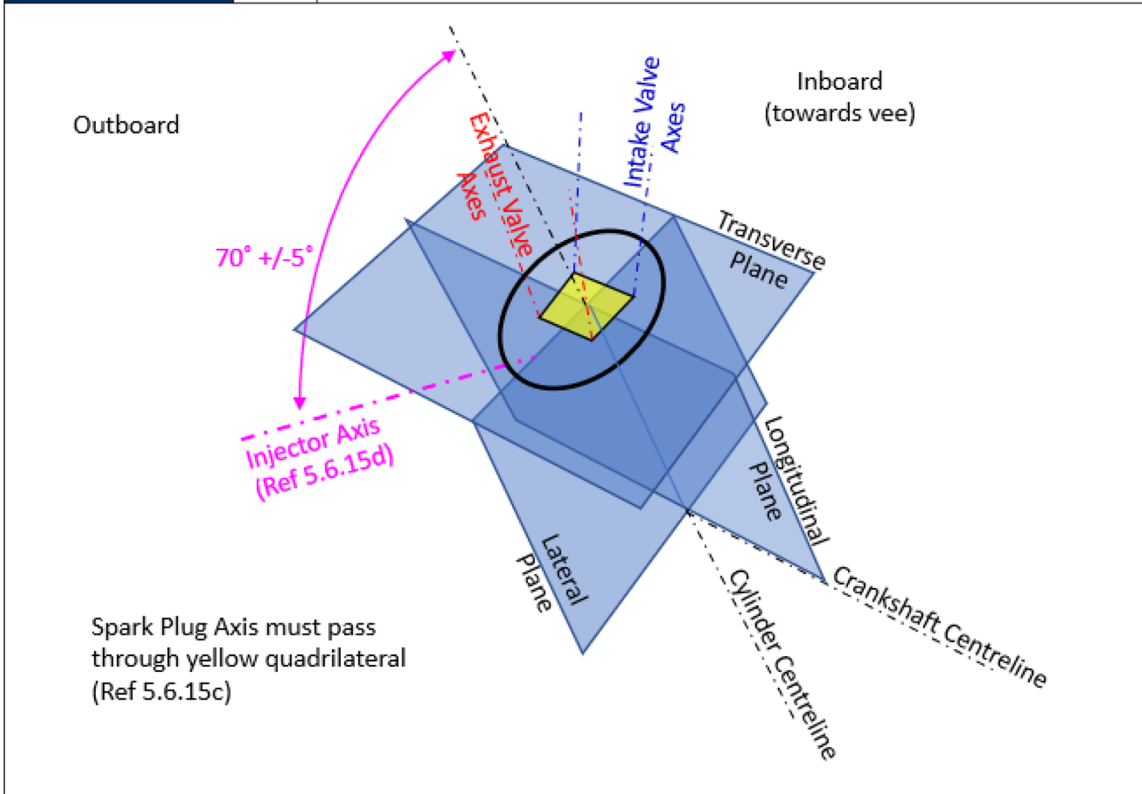
Camera Positions

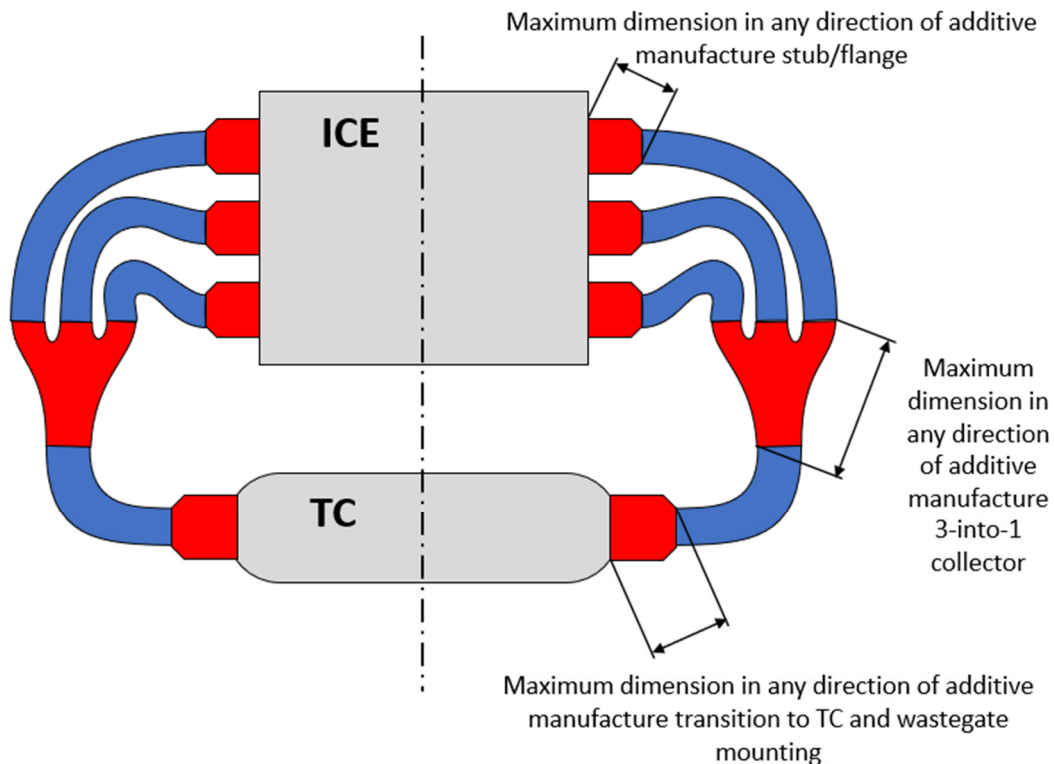
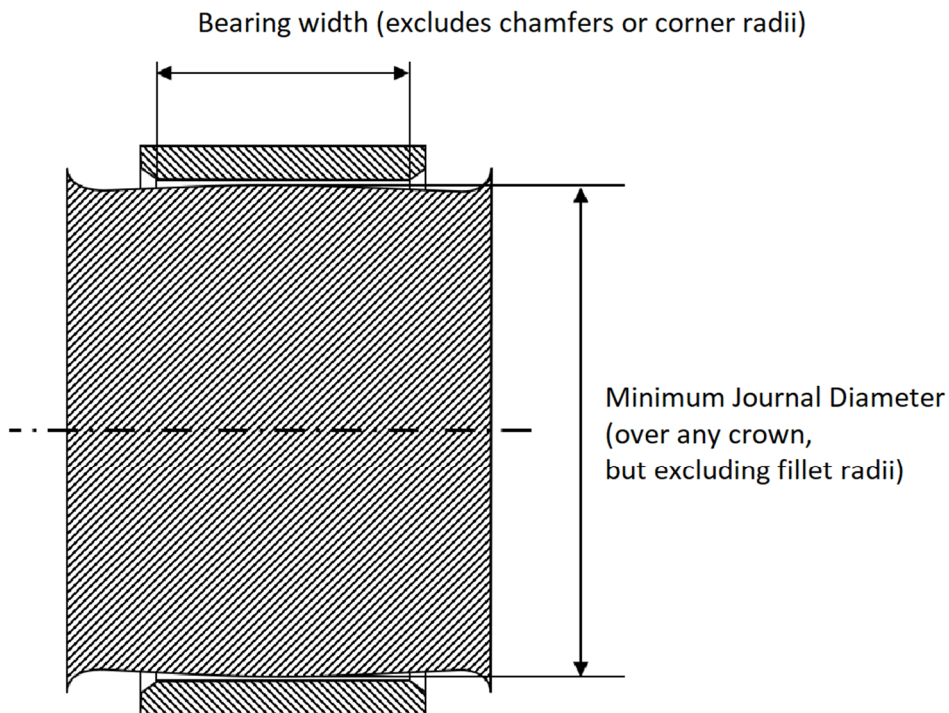




See Article 13.3.1 & Article 14.6.7











<b>ESME</b>	<b>MGUK</b>	<b>MGU-K Mechanical Transmission</b>	<b>ICE</b>	<b>TC</b>	<b>Powerbox</b>
			No individual mass limit	Min <b>12kg</b>	No individual mass limit
Min <b>35kg</b>	Min <b>16kg</b>	Assumed <b>4kg</b>	Min ICE+TC+Powerbox <b>130kg</b>		

2026 PU MASS ALLOWANCES AS WEIGHED						
	ESME Min Mass as weighed	MGUK Min Mass as weighed	Not weighed		ICE Min Mass as weighed	TOTAL PU MINIMUM MASS
Drive in MGUK	> 35kg	> 20kg	> -	>	130kg	> 185kg
Drive Split	> 35kg	> 18kg	> -	>	132kg	> 185kg
Drive in ICE	> 35kg	> 16kg	> -	>	134kg	> 185kg

## APPENDIX 3: POWER UNIT SYSTEMS, FUNCTIONS, COMPONENTS AND SUPPLY PERIMETER

**Table 1: ‘Power Unit Components’** below provides all category allocations and specific permissible upgrade schedule for every part of the PU.

**Column 1** provides a description of the general area of the PU for the rows bracketed by the description and is for reference only.

**Column 2, ‘Item No’** provides a sequential item number for ease of navigation within the table and is for reference only.

