



## **ROAR RULES**

### **Ver. 25-12**

Major revisions to the previous version of the rules are highlighted in yellow.

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# ROAR RULES

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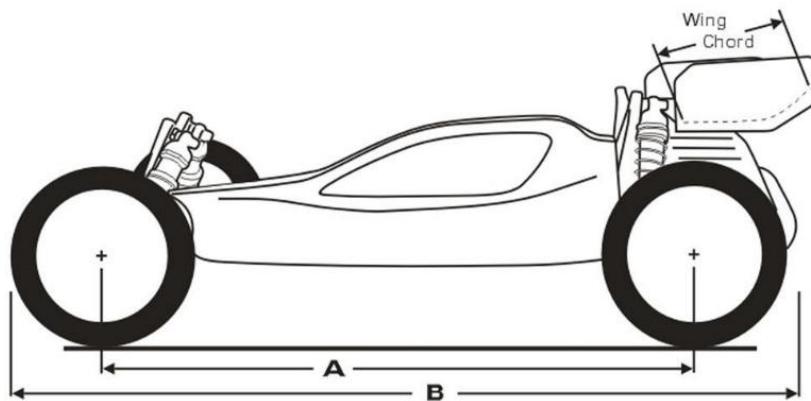
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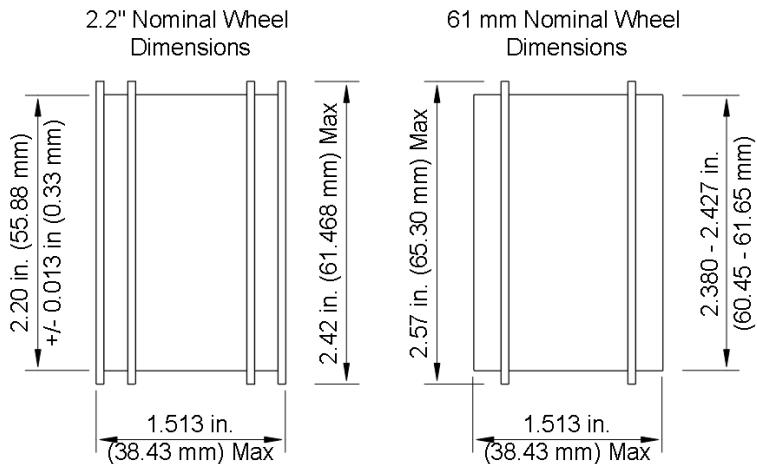
# 1. ELECTRIC VEHICLE CLASS SPECIFICATIONS

## 1.1 1/10 SCALE ELECTRIC OFF-ROAD BUGGY (IFMAR CLASSES)



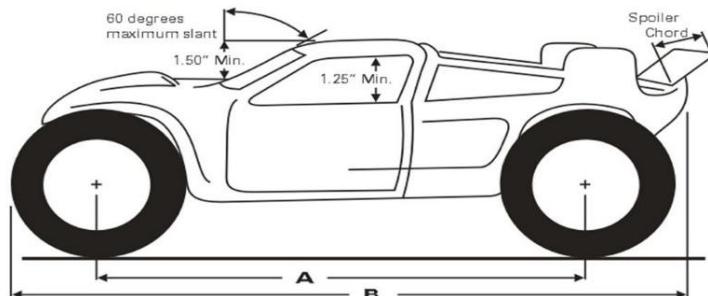
### 1.1.1 Dimensional specifications:

Item	Limit	Specification	
<b>Wheelbase (A)</b>	Max	292 mm	
	Min	229 mm	
<b>Length (B)</b>	Max		457.2 mm
<b>Width</b>	Max		250 mm
<b>Height</b>	Max		203.2 mm
<b>Weight</b>	2WD class	Min	1474 gr
			1588 gr
<b>Wheels</b>	Either 2.2' nominal or 61mm nominal wheels may be used. See drawing below for dimensions.		
<b>Tires</b>	<b>Diameter</b>	Max	90 mm
	<b>Width</b>	Max	44.45 mm
	<b>Type</b>	Rubber only	
<b>Rear Wing</b>	<b>Chord</b>	Max	76.2 mm
	<b>Side dam</b>	<b>Length</b>	100 mm
		<b>Height</b>	50 mm
	<b>Width</b>	Max	177 mm
<b>Front Wing</b>	<b>Chord</b>	Max	63.5 mm
	<b>Side dam</b>	<b>Length</b>	69.85 mm
		<b>Height</b>	19.05 mm
	<b>Width</b>	Max	127 mm
<b>Motor</b>	<b>Size</b>	Only	540
<b>Battery</b>	<b>Size</b>	Max	2s
	<b>Voltage</b>	Max	8.40 v
	<b>Type</b>	Only	LiPo
<b>Transmission</b>	<b>Type</b>	Only	Single Speed
<b>Suspension</b>	<b>Type</b>	Only	Independent
<b>Body</b>	<b>Style</b>	Buggy or other off-road style body that resembles an actual off-road racing non-truck type vehicle.	
<b>Track</b>	<b>Lane Width</b>	Min	8 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	6 min
	<b>Main</b>	Std	6 min



- 1.1.2 Racers in all classes will be permitted to sand or grind the tread of the tire. All sanding / grinding must be done outside the building or in any area designated by the host track.
- 1.1.3 Except for adding vent holes, or trimming tread spikes, all other modifications to the tire carcass are prohibited. At least a "ghost outline" of the original tire tread must be visible at the pre-race technical inspection.
- 1.1.4 For handout tires, tire identification information on the sidewall must not be modified, altered or removed. Racers in classes using handout tires may use their own inserts. Racers are limited to 4 sets of handout tires.

## 1.2 1/10 SCALE ELECTRIC OFF-ROAD TRUCK



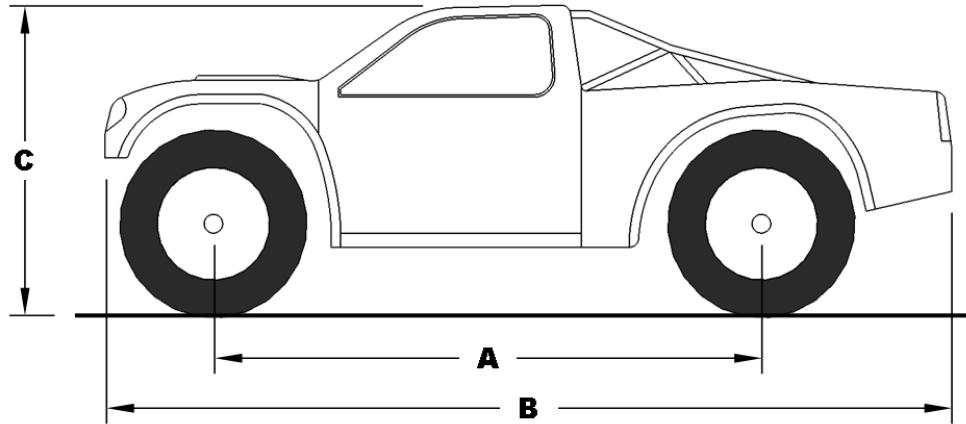
1.2.1 Dimensional specifications:

Item		Limit	Specification
<b>Wheelbase (A)</b>	Max	292mm	
	Min	229mm	
<b>Length (B)</b>	Max	457.2mm	
	Min	387mm	
<b>Width</b>	Max	330mm	
<b>Weight</b>	<b>2WD class</b>	Min	1701gr
	<b>4WD class</b>		1815gr
<b>Wheels</b>	<b>Mounting bead diameter</b>	Max	57mm
		Min	55mm
	<b>Overall diameter</b>	Max	62.5mm
	<b>Width</b>	Max	51mm
<b>Tires</b>	<b>Diameter</b>	Min	91.5mm
	<b>Width</b>	Max	54mm
		Min	51mm
<b>Spoiler</b>	<b>Type</b>	Only	Rubber
	<b>Chord</b>	Max	51mm
	<b>Width</b>	Max	Body width
<b>Body</b>	<b>Edge turn-up</b>	Max	6.5mm
	<b>Width</b>	Min	146mm
	<b>Height</b>	Min	108mm
<b>Cab</b>	<b>Style</b>	Only	Off-road Truck
	<b>Width</b>	Min	98.5mm
<b>Window</b>	<b>Height</b>	Min	38mm
	<b>Slant</b>	Max	31.75mm
	<b>Size</b>	Only	60 degrees
<b>Motor</b>	<b>Type</b>	Only	540
<b>Battery</b>	<b>Size</b>	Only	2s
	<b>Type</b>	Only	LiPo
	<b>Voltage</b>	Max	8.40v
<b>Transmission</b>	<b>Type</b>	Only	Single Speed
<b>Suspension</b>	<b>Type</b>	Only	Independent
<b>Track</b>	<b>Lane Width</b>	Min	8 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	6 min
	<b>Main</b>	Std	6 min

- 1.2.2 Formula for Frontal area calculation: Cab width + body width / 2 x cab height + body width x body height.
- 1.2.3 Wheel arch cut-outs: To molded body line
- 1.2.4 No belted tires will be allowed.
- 1.2.5 Except for adding vent holes, or trimming tread spikes, all other modifications to the tire carcass are prohibited. At least a “ghost outline” of the original tire tread must be visible at the pre-race technical inspection.

## 1.3

## 1/10 SCALE SHORT COURSE TRUCK

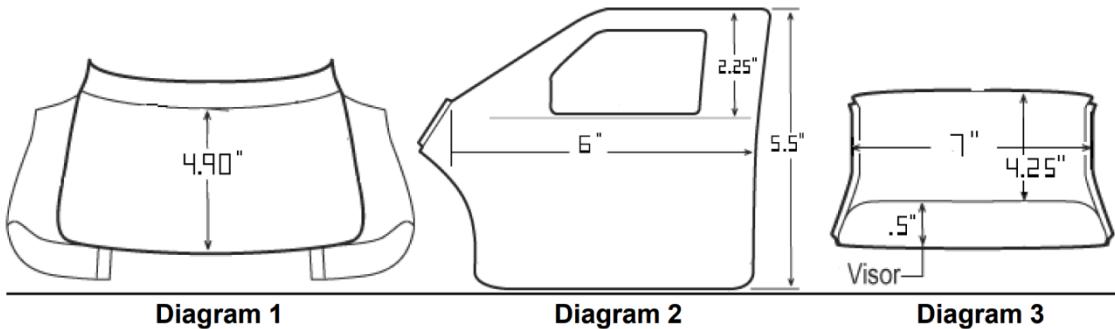


## 1.3.1 Dimensional Specifications:

Item	Limit	Specification	
		2wd	4wd
<b>Wheel Base (A)</b>	Min	320 mm (12.59")	
	Max	335 mm (13.19")	
<b>Length (B)</b>	Min	540 mm (21.25")	511 mm (20.10")
	Max	568 mm (22.36")	
<b>Vehicle Height (C)</b>	Min	199 mm (7.835")	
<b>Width</b>	Min	290 mm (11.42")	273 mm (10.75")
	Max	296 mm (11.65")	
<b>Weight</b>	Min	2098 gr (74 oz)	2505 gr (88 oz)
<b>Wheels</b>	Wheel bead diameter	Inner	Max 76.20 mm (3.0")
		Outer	Max 55.88 mm (2.2")
	Wheel bead width		Max 39.37" (1.55")
	Wheel width		Max 41.91 mm (1.65")
<b>Tires</b>	Diameter mounted	Min	106.68 mm (4.20") 99 mm (3.9")
<b>Motor</b>	Size	Only	540 540/550
<b>Drivetrain</b>	Type	Only	2wd geared/ball 4wd geared/ball
<b>Battery</b>	Size	Only	2s
	Type	Only	LiPo
	Voltage	Max	8.40v
<b>Body</b>	Type	Only	Full fender truck, must completely cover tires when views from above
<b>Track</b>	Lane Width	Min	8 ft
<b>Race Length</b>	Qualifier	Std	6 min
	Main	Std	6 min

## 1.3.2 Body Specifications:

- 1.3.2.1. Minimum setback from front of hood to begin windshield = 4.9 inches (see Diagram 1 below).
- 1.3.2.2. Cab minimum height = 5.5 inches and minimum width = 6.0 inches (see Diagram 2).
- 1.3.2.3. Cab roof minimum width = 7.0 inches and minimum depth = 4.75 inches including visor or 4.25 inches excluding visor (see Diagram 3 below).



**Diagram 1**

**Diagram 2**

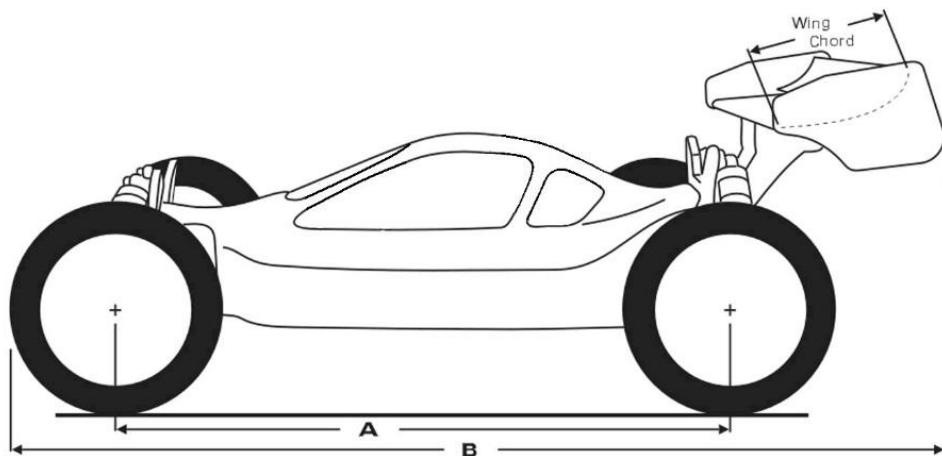
**Diagram 3**

- 1.3.2.4. Cab Setback: Minimum setback is measured from a point equal to the Front (centerline) of the body to the beginning of the windshield/lower rock guard.
- 1.3.2.5. Cab Profile: Minimum depth of the cab is measured from the beginning point (centerline) of the windshield/lower rock guard to the rear reference point of the cab
- 1.3.2.6. Roof Panel: Minimum width is measured from outer most points of the roof section to the upper side window reference line depth of the roof panel is measured (centerline) from
- 1.3.2.7. No add on or integrated spoilers/wings allowed.

### 1.3.3 Tires and Wheels

- 1.3.3.1. No Dish style wheels/rims.
- 1.3.3.2. Tire Mounted: Minimum Diameter of the tire (mounted) is established to limit extremely low-profile designs. The target dimension (new tire) is established at 4.30 Inches. To compensate for wear, molding tolerances, degradation of foam inserts, the pre- race minimum allowable diameter of a mounted tire is 4.20 inches. Tracks and Promoters are encouraged to select a "Stated" tire that works best for their particular location.
- 1.3.4 Except for adding vent holes, or trimming tread spikes, all other modifications to the tire carcass are prohibited. At least a "ghost outline" of the OEM tread must be visible at pre-race technical inspection.
- 1.3.5 Vehicles must have front and rear bumpers made from non-metallic material with no sharp edges.
- 1.3.6 Front bumper must be minimum 171.45mm (6.750 inch) in width. Front Bumper can be no wider than the inner sidewall of the front tire when straight.
- 1.3.7 No belted tires will be allowed.

## 1.4 1/8 SCALE ELECTRIC OFF-ROAD BUGGY



1.4.1 Dimensional Specifications:

Item	Limit	Specification
<b>Wheelbase (A)</b>	Maximum	330 mm
	Minimum	270 mm
<b>Length (B)</b>	Max	730 mm
<b>Width</b>	Max	310 mm
<b>Height (measured with suspension fully compressed)</b>	Max	250 mm
<b>Weight</b>	Min	3200 gr
<b>Wheels</b>	Mounting Bead Diameter	Min 79.00mm Max 83.50mm
	Overall Diameter	Max 88.50mm
	Width	Max 44.45 mm
		Max 119.38 mm
<b>Tires</b>	Diameter	Mini 109.22 mm
	Width	Max 46.99 mm
	Side dam	Length Max 100 mm Height Max 70 mm
<b>Rear Wing</b>	Chord	Max 85 mm
	Width	Max 217 mm
<b>Battery</b>	Size	Max 4s
	Type	Only LiPo
	Voltage	Max 16.80v
<b>Drivetrain</b>	Transmission	Only Single speed
	Type	Only 4wd
<b>Suspension</b>	Type	Only Independent
<b>Body</b>	Style	Buggy or other off-road style body that resembles an actual off- road racing non-truck type vehicle.
<b>Gear Covers</b>		Always Mandatory
<b>Motors</b>	Type	Only 1/8 ROAR Approved
<b>Track</b>	Lane Width	Min 8 ft
<b>Race Length</b>	Qualifier	Std 5-10 min
	Main	Std 5-20 min

1.4.2 Tire Rules

- 1.4.2.1. No tires created for other vehicle types even if they meet the specifications will be allowed.
  - 1.4.2.2. Except for drilling vent holds, or trimming tread spikes, all other modifications to the tire carcass are prohibited. Trimming the mounting bead of a tire in order to fit a legal rim is allowed. Cutting tires from same class to fit wheels of same is not allowed, regardless if it fits minimum tire dimensions. Cutting tires from one class to another class is not allowed regardless of dimensions.
  - 1.4.2.3. All tire measurements reference the carcass dimensions and do not include the tread depth or width.
  - 1.4.2.4. No belted tires allowed.
- 1.4.3      Battery Cells: 14.8v LiPo battery maximum; If two 2s 7.4v Li-Poly packs are used, both packs must be the same brand and part #.

## 1.5 1/8 SCALE ELECTRIC OFF-ROAD TRUCK

### 1.5.1 Dimensional Specifications:

Item		Limit	Specifications for 1/8 Truck
<b>Wheelbase (A)</b>		Min	304.8mm
<b>Weight</b>		Min	3900 gr
		Max	6067 gr
<b>Battery</b>	<b>Size</b>	Max	4s
	<b>Type</b>	Only	LiPo
	<b>Voltage</b>	Max	16.80v
<b>Rear Wing</b>	<b>Side dam length</b>	Max	100 mm
	<b>Side dam height</b>	Max	70 mm
	<b>Chord</b>	Max	77 mm
	<b>Width</b>	Max	217 mm
<b>Wheels</b>	<b>Mounting Bead Diameter</b>	Max	95.25 mm
	<b>Mounted Width</b>	Min	55.88 mm
	<b>Overall Diameter</b>	Max	101.6 mm
<b>Tires</b>	<b>Diameter</b>	Min	137.16 mm
	<b>Width</b>	Min	60.33 mm
<b>Track</b>	<b>Lane Width</b>	Min	10 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	5-10 min
	<b>Main</b>	Std	5-20 min

1.5.2 Monster Trucks are defined by fully compressing the vehicle's suspension and measuring a minimum of 1.5" from the flat surface to the underside of the engine. Two or three speed gear reduction transmissions are required. Differentials residing inside the transmission are permitted. All reverse gearing must be disabled for racing.

1.5.3 Drive configuration: Two or four wheel drive is allowed.

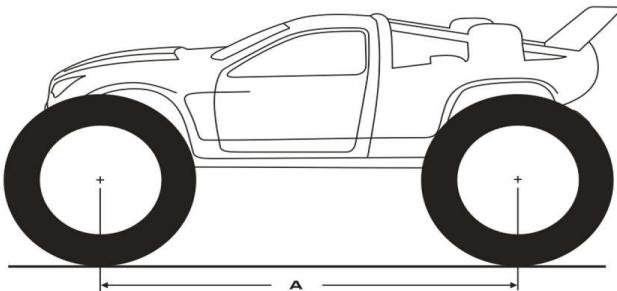
1.5.4 May use any ROAR Approved 1/8 scale electric motor

### 1.5.5 Tire Rules:

- 1.5.5.1. No tires created for other vehicle types even if they meet the specifications will be allowed.
- 1.5.5.2. Cutting or modifying the tread is allowed. Except for drilling vent holds, all other modifications to the tire carcass are prohibited.
- 1.5.5.3. Trimming the mounting bead of a tire in order to fit a legal rim is allowed. Cutting tires from same class to fit wheels of same is not allowed, regardless if it fits minimum tire dimensions. Cutting tires from one class to another class is not allowed regardless of dimensions.
- 1.5.5.4. All tire measurements reference the carcass dimensions and do not include the tread depth or width. LP tires are referenced for the minimum 1/8 Truck size and measure the absolute minimal diameter allowable in the 1/8 Truck class.

## 1.6

## 1/8 SCALE ELECTRIC OFF-ROAD MONSTER TRUCK



## 1.6.1 Dimensional Specifications:

Item	Limit	Specifications	
		2wd	4wd
<b>Wheelbase (A)</b>	Min	305 mm	
<b>Weight</b>	Min	2721 gr	4309 gr
	Max	6067 gr	
<b>Battery</b>	<b>Size</b>	Max	4s
	<b>Type</b>	Only	LiPo
	<b>Voltage</b>	Max	16.80v
<b>Rear Wing</b>	<b>Side dam length</b>	Max	92 mm
	<b>Side dam height</b>	Max	60 mm
	<b>Chord</b>	Max	77 mm
	<b>Width</b>	Max	217 mm
<b>Wheels</b>	<b>Mounting Bead Diameter</b>	Max	95 mm
	<b>Mounted Width</b>	Min	56 mm
	<b>Overall Diameter</b>	Max	102 mm
<b>Tires</b>	<b>Diameter</b>	Min	137 mm
	<b>Width</b>	Min	60 mm
<b>Track</b>	<b>Lane Width</b>	Min	10 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	5-10 min
	<b>Main</b>	Std	5-20 min

1.6.2 Monster Trucks are defined by fully compressing the vehicle's suspension and measuring a minimum of 1.5" from the flat surface to the underside of the engine. Two or three speed gear reduction transmissions are required. Differentials residing inside the transmission are permitted. All reverse gearing must be disabled for racing.

1.6.3 All Monster Trucks will race together unless sufficient entries warrant splitting the entrants according to the specifications in the above table.

1.6.4 Drive configuration: Two-wheel drive or four wheel drive is allowed.

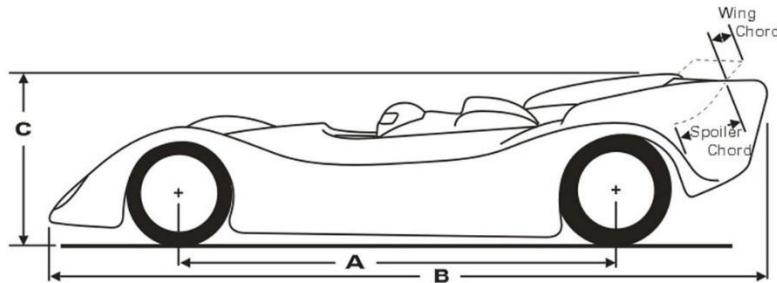
1.6.5 Must use a ROAR-Approved 1/8 scale electric motor.

1.6.6 Tire Rules:

- 1.6.6.1. No tires created for other vehicle types even if they meet the specifications will be allowed.
- 1.6.6.2. Cutting or modifying the tread is allowed. Except for drilling vent holes, or trimming tread spikes, all other modifications to the tire carcass are prohibited.
- 1.6.6.3. Trimming the mounting bead of a tire in order to fit a legal rim is allowed. Cutting tires from same class to fit wheels of same is not allowed, regardless if it fits minimum tire dimensions. Cutting tires from one class to another class is not allowed regardless of dimensions.

1.6.6.4. All tire measurements reference the carcass dimensions and do not include the tread depth or width. LP tires are referenced for the minimum 1/8 Truck size and measure the absolute minimal diameter allowable in the 1/8 Truck class.

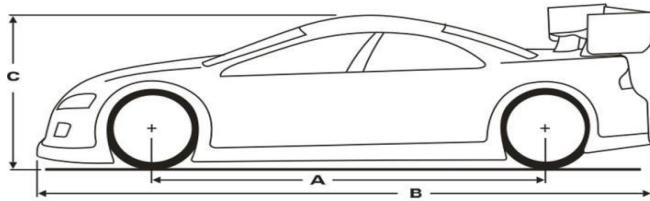
## 1.7 1/12 ELECTRIC ON-ROAD (IFMAR CLASS)



1.7.1 Dimensional specifications:

<b>Wheelbase (A)</b>		<b>Max</b>	<b>222 mm</b>
		Min	184 mm
<b>Length (B)</b>		Max	380 mm
		Min	320 mm
<b>Height (C)</b>		Min	70 mm
<b>Width</b>	<b>Chassis</b>	Max	172 mm
	<b>Body</b>	Max	174 mm
<b>Weight</b>		Min	730 gr
<b>Wheels</b>	<b>Diameter</b>	Max	38 mm
		Min	29 mm
	<b>Width</b>	Max	38 mm
		Min	13 mm
<b>Tires</b>	<b>Width</b>	Max	38 mm
		Min	13 mm
	<b>Type</b>	Only	Foam
<b>Rear Spoiler</b>	<b>Chord</b>	Max	52 mm
	<b>Width</b>	Max	172 mm
<b>Battery</b>	<b>Size</b>	Max	1s
	<b>Type</b>	Only	LiPo
	<b>Voltage</b>	Max	4.20v
<b>Transmission</b>	<b>Type</b>	Only	Single speed
<b>Rear Suspension</b>	<b>Axle</b>	Only	One-piece
	<b>Suspension</b>	No	Independent Suspension
<b>Chassis</b>	<b>Ground Clearance Carpet</b>	Min	3 mm
	Minimum Excludes spur gear		
<b>Antenna</b>	<b>Height from ground</b>	Max	35 cm
<b>Track</b>	<b>Lane Width</b>	Min	6 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	8 min
	<b>Main</b>	Std	8 min

1.7.2 Body style: Can-Am, GTP and WSC



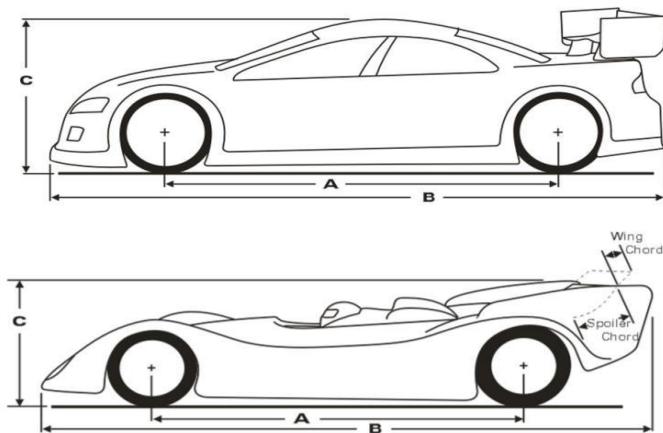
## 1.8.1 Dimensional specifications:

Item		Min/Max	Specification
<b>Wheelbase (A)</b>	Max	222 mm	
	Min	184 mm	
<b>Length (B)</b>	Max	380 mm	
	Min	320 mm	
<b>Height (C)</b>	Min	70 mm	
<b>Width</b>	<b>Chassis</b>	Max	172 mm
<b>Weight</b>	<b>Complete Vehicle</b>	Min	730 gr
	<b>Body (incl. wing)</b>	Min	45 gr
<b>Wheels</b>	<b>Diameter</b>	Max	38 mm
		Min	29 mm
	<b>Width</b>	Max	38 mm
		Min	13 mm
<b>Tires</b>	<b>Width</b>	Max	38 mm
		Min	13 mm
	<b>Composition</b>	Asphalt or Carpet	Foam Striped or Pre-mounted Rubber
<b>Wing</b>	<b>Diameter</b>	Min	40 mm*
	<b>Height</b>	Max	10 mm
	<b>Width</b>	Max	172 mm
<b>Battery</b>	<b>Size</b>	Max	1s
	<b>Type</b>	Only	LiPo
	<b>Voltage</b>	Max	4.20v
<b>Transmission</b>	<b>Type</b>	Only	Single speed
<b>Speed Control</b>	<b>Type</b>	Only	Blinky
<b>Rear Suspension</b>	<b>Axle</b>	Only	One-piece
	<b>Suspension</b>	No Independent Rear Suspension	
<b>Chassis</b>	<b>Ground Clearance Carpet</b>	Min	3 mm
	Minimum Excludes spur gear and motor		
<b>Track</b>	<b>Lane Width</b>	Min	6 ft

\*Tire must not fall through a 40 mm Go-NoGo template gauge under its own weight.

- 1.8.1.1. Bodies must strongly resemble those actually run in the full-scale GT2 or GT3 series. No LMP or LMH bodies allowed in the GT12 class.
- 1.8.1.2. The contact-patch surface of all rubber tires must be uniformly smooth and show no sign of artificial texturing (i.e., resembling fish scales, snake skin, or alligator hide). Such illegal textures, which frequently occur when using a mechanical tire truing machine to skim or resurface the contact patch of rubber tires, must be completely removed before presenting the vehicle for pre-race technical inspection. Violation of this provision will result in automatic disqualification from heat or main.
- 1.8.1.3. Treaded tires are permitted provided they are OEM. Treads may not be added to tires that were originally manufactured and sold as untreaded tires (i.e., "slicks").

## 1.9 1/10 SCALE ELECTRIC-ON ROAD



1.9.1 Dimensional specifications:

Item	Min/Max	Specifications			
		Can-Am/GTP/WSC	GT/GT-1	World GT	
<b>Wheelbase (A)</b>	Min	229 mm	254 mm		
	Max	279 mm	267 mm		
<b>Length (B)</b>	Max	560 mm			
<b>Width</b>	Max	251 mm	205 mm		
<b>Height (C)</b>	Max	76 mm	102 mm	N/A	
	Min	N/A	N/A	104 mm	
<b>Weight</b>	Max	1200		930 gr	
<b>Wheels</b>	<b>Diameter</b>	Max	51 mm		
		Min	41 mm		
<b>Tires</b>	<b>Width</b>	Max	51 mm		
		Min	19 mm		
<b>Rear Spoiler</b>	<b>Chord</b>	Max	51 mm	N/A	
	<b>Width</b>	Min	251 mm	N/A	
<b>Rear Wing (if fitted to the full size vehicle)</b>	<b>Chord</b>	Max	Not Allowed	76 mm	
	<b>Width</b>	Max	Not Allowed	45 mm	
	<b>Side Dam</b>	<b>Length</b>	Max	229 mm	
		<b>Height</b>	Max	200 mm	
<b>Tires</b>	<b>Type</b>	Only	Foam		
<b>Battery</b>	<b>Size</b>	Max	2s	2s	
	<b>Type</b>	Only	LiPo	LiPo	
<b>Voltage</b>	Max	8.40v	8.40v	4.20v	
<b>Transmission</b>	<b>Type</b>	Only	Single Speed		
<b>Rear Suspension</b>	<b>Axle</b>	Only	One-piece		
	<b>Suspension</b>	No	Independent Suspension		
<b>Chassis</b>	<b>Ground Clearance Carpet</b>	Min	4 mm		
		Minimum Excludes spur gear			
<b>Antenna</b>	Roll over antennas not allowed				
<b>Track</b>	<b>Lane Width</b>	Min	8 ft		
	<b>Qualifier</b>	Std	5 min		
<b>Race Length</b>	<b>Main</b>	Std	5 min		

1.9.2 Body style: Can-Am/GTP/WSC, GT/GT-1/Trans-Am or World-Gt

1.9.3 World GT body rules:

1.9.3.1. Bodies must be based on production front engine - rear drive autos

1.9.3.2. Body must be a replica of an original, 2 door sports/gt production car or based on a full sized auto which has been raced in a major series (Speed World Challenge, FIA GT Championship, ALMS GT1 + GT2, Japanese GT Championship, etc.)

1.9.3.3. Bodies must be of a model year no older than 10 years prior to the year of submittal.

1.9.3.4. Bodies deemed unrealistic or out of scale will not be approved. The burden of proof lies with the manufacturer to provide documentation for submitted bodies.

1.9.3.5. Acceptable documentation for proof of scale realism shall be pictures of original 1:1 car from the top, front, rear and sides and or manufacturers dimensional data for production vehicle

1.9.3.6. Overall roof height shall be measured with the car ready to run.

1.9.3.7. The rear of the body must be trimmed no more than 40mm higher than the ground level with the body mounted.

1.9.3.8. Minimum dimension, center base of body windshield to intersection of hood and front grill 135mm

1.9.3.9. Minimum body width at the base of the windshield 145mm

1.9.3.10. Maximum body width: 205mm

1.9.3.11. Minimum body material thickness .030" to be measured by a cut out in the upper rear or front windshield

1.9.4 World GT wing rules:

1.9.4.1. Wing must be fastened to the rear deck of body

1.9.4.2. Rear wing may not be higher than the roof height.

## 1.10 1/10 SCALE ELECTRIC ON-ROAD T-2 TOURING CAR (IFMAR ISTC CLASS)

### 1.10.1 Dimensional Specifications:

Item		Limit	Specifications	
<b>Wheelbase