

# 2022 TECHNICAL REGULATIONS

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Series:

**IMSA WEATHERTECH SPORTSCAR CHAMPIONSHIP**

Class:

**DAYTONA PROTOTYPE INTERNATIONAL**



Sanctioned by:

**INTERNATIONAL  
MOTOR SPORTS  
ASSOCIATION**

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## Foreword:

For all Members, the IMSA RULES of the International Motor Sports Association establish the foundation for the organization and conduct of all IMSA Sanctioned Events. The IMSA RULES take effect immediately upon publication.

The purpose of the RULES is to: (i) promote safety, the sport of automobile Competition and IMSA, (ii) enhance Competition, (iii) ensure the quality, fairness and integrity of the IMSA programs and operations and (iv) achieve prompt finality in the Competition results (“**Purpose**”).

### **ALL MEMBERS ARE REQUIRED TO REVIEW THESE IMSA RULES CAREFULLY.**

The **IMSA RULES** consist of following three (3) sections and the Event Supplementary Regulations (**SR**):

- The Technical Regulations, which outline the rules and regulations for the specific cars and equipment. The Technical Regulations may be modified or changed at any time by the publication of a Technical Bulletin, amending the Technical Regulations.
- The IMSA Sporting Regulations (**ISR**), which concern Competitor and Event procedures, as well as guidelines for the safe and uniform operation of the sport. The ISR may be modified or changed at any time by the publication of a Competition Bulletin, amending the ISR.
- The Series Supplementary Regulations (**SSR**) that provides Series-specific information about each IMSA Series. The SSR is integrated into the ISR and are designated with “(SSR)” next to the Paragraph title. The SSR may be modified or changed at any time by the publication of a Competition Bulletin, amending the SSR.

Any portion of the RULES may be modified through Bulletins (Competition Bulletins and Technical Bulletins, respectively) and takes force when published. Once published, the Bulletin shall take precedence over the applicable portion of the RULES. Additionally, the RULES may be modified for an Event by the Race Director through the mandatory briefing instructions.

### **HOW TO READ THE RULES**

IMSA Technical Regulations follow a common philosophy across all Classes. The IMSA Technical Regulation philosophy can be summed in the following concepts:

- Cars are constructed and regulated to a controlled standard, the vehicle Homologation.
- Modifications to the Car are not permitted unless specifically stated in the applicable class's Technical Regulations.
- The Car, at all times, must adhere to:
  - The current Homologation Document(s) and valid extension documents (e.g., EVO).
  - The Manufacturer's or Constructor's Parts Manual.
  - Manufacturer submitted and IMSA approved declarations (where applicable).
  - The IMSA Technical Regulations for the Class
- Normal adjustment of the Car is permitted as defined by the applicable Car's Homologation and Class's Technical Regulations.
- Repair of the Car, parts, and components is permitted, provided it serves no additional purpose other than the repair itself. All such repairs must meet all Constructor / Manufacturer specifications and regulatory requirements.

(cont.)

Modifications by an Entrant to parts, systems, and/or components of the Car is not permitted for any reason. An Entrant wishing to perform any modification(s) must present modification(s) to the applicable Manufacturer or Constructor for formal approval from the applicable Homologating Authority for the Class. Entrants are not permitted to work directly with a Homologating Authority(s).

Entrants must have a current copy of the applicable Homologation for their Car Model at all times, as well as full access to the Manufacturer's / Constructor's Part Manual. Both of these documents together clearly identify the compliant specification of the Car and will be used as reference materials for both the Entrant and IMSA. A copy of the Homologation may be provided by the applicable Manufacturer / Constructor or purchased from the Homologating Authority.

IMSA's regulations work in conjunction with Homologation regulations from a Homologating Authority. This sometimes creates conflicts across the various regulation sets. Often the Homologating Authority has a combined set of Technical and Homologation regulations.

The hierarchy of these various regulations applies in descending order is as follows:

1. IMSA Class Technical Regulations and Bulletins
2. These IMSA Technical Regulations shall govern in any case where a conflict exists with the Homologation Regulations and Documentation.
3. Homologation Authority Technical Regulations and corresponding Homologation Form & Parts Book

#### **Example 1: Incorrect process**

A Team has found that a suspension part of the Car is prone to failure when going over large bumps. The Team chooses to resolve the problem on their own and modifies the part with components made in their own shop, which are not in the Homologation or Parts Manual of the Car. IMSA Technical Staff find this modification during a post-Race inspection. IMSA finds that the car is not in the approved configuration and the Entrant is penalized.

#### **Example 2: Correct process**

A Team suspects a part on the Car may be prone to failure during longer races. The Team therefore informs their Manufacturer or Constructor representative of their concern. The Manufacturer or Constructor agrees that a modification or redesign is appropriate and submits a written proposal with supporting documentation to the Homologating Authority for review. Upon approval the Homologation documents are updated and distributed for equitable customer awareness and part implementation.

Homologation Authority for the Class:

Class	Homologating Authority
DPi	IMSA

## EXECUTIVE LEADERSHIP MASTHEAD

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**Vice President, Competition**

**Brandon Huddleston**

**Vice President, Partnership Marketing and  
Business Development**

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## ARTICLE 1. DEFINITIONS SPECIFIC TO THE TECHNICAL REGULATIONS

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- 1.1.1. **Car** means a singular representation of a Car Model entered by an Entrant in an Event.
- 1.1.2. **Car Model** means a specific model of a vehicle constructed by an IMSA-recognized Manufacturer Partner, and intended for Competition.
- 1.1.3. **Class** means a category for Cars sharing a common set of Homologation Regulations and differentiated from others by type of Car Model.
- 1.1.4. **Competition** means a contest of competitive nature in which a Car takes part during an Event and results of which Competition are published.
- 1.1.5. **Constructor** means an entity that designs and builds race car chassis.
- 1.1.6. **Entrant** means an entity or person who has entered a Car that has been accepted for Competition and holds an IMSA Membership in the capacity of an Entrant or Entrant/Driver.
- 1.1.7. **Event** means an IMSA Sanctioned motorsport activity. It includes the designated Race as well as all periods for registration, inspections, practice Sessions, qualifying Sessions, racing, pre- and post-Race activities and inspections, and rain or postponed dates related thereto.
- 1.1.8. **Homologate** means to execute the Homologation Process.
- 1.1.9. **Homologated** means a Car Model approved through the Homologation Process.
- 1.1.10. **Homologation** means the concept of all things associated with Homologation Authority approval via the Homologation Process.
- 1.1.11. **Homologation Authority** means an entity with the authority to Homologate.
- 1.1.12. **Homologation Documentation** means all files, documents, information, and communication associated with the issuance of official approval of Homologation.
- 1.1.13. **Homologation Identifier** means the unique identifier (generally including a string of characters identifying the Category or Class of Homologation followed by a sequential number assigned to the Car Model) serving as a reference to the official approval of Homologation, assigned by the Homologation Authority.
- 1.1.14. **Homologation Process** means all procedures associated with petitioning a Homologation Authority for approval that a Car Model complies with the Homologation Regulations.
- 1.1.15. **Homologation Regulations** means a set of technical requirements and criteria used to design, construct, and document a Car Model intended for racing in a specific category or class of racing.
- 1.1.16. **Manufacturer** means a Manufacturer Partner constructing an approved Car Model.
- 1.1.17. **Manufacturer Partner** means a recognized IMSA Official Automotive Partner.
- 1.1.18. **Specification** means all technical characteristics of the Car Model defined by the Homologation and Technical Catalog.
- 1.1.19. **Specific Homologation** means the Homologation specific to a particular Car Model.
- 1.1.20. **Technical Catalog** means IMSA's collection of data and documents supporting a Car Model
- 1.1.21. **Technically Eligible** means conforms to all technical requirements and criteria defined by these Technical Regulations.

## ARTICLE 2. TECHNICAL PHILOSOPHY

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### 2.1. Technical Eligibility

- 2.1.1. Cars representing a Car Model must always respect the Specification.
- 2.1.2. To be eligible for participation in this Class, a Car Model must:
  - a. Be a Car Model constructed by an IMSA-recognized Manufacturer Partner.
  - b. Hold a valid Homologation, approved and issued by an IMSA-recognized Homologation Authority.
- 2.1.3. IMSA is the sole authority to define the Technical Eligibility of a Car Model and issue the Technical Credential.

### 2.2. Changes

- 2.2.1. Changes to the Specification are prohibited, unless explicitly authorized by IMSA.
- 2.2.2. Manufacturers alone are permitted to petition IMSA to change the Specification; requests by Entrants are not recognized.

### 2.3. Conflict Resolution

- 2.3.1. These IMSA Technical Regulations shall govern in any case where a conflict exists with the Homologation Regulations and Documentation.

### 2.4. Final Authority

- 2.4.1. IMSA is the Final Authority with respect to these Technical Regulations.

### 2.5. Conditions for Use of a Specific Homologation

- 2.5.1. At all times during IMSA-sanctioned Events it is the Entrant's responsibility to ensure the configuration of the Car Model represents the Homologation components of the Specification; including:
  - a. As-Homologated Configuration
  - b. As-Delivered Configuration
  - c. Parts Manual
  - d. Homologation Extension Form Configuration
- 2.5.2. The original, As-Homologated Configuration of the Car Model must not be modified unless permitted by these Technical Regulations.
- 2.5.3. The As-Delivered Configuration of a Car must respect the as-received configuration from the Car Model Manufacturer, unless permitted by these Technical Regulations.
- 2.5.4. The Parts Manual is the official parts catalog for the Car Model as defined by the Car Model Manufacturer or Constructor:
  - a. Specific parts listed in the Parts Manual must be used on all representations of a Car Model unless permitted by these Technical Regulations.
- 2.5.5. To be eligible for use in any IMSA-sanctioned Event, modifications detailed in Homologation Extension Forms must:
  - a. Be approved by, or have initiated the process to obtain approval from, the Homologation Authority, and appended to the Car Model Homologation.
  - b. Be approved by IMSA
  - c. Be available to all Entrants of the relevant Homologated Car for the next Event.

## ARTICLE 3. TECHNICAL TESTING AND VERIFICATION

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### 3.1. Reference Components

- 3.1.1. IMSA may request Manufacturers submit reference components, tooling, and/or templates to the IMSA Technical Department.
  - a. IMSA may retain these components without compensation.
  - b. Manufacturers are responsible for all costs as related to submitting reference components.
  - c. Fees may apply.

### 3.2. Technical Testing

- 3.2.1. Any testing conducted by IMSA to support the Technical Credential Process; including, but not limited to:
  - a. Restrictor Flow
  - b. Engine Dyno
  - c. Wind Tunnel
  - d. On-track Testing
  - e. Fuel Delivery Testing
  - f. Fuel Consumption Testing
- 3.2.2. Testing and associated costs are the responsibility of the applicable Manufacturer or Constructor.

## ARTICLE 4. BALANCE OF PERFORMANCE

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### 4.1. Balance of Performance

- 4.1.1. IMSA may, at its discretion, utilize an adjustment method to maintain competitive equivalency between Cars within each Class, and between Classes.
  - a. Details of the Balance of Performance Process are described in Attachment 2 of the applicable Sporting Regulations.
- 4.1.2. Technical Bulletins are an extension of these Regulations and part of the Rules.
- 4.1.3. Providing false or intentionally misleading information is a breach of these Technical Regulations.

## ARTICLE 5. SAFETY

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### 5.1. Driver Safety Harness System

- 5.1.1. Cars must be equipped with a minimum 6-point Driver safety harness with a valid label demonstrating compliance with one of the following standards:
  - a. FIA Standard 8853-2016: Safety Harnesses
    - i. [FIA Technical List #57](#): Harnesses Homologated according to the FIA Standard 8853-2016
- 5.1.2. Installation must be performed in accordance with instructions provided by the system supplier and/or manufacturer.
  - a. Belt components must be installed at each Homologated anchor point to prevent accidental release or opening.
  - b. Individual belt straps must be independent; any method or attempt to combine individual straps is prohibited.
  - c. Elastic retention straps are prohibited on shoulder belts.
- 5.1.3. Harnesses must be replaced at the request of IMSA, or whenever the following conditions occur:
  - a. Expiration:
    - i. FIA Homologated: Immediately following December 31<sup>st</sup> of the year printed on the label.
  - b. Damage:
    - i. Following a severe collision.
    - ii. Webbing is cut or frayed, or weakened due to actions of chemicals or sunlight.
    - iii. Buckles are bent, deformed, rusted, or improperly functioning.
- 5.1.4. Entrants are responsible for ensuring the Driver safety harnesses and all associated components are properly labeled, installed, used, and maintained.
- 5.1.5. Belt components must be used as designed by the manufacturer. It is prohibited to mix belt components between manufacturers or certifications.



## 5.2. Seat

- 5.2.1. As homologated.

## 5.3. Driver Containment Nets

- 5.3.1. Not Applicable

## 5.4. Protective Padding

- 5.4.1. Not Applicable

## 5.5. Master Electrical Switches

- 5.5.1. As homologated.
- 5.5.2. Systems must remain functional during any on track activity or at the request of IMSA.
- 5.5.3. Interior and exterior master switches must be clearly identified by a self-reflective symbol of a red spark surrounded by a white-edged, blue triangle with a base greater than 30 mm.

## 5.6. Fire Suppression System

- 5.6.1. Cars must be equipped with a fire extinguisher system with a valid label demonstrating compliance with one of the following standards:
- a. FIA Standard for plumbed-in Fire Extinguisher Systems in Competition Cars (1999):
    - i. [FIA Technical List #16](#): Extinguisher Systems Homologated by the FIA
  - b. FIA Standard 8865-2015: Plumbed-in and Hand-Held Fire Extinguisher Systems
    - i. [FIA Technical List #52](#): Plumbed-in Fire Extinguisher Systems according to FIA Standard 8865-2015
- 5.6.2. Identification
- a. Exterior activation mechanism must be marked with a self-reflective symbol with a red edge surrounding a red "E" inside a white circle at least 100 mm in diameter.
  - b. The interior fire activation switch, located in cockpit, must be marked with an appropriately sized decal of a red "E" inside a white circle.
- 5.6.3. Inspection
- a. IMSA may require removal of the fire bottle for Technical Inspection.
  - b. Entrant is responsible to demonstrate proper system function of the interior and exterior fire suppression activation mechanisms, using the "test" mode if present.

## ARTICLE 6. DEFINITION OF CLASS

### 6.1. Daytona Prototype International (DPi)

- 6.1.1. Class Structure: Prototype Cars compete in the DPi Class of the IMSA WeatherTech Sportscar Championship (IWSC).
- 6.1.2. Eligibility Requirements: To be eligible for participation in the Class, a Car Model must respect the Specification defined by the Homologation and Technical Eligibility requirements:

- a. Homologation (DPi):

<b>Homologation Authority:</b>	International Motor Sports Association (IMSA)
<b>Homologation Specification:</b>	IMSA DAYTONA PROTOTYPE international (DPi)
<b>DPi Homologation Regulations:</b>	2020 IMSA DAYTONA PROTOTYPE international (DPi) / LMP2 CONSTRUCTOR/OE MANUFACTURER MANUAL (DPi HOMOLOGATION REGULATIONS)

## ARTICLE 7. VEHICLE SYSTEMS

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### 7.1. General

- 7.1.1. All Vehicle Systems and associated sub-systems are listed in this Article.
- Where change to the Homologated Vehicle Systems is permitted, regulatory text is **bold and underlined**.
  - Where change to the Homologated Vehicle Systems is prohibited, regulatory text is light grey.
  - Advisory statements are in normal text.

### 7.2. Modifications to the Specification

- 7.2.1. Entrants are permitted to execute the following changes to parameters defined by the Homologation component of the Car Model Specification, provided these Technical Regulations, all current Technical Bulletins, and the Technical Credential are fully respected:
- Adjust component settings defined as adjustable.
  - Replace components with parts defined as optional.
- 7.2.2. Manufacturers must make any declarations listed in these Technical Regulations in the Technical Eligibility Form.
- Further authorization to modify the Specification and/or As-Delivered Condition is granted via the following formal communication methods:
- Published IMSA Technical Bulletin
  - IMSA Technical Committee Bulletin
- 7.2.3. Informal and/or verbal communication is not considered valid authorization.

### 7.3. Servicing, Repair, and Replacement

- 7.3.1. All servicing or repair must be made in good faith to restore the Car and all components to their originally intended form and function as defined by the Specification.
- 7.3.2. Entrants are permitted to replace damaged or worn components provided these Technical Regulations are respected.

### 7.4. Dimensions

- 7.4.1. General
- IMSA's calibrated measurement instruments are the official measurement instruments.
  - Scrutineering measurement(s) are taken with the applicable dry-type tire set installed.
    - Tire compound per the applicable Event SR.
  - Tire pressure shall be set at 30.0 psi ( $\pm 0.5$  psi) for scrutineering measurement(s).
- 7.4.2. Reference Surface
- The flat floor reference surface of the Car is measured to the plane of the Technical Inspection surface plate.
- 7.4.3. Mass
- The minimum mass for all Car Models is defined via Balance of Performance Tables and associated Technical Bulletins.
  - Car mass is measured as-raced minus Driver and Fuel using the IMSA scales during Technical Inspection.
- 7.4.4. Ballast
- Entrants are permitted to add or remove ballast to achieve minimum mass:**
    - Ballast must be per the Constructor's Base Homologation.
  - Manufacturers and/or Constructors must place ballast in assigned locations when required by IMSA.
- 7.4.5. Ground Clearance
- 7.4.6. Overall Dimensions

## 7.5. Chassis

### 7.5.1. General

- a. **Entrants are permitted to execute minimum modifications for the installation of components.**
  - i. All modifications must be approved by IMSA.

## 7.6. Driver Interface

### 7.6.1. General

- i. Installations must be approved by IMSA.
- ii. System must not serve any additional purpose.

### 7.6.2. Steering Wheel

- a. **Entrants are permitted to add, and/or modify the shape of, steering wheel grips.**

### 7.6.3. Pedal Box

- a. **Entrants are permitted to apply non-slip adhesives to the surface of driver pedals.**

### 7.6.4. Shifting Mechanism

### 7.6.5. Driver Adjustable Components

### 7.6.6. Driver Cooling Systems

- a. **Entrants are permitted to remove all or part of the cockpit cooling system**

## 7.7. Bodywork

### 7.7.1. General

- a. All bodywork must comply to the submitted homologated CAD and geometries tested at IMSA's Windshear Test, within a tolerance of +/- 2 mm.
- b. No material is permitted to be added or removed from planks.
- c. No bodywork is permitted below the Reference Surface.
- d. **The following films are permitted to be added to the front windscreen:**
  - i. Tear-offs
  - ii. Anti-fog

### 7.7.2. Bodywork Seams

- a. **Entrants are permitted to apply tape or vinyl around refueling receptacle seams and/or rear wing end fence adjustment holes.**

### 7.7.3. Decals

- a. **Entrants are permitted to apply removable die cut sponsorship decals with the approval of IMSA.**
- b. Windows must remain free of decals and/or tint unless required by IMSA

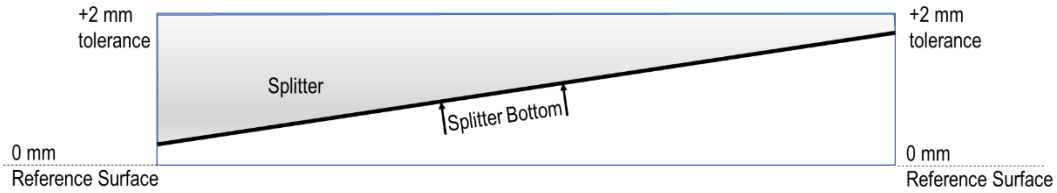
## 7.8. Aerodynamic Elements

### 7.8.1. General

- a. All aerodynamic elements must comply to the submitted homologated CAD and geometries tested at IMSA's Windshear Test, within a tolerance of +/- 2 mm.
- b. No aerodynamic element is permitted below the Reference Surface.

### 7.8.2. Splitter

- a. As per Technical Bulletin.
- b. The lowest points on the splitter must be coplanar with the Reference Surface within a tolerance of +2 mm / -0 mm.



7.8.3. Dive Planes

- a. As per Technical Bulletin.

7.8.4. Body Gurney

- a. As per Technical Bulletin.

7.8.5. Wings

- a. As per Technical Bulletin

7.8.6. Rear Wing Gurney

- a. As per Technical Bulletin

7.8.7. Floor

7.8.8. Friction Blocks

7.8.9. Diffuser

**7.9. Engine System**

7.9.1. General

- a. Manufacturer seals must be respected

7.9.2. Engine

- a. Approved lubricants are permitted to be utilized.

## 7.9.4. Lambda

- a. The declared lambda value for all Car Models is defined via Balance of Performance Tables and associated Technical Bulletins.
- b. Automated or driver-initiated control strategies used for competitive advantage that result in Low Lambda Counters are not permitted.
  - i. Examples include push-to-pass and overtake buttons.
- c. Lambda Control Strategy Inputs

Parameter	Description	TB*
Lambda <sub>Declared</sub>	Declared lambda value as defined in Balance of Performance Tables	TB
Lambda <sub>Average</sub>	Lambda measured on IMSA scrutineering sensors in accordance with these Technical Regulations. In case of two separate exhaust banks, the average of the two lambda sensors will be referenced.	
Lambda <sub>Filtered</sub>	Exponentially weighted moving average of Lambda <sub>Average</sub> . Definition is conditional.	
Ce <sub>Fit1</sub>	Filter coefficient that defines weighting for Lambda <sub>Filtered</sub>	
RPM	Engine speed [RPM] measured in accordance with these Technical Regulations	
RPM <sub>Max</sub>	Maximum engine speed [RPM] defined in Balance of Performance Tables	TB
RPM <sub>Min</sub>	Minimum engine speed [RPM] to which lambda is regulated	
APS	Throttle pedal position [%] measured in accordance with these Technical Regulations	
APS <sub>Min</sub>	Minimum throttle pedal position [%] to which lambda is regulated	
Gear	Selected gear position measured in accordance with these Technical Regulations	
Shift <sub>Active</sub>	Flag denoting gearbox shift strategy active measured in accordance with these Technical Regulations	
V <sub>GPS</sub>	Vehicle speed [km/h] measured in accordance with these Technical Regulations	
V <sub>wheelXX</sub>	Individual wheel speeds [km/h] measured in accordance with these Technical Regulations. XX denotes location on vehicle.	
V <sub>AxleF</sub>	$(V_{wheelFR} + V_{wheelFL})/2$	
V <sub>AxleR</sub>	$(V_{wheelRR} + V_{wheelRL})/2$	
Slip <sub>r</sub>	Ratio [%] of rear to front axle slip. Definition is conditional.	
Slip <sub>Filtered</sub>	Exponentially weighted moving average of Slip <sub>r</sub>	
Ce <sub>Fit2</sub>	Filter coefficient that defines weighting for Slip <sub>Filtered</sub>	
Slip <sub>Threshold</sub>	Flag denoting axle slip condition	
Ce <sub>Tolerance</sub>	Tolerance coefficient used in Lambda <sub>Min</sub> and Lambda <sub>Max</sub> calculations	
Lambda <sub>Min</sub>	Minimum permitted lambda value	
Lambda <sub>Max</sub>	Maximum permitted lambda value	
Lambda <sub>Resultant</sub>	Absolute value of the difference from Lambda <sub>Filtered</sub> to both Lambda <sub>Min</sub> and Lambda <sub>Max</sub> . Definition is conditional.	
Integral	Area under the Resultant Lambda as a function of time curve in units of lambda-time	
Integral <sub>Reset</sub>	Flag denoting condition to reset integral.	
Integral Time Step	Time step of the Integral	
Integral Decay	A value in units of lambda-time subtracted from the Integral when the integral is positive	
Low Lambda Level	A lower lambda limit in units of lambda-time	
Low Lambda Counter	A counter which is incremented when the Low Lambda Level is met or exceeded. Low Lambda Counter limits must never be exceeded	
Low Lambda Counter Reset Condition	A condition that will reset the Low Lambda Counter	
High Lambda Level	A maximum lambda limit in units of lambda-time that can never be met or exceeded	

\* All parameters indicated in table above with TB are defined via Technical Bulletin.

## d. Lambda Calculation Method

Session Classification	RPM <sub>Min</sub>	APS <sub>Min</sub>	Integral Time Step	Integral Decay	Ce <sub>Filt1</sub> Coefficient	Ce <sub>Filt2</sub> Coefficient	Ce <sub>Tolerance</sub> Coefficient	Low Lambda Counter Level	High Lambda Counter Level	Low Lambda Counter Limit	Low Lambda Counter Reset Conditions
	[RPM]	[%]	[s]	[lambda*s]				[lambda*s]	[lambda*s]		
Qualifying	0.5*RPM <sub>Max</sub>	50	0.001	25	0.1	0.26959	0.08	0.15	0.45	1	Crossing Start/Finish Timing Loop, Crossing Pit-In Timing Loop, Crossing Pit-Out Timing Loop
All Other Sessions	0.5*RPM <sub>Max</sub>	50	0.001	25	0.1	0.26959	0.08	0.15	0.45	5	Crossing Pit-In Timing Loop, Crossing Pit-Out Timing Loop

e. Input variables are constrained accordingly:

- i. If  $RPM > RPM_{Max}$ ,  $RPM = RPM_{Max}$
- ii. If  $APS > 100$ ,  $APS = 100$

f. Slip Ratio is calculated as follows:

- i.  $VGPS > 5$  km/h
- ii. If true:  $Slip_r = (v_{AxleR} / v_{AxleF}) * 100$
- iii. If false:  $Slip_r = -1$

g. Filtered Slip Ratio is calculated as follows:

- i.  $(Slip_{Filtered})_n = (Slip_r)_n * (Ce_{Filt2}) + (Slip_{Filtered})_{n-1} * (1 - Ce_{Filt2})$

h. Slip Threshold is calculated as follows:

- i.  $Slip_{Threshold} = 1$
- ii. If true:  $Slip_{Filtered} > 103$
- iii. If True:  $Slip_{Threshold} = 1$
- iv. If False:  $Slip_{Threshold} = 0$
- v. If false:  $Slip_{Filtered} > 106$
- vi. If True:  $Slip_{Threshold} = 1$
- vii. If False:  $Slip_{Threshold} = 0$

i. Integral Reset is calculated as follows:

- i.  $(APS < APS_{Min})$  OR  $(RPM < RPM_{Min})$  OR  $(Gear < 2)$
- ii. If True:  $Integral_{Reset} = 1$
- iii. If False:  $Integral_{Reset} = 0$

j. Filtered Lambda is calculated as follows:

- i.  $(Integral_{Reset} \text{ time false} > 1 \text{ s})$  AND  $(Slip_{Threshold} = 0)$  AND  $(Shift_{Active} = 0)$
- ii. If True:  $(Lambda_{Filtered})_n = (Lambda_{Average})_n * (Ce_{Filt1}) + (Lambda_{Filtered})_{n-1} * (1 - Ce_{Filt1})$
- iii. If False:  $(Lambda_{Filtered})_n = (Lambda_{Declared})_n * (Ce_{Filt1}) + (Lambda_{Filtered})_{n-1} * (1 - Ce_{Filt1})$

k. Minimum permitted lambda value is calculated as follows:

$$Lambda_{Min} = Lambda_{Declared} - Ce_{tolerance} \left( \frac{100 - APS_{Min}}{15APS - 16APS_{Min} + 100} + \frac{RPM_{Max}}{30RPM - 14RPM_{Max}} \right)$$

l. Maximum permitted lambda value is calculated as follows:

$$Lambda_{Max} = Lambda_{Declared} + Ce_{tolerance} \left( \frac{100 - APS_{Min}}{15APS - 16APS_{Min} + 100} + \frac{RPM_{Max}}{30RPM - 14RPM_{Max}} \right)$$

m. Resultant Lambda is conditionally integrated over time at each time step at a rate equal to Integral Time Step as follows:

- i.  $(\text{Lambda}_{\text{Filtered}} > \text{Lambda}_{\text{Max}})$  OR  $(\text{Lambda}_{\text{Filtered}} < \text{Lambda}_{\text{Min}})$
    - ii. If True:  $\text{Lambda}_{\text{Filtered}} > \text{Lambda}_{\text{Max}}$
    - iii. If True:  $\text{Lambda}_{\text{Resultant}} = \text{Lambda}_{\text{Filtered}} - \text{Lambda}_{\text{Max}}$
    - iv. If False:  $\text{Lambda}_{\text{Resultant}} = \text{Lambda}_{\text{Min}} - \text{Lambda}_{\text{Filtered}}$
    - v. If False:  $\text{Lambda}_{\text{Resultant}} = 0$
    - vi. The current Integral value is added to the initial Integral value
  - n. The Integral Decay is subtracted from the Integral when Resultant Lambda = 0
    - i. This value is always positive
    - ii.  $(\text{Integral}) - (\text{Integral Decay}) \geq 0$
  - o. A Low Lambda Counter is incremented if:
    - i.  $(\text{Integral}) \geq (\text{Low Lambda Level})$
  - p. It is a violation of the lambda regulations if either:
    - i. The Low Lambda Counter Limit is exceeded
    - ii.  $(\text{Integral}) \geq (\text{High Lambda Level})$
  - q. The Integral is reset to zero (0) if:
    - i.  $\text{Integral}_{\text{Reset}} = 1$
  - r. The Integral value is held in memory as an initial condition for the next time step.
- 7.9.5. Engine RPM
- a. The maximum engine RPM limits for all Car Models are defined via Balance of Performance Tables and associated Technical Bulletins.
  - b. The RPM limit is considered exceeded when either of these conditions occur:
    - i. Engine RPM exceeds RPM limit for more than 250 ms, and actual pedal position is greater than 60% of the maximum
    - ii. Engine RPM is more than 1.0% over RPM limit for more than 100 ms, and actual pedal position is greater than 60% of the maximum, i.e. an 8000 RPM limit is exceeded when RPM is greater than 8080 for more than 100 ms while actual pedal position is greater than 60%.
- 7.9.6. Intake
- a. The assigned inlet air restrictor diameter(s) for all Car Models is defined via Balance of Performance Tables and associated Technical Bulletins.
    - i. The assigned air restrictor diameter must be maintained at least 3 mm axially in the throat
    - ii. The IMSA Restrictor Throat Pressure Sensor measurement tap must be 1 mm diameter and centered axially in the restrictor throat
    - iii. All air entering the engine must pass through the restrictor.
  - b. Intake air restrictors may be sealed by IMSA Technical Officials during Pre-Event Technical Inspection.
    - i. Entrants must receive approval from IMSA to remove seals following inspection, and seals must be replaced by IMSA Technical Officials prior to on-track activity.
  - c. **Manufacturers are permitted to declare an alternative air filter via the Technical Eligibility Form**
    - i. Declared filter must be approved by IMSA in writing at least seven (7) days before first use.
    - ii. Entrants must use the manufacturer declared air filter.
- 7.9.7. Exhaust
- 7.9.8. Turbo
- 7.9.9. Engine Control Unit (ECU)

## 7.9.10. Engine Transportation Crate

- a. Entrant must have immediately available a crate sufficient to securely and safely package and ship an engine.

**7.10. Boost Management**

## 7.10.1. Maximum Boost Pressure

## 7.10.2. Boost Pressure Ratio

- a. The table of maximum boost pressure ratio versus engine RPM for applicable Car Models is defined via Balance of Performance Tables and associated Technical Bulletins:
  - i. All values between the tabulated set points defined via the table are interpolated linearly.

## 7.10.3. Boost Control Strategy Inputs

Parameter	Description	TB*
Maximum Boost Pressure Ratio (Max Pboost Ratio)	Curve of Maximum Boost Pressure Ratio as a function of Engine RPM	TB
Actual Boost Pressure (Pboost)	Intake manifold pressure measured in accordance with these Technical Regulations In case of two separate intake manifolds, the average of the two manifold pressure sensors will be referenced	
Filtered Boost Pressure (Pboost Filtered)	Exponentially weighted moving average of Actual Boost Pressure. Defined as: $(P_{boost\ Filtered})_n = (P_{boost})_n * (C_{eFit}) + (P_{boost\ Filtered})_{n-1} * (1 - C_{eFit})$	
Filter Coefficient (CeFit)	Coefficient that defines weighting for Filtered Boost Pressure	
Barometric Pressure Reference	Absolute barometric pressure reading measured by IMSA and transmitted to IMSA Scrutineering Data System via telemetry	
Actual RPM	Unfiltered RPM value measured in accordance with these Technical Regulations	
Actual Throttle	Engine throttle position measured in accordance with these Technical Regulations In case of two engine throttles, the maximum value of the two throttle positions is referenced	
RPM Threshold	An RPM threshold which is used as a condition	
Resultant Boost	$(P_{boost\ Filtered}) - (\text{Barometric Pressure Reference}) * (\text{Max Pboost Ratio})$	
Integral	Area under the Resultant Boost as a function of time curve in units of pressure-time	
Integral Time Step	Time step of the Integral	
Integral Decay	A value in units of pressure-time subtracted from the Integral when the integral is positive	
Low Overboost Level	A lower overboost limit in units of pressure time	
Lower Overboost Counter	A counter which is incremented when the Low Overboost Level is met or exceeded Low Overboost Counter limits must never be exceeded	
Low Overboost Counter Reset Condition	A time-based condition that will reset the Low Overboost Counter	
High Overboost Level	A maximum overboost limit in units of pressure-time that can never be met or exceeded	

\* All parameters indicated with TB are defined via Technical Bulletin.

Session Classification	RPM Threshold	Throttle Threshold	Integral Time Step	Integral Decay	Filter Coefficient	Low Overboost Level	High Overboost Level	Low Overboost Counter Limit	Low Overboost Counter Reset Conditions
	[RPM]	[%]	[s]	[mb*s]		[mb*s]	[mb*s]		
Qualifying	2000	25	0.001	5	0.1718	30	100	1	Crossing Start/Finish Timing Loop, Crossing Pit-In Timing Loop, Crossing Pit-Out Timing Loop
All Other Sessions	2000	25	0.001	5	0.1718	30	100	5	Crossing Pit-In Timing Loop, Crossing Pit-Out Timing Loop



#### 7.10.4. Calculation Method

- a. Resultant Boost is integrated over time at each time step at a rate equal to Integral Time Step when:
  - i.  $[(\text{Actual RPM}) \geq (\text{RPM Threshold})] \text{ AND } [(\text{Actual Throttle}) \geq (\text{Throttle Threshold})] \text{ AND } [(\text{Resultant Boost}) > 0]$
  - ii. The current Integral value is added to the initial Integral value
- b. The Integral Decay is subtracted from the Integral when Resultant Boost  $< 0$ 
  - i. This value is always positive
  - ii.  $(\text{Integral}) - (\text{Integral Decay}) \geq 0$
- c. A Low Overboost Counter is incremented if:
  - i.  $(\text{Integral}) \geq (\text{Low Overboost Level})$
- d. It is a violation of the boost regulations if either:
  - i. The Low Overboost Counter Limit is exceeded
  - ii.  $(\text{Integral}) \geq (\text{High Overboost Level})$
- e. The Integral is reset to zero (0) if:
  - i.  $[(\text{Actual RPM}) \leq (\text{RPM Threshold})] \text{ OR } [(\text{Actual Throttle}) \leq (\text{Throttle Threshold})]$
- f. The Integral value is held in memory as an initial condition for the next time step.

#### 7.10.5. Low Overboost Counter Usage Limitation

- a. Automated or driver-initiated control strategies used for competitive advantage that result in Low Overboost counters are not permitted.
  - i. Examples include push-to-pass and overtake buttons.

### 7.11. Drive System

#### 7.11.1. General

- a. Manufacturer seals must be respected

#### 7.11.2. Fluids & Lubricants

- a. **Unrestricted.**

#### 7.11.3. Clutch

#### 7.11.4. Gearbox

#### 7.11.5. Gears

- a. **In addition to the FIA Homologated final drive ratio DPi Manufacturers are permitted to declare up to two (2) final drive ratios via the Technical Eligibility Form.**
  - i. Entrants are permitted to use any of the declared final drive ratios.
  - ii. Declared units must be commercially available to all Manufacturers, Constructors, and relevant Entrants.
- b. **DPi Manufacturers are permitted to declare one (1) bevel gear via the Technical Eligibility Form.**
  - i. Declared units must be commercially available to all Manufacturers, Constructors, and relevant Entrants.
- c. **Change ratios are unrestricted.**
  - i. Change gears must be sourced from the original homologated gearbox manufacturer.

#### 7.11.6. Gearbox Control Unit

#### 7.11.7. Differential

#### 7.11.8. Axles

#### 7.11.9. Uprights

## 7.12. Cooling System

### 7.12.1. General

### 7.12.2. Fluids

a. **Entrants are permitted to utilize the following approved cooling fluids:**

- i. Water
- ii. Air
- iii. Non-glycol based fluids

### 7.12.3. Inlet Blockers

a. **Entrants are permitted to utilize the following approved methods for the sole purpose of blocking off portions of the cooling system inlet openings:**

- i. Opaque adhesive tape.
- ii. Panels made from carbon fiber and/or aluminum with associated fastener hardware.

### 7.12.4. Water System

### 7.12.5. Oil Cooling System

## 7.13. Fuel System

### 7.13.1. General

a. Maximum Capacity

- i. The maximum fuel capacity for all Car Models is defined via Balance of Performance Tables and associated Technical Bulletins.
- ii. The maximum fuel capacity is the total volume of fuel contained in the Car.

### 7.13.2. Fuel Types

- a. The approved fuel for the Class is IMSA E20C, as supplied by VP Fuels.
- i. IMSA may require a fuel sample for inspection via a gas chromatograph

### 7.13.3. Fuel Cell

a. **Entrants must use blocks or balls to achieve maximum fuel cell capacity:**

- i. Any device, system, or procedure designed to increase, even temporarily, the total fuel storage capacity beyond the maximum is prohibited.
- b. Any configuration of the homologated design intended to decrease the minimum full refueling time below the minimum time listed in the class specific BoP table is prohibited.

### 7.13.4. Fuel Lines

### 7.13.5. Fuel Sample Port

a. **Entrants must equip the Car with the approved self-sealing connector for extraction of fuel samples:**

- i. Approved Connector: Staubli P/N: CBI06.7251/IA/JKV.
- ii. Must be located immediately before the injector nozzles.
- iii. Installation must be approved by IMSA.

### 7.13.6. Refueling Receptacle

## 7.14. Brake System

### 7.14.1. General

### 7.14.2. Fluids & Lubricants

a. **Unrestricted.**

### 7.14.3. Bias Assembly

7.14.4. Master Cylinders

7.14.5. Brake Lines

7.14.6. Calipers

7.14.7. Rotors

7.14.8. Pads

7.14.9. Ducting

7.14.10. Brake Duct Inlet Blockers

- a. **Entrants are permitted to utilize the following approved methods for the sole purpose of blocking off portions of the brake duct inlet openings:**
  - i. Opaque adhesive tape.
  - ii. Panels made from carbon fiber and/or aluminum with associated fastener hardware.
- b. Must be fixed.

7.14.11. Anti-Lock Braking System

## 7.15. Steering System

7.15.1. General

7.15.2. Fluids & Lubricants

- a. **Unrestricted.**

## 7.16. Suspension System

7.16.1. General

7.16.2. Geometry Elements

7.16.3. Springs

- a. **Entrants are permitted to change primary spring rates:**
  - i. The As-delivered number of springs per wheel must be respected.
- b. **Entrants are permitted to install thrust bearings between the spring and perch.**
  - i. Maximum of two (2) per spring.

7.16.4. Dampers

- a. **Entrants are permitted to change the damper internal build:**
  - i. Inerter technology is prohibited.

7.16.5. Bump Rubbers and Packers

- a. **Unrestricted.**

7.16.6. Anti-Roll Bar

7.16.7. Third Elements

- a. **Entrants are permitted to change third element spring rates:**
  - i. The As-delivered number of springs must be respected.

## 7.17. Wheels & Tires

7.17.1. General

7.17.2. Wheels

7.17.3. Wheel Attachment

7.17.4. Tires

- a. The approved tire supplier for this Class is Michelin.
- b. Tires must be used in accordance with SSR Attachment 3.

**7.18. Electronics**

7.18.1. General

7.18.2. Data Logger

- a. IMSA reserves the right to download and/or view all logged data at any time.

7.18.3. Telemetry

- a. **Entrants are permitted to utilize one-way telemetry systems for data acquisition purposes.**

7.18.4. Wiring Loom

7.18.5. Sensors

7.18.6. Radio

- a. **Entrants are permitted to install one (1) primary, and one (1) secondary, two-way voice communication radio with car-to-pit communication capability:**
  - i. Radio(s) must comply with Series Sporting Regulations.
  - ii. Secondary radio must not transmit or receive signals while primary radio is functional.

7.18.7. Rear View Camera

7.18.8. Auxiliary Power Sources

## ARTICLE 8. SERIES REQUIRED ELECTRONICS

### 8.1. Series Scrutineering Data System

- 8.1.1. Cars must be equipped with the IMSA Scrutineering Data System at all Events.
- The manual for the Scrutineering Data System for the Class is the Bosch Scrutineering Systems Manual (BSSM). Entrant must use the most current version of the BSSM as posted to the [IMSA Competitor site](#).
  - Scrutineering system components must be purchased from, or supplied by, the approved sources listed in the BSSM.
- 8.1.2. The system consists of a combination of the following as specified by IMSA:

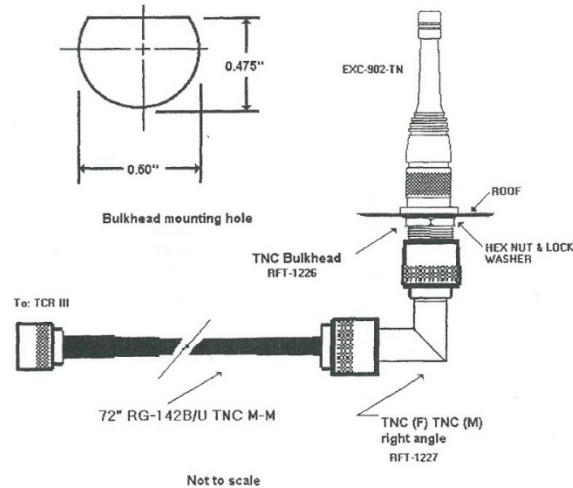
Part Number	Item
F02U.V0U.249-01	Bosch DDU9
F02U.V0U.252-01	Bosch PBX90 PowerBox
F02U.B00.435-01	Bosch MM5.10 5-axis Inertial Measurement Unit
F02U.V0U.251-01	Bosch LT4 Sport Lambda Sensor Controller
F02U.V0U.203-01	GPS Unit
F02U.V0U.197-01	1 Bar Pressure Sensor
F02U.V0U.205-01	3.5 Bar Pressure Sensor
F02U.V0U.356-01	Temperature Sensor
F02U.V0U.264-01	Pitot Tube
F02U.V01.342-01	USB Stick
F02U.002.996-01	USB Data Storage Device Port
AS112-35SM	MSA Diagnostic/Communication Port
0258.988.001	LSU 4.9 Lambda Sensor
RG.DV.PV0099	Leader Light System
Provided by IMSA	X2 Transponder
Provided by IMSA	Delphi Yellow Light System
Bosch Approved Supplier	Wiring Loom
ET-100-01/GT-100-01	Fuel Flow Sensor
Constructor Specific	Laser Ride Height Sensor
Constructor Specific	Engine Speed Sensor

- The scrutineering system and all its components are standalone and intended for IMSA use.
  - Entrants must install, utilize, and maintain other sensor(s) as required by IMSA.
- 8.1.3. All components of the Scrutineering System, and other sensors as required by IMSA, must remain powered and functional during on-track sessions and pit stops.
- DPi Cars must run fuel flow sensors for all Events.
  - Laser ride height sensors are optional and must be declared if Entrant intends to install them for an Event.
    - If declared, laser ride height sensors must be installed and functioning during all on-track sessions.
    - DDU9 input unlock is a requirement for running laser ride height sensors and is the responsibility of the Entrant to obtain.
    - Calibration and accuracy of laser ride height sensors is the responsibility of the Entrant. Laser ride height CAN channels are provided to the Entrant from the IMSA Scrutineering Logger.
    - No other laser ride height sensor(s) can be installed on the Car.
- 8.1.4. Entrants must complete a [IMSA Scrutineering Sensor Declaration Form](#) no later than 24 hours before load-in day of every Event.

- 8.1.5. Scrutineering system components and sensors must be installed per the Car Model's Scrutineering Homologation document.
- a. IMU unit must be:
    - i. Aligned within 1 degree of centerline of Car.
    - ii. Aligned within 0.5 degrees of horizontal.
  - b. Fuel Flow Sensor must have a valid calibration for the entire duration of all IMSA Sanctioned Events.
    - i. Fuel Flow Sensor calibration expires at 150 hours of run time.
    - ii. Entrants are responsible for monitoring the calibration time remaining. A cumulative run time counter CAN channel is provided to the Entrant from the IMSA Scrutineering Logger.
  - c. All other antennas on Car must be installed at least 250 mm from IMSA GPS Receiver.
  - d. Wiring loom must be:
    - i. Consistent with IMSA approved Car Models Scrutineering Homologation document
    - ii. Provided by the Entrant.
    - iii. Independent of any other system.
    - iv. Removable.
    - v. Verified and serialized before Entrant participates in their first event of each season, per the Loom Certification outlined in the BSSM.
    - vi. Certifications are only valid for the season they are issued.
    - vii. Available for additional testing when requested by IMSA.
- 8.1.6. CAN channels must be configured per the applicable DBC file posted in the regulation section of competitors.imsa.com.
- a. Entrants must provide CAN channels from the ECU, chassis logger, or equivalent device per the CAN specification detailed in the BSSM.
  - b. CAN communication to the IMSA Scrutineering Logger must be transmitted directly from the device of origin, and not repeated through a 3<sup>rd</sup> party device.
    - i. Example: Engine RPM must be transmitted directly from the ECU to the IMSA Scrutineering Logger, and not through the chassis logger.
  - c. Scrutineering sensors take precedence over CAN provided values from the ECU or chassis logger.
  - d. Scrutineering sensor outputs are provided to the Entrant over a Public CAN bus.
- 8.1.7. Series Scrutineering Data System inspection and data collection requirements are:
- a. Entrants must present all series mandated data collection media to the IMSA Technical Inspection trailer within thirty (30) minutes of the completion of each session.
    - i. For instances of less than 60 minutes from the end of a Session and the start of the next Session, Entrant must return both Session's data collection media within thirty (30) minutes of the completion of the second Session.
  - b. Series Scrutineering Data Logger must be installed and tested prior to Technical Inspection.
    - i. Entrant may be required to install USB Stick during inspection process at the direction of series officials.
  - c. Any repair to the looms must be approved by Bosch Motorsport and re-certification through Bosch Motorsport may be required.
- 8.1.8. Scrutineering system primary component units must have an IMSA Scrutineering Seal.
- a. Each device ordered through Bosch Motorsport NA using the order form found in the Scrutineering System Manual will be delivered with the seal in place.

## 8.2. Safety Light System

- 8.2.1. Cars must be equipped with the Delphi Yellow Light Kit to indicate active flag status.
- 8.2.2. The Safety Light system must be installed and functioning during on-track activity.
  - a. The Yellow Indicator Light must be prominently installed within the cockpit, in clear line of sight of the driver.
  - b. Antenna Installation: The supplied antenna must be mounted:
    - i. On the Car roof
    - ii. Away from other antennae
    - iii. Following the diagram below (a ground plane is not required):



- 8.2.3. An activating receiver is available from IMSA during Safety Checks at each Event and remains the property of IMSA.
  - a. Entrants must surrender the receiver when required by IMSA.
  - b. A lost or damaged receiver is subject to a replacement fee referenced in the IMSA Accessories form.
  - c. Activating receiver must be installed using supplied Mounting Bracket

## 8.3. Driver ID System

- 8.3.1. Cars must be equipped with a Driver ID system to identify the active Driver piloting the Car.
- 8.3.2. Driver ID plugs must be installed and connected per the BSSM.
- 8.3.3. Transponder and plugs must operate to the satisfaction of the Timing and Scoring Officials.

## 8.4. X2 Transponder System

- 8.4.1. Cars must be equipped with the X2 Transponder System Kit (Qty 2) to transmit scrutineering data from the car.
  - a. X2 Transponder Kit contains the following component(s):
    - i. Transponder.
    - ii. Isolation Mounts.
  - b. Entrant must supply the following additional item(s):
    - i. X2 Transponder Mounting Bracket (available for purchase as listed in the IMSA Accessories Order Form).
    - ii. M4 Socket Head Cap Screw and Washer.
- 8.4.2. X2 transponder must be purchased via the IMSA Accessories Order Form.

- 8.4.3. Transponder system must be installed, as per Car Model's Scrutineering Homologation documentation, and functioning during Events.
- Transponder must be mounted using the mounting bracket with appropriate thermal protection in an area where the temperature cannot exceed 50 °C

## 8.5. Leader Light System

- 8.5.1. Cars must be equipped with approved LED leader light panels.
- IMSA Leader Lights are available from MoTec USA ( [https://www.milspecwiring.com/IMSA-WeatherTech-Leader-Light-Panel\\_p\\_2255.html](https://www.milspecwiring.com/IMSA-WeatherTech-Leader-Light-Panel_p_2255.html) )
- 8.5.2. Leader light system must be installed and functioning during Events.
- Leader lights must be installed and connected to the Scrutineering System loom per the Car Model's Scrutineering Homologation document.
- 8.5.3. Cars must utilize MoTec USA CAN Isolation Module #PV0265
- 1 CAN Isolation Module is required per panel
  - Purchase information ( [https://www.milspecwiring.com/IMSA-WeatherTech-CAN-Isolation-Module\\_p\\_2941.html](https://www.milspecwiring.com/IMSA-WeatherTech-CAN-Isolation-Module_p_2941.html) )
  - Ambient temperatures in installation location must not exceed 70 degrees C.
  - Firmware version 1.04 or newer is required

## 8.6. Back-lit Panel

- 8.6.1. Cars must be equipped with white light-emitting side number panels for Races taking place partly by night.
- Colored background must be cut out in the number shapes so they are illuminated during the night.
  - White light-emitting side number panels are supplied by Entrants.

## 8.7. Pro-Am Light

- 8.7.1. Cars must be equipped with a Pro-Am light per the Car Model's Scrutineering Homologation document.

## 8.8. Rain Light

- 8.8.1. Cars must be equipped with a Rain Light system as per the Car Model's Scrutineering Homologation document.

## 8.9. Car Mounted Cameras

- 8.9.1. Cars may be required to carry a cockpit mounted In-Car-Camera (ICC)
- 8.9.2. Cars must carry either a Nose Mounted Camera or IMSA Specified Replica Nose Camera.
- Entrants NOT carrying a Nose Mounted Camera must install the Replica Nose Camera as illustrated in the drawings attached to these Technical Regulations (2022 Specification TBD)
- 8.9.3. Entrants carrying any camera must cooperate with the official broadcaster in the installation of the camera, including the provision of power for the equipment.
- Camera may require a battery pack
  - Cars equipped with car mounted camera/s must display the Car number in the camera's home position field of vision.
  - Cameras must not be removed or disabled by the Entrant for any Session.



## ARTICLE 9. REFUELING SYSTEM

### 9.1. Fuel Transfer

- 9.1.1. Fuel must be transferred from the autonomous supply tank to the Car using the equipment and methods defined in this Article.
- Approved equipment as defined herein must be:
    - Unmodified.
    - Installed and operational.
  - Approved method:
    - Gravity.
- 9.1.2. Fuel transferred to the autonomous supply tank must be delivered by means of a hose fitted with a self-sealing connector (e.g. dry break, cam-lock) connected to the autonomous supply tank.

### 9.2. Pit Tank

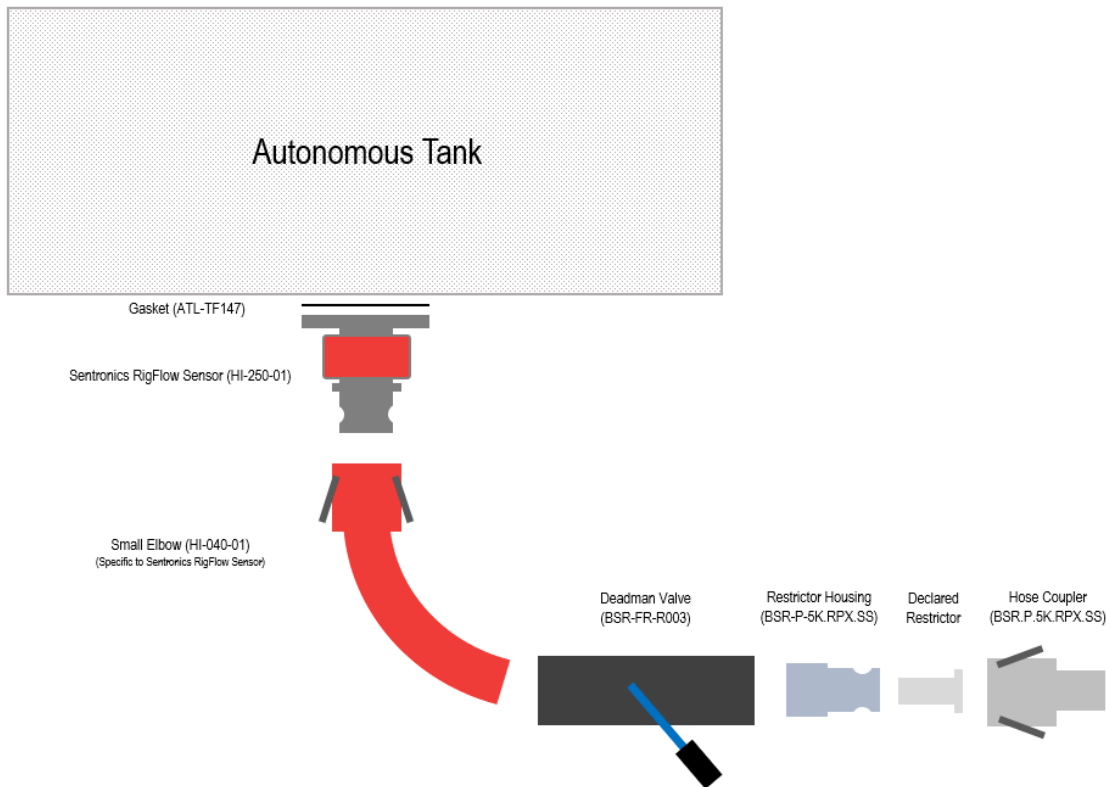
- 9.2.1. Construction of the Autonomous Supply Tank must:
- Comply with FIA Appendix J Drawing n° 252-7 with the exception of the top plate shape and dimensions.
  - Any configuration of the IMSA-mandated design intended to decrease the minimum refueling time below the minimum time listed in the class specific BoP table is prohibited.
  - Have provisions to seal any mechanisms that regulate tank height.
  - Not have sensors other than as required by IMSA.
- 9.2.2. Refueling tank height is measured from the top surface of the vessel, not including vent, cover, cover plate, or fasteners, at a distance of 1.25 meters from the outermost face of the pit wall
- The required refueling tank height is 2.0 meters with a tolerance of +0/-1.0 cm.
- 9.2.3. Once inspected by an IMSA Official the Autonomous Supply Tank, Trolley, Peripheral Connections, and Restrictor must remain as inspected with all IMSA seals intact until the conclusion of the Race or upon an approved retirement via TIMS.

### 9.3. Peripheral Connections

- 9.3.1. Tanks must be equipped with the IMSA-specified peripheral connections between the tank outlet and the refueling hose.
- Parts below must be purchased from RPXpress (Phone: +1-828-428-0820 Email: [Imcelwain@rpxpress.com](mailto:Imcelwain@rpxpress.com)) and used unmodified:

Part Number	Part	Description
ATL-TF 147	12-Bolt Gasket	
BSR.FR.1981.1	Bottom Elbow 67.12°	Female Camlock x Male 2" (Red)
BSR-FR R003	Deadman Valve	Stainless Deadman Valve
BSR.P.5K56.SS	Restrictor Housing	Deadman Outlet, 2" Male to 1 ½" Camlock

- Details and purchasing of the of the Sentronics RigFlow Sensor can be found in Article 9.8
  - Sensor must be oriented such that the face plate is directed toward the hot pit lane.
- FIA nut ring, as-supplied with original tank, must be used to secure the Sentronics Flow Sensor to the bottom of the supply tank using socket head cap screws.
- A 0.125 inch hole must be drilled in two adjacent bolts connecting Sentronics Flow Sensor and FIA nut ring.
- Refueling System Assembly Illustration:

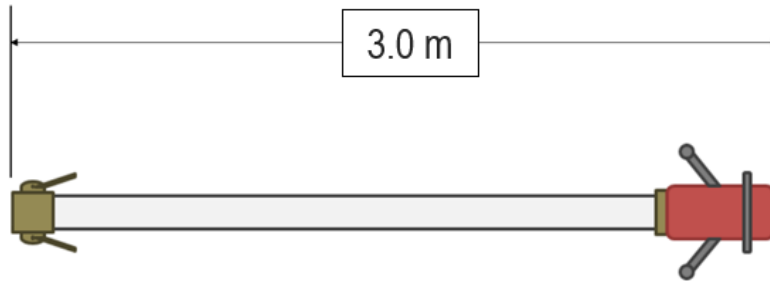


- 9.3.2. Deadman valve and bottom elbow assembly must be securely braced to remain attached to the tank in the event of an incident.
  - a. Mechanisms preventing normal operation of the deadman valve are prohibited.
  - b. Any configuration of the IMSA-mandated design intended to decrease the minimum refueling time below the minimum time listed in the class specific BoP table is prohibited.
  - c. During fuel delivery operations, the deadman valve must be fully open such that the throat of the ball is aligned axially with the outlet of the deadman valve body with the actuation handle fully extended.
    - i. Adjustment mechanisms will be sealed by IMSA.
- 9.3.3. During refueling the air vent outlet must be connected using an appropriate coupling to the tank.
  - a. In dual point refueling, the dedicated vent hose maximum inside diameter must be less than 1.5 inches.
- 9.3.4. A sight glass is permitted to be installed to the outside of the supply tank and must be equipped with isolating valves mounted as close as possible to the tank.

**9.4. Refueling/Vent Hoses**

- 9.4.1. Refueling/vent hoses must have one end equipped with a self-sealing connector to fit the autonomous supply tank outlet.
- 9.4.2. Refueling/vent hoses are permitted to be protected for the sole purpose of resisting abrasion damage.
  - a. Cover must be easily removable by means of full-length Velcro or zipper.
  - b. Cover must be non-reflective
- 9.4.3. Hose maximum inside diameter:
  - a. Dual-port systems must be less than 1.5 inches for all hoses.
  - b. Single-port (coaxial) systems must be less than 1.5 inches for Refueling Hose and less than 75.0 mm for Vent Hose.

9.4.4. Refueling hose minimum length must be greater than 3.0 meters



- a. Minimum length is measured from the most distant plane of the dry break/fuel probe to the most distant plane of the fuel hose coupler.
- b. Cars employing an approved offside refueling system, must have a vent hose with a minimum length of six (6) meters, connectors included.

**9.5. Pit Tank Support Stand**

9.5.1. The tank must be attached to one of the following:

- a. Through a tower, to a trolley meeting the following requirements:
  - i. All tower components must be assembled without any degree of freedom in relation to the trolley.
  - iii. Have a surface area greater than two (2) square meters.
  - iv. Utilize four (4) self-braking casters.
  - v. Be ballasted with weight exceeding that of the tank when filled with fuel.
- b. Scissor style (X-brace) stand

9.5.2. Trolley is permitted to have load sensors for the sole purpose of weighing fuel in the Autonomous Tank.

**9.6. Boom**

9.6.1. Entrants are permitted to attach a member (boom) to the trolley.

- a. Boom must be independent of the tank and the tower.
  - i. Boom member must be permitted a degree of freedom in relation to the trolley (rotation following a vertical axis).
- b. Boom is permitted to support:
  - i. Hose for a Car utilizing an approved offset vent or fuel filler.
  - ii. Lighting for the illumination of the pit stop.
  - iii. Download cable.

9.6.2. Boom must be identified with the Car number fixed to its outboard end, that must be:

- a. Visible from either direction
- b. A minimum of seven (7) inches high with a 1.25-inch stroke

9.6.3. Boom must respect the following dimensions:

- a. Must not exceed four (4) meters in length
- b. Must permit free passage of a height of two (2) meters over its entire length including hoses and/or accessories.

**9.7. Refueling Restrictor**

9.7.1. During refueling, all fuel entering the Car must pass through the refueling restrictor.

9.7.2. Refueling Restrictor must meet the following criteria:

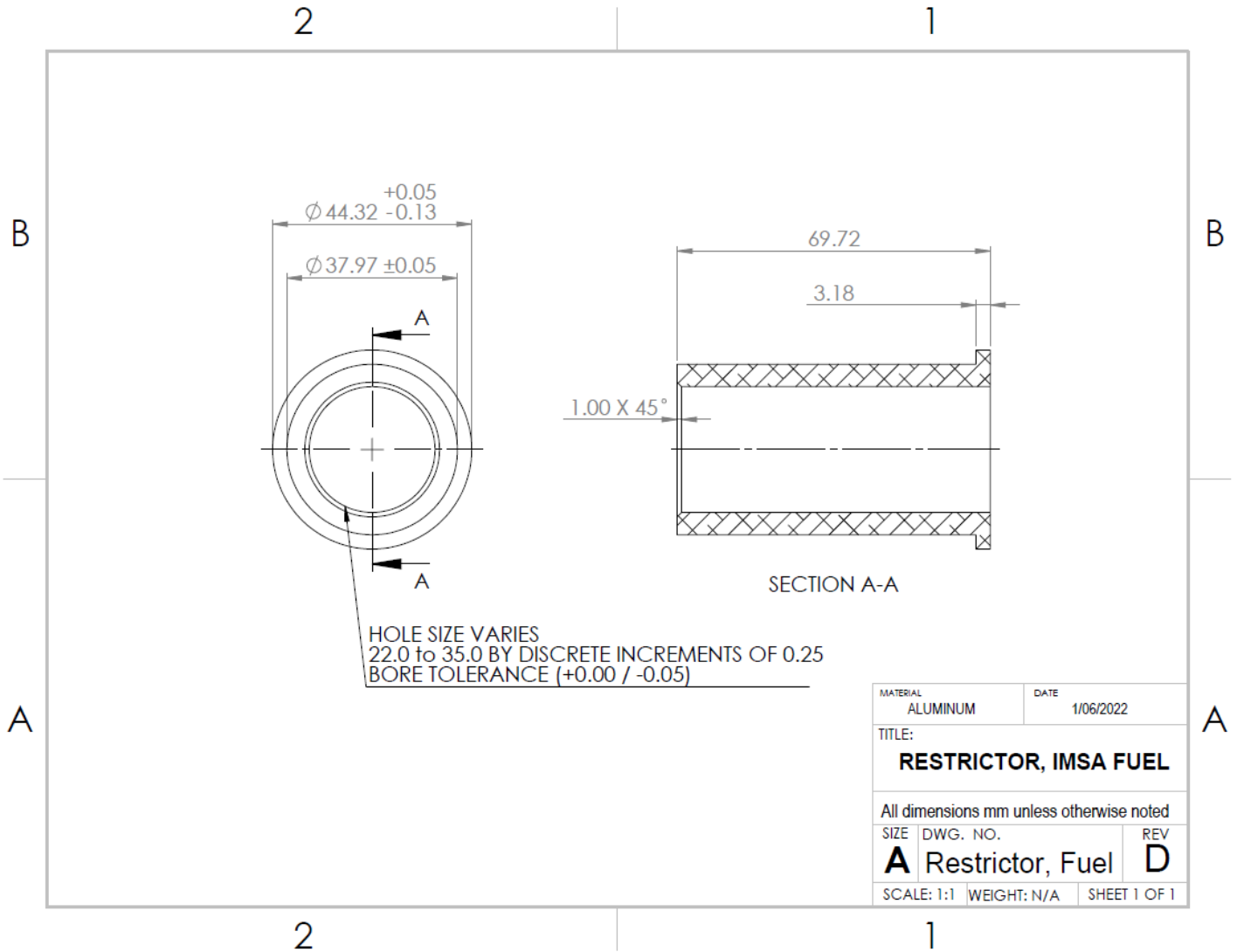
- a. Material must be an aluminum alloy.
- b. Must comply with the IMSA Fuel Restrictor Part Drawing at the end of these Technical Regulations.
- c. Restrictor size varies from 22.0 mm to 35.0 mm by discrete increments 0.25 mm
- d. Bore tolerance (+0.00 mm / -0.05 mm)

- 9.7.3. Refueling restrictors may be purchased from RPXpress (Phone: +1-828-428-0820 Email: lmcclwain@rpxpress.com).
- 9.7.4. At each Event, every Entrant must declare their chosen diameter, limited to 22 to 35.0 mm in 0.25 mm increments, by completing the [IMSA Refueling Restrictor Declaration Form](#) no later than four (4) hours before the official start time of the Race.
- 9.7.5. IMSA utilizes the following scrutineering inspection methods to check minimum refueling times:
  - a. Calibrated autonomous tank sensor system.
  - b. Calibrated vehicle fuel flow sensors.
  - c. Minimum Refueling Time Audit (Reference: SSR 37.10).
- 9.7.6. Refueling Restrictors are sealed by IMSA Technical Officials.
  - a. Entrants must receive written approval from IMSA to remove seals following inspection, and seals must be replaced by IMSA Technical Officials prior to on-track activity.
  - b. The following items must be drilled for safety-wire sealing of the restrictor
    - i. Two (2) adjacent Bolt heads of the Restrictor Housing
    - ii. Two (2) Hinge Bolts (threaded section) of the Outlet Pipe Cam Lock
    - iii. Two (2) Lock Lever Arms of the Refueling Hose Cam Lock
    - iv. A 0.125 inch hole must be drilled in the two female camlock levers on the bottom elbow assembly 0.5 inches below pin in the locations indicated in yellow on the diagram below:



## 9.8. Autonomous Tank Sensor System

- 9.8.1. Autonomous fuel supply tanks must be equipped with Sentronics RigFlow pit tank fuel flow meter and wiring loom. Approved sensor and wiring harness as follows:
  - a. Flow sensor part number (HI-250-01).
  - b. Wiring harness part number ([CMS2021-1487](#)).
- 9.8.2. The fuel flow sensor kit and wiring loom must be purchased from an authorized Sentronics dealer.
- 9.8.3. Sensors packages are serialized, and assigned to a Car and Pit Tank.
  - a. Sensors packages must remain exclusive to the assigned Car and Pit Tank throughout the Event in which the sensor is declared.
- 9.8.4. Wiring loom connects the sensor package to a dedicated port on the IMSA pit-lane network box.
  - a. Wiring loom must be IMSA certified and unmodified.
  - b. Wiring harness part number ([CMS2021-1487](#)) must be used to connect flow sensor to pit-lane network.
- 9.8.5. Entrant must ensure the flow sensor system is functional.
  - a. Two hours before 1<sup>st</sup> Practice Entrant must connect the loom to a specific pit-lane network box designated by IMSA.
  - b. Loom must remain connected until the conclusion of the Event
  - c. Entrant must remove the loom at the conclusion of the Event.
- 9.8.6. Flow Sensor must be installed in the location and orientation as indicated in Article 9.3.



REVISION HISTORY		
REV	DATE	DESCRIPTION
01	08/22/2018	INITIAL DESIGN.

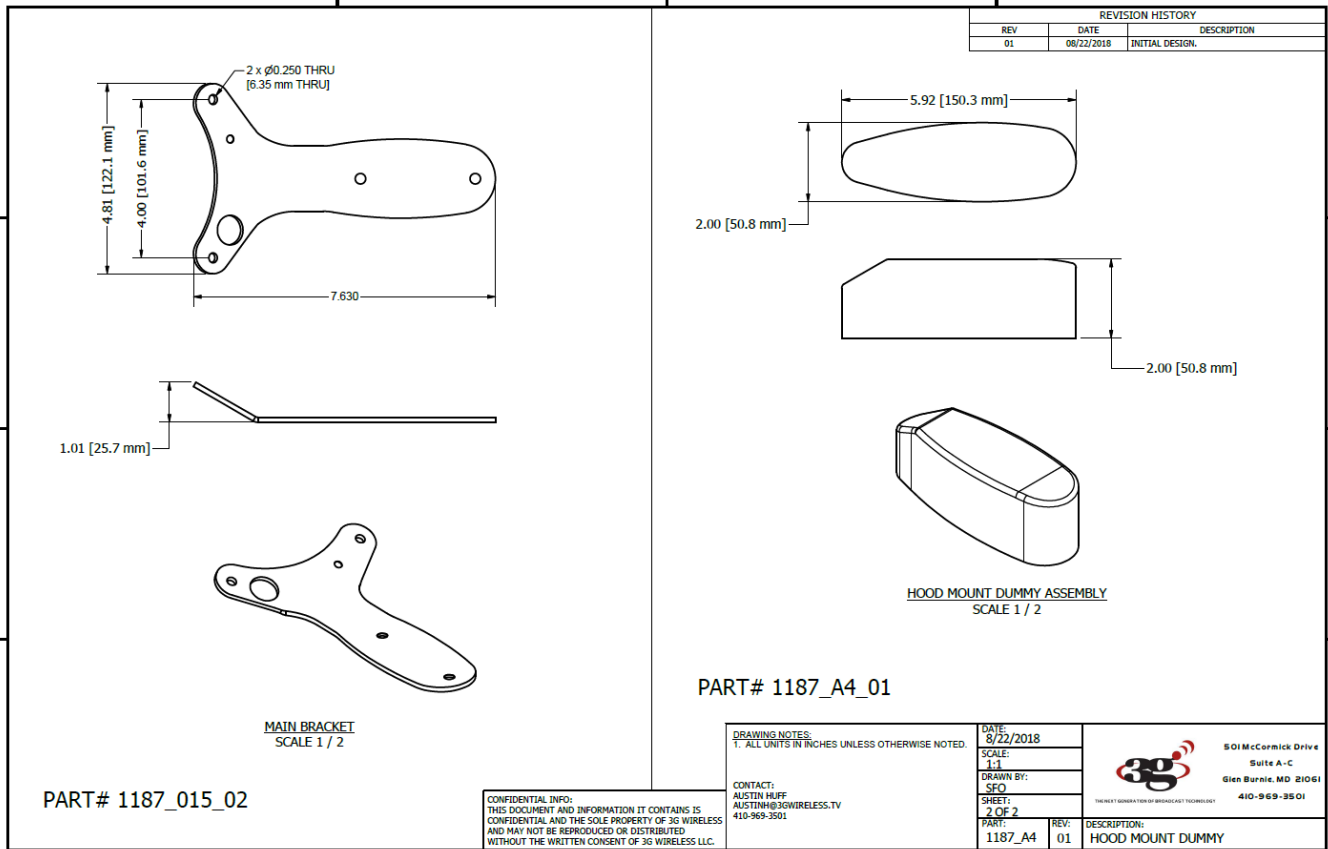
  

**INSTALLATION DETAIL**  
SCALE 1 / 2

**HOOD MOUNT DUMMY ASSEMBLY**  
SCALE 1 : 1

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REVISION HISTORY		
REV	DATE	DESCRIPTION
01	08/22/2018	INITIAL DESIGN

PART# 1187\_015\_02

MAIN BRACKET  
 SCALE 1 / 2

PART# 1187\_A4\_01

HOOD MOUNT DUMMY ASSEMBLY  
 SCALE 1 / 2

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 1. ALL UNITS IN INCHES UNLESS OTHERWISE NOTED.

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 410-969-3501

DATE:  
 8/22/2018  
 SCALE:  
 1:1  
 DRAWN BY:  
 SFO  
 SHEET:  
 2 OF 2  
 PART:  
 1187\_A4  
 REV:  
 01

301 McCormick Drive  
 Suite A-C  
 Glen Burnie, MD 21061  
 410-969-3501

DESCRIPTION:  
 HOOD MOUNT DUMMY