**Column 3, ‘List of PU functions/systems/components’** provides a description of the functions, systems and components in enough detail to place any aspect of the PU into one of the columns. The understanding of what each of the elements listed refers to will be taken as that which is widely understood unless there are specific definitions elsewhere in the regulations. For these items, the definition will take precedence.

**Column 4, ‘PU Element’** identifies which of the six ‘Sealed Perimeter’ PU elements (ICE, TC, EXH, MGU-K, ESME or PU-CE) the item belongs to (see also Column 5). If the item does not belong to any of these six elements, then ‘EXC’ is shown in the column.

**Column 5, ‘Sealed Perimeter’** differentiates those items included in a PU element sealed perimeter (‘INC’) and those items excluded from a PU element sealed perimeter (‘EXC’).

The parts listed as ‘INC’ are included within the PU element shown in Column 4. Treatment of these items is defined in Article 2 of the F1 Sporting Regulations.

The parts listed as ‘EXC’ are not part of a PU element. Treatment of these items is defined in Article 2 of the F1 Sporting regulations.

**Column 6, ‘Supply Perimeter’** differentiates those items included in the PU supply within Power Unit Maximum Supply Price described in Tech Regs Appendix 5 Article 1.4.

**Column 7, ‘Reference Volume’** identifies which of the four PU Reference Volumes (RV-PU-; ICE, OT, TC or ERS) defined in Appendix 1 of these regulations the item belongs to. If the item does not belong to any of these four elements, the ‘EXC’ is shown in the column.

**Column 8, ‘PU Mass Group’** identifies which of the four PU Mass Groups (ICE, TC, MGU-K or ESME) the item belongs to. The minimum masses of the mass groups are defined in Articles 5.7.1, 5.5.4, 5.20.7 and 5.19.9 respectively. If the item does not belong to any of these four elements, the ‘EXC’ is shown in the column. For reference, Drawing 9 summarises all masses involved.

**Columns 9-14, Upgrade Schedule (Homologation Status)’** is described in Appendix 4.

Columns 9-13 show which season the upgrades described in Appendix 4, Article 3 are permitted. A tick in a green cell indicates that the item may be upgraded for that season while a cross in a red cell indicates the item may not be upgraded in that season and must be carried over from the previous season – both subject to the provisions described in Appendix 4, Article 3.

Column 14 refers to items that may be upgraded as described in Appendix 4, Article 4 – Additional Development and Upgrade Opportunities. A tick in a green cell indicates that the item may be upgraded if the PU Manufacturer is granted ADUO status. A cross in a red cell indicates that no upgrade is permitted even if the PU Manufacturer is granted ADUO status.

**Column 15, ‘Component Classification’** identifies which classification of components the item belongs to.

PU component classifications are described in Article 18 of these regulations and any item so regulated will be shown as one of the four PU component classifications (LPUC, SSPUC, OSPUC or DSPUC).

For those items associated with a car component classification, the table will show ‘App 5’ referring to Appendix 5 of the 2023 Technical Regulations. Once the 2026 Technical Regulations are subsequently expanded to include articles pertaining to the car, the references to App 5 will be replaced with the correct car component classification.

**Column 16, 'Ancillary Components'** identifies those items which are considered as ancillaries, included in the sealed perimeter, and which are subject to the provisions of Article 2.1.4 of the Sporting Regulations.

Any other non-listed ancillary parts, considered minor but which are necessary for the assembly and normal operation of the Power Unit, must be considered as belonging to the main component they are attached to. As such, they benefit from the same category allocations except for the sealed perimeter from which they are excluded. Such parts are typically mountings, brackets, fixings, tubes, hoses, screws, bolts, studs, shims, nuts, washers, gaskets, O-rings and other seals. **It is accepted that such parts can cross the boundaries between 2 reference volumes when they create a link between components belonging to these 2 volumes.**

**Table 1: Power Unit Components**

PU Area	Item No	List of PU functions/ systems/ components	PU ELEMENT	SEALED PERIMETER	SUPPLY PERIMETER	REFERENCE VOLUME	PU MASS GROUP	UPGRADE SCHEDULE (HOMOLOGATION STATUS)						COMPONENT CLASSIFICATION	ANCILLARY COMPONENTS
								2026	2027	2028	2029	2030	ADUO		
ICE ASSEMBLY	1	Main ICE assembly comprising Crankcase, Cylinder heads (except combustion chamber and ports machining), Crankshaft, Camshaft (excluding camshaft lobes profiles), Cam drive, Cam covers, Front and rear covers, Valvegear (valves, finger followers, air spring sub-assemblies), Internal gear drives, <b>any part which provides a structural connection between the survival cell and the gearbox case through the ICE mounting studs.</b>	ICE	INC	INC	ICE	ICE	✓	x	x	x	x	✓	LPUC	
	2	ICE-mounted water pumps, ICE oil pumps, ICE oil scavenge pumps, any air/oil separator Non-hydraulic actuators (to allow PU to function), ICE-mounted air valve compressors and storage bottles.	ICE	INC	INC	ICE	ICE	✓	x	x	x	x	✓	LPUC	YES
	3	Flywheel	EXC	EXC	INC	EXC	ICE							App 5	
	4	Main ICE assembly comprising Combustion chamber surface and pre-chamber detail within cylinder heads, piston, connecting rod, camshaft lobe profiles, intake and exhaust ports.	ICE	INC	INC	ICE	ICE	✓	✓	x	✓	x	✓	LPUC	
	5	<b>Air valve regulators;</b> Trumpets, Throttle system, Plenum	ICE	INC	INC	ICE	ICE	✓	✓	x	✓	x	✓	LPUC	YES

PU Area	Item No	List of PU functions/ systems/ components	PU ELEMENT	SEALED PERIMETER	SUPPLY PERIMETER	REFERENCE VOLUME	PU MASS GROUP	UPGRADE SCHEDULE (HOMOLOGATION STATUS)						COMPONENT CLASSIFICATION	ANCILLARY COMPONENTS
								2026	2027	2028	2029	2030	ADUO		
ICE	6	ICE intake air system components, other than those included in item 5 and downstream of those included in item 52	ICE	INC	INC	EXC	ICE	✓	✓	✗	✓	✗	✓	LPUC	YES
	7	PU mounted fuel system components: (e.g., High Pressure fuel hose, fuel rail)	ICE	INC	INC	ICE	ICE	✓	✗	✗	✗	✗	✓	LPUC	YES
	8	High Pressure Fuel Pump [5.1.10]	ICE	INC	INC	ICE	ICE	✓	✗	✗	✗	✗	✓	SSPUC	YES
	9	ICE Fluid Filters (Oil, Fuel)	ICE	EXC	INC	ICE	ICE	✓	✗	✗	✗	✗	✓	LPUC	
	10	Fuel Injectors	ICE	INC	INC	ICE	ICE	✓	✗	✗	✗	✗	✗	SSPUC	YES
	11	Fuel Injector spray pattern tuning feature	ICE	INC	INC	ICE	ICE	✓	✓	✗	✓	✗	✓	LPUC	
	12	Knock Sensors [5.1.8]	ICE	EXC	INC	ICE	ICE	✓	✗	✗	✗	✗	✗	SSPUC	
	13	Spark Plugs	ICE	EXC	INC	ICE	ICE	✓	✓	✗	✓	✗	✓	LPUC	
EXHAUST	14	Engine exhaust system (including thermal insulation, excluding fasteners and seals)	EXH	INC	INC	ICE	ICE	✓	✓	✗	✓	✗	✓	LPUC	
	15	Exhaust fasteners and seals	EXH	EXC	INC	ICE	ICE	✓	✓	✗	✓	✗	✓	LPUC	
TURBO	16	TURBOCHARGER - Includes Compressor and Turbine Wheels, Shaft, Bearings, Centre, Compressor and Turbine Housings, Inlet VG Device	TC	INC	INC	TC	TC and ICE	✓	✓	✗	✓	✗	✓	LPUC	
	17	Turbocharger-mounted electrical components (e.g. wiring looms, non-regulatory sensors)	TC	EXC	INC	TC	TC and ICE	✓	✓	✗	✓	✗	✓	LPUC	
WG / POP-OFF	18	Wastegate or similar	EXH	INC	INC	ICE	ICE	✓	✓	✗	✓	✗	✓	OSPUC	YES
	19	Pop-off valve or similar	ICE	INC	INC	ICE	ICE	✓	✓	✗	✓	✗	✓	OSPUC	YES
ICE ELECTRICAL	20	ICE or EXH-mounted electrical components (e.g., wiring looms within legality volume, non-regulatory-sensors, actuators)	ICE	EXC	INC	ICE	ICE	✓	✓	✗	✓	✗	✓	LPUC	
	21	Clutch shaft regulatory torque sensor	EXC	EXC	EXC	EXC	EXC							App 5	
	22	ICE-mounted regulatory temperature and pressure sensors	ICE	EXC	INC	ICE	ICE	✓	✗	✗	✗	✗	✗	SSPUC	
	23	Ignition coils	ICE	EXC	INC	ICE	ICE	✓	✓	✗	✓	✗	✓	DSPUC	

PU Area	Item No	List of PU functions/ systems/ components	PU ELEMENT	SEALED PERIMETER	SUPPLY PERIMETER	REFERENCE VOLUME	PU MASS GROUP	UPGRADE SCHEDULE (HOMOLOGATION STATUS)						COMPONENT CLASSIFICATION	ANCILLARY COMPONENTS
								2026	2027	2028	2029	2030	ADUO		
	24	FIA Standard ECU.	EXC	EXC	EXC	EXC	EXC							App 5	
ERS - MGU-K	25	MGU-K excluding mechanical power transmission components	MGU-K	INC	INC	ERS	MGU-K	✓	✗	✓	✗	✓	✗	LPUC	
	26	MGU-K mechanical power transmission components, housing assembly and mounting accessories	ICE and/or MGU-K	INC	INC	ICE or ERS	MGU-K and/or ICE	✓	✗	✓	✗	✓	✗	LPUC	
	27	MGU-K regulatory Torque sensor	MGU-K	EXC	INC	ICE or ERS	MGU-K or ICE	✓	✗	✓	✗	✓	✗	SSPUC	
	28	The MGU-K torque sensor shaft, mounting accessories and the mechanical connection elements between K and ICE, if applicable.	ICE and/or MGU-K	EXC	INC	ICE and/or ERS	MGU-K or ICE	✓	✗	✓	✗	✓	✗	LPUC	
	29	ERS-K phase conductors, associated interfaces and mounting accessories. MGU-K terminal box	MGU-K	EXC	INC	ERS	MGU-K	✓	✗	✓	✗	✓	✗	LPUC	
	30	MGU-K electrical components fitted outside of sealed perimeter of item 20 (e.g. wiring looms, non-regulatory sensors)	MGU-K	EXC	INC	ERS	MGU-K	✓	✗	✓	✗	✓	✗	LPUC	
ERS - ES	31	ES Main Enclosure (ESME)	ES	INC	INC	ERS	ESME	✓	✗	✓	✗	✓	✗	LPUC	
	32	Energy Store	ES	INC	INC	ERS	ESME	✓	✗	✓	✗	✓	✗	LPUC	
	33	Regulatory DC sensors and Insulation monitoring device	ES	EXC	INC	ERS	ESME	✓	✗	✗	✗	✗	✗	SSPUC	
	34	Safety devices (Fuses, Contactors, MSD, relays)	ES	EXC	INC	ERS	ESME	✓	✗	✓	✗	✓	✗	LPUC	
	35	Busbars, connectors conductors, looms or any other component fitted inside the ESME that is not explicitly mentioned in any other rows of this table.	ES	EXC	INC	ERS	ESME	✓	✗	✓	✗	✓	✗	LPUC	
PU-CE	36	CU-K	PU-CE	INC	INC	ERS	ESME	✓	✗	✓	✗	✓	✗	LPUC	
	37	DC-DC Unit	PU-CE	INC	INC	ERS	ESME	✓	✗	✓	✗	✓	✗	LPUC	
	38	Powerbox (ignition, injection, high pressure fuel pump driver)	PU-CE	EXC	INC	EXC	ICE	✓	✗	✗	✗	✗	✗	SSPUC	

PU Area	Item No	List of PU functions/ systems/ components	PU ELEMENT	SEALED PERIMETER	SUPPLY PERIMETER	REFERENCE VOLUME	PU MASS GROUP	UPGRADE SCHEDULE (HOMOLOGATION STATUS)						COMPONENT CLASSIFICATION	ANCILLARY COMPONENTS
								2026	2027	2028	2029	2030	ADUO		
	39	General electrical devices including Power distribution board, Driver for PU electric pumps, LV fuse box and any electronic box exclusively used for PU functionalities.	PU-CE	INC	INC	EXC	ICE or ESME	✓	✗	✓	✗	✓	✗	LPUC	
OIL TANK	40	Main PU oil tank	ICE	INC	INC	OT	ICE	✓	✗	✗	✗	✗	✓	LPUC	YES
	41	Oil level sensor	ICE	EXC	INC	OT	ICE	✓	✗	✗	✗	✗	✓	SSPUC	
	42	Catch tanks, any breather system connected to the PU excluding tubes and hoses	ICE	INC	INC	OT and ICE	ICE	✓	✗	✗	✗	✗	✓	LPUC	YES
FUEL CELL	43	Fuel cell including fuel bag, internal baffles/foam, fixings	EXC	EXC	EXC	EXC	EXC							App 5	
	44	Lift pump(s) and filter(s)	EXC	EXC	EXC	EXC	EXC							App 5	
	45	Collector including any NRVs, pressure sensors, level sensors, fill/drain ports, PRVs, running bleeds, filters, FIA sample tube	EXC	EXC	EXC	EXC	EXC							App 5	
	46	Primer pump(s)	EXC	EXC	EXC	EXC	EXC							App 5	
	47	Pressure and temperature sensors at inlet and outlet of FFM <sub>s</sub> and at inlet to high pressure fuel pump	EXC	EXC	EXC	EXC	EXC							App 5	
	48	FFM (regulatory fuel flow meter) [5.1.11]	EXC	EXC	EXC	EXC	EXC							App 5	
	49	Breakaway valves and any filters	EXC	EXC	EXC	EXC	EXC							App 5	
ICE COOLERS	50	Secondary heat exchangers for water and oil plus any associated accessories, header tanks, connections to the ICE, tubes, pipes, hoses, and fixings	EXC	EXC	EXC	EXC	EXC							App 5	
	51	Primary heat exchangers for water, oil and any associated accessories, header tanks, connections to the ICE, tubes, pipes, hoses, and fixings	EXC	EXC	EXC	EXC	EXC							App 5	
	52	ICE intake air heat exchangers and their associated accessories (including but not limited to housings, supports, brackets, fasteners and maximum 2 simple and smooth bore	EXC	EXC	EXC	EXC	EXC							App 5	

PU Area	Item No	List of PU functions/ systems/ components	PU ELEMENT	SEALED PERIMETER	SUPPLY PERIMETER	REFERENCE VOLUME	PU MASS GROUP	UPGRADE SCHEDULE (HOMOLOGATION STATUS)						COMPONENT CLASSIFICATION	ANCILLARY COMPONENTS
								2026	2027	2028	2029	2030	ADUO		
		outlet tubes for intake air lines)													
ERS COOLING	53	ICE-mounted ERS cooling system including pumps, associated motors, actuators, excluding tubes, and hoses	PU-CE	INC	INC	ICE and/or ERS	ICE	✓	✗	✓	✗	✓	✓	LPUC	YES
	54	Non ICE-mounted ERS cooling system including pumps, associated motors, actuators, excluding tubes and hoses	PU-CE	INC	INC	ICE and/or ERS	ESME	✓	✗	✓	✗	✓	✓	LPUC	YES
	55	Secondary heat exchangers for ERS cooling fluid plus any associated accessories, header tanks, tubes, pipes, hoses, and fixings	EXC	EXC	EXC	EXC	EXC							App 5	
	56	ICE-mounted ERS cooling system filters	PU-CE	EXC	INC	ICE	ICE	✓	✓	✓	✓	✓	✓	LPUC	
CLUTCH	57	Clutch and clutch actuation system between the PU and the gearbox	EXC	EXC	EXC	EXC	EXC							App 5	
HYDRAULICS	58	ICE-mounted hydraulic pump including associated brackets, fixings, tubes and hoses	EXC	EXC	EXC	EXC	EXC							App 5	
	59	Hydraulic system servo valve(s) for PU control.	ICE	INC	INC	EXC	ICE	✓	✗	✗	✗	✗	✓	LPUC	YES
	60	Hydraulic system actuator(s) for PU control	ICE	INC	INC	ICE	ICE	✓	✗	✗	✗	✗	✓	LPUC	YES
	61	Hydraulic system (e.g., accumulators, manifolds, servo-valves, solenoids, actuators, hoses) other than servo valve(s) and actuator(s) for PU control.	EXC	EXC	EXC	EXC	EXC							App 5	
	62	ICE-mounted hydraulic circuit filters	ICE	EXC	INC	EXC	ICE	✓	✓	✓	✓	✓	✓	LPUC	
INSTALLATION AND MISCELLANEOUS	63	Fuel feed pumps delivering less than 10 bar <sub>G</sub> and their associated accessories (included but not limited to tubes, hoses, supports, brackets, and fasteners).	EXC	EXC	EXC	EXC	EXC							App. 5	
	64	Heat Shields and associated mounting hardware.	EXC	EXC	EXC	EXC	EXC							App. 5	
	65	PU air valve regulators	ICE	EXC	INC	EXC	ICE	✓	✓	✗	✓	✗	✓	LPUC	

PU Area	Item No	List of PU functions/ systems/ components	PU ELEMENT	SEALED PERIMETER	SUPPLY PERIMETER	REFERENCE VOLUME	PU MASS GROUP	UPGRADE SCHEDULE (HOMOLOGATION STATUS)						COMPONENT CLASSIFICATION	ANCILLARY COMPONENTS
								2026	2027	2028	2029	2030	ADUO		
	66	Any ancillary equipment associated with the PU air valve system excluding regulators (e.g., pneumatic bottles, hoses, filling valves).	ICE	EXC	INC	EXC	ICE	✓	✗	✗	✗	✗	✓	LPUC	
	67	Intake upstream of compressor inlet/VG Intake device up to and including the air filter.	EXC	EXC	EXC	EXC	EXC							App. 5	
	68	Exhaust beyond turbine exit and WG exit and associated brackets, support, screws, nuts, dowels, washers, or cables.	EXC	EXC	EXC	EXC	EXC							App. 5	
	69	Any breather system ducting between the PU and the orifice referenced in 5.3.9.	EXC	EXC	EXC	EXC	EXC							App. 5	
	70	Wiring harnesses attached to the PU which are not ordinarily part of a power unit (car looms)	EXC	EXC	EXC	EXC	EXC							App. 5	
	71	Studs used to mount PU to the Survival Cell or gearbox.	EXC	EXC	EXC	EXC	EXC							App. 5	
	72	Boost pressure measurement devices	EXC	EXC	INC	EXC	EXC	✓	✗	✗	✗	✗	✗	SSPUC	
	73	Lambda sensor(s) [5.10.4]	EXC	EXC	INC	EXC	EXC	✓	✓	✗	✓	✗	✓	DSPUC	
FLUIDS	74	Fuel	EXC	EXC	EXC	EXC	EXC	✓	✓	✗	✓	✗	✓		
	75	Engine oil	EXC	EXC	EXC	EXC	EXC	✓	✓	✗	✓	✗	✓		
	76	Hydraulic fluid	EXC	EXC	EXC	EXC	EXC	✓	✓	✓	✓	✓	✓		
	77	ICE Coolant	EXC	EXC	EXC	EXC	EXC	✓	✓	✓	✓	✓	✓		
	78	ERS Coolant	EXC	EXC	EXC	EXC	EXC	✓	✓	✓	✓	✓	✓		
BALLAST	79	Any ballast mounted on the PU in order to reach the mass requirement is permitted (subject to Article 4.4)	ICE	INC	INC	ICE	ICE	✓	✓	✓	✓	✓	✓	LPUC	



**Table 2: ‘Additional Power Unit matters affecting the Supply Perimeter’** below relates to additional PU functions, systems and components not included within the PU component definition defined in Table 1 and classifies them as included in or excluded from the Supply Perimeter.

**Column 1** provides a description of the general area of the PU – in this case Operational matters and is for reference only.

**Column 2, ‘Item No’** provides a continuation of the sequential item number from Table 1 for ease of navigation within the table and is for reference only.

**Column 3, ‘List of PU functions/systems/components’** provides a description of the functions, systems and components in enough detail to differentiate what is included in or excluded from the Supply Perimeter.

place any aspect of the PU supply described into one of the columns. The understanding of what each of the elements listed refers to will be taken as that which is widely understood unless there are specific definitions elsewhere in the regulations. For these items, the definition will take precedence.

**Column 4, ‘Supply Perimeter’** differentiates those items included in the PU supply within Power Unit Maximum Supply Price described in Tech Regs Appendix 5 Article 1.4. ‘INC’ is included in the Supply Perimeter and ‘EXC’ is excluded from the Supply Perimeter.

**Table 2: Additional Power Unit matters affecting the Supply Perimeter**

	Item No	List of PU functions/ systems/ components	SUPPLY PERIMETER
Operational	80	PU and spares for all Competitions in F1 World Championship plus 5000 km testing.	INC
	81	Minimum number of PUs per team to be (number of PUs per driver per season according to F1 Sporting Regulations) x 2 + Necessary number of units to achieve 5000 km of testing.	INC
	82	Additional PUs or spares required to replace units out of service due to accident damage or other cause induced by team will be outside the supply perimeter and will incur additional charges	EXC
	83	Demo event Power Units	EXC
	84	Transport of Power Units and support equipment from Manufacturer’s factory to event	EXC
	85	Personnel to support Power Unit (5 people per Competitor) at test and race events	INC
	86	Travel, accommodation, and reasonable expenses for support personnel	EXC
	87	Quantity of manufacturer specified fuel and oil	EXC
	88	Garage equipment defined as compulsory by Manufacturer (e.g., battery management)	INC
	89	Garage IT equipment, connection to factory, servers, telemetry, radio, team clothing	EXC
90	Dyno testing of installation components (Y hours or km)	EXC	

## APPENDIX 4: HOMOLOGATION AND DEVELOPMENT OF POWER UNITS, FUEL AND OIL FOR 2026-2030

### 1 Homologation dossier

- 1.1 Any PU Manufacturer registered in accordance with the procedures set out in Article 1 of Appendix 5 to supply Power Units for use by one or more Competitors in the 2026 to 2030 Championships must submit to the FIA a Power Unit homologation dossier before 1 March of the first year in which it intends to supply such power unit for use during the Championship period indicated. Each PU Manufacturer shall be permitted to present only one homologation dossier with respect to the period and the homologation granted will be valid until the end of the 2030 Championship.
- 1.2 The homologation dossier must:
- include details of all the parts described as “ICE”, “PU-CE”, “EXH”, “TC”, “ES” and “MGU-K” in the “PU ELEMENT” column of Appendix 3 of the Technical Regulations.
  - include a detailed list of all minor parts associated with ancillary components (as described in Appendix 3 of the Technical Regulations) which may be replaced when those components are fitted, removed or swapped between Power Units. This list must be approved by the FIA.
  - include all documents required in Article 1 of this Appendix.
  - be submitted and updated according to the procedure detailed in the Appendix of the Regulations.
- 1.3 A Power Unit will be homologated for a Competitor once a complete homologation dossier has been submitted by the relevant Power Unit Manufacturer and has been approved by the FIA, such approval to take place within 14 days from the submission of the homologation dossier.
- 1.4 Each Power Unit Manufacturer must submit one homologation dossier which applies to all Competitors it intends to supply. Only the fuel specification, the engine oil specification, **the hoses defined in item 66 of Appendix 3** and Power Unit wirings may differ between Competitors. In this event they must be declared separately in the dedicated sections of the homologation dossier.

All Power Units supplied by a single Power Unit Manufacturer must also be operated in the same way, they must therefore be:

- Identical according to the dossier for each Competitor.
  - Run with identical software for PU control and capable of being operated in precisely the same way.
  - Run with identical specifications of engine oil and fuel, and associated software calibrations, unless an alternative supplier is preferred by a customer Competitor.
- 1.5 PU Manufacturers carrying out modifications to the homologated Power Unit under the provisions of Article 3 of this Appendix must submit to the FIA an updated homologation dossier at least 14 days before the first introduction of the requested modifications in a Competition. The homologation dossier thus submitted:
- Will not constitute a new dossier but will instead be considered as updates to the initial dossier
  - Must have a clear indication of version number, and all the new changes appropriately highlighted.

### 2 Information provided by the PU Manufacturer to their customer Competitors

Any PU Manufacturer intending to supply a Power Unit to a Competitor during a Championship (year N) must:

- a. Declare to the FIA, before 1 August of year N-1, that they provided to their customer Competitors:
  - i. An initial full external space model of the Power Unit including details and locations of all physical interfaces required by the team to install the Power Unit.
  - ii. Preliminary estimates of important operating parameters such as heat rejection, fuel mass and density, clutch shaft stiffness and engine stiffness.
- b. Declare to the FIA, before 1 November of year N-1, that they provided to their customer Competitors:
  - i. A final full external space model of the Power Unit including details and locations of all physical interfaces required by the team to install the Power Unit.
  - ii. Firm predictions of important operating parameters such as heat rejection, fuel mass and density, clutch shaft stiffness and engine stiffness.
  - iii. Initial details of any other parts, procedures, operating conditions and limits or any other information required by the team to install and operate the Power Unit as intended.

After the 1 August of year N-1, any significant change compared to previous communication, must be notified to the customer Competitors in due time. Should a customer Competitor consider that the change has an unreasonable impact on the Power Unit installation in the car, they may contact the FIA within 7 days of the notification. The FIA will then contact the relevant PU Manufacturer and its customer Competitors in order to conduct its investigation. If the FIA is satisfied, in its absolute discretion, that these changes are acceptable, the FIA will confirm to the PU Manufacturer and the customer Competitors within 14 days that they may be carried out.

### **3 Permitted upgrades for the Power Unit**

- 3.1 Following the first homologation of a Power Unit by a PU Manufacturer in the period 2026-2030, upgrades to Power Unit components may only be carried out if they are specifically covered by the provisions of this Article 3.
- 3.2 For the years 2027, 2028, 2029 and 2030, upgrades to the components marked with a “✓” in the table of Appendix 3, in the relevant column for each year, may be carried out. Such upgrades must be introduced for the first Competition of the year when they are allowed and used for the whole Championship season.
- 3.3 PU Manufacturers who fulfil the criteria described by Article 4 of this Appendix in year N, will be permitted to upgrade the components marked with a “✓” in the column “ADUO” in the table of Appendix 3 for the first Competition in year N+1.
- 3.4 Components may be modified in order to comply with an amendment to the published regulations or issued FIA guidance. Such modifications must be first approved by the FIA.
- 3.5 Minimal incidental changes may be carried out for car installation purposes to the following components of the Power Unit, subject to the approval process outlined in Article 3.10.a of this Appendix:
  - a. Wirings
  - b. Exhaust system, provided the key defining parameters of the system (diameters, lengths, etc.) remain fundamentally unchanged

- c. Turbo-compressor position (within 20mm from the original position in relation to the ICE), turbo clocking, turbo supports
  - d. Position of the wastegates with housings and pipes
  - e. Position of the pop-off valves with housings and pipes
  - f. Engine intake air system as defined in item 6 of Appendix 3, provided the key defining parameters of the system (diameters, lengths, etc.) remain fundamentally unchanged
  - g. Hoses defined in item 66 of Appendix 3
- 3.6** Modifications may be made to Power Unit components for the sole purposes of reliability, safety, cost saving, or supply issues, subject to the approval process outlined in Article 3.10.a of this Appendix.
- 3.7** Minor modifications may be made to Power Unit components subject to the approval process outlined in Article 3.10.a of this Appendix. Such modifications may be (but are not limited to) due to different branding, a change of supplier, a change of part number, etc. and may have no or very limited effect on reliability or functionality.
- 3.8** Requests for repair of a Power Unit component in the form of a patch made of the same material or of a composite material, following damage or failure, may be accepted if it is only local and minimal. If accepted, such repair can be applied on a temporary basis to all components available. If the repair is made of a different material, such a repair must not be present on the components used during the following Championship season.
- 3.9** Changes of fuel and oil suppliers will be accepted, provided such changes are intended for commercial and not for performance reasons.
- 3.10** The following additional constraints apply to the permitted modifications discussed in this Article 3:
- a. To carry out modifications under the provisions of Articles 3.5, 3.6 and 3.7 of this Appendix, PU Manufacturers must apply in writing to the FIA Technical Department and must provide all necessary supporting information including, where appropriate, clear evidence of failures. The FIA will circulate the correspondence to all Power Unit Manufacturers for comment. If the FIA is satisfied, in its absolute discretion, that these changes are acceptable, they will confirm to the Power Unit Manufacturer concerned that they may be carried out.  
  
Wherever practical, such requests must be submitted at least 14 days before the requested date of homologation.  
  
The procedure and associated document templates that must be used by the Power Unit Manufacturers for their requests are available in the Appendix of the Regulations.
  - b. Any permitted modifications concerning parts that are inside the sealed perimeter (i.e. parts described as “INC” in the “Sealed Perimeter” column of Appendix 3 of the Technical Regulations) can only be applied to new Power Unit elements.
  - c. With reference to the Sporting Regulations, if a Power Unit Element is subsequently replaced by another of a different specification after qualifying practice, the replacement Power Unit part will be considered the same in design and similar in mass, inertia and function if any differences it contains are limited to components modified under the provisions of Articles 3.6, 3.7 and 3.8 of this Appendix.
  - d. A customer Competitor may refuse or request a delay of a Power Unit modified under the provisions of Articles 3.6 and 3.7 of this Appendix if such modifications cause installation issues in their car. In such cases, the customer Competitor must apply in writing to the FIA Technical Department and must provide all necessary supporting information. If the FIA is satisfied, in its absolute discretion, that the installation issues are genuine, they will confirm approval to the customer

Competitor and to the PU Manufacturer. In this case, the provisions of (e) below won't apply.

- e. The first time one or more Power Units comprising modified parts, as permitted by Article 3.6 of this Appendix, are used in any of the cars powered by the Power Unit Manufacturer, a minimum of 1 Power Unit with the exact same specification must be available for each Competitor. Each Competitor will have priority use of one of these Power Units until the end of the first day of the Competition.

In the case of a Manufacturer supplying Power Units to more than 2 Competitors, one exception per Championship season can be granted by the FIA, in its absolute discretion, in the event of genuine supply issues. The request must be made in writing to the FIA Technical Department and must provide all necessary information and evidence of the supply issue. If the FIA is satisfied, the minimum required number of Power Units available for all Competitors may be reduced to 2 for the Event where the modified part is used for the first time.

- f. Any new Power Unit element used for the first time in a Competition must always include all modifications included in any Power Unit element already used by any of the cars powered by the PU Manufacturer.
- g. The requirements of e. and f. don't apply to minor modifications as defined in 3.7.
- h. A Power Unit element will be deemed to have been used once the car's timing transponder has shown that it has left the pit lane.

- 3.11 Minimal incidental changes may be carried out on PU components as a consequence of changes made to another PU component with a different upgrade schedule. Such modifications are subject to the approval process outlined in Article 3.10.a of this Appendix.

#### **4 Additional Development and Upgrade Opportunities**

Over the first five Competitions of each Championship Season in the 2026-2030 period, the FIA will monitor the performance of Internal Combustion Engine (ICE) part of all the Power Units supplied by each PU Manufacturer to its customer Competitors.

For each ICE supplied by the PU Manufacturers, an average power will be calculated. The methodology to calculate this power can be found in the Appendix to the Regulations.

Any PU Manufacturer whose ICE power is more than 3% below that of the highest ICE power recorded amongst all the PU Manufacturers will be granted Additional Development and Upgrade Opportunities ("ADUO").

PU Manufacturers granted ADUO may implement further upgrades (as described in Article 3.2 of this Appendix) and extend the usage of their PU Test Benches (as described in Article 3.7 of Appendix 1 of the Sporting Regulations).

The FIA reserves the right to:

- a. Revoke the ADUO if the performance demonstrated by the PU Manufacturer after the first five Competitions is inconsistent with that measured during the first five Competitions.
- b. Take measures, to its absolute discretion, if the resulting upgrades implemented by the PU Manufacturer under the provisions of Article 3.2 of this Appendix give that PU Manufacturer an advantage that is deemed to be unfair in comparison to PU Manufacturers who were not awarded any ADUO. Such measures will be discussed in good faith with all PU Manufacturers.

#### **5 Conformity with the power unit homologation dossier**

All Power Units must be delivered such that the seals required under Article 2.1.9 of the Sporting Regulations can be fitted. Both the Power Unit Manufacturer and users of a homologated Power Unit must take whatever steps are required at any time by the FIA

Technical Department, in its absolute discretion, to demonstrate that a Power Unit used at a Competition is in conformity with the corresponding Power Unit homologation dossier.

## APPENDIX 5: SUPPLY OF POWER UNITS, FUEL AND OIL FOR 2026-2030

### 1 Supply of Power Units for the 2026 to 2030 FIA Formula 1 World Championship

#### 1.1 Registration Requirement and Effect for Power Unit Manufacturers

- 1.1.1 Any entity that wishes to supply Power Units (“PUs”) to one or more Competitors (including a Competitor that is the same legal entity as the supplier or that is affiliated to the supplier) (a “PU Manufacturer”) for use in one or more editions of the Championship taking place in seasons 2026 to 2030 must complete the PU Manufacturer registration form, enter into the PU Manufacturer Non-Assert Agreement (as defined in Article 3 below) and also enter into the “2026 F1 PU Governance Agreement”.
- 1.1.2 The deadline for a PU Manufacturer wishing to supply Power Units starting from year N in this period to complete the PU Manufacturer registration form will be: (a) 30 June of year N-4; (b) 30 days after the publication of the first set of 2026 PU Technical, Sporting and Financial Regulations; (c) 15 October 2022, whichever is the later.
- 1.1.3 The acceptance (or otherwise) by the FIA of a PU Manufacturer registration form and any confirmation of registration will be at the sole discretion of the FIA. The FIA also reserves the right, at its sole discretion, to accept the registration of a PU Manufacturer who has failed to comply with the deadline defined in Article 1.1.2 of this Appendix. A PU Manufacturer whose registration is accepted notwithstanding its failure to meet the deadline set out at Article 1.1.2 of this Appendix must comply with the requirements of Article 1.1.1 of this Appendix, and additionally demonstrate to the FIA that the failure to comply with of any aspects of the registration process defined in this Appendix has not led to that PU Manufacturer obtaining any competitive or financial advantage over any other PU Manufacturer. The FIA will review any such information provided at its sole discretion.
- 1.1.4 Notwithstanding any confirmation of registration provided by the FIA, the registration of a PU Manufacturer will only be complete (and so will only become valid and effective) upon the applicant’s payment to the FIA of the applicable administrative fee and its entry into the PU Manufacturer Non-Assert Agreement and the 2026 F1 PU Governance Agreement.

#### 1.2 Obligations related to the supply of Power Units to a Competitor for the year N

- 1.2.1 Each PU Manufacturer of a homologated PU must provide the FIA, before 15 May of year N-1, with the list of Competitors (clearly identifying the appointed “works/factory” Competitor (also referred to as the “Nominated Competitor”)) with which it has concluded a supply agreement for the given Championship season N.

Save for exceptional circumstances, as determined in the FIA’s absolute discretion, the appointed works / factory Competitor must be identified using the following criteria:

- a. If the PU Manufacturer supplies only one Competitor, and/or if only one Competitor belongs to the Legal Group Structure of the PU Manufacturer, then that Competitor will be the works / factory Competitor; or
  - b. If the criteria of point (a) do not apply, the works / factory Competitor will be the Competitor who earned the highest Constructors Championship finishing position in the Championship season N-2.
- 1.2.2 A PU Manufacturer, if called upon to do so by the FIA before 1 June of year N-1, must supply at least a number of Competitors (“T”) equal to the following equation:

$$T = (N_{TOT}-A)/(B-C), \text{ where:}$$

- T is rounded up to the next whole integer
- A = Total number of Competitors (including “works/factory” Competitors) having a supply agreement concluded for year N with a New PU Manufacturer.
- B = Total number of manufacturers of homologated PUs for year N.

- C = Total number of New PU Manufacturers for year N.
- $N_{TOT}$  = is set to 11 and is related to the “total number of entered Competitors” for year N, which is not known until November of year N-1. This number may be reviewed if the number of Competitors exceeds 12.

In doing so, the FIA will first allocate the PU supply between the PU Manufacturers that are supplying the fewest number of Competitors, provided that the Competitors without a supply agreement shall be allocated to the PU Manufacturer(s) that supply or supplies the fewest Competitors and so on and so forth. If there is more than one PU Manufacturer supplying the fewest number of Competitors (i.e. in the same position) and/or more than one Competitor requesting a supply the allocation between such PU Manufacturers shall occur by ballot (which ballot shall be transparent and undertaken by the FIA in the presence of a representative of each of the PU Manufacturers and the New Customer Competitors (as defined below) concerned).

Any such allocation made by the FIA in accordance with this Article will have to be formalised by a supply agreement with the relevant Competitor by 1 August of year N-1 at the latest.

A New PU Manufacturer will not be required to comply with the obligation of supply as set out above.

- 1.2.3** Unless agreed otherwise by the FIA, each of the PU Manufacturers of a homologated PU may not directly or indirectly supply PUs for more than (T+1) teams, with T as defined in Article 1.2.2.
- 1.2.4** Any PU Manufacturer of a homologated PU wishing to cease the supply of PUs must notify the FIA of its intention to do so no later than 1 January of the year preceding that in which such PUs will no longer be supplied.
- 1.2.5** The FIA and all the PU Manufacturers may agree in writing to temporarily revise the dates set out in Articles 1.2.1 and 1.2.2 of this Appendix.

### **1.3 Obligation to the supply Power Units to a New Customer Competitor for the year N**

The FIA shall be entitled to request a PU Manufacturer to supply a Competitor (“New Customer Competitor”) with a PU under the terms of this Appendix except if, at the date set out in Article 1.2.1 of this Appendix above:

- Such Competitor has entered into a supply agreement with a PU Manufacturer for year N before the date set out in Article 1.2.1 of this Appendix above, and
- Such Competitor has been granted a right, under a currently binding offer with a PU Manufacturer, to be supplied with a PU for year N.

Moreover, such PU Manufacturer shall only be required to supply a New Customer Competitor if the following cumulative conditions are met. If such conditions are not met, then the PU Manufacturer may, at its sole and absolute discretion, decline the request to supply such New Customer Competitor and the decline of such request shall not be deemed to be a breach of the terms set out in this Appendix. However, this Article 1.3 cannot be applied or interpreted by the PU Manufacturer in a way that would deprive the obligation of supply as referred to in Article 1.2 of this Appendix above of any effect and/or that would prevent the FIA from making and enforcing the provisions set out in Article 1.2 of this Appendix.

The PU Manufacturer undertakes to exercise in good faith the conditions referred to in Articles 1.3.1 to 1.3.11 below).

The Competitors and the PU Manufacturers remain free to negotiate the terms of the supply agreement, subject to the fall-back positions set out below which shall apply should a Competitor and a PU Manufacturer fail to reach an agreement, despite negotiating in good faith.



- 1.3.1** For the purpose of this Article 1.3.1, supply contract only refers to the contract related to the FIA Supply Perimeter as set out in the relevant column of the two tables in Appendix 3 of the Technical Regulations.
- a. Any supply contract entered into with the New Customer Competitor must be on substantially the same terms as those entered into between the PU Manufacturer and the other customer Competitors (other than its appointed “works/factory” Competitor) to whom it already supplies a PU at the date of the FIA request (“Existing Customer Competitor”), other than the Price as referred to in paragraph 8 below. In particular, the PU Manufacturer may impose, and the Competitor cannot refuse to sign up to any terms which at least one of its other Existing Customer Competitors has agreed to and the PU Manufacturer may refuse and the Competitor cannot request the inclusion of terms which are not included in the supply agreements with other Existing Customer Competitors.
  - b. In the event that a PU Manufacturer has not supplied a PU to any other Existing Customer Competitor, the PU Manufacturer shall have the right to decide, at its sole and exclusive discretion, the payment terms and conditions (including the price of additional goods and services not included in the supply perimeter designated “EXC” in the relevant column of the two tables in Appendix 3 of the Technical Regulations, but excluding the Price which shall be determined in compliance with the definition of Price below) applicable to the New Customer Competitor subject to the provisions of paragraph 1.3.8 below.
  - c. In case of a dispute about the application or the interpretation of paragraph 1.3.1 hereto, the FIA will be entitled to request copies of the contracts being entered into by the PU Manufacturer with any customer Competitor, provided that such contracts are not disclosed to any new Customer Competitor and subject to the FIA agreeing to comply with strict customary confidentiality obligations.
- 1.3.2** The PU Manufacturer shall determine, at its sole and absolute discretion, the duration of the term of the PU supply which:
- a. may not be less than one Championship season; and
  - b. shall not exceed three Championship seasons nor go beyond the end of the 2030 Championship season, unless jointly agreed by the PU Manufacturer and the New Customer Competitor
- 1.3.3** The PU Manufacturer shall determine, at its sole and absolute discretion, whether the New Customer Competitor shall use the name of the PU Manufacturer or the New Customer Competitor shall operate under a white label/unbranded way and, for this purpose, use a different name:
- a. The use of this different name shall always be agreed in advance by the PU Manufacturer, which agreement shall not be unreasonably withheld; and
  - b. In the event that the white label/unbranded supply is required without being requested by the New Customer Competitor, this supply will not incur additional fees for the New Customer Competitor except if the use of the PU name leads to the conclusion of a commercial agreement between the New Customer Competitor and any third party. In that case, the PU Manufacturer and the New Customer Competitor shall enter into good faith negotiations and shall commonly agree on the fair and reasonable part of the revenues generated by the commercial agreement which could be considered as additional fees;
  - c. In the event that the white label/unbranded supply is requested by the New Customer Competitor and agreed by the PU Manufacturer, this supply may incur additional fees for the New Customer Competitor, such fees being determined at the sole and exclusive discretion of the PU Manufacturer in a fair and reasonable manner.
- 1.3.4** The New Customer Competitor shall provide a warranty that it has no binding contracts or option(s) in place with another PU manufacturer for future supply of PUs. The New Customer

Competitor shall be required to terminate any such contracts or option(s) which do exist in so far as they conflict with any part of the period of the contract being entered into with the PU Manufacturer.

- 1.3.5** Neither the New Customer Competitor nor any of its affiliated companies shall be an Automotive Manufacturer set up with the purpose of (amongst other things) of participating in the Championship, unless otherwise agreed by the PU Manufacturer.
- 1.3.6** The New Customer Competitor shall not have any sponsorship agreement in place with any entity that is in competition with the Core Activities of an Automotive Manufacturer which are also carried out by the PU Manufacturer, unless otherwise agreed by the PU Manufacturer.
- 1.3.7** The New Customer Competitor and/or any senior executives, directors or beneficial shareholders of the New Customer Competitor must not at any time (i) be listed or included in the official EU and/or US published sanction lists; (ii) have been convicted of any indictable criminal offence; (iii) have been convicted by any government or government agency in connection with fraud, money laundering, racketeering or terrorism activities; and/or (iv) have been declared bankrupt; and/or (v) have committed any other identified action which, in the reasonable opinion of the PU Manufacturer, harms the reputation of such PU Manufacturer. This clause shall also reciprocally apply to the PU Manufacturer.
- 1.3.8** The PU Supply Perimeter listed in the relevant column of the two tables in Appendix 3 of the Technical Regulations and designated "INC" shall be supplied to New Customer Competitors at no more than the maximum supply price set out in Article 1.4 of this Appendix.
- The supply of additional goods or services not listed in Appendix 3 of the Technical Regulations (which shall be agreed between the PU Manufacturer and the New Customer Competitor) shall incur additional charges, the amount of which shall be substantially the same as that applied by the PU Manufacturer to its Existing Customer Competitor. In the event that a PU Manufacturer has not supplied a PU to any other Existing Customer Competitor, the PU Manufacturer shall decide the price of the above-mentioned additional goods and services based on the usages and practices generally recognised and respected in the market for the supply of parts and services in the Championship.
- 1.3.9** The FIA shall confirm in writing to the PU Manufacturer that, to the best of its knowledge, the New Customer Competitor, including its officers, directors and beneficial shareholders, has not been convicted of non-complying at all times with the FIA Code of Good Standing.
- 1.3.10** Payment of the fees (directly or indirectly through a payment guarantee) under the supply contract for each season shall as a fall-back position (unless otherwise agreed between the PU Manufacturer and the New Customer Competitor) and, notwithstanding the terms of any contract with an Existing Customer Competitor or its own factory Competitor, be made in four instalments:
- 25% on the date of signature of the supply contract;
  - 25% on or before 30 October of year N-1;
  - 30% before the start of the Championship season (year N); and
  - The remaining 20% before the fifth Formula One Event of the Championship (year N).

The following additional provisions apply:

- a. In case of any delayed payment for an amount greater than €100,000, the PU Manufacturer shall send the New Customer Competitor a written notice of the breach, with a copy to the FIA and the Commercial Rights Holder. Should the New Customer Competitor fail to resolve this breach to the satisfaction of the PU Manufacturer (with or without the involvement of the FIA and the Commercial Rights Holder) within thirty days from the issuing of this notice the PU Manufacturer shall be entitled to either terminate the supply contract immediately by serving written

notice on the New Customer Competitor, with a copy to the FIA and the Commercial Rights Holder, or, suspend delivery of the PUs to the New Customer Competitor.

- b. In case of breach of the obligation to deliver the PUs and/or to supply additional goods or services to the New Customer Competitor pursuant to the supply agreement, such New Customer Competitor may send the PU Manufacturer a written notice of the breach (but only in the event that the New Customer Competitor is not itself in breach of contract including for non-payment except if that non-payment is justified by an alleged breach of the supply contract by the PU Manufacturer), with a copy to the FIA and the Commercial Rights Holder. Should the PU Manufacturer fail to resolve this breach to the satisfaction of the New Customer Competitor (with or without the involvement of the FIA and the Commercial Rights Holder) within thirty days from the issuing of this notice the New Customer Competitor shall be entitled to suspend payment of the fees to the PU Manufacturer.

**1.3.11** The New Customer Competitor and the PU Manufacturer shall not take any action and/or make any omission, deceptive, misleading or disparaging or negative comments, which directly injures, damages or brings into disrepute the public reputation, goodwill or favourable name or image of the other party to the supply agreement. Both parties will procure their affiliates and/or their respective senior executives, employees, directors and shareholders to abide by the same provisions.

#### **1.4 Power unit maximum supply price**

The PU supply perimeter listed in the corresponding column of Appendix 3 of the Technical Regulations shall be supplied at the maximum price of 17 million euros, adjusted for Indexation. For the purpose of this article, Indexation has the meaning indicated, and will be calculated pursuant to the methodology set forth, in Appendix 1 of the Formula 1 Power Unit Financial Regulations. The supply of additional goods or services not listed in the Appendix hereto (which shall be agreed between the PU Manufacturer and the Competitor) shall incur additional charges, the amount of which shall be based on the usages and practices generally recognised and respected in the market.

## **2 Obligations in order to supply Fuel and Engine Oil to a Competitor**

### **2.1 Obligations of Fuel and Engine Oil Suppliers**

**2.1.1** Any supplier wishing to supply fuel and/or engine oil to a Competitor in any Championship in the period 2026-2030, starting in year N ("Prospective Supplier") must:

- a. Complete the Fuel and/or Engine Supplier registration form, no later than 1 January of year N-1;
- b. agree to be bound by and to observe the provisions of the Code, the Technical Regulations, the Sporting Regulations the Judicial and Disciplinary Rules and all other relevant and applicable FIA rules and/or regulations (as supplemented or amended from time to time);
- c. agree to be bound by the provisions of Article 2.1.2 of this Appendix with regard to the applicability of any patents or pending patent applications to the 2026-2030 Formula 1 World Championships;
- d. agree to be subject to the jurisdiction of the internal judicial and disciplinary bodies of the FIA.
- e. enter into an agreement in the form prescribed by the FIA ("Prospective Supplier Non-Assert Agreement") with the FIA and the Commercial Rights Holder, pursuant to which the Prospective Supplier agrees not to assert any rights or claims with regard to patents, pending patent applications, or any licensed rights in respect of patents or patent applications against the FIA, the Commercial Rights Holder, any other Fuel and/or Engine Oil Suppliers, all PU Manufacturers and Competitors related to the following:

- i. blending, processing, developing importing, exporting, testing and/or storing of fuel or engine oil intended for use in Formula 1 in the period 2026-2030. Such provision applies (but is not limited to) the use of any such fuel or engine oil used for development of the fuel or engine oil itself, for the development of the PU by the PU Manufacturer, for track testing or during Competitions; and/or
- ii. the setting of the Technical Regulations or any activities arising therefrom, or any activities arising out of the compliance with any mandatory or optional requirement of the Technical Regulations.

**2.1.2** The Prospective Supplier Non-Assert Agreement shall apply to the Prospective Supplier and any of its affiliate companies.

**2.1.3** For the avoidance of doubt, the Prospective Supplier Non-Assert Agreement shall not impose an obligation on the Prospective Supplier to supply fuel and/or engine oil for use in any Championship in the period 2026-2030. However, the FIA has the right (in its sole discretion) to refuse the participation in the Championship of any Prospective Supplier that does not enter into the Prospective Supplier Non-Assert Agreement within 30 days of being invited to do so by the FIA.

**2.1.4** The Prospective Supplier Non-Assert Agreement shall remain binding and valid in respect of any Prospective Supplier that supplies fuel and/or engine oil in any of the 2026-2030 Championships and then subsequently ceases to do so.

**2.1.5** Each Prospective Supplier warrants that the fuel and/or engine oil that it manufactures and/or supplies for use in the Championships staged during the 2026-2030 period (or subsequent period) (“Relevant Period”) do not infringe the Intellectual Property Rights of any third party, and indemnifies the FIA and its affiliates and the Commercial Rights Holder and its affiliates against all liabilities suffered or incurred by such entities arising out of or in connection with any claim that the fuel and/or engine oil that it manufactures and/or supplies for use in the Championship during the Relevant Period infringe(s) the Intellectual Property Rights of any third party. In this context “Intellectual Property Rights” means: (i) patents, rights to inventions, designs, copyright and related rights, database rights, trade marks, related goodwill and the right to sue for passing off and/or unfair competition and trade names, in each case whether registered or unregistered; (ii) proprietary rights in domain names; (iii) knowhow, trade secrets and confidential information; (iv) applications, extensions and renewals in relation to any of these rights; and (v) all other rights of a similar nature or having an equivalent effect anywhere in the world

## **2.2 Obligations of Competitors and PU Manufacturers with respect to Fuel and Oil Suppliers**

### **2.2.1 PU Manufacturers**

- a... Within 90 days of being registered to supply PUs in one or more Championship in the 2026-2030 period under the provisions of Article 1.1 of this Appendix, a PU Manufacturer must nominate in writing to the FIA the Prospective Supplier(s) with whom it intends to develop its PU.

The PU Manufacturer may change its Fuel and/or Oil Supplier at any time, provided the provisions of this Article and Articles 2.1.2 – 2.1.5 are met in relation to any subsequent Prospective Supplier.

Following the nomination of the Prospective Supplier(s), the FIA will invite Prospective Supplier(s) to enter into a Prospective Supplier Non-Assert Agreement in the form prescribed by the FIA pursuant to the provisions of Articles 2.1.2 – 2.1.5 above. Should a Prospective Supplier fail to enter into the Prospective Supplier Non-Assert Agreement within 30 days of being invited to do so by the FIA, the FIA will inform the PU Manufacturer whether, as a result of that failure, the PU Manufacturer will be required to find a different Fuel and/or Oil Supplier.

The FIA reserves the right, at its absolute discretion, to exempt a PU Manufacturer from the nomination requirement, if it is evident that the PU Manufacturer has not entered into an agreement with a Prospective Supplier within 90 days of its registration as a PU Manufacturer. In such cases, if the PU Manufacturer subsequently enters into an agreement with a Prospective Supplier, it must notify the FIA within 30 days of having done so.

- b. The following information cannot be shared between a PU Manufacturer and any Existing or Prospective Fuel/Oil Supplier:
  - i. Any drawing and/or CAD and/or any physical parts (such as but not limited to piston, cylinder head, etc.) of the combustion chamber
  - ii. Any information relating to gas exchange within the combustion chamber (such as but not limited to cams, ports, plenum, exhausts, cam timing, etc.), apart from cylinder pressure data, simulation and dyno test results.

No PU Manufacturer may use the movement of personnel (whether employee, consultant, contractor, secondee or any other type of permanent or temporary personnel) with an Existing or Prospective Fuel/Oil Supplier or another PU Manufacturer, either directly or via an external entity, for the purpose of obtaining an Intellectual Property transfer and/or circumventing the requirements of this Article. In order that the FIA may be satisfied that any such movement of staff is compliant with this Article, each PU Manufacturer must inform the FIA of all relevant staff movements at the end of each calendar quarter using the template which may be found in the Appendix to the Technical and Sporting Regulations and must demonstrate that they have implemented all reasonable measures to avoid the disclosure of Intellectual Property, including but not limited to that explicitly detailed in this Article, between the PU Manufacturer and an Existing or Prospective Fuel/Oil Supplier involved.

## **2.2.2 Competitors**

In the case of Competitors participating in the 2022-2025 Championships (and in relation to whom Article 2.2.1 is inapplicable), the FIA invites each such Competitor to nominate in writing to the FIA their Prospective Supplier(s) within 90 days of: (i) the first publication of these Technical Regulations; or (ii) entering into a commercial or supply agreement with its pre-existing Fuel and/or Engine Oil Supplier in relation to any of the 2026-2030 Championships, whichever is earlier.

Following the nomination of the Prospective Supplier(s), the FIA will invite such Prospective Supplier(s) to enter into a Prospective Supplier Non-Assert Agreement in the form prescribed by the FIA, pursuant to the provisions of Articles 2.1.2 – 2.1.5 above. Should a Prospective Supplier fail to enter into the Prospective Supplier Non-Assert Agreement within 30 days of being invited to do so by the FIA, the FIA will inform the Competitor whether, as a result of that failure, they will be required to find a different Fuel and/or Engine Oil Supplier.

Each Competitor has the right to change their Fuel and/or Engine Oil Supplier at any time, provided the provisions of this Article and Articles 2.1.2 – 2.1.5 are met in relation to any subsequent Prospective Supplier.

## **3 Non-exclusivity of technologies, licences, patents, and pending patent applications**

### **3.1 Non-exclusivity**

With the exception of agreements relating to the supply of fuel and/or engine oil, no PU Manufacturer may enter into a supply agreement with a third-party supplier that is exclusive, or that prevents an equally advantageous supply of a PU component or technology supplied by the third-party supplier in question to another PU Manufacturer.

For the avoidance of doubt, provisions of a supply agreement prohibiting a third party supplier from disclosing to third parties (whether directly or indirectly) a PU Manufacturer's Intellectual Property and/or any information in respect of its LPUCs shall not breach this provision.

### **3.2 Licences, patents and pending patent applications**

The existence of: (i) patents; (ii) pending patent applications; or (iii) any licensed rights in respect of patents or patent applications of a PU Manufacturer shall not prevent any other PU Manufacturer from using any technology, design, or concept in their PUs in Formula 1. To achieve this objective the following provisions must be met:

- a. In registering to supply PUs for the period 2026-2030, the PU Manufacturer must enter into an agreement in the form prescribed by the FIA ("PU Manufacturer Non-Assert Agreement") with the FIA and the Commercial Rights Holder pursuant to which the PU Manufacturer agrees not to assert any rights or claims with regard to patents, pending patent applications, or any licensed rights in respect of patents or patent applications related to PUs against the FIA, the Commercial Rights Holder, any other PU Manufacturers, any suppliers to other PU Manufacturers, or the Competitors.
- b. If the PU Manufacturer obtains any component, design, process or technology relating to a PU from a third-party supplier (the "Third Party Input"), it must obtain written confirmation from the third party supplier in question that the third party supplier will also be bound by the obligations in the PU Manufacturer Non-Assert Agreement as if it was a party to that agreement. Such confirmation should be in the form or substantially the form of the "Supplier Confirmation" at Schedule 2 to the PU Manufacturer Non-Assert Agreement. Failure by the PU Manufacturer to obtain such a confirmation and provide it to the FIA upon request will be considered a breach of these Technical Regulations and may result in the PU or PU component in question that incorporates the third-Party Input not being permitted.

For the avoidance of doubt, this Article regards solely the use of a technology, design or concept in a Formula 1 PU, and does not regard any use of such a technology, design or concept by affiliates of the PU Manufacturer in any other sector.

### **3.3 PU Manufacturer Warranty**

Each PU Manufacturer warrants that the Power Units that manufacturers and/or supplies for use in the Championships staged during the 2026-2030 period (or subsequent period, if extended) ("Relevant Period") do not infringe the Intellectual Property Rights of any third party, and indemnifies the FIA and its affiliates and the Commercial Rights Holder and its affiliates against all liabilities suffered or incurred by such entities arising out of or in connection with any claim that the Power Units that it manufactures and/or supplies for use in the Championship during the Relevant Period infringe the Intellectual Property Rights of any third party. In this context "Intellectual Property Rights" means: (i) patents, rights to inventions, designs, copyright and related rights, database rights, trade marks, related goodwill and the right to sue for passing off and/or unfair competition and trade names, in each case whether registered or unregistered; (ii) proprietary rights in domain names; (iii) knowhow, trade secrets and confidential information; (iv) applications, extensions and renewals in relation to any of these rights; and (v) all other rights of a similar nature or having an equivalent effect anywhere in the world.

## **4 Material breach of the Regulations**

In the case of any alleged material breach or alleged material failure by a PU Manufacturer to comply with any of the obligations of this Appendix, the FIA shall engage in good faith and active discussions with the PU Manufacturer and, in the absence of an amicable solution within one month, be entitled to commence proceedings before the FIA International Tribunal against the PU Manufacturer in respect of such alleged breach or failure. In the event that (in accordance of the provisions of the Code and of the Judicial and Disciplinary Rules), the International Tribunal rules that the PU Manufacturer has materially breached or materially failed to comply with this Appendix, the International Tribunal may impose on the

PU Manufacturer concerned, to the exclusion of any other sanction it may have the power to impose, a fine (the amount of which shall be no more than fifteen million euros and shall be determined, on a case by case basis, depending on the merits and circumstances of the applicable case).

## 5 New PU Manufacturers

### 5.1 Definition of a New PU Manufacturer

A PU Manufacturer intending to supply PUs for the first time in year N, will be considered to be a “New PU Manufacturer” if it (or any related party):

- a. has not homologated a PU at least once in the period 2014-2021; and
- b. has not received any significant recent Intellectual Property from a PU Manufacturer who is not a New PU Manufacturer, subject to the conditions outlined in Article 5.2 of this Appendix.

(together, for this Article 5 only, the “Necessary Conditions”)

The “New PU Manufacturer” status will be granted by the FIA, at its absolute discretion, for the complete calendar years from N-3 to N+1.

In order to be granted the “New PU Manufacturer” status, the PU Manufacturer in question must, upon the request of the FIA, provide the FIA with all of the detailed information or documents requested by the FIA describing the commercial background and details of the PU Manufacturer’s business, the Intellectual Property owned by the PU Manufacturer and the technical relationship between the PU Manufacturer and any other related entity or persons (the “Requested Documentation”).

PU Manufacturers granted a “New PU Manufacturer” status are given additional rights or exemptions in certain provisions of the Technical, Sporting and Financial Regulations.

In order to assess whether the Necessary Conditions have been satisfied by a PU Manufacturer, the FIA will assess the Requested Documentation provided by the PU Manufacturer with regard to three factors:

- a. Infrastructure: the necessity for the PU Manufacturer to build facilities, invest significantly in assets, and hire personnel with prior Formula 1 experience;
- b. ICE status: the prior experience of the PU Manufacturer in Formula 1 Internal Combustion Engines, and potential possession of significant recent Intellectual Property; and
- c. ERS status: the prior experience of the PU Manufacturer in Formula 1 ERS systems, and potential possession of significant recent Intellectual Property.

### 5.2 Partial New PU Manufacturer status

If, following a review of the Requested Documentation, the FIA determines that a PU Manufacturer does not fully satisfy the Necessary Conditions, the FIA reserves the right, at its absolute discretion, to grant the PU Manufacturer a partial New PU Manufacturer status. Partial New PU Manufacturer status will give rise to a reduction of the additional rights accorded to New PU Manufacturers by the Technical, Sporting and Financial Regulations.

The level of reduction of additional rights applied to holders of partial New PU Manufacturer status will be determined according to the weights shown on the following table:

		Regulations Influenced by criteria	
		Financial Regulations: Cost cap and CapEx limits	Technical or Sporting Regulations
Parameter	Infrastructure	40% *	20% *
	ICE status	50% *	50% *

	<b>ERS status</b>	10% *	30% *
	<b>Outcome:</b>	<b>sum of three parameters</b>	<b>0% or 100% **</b>

\* For each parameter, these weightings are allocated either in full or at zero value, depending on the criteria met by the PU Manufacturer

\*\* For Technical or Sporting Regulations, the Newcomer status is awarded either in full (if the sum of the three parameters is greater or equal to 50%), or at zero value.

### 5.3 Revocation of the New PU Manufacturer status

The FIA reserves the right, at its absolute discretion to revoke a PU Manufacturer's New PU Manufacturer status if:

- a. it becomes apparent that any of the information provided to the FIA by the PU Manufacturer as part of the Requested Documentation that led to the status being granted have changed in a significant manner; or
- b. new evidence comes to light indicating that erroneous information has been provided by the PU Manufacturer to the FIA as part of the Requested Documentation.

The knowing provision by a PU Manufacturer of false or misleading information in the Requested Documentation shall be considered a material breach of these Technical Regulations and will be treated by the FIA in accordance with Article 4 of this Appendix.

### 5.4 Transparency

Should a PU Manufacturer be awarded the New PU Manufacturer status (or a partial such New Manufacturer status), the FIA will communicate this to all other PU Manufacturers, alongside a detailed report on such status. The report will include the two percentage scores to be determined in accordance with Article 5.2 of this Appendix and will explain the reasons for the FIA's decision, whilst withholding any confidential information.

### 5.5 No right of appeal

PU Manufacturers shall have no right of appeal against any decision by the FIA in relation to the provisions of this Appendix 5.

## 6 Definitions

6.1 An **Automotive Manufacturer** is a Manufacturer of at least one model of automobile (as defined in the Code) that has produced at least 3,000 units during the past 12 months.

6.2 The **Core Activities** of an Automotive Manufacturer are the Design, production and sale of automobiles (as defined in the Code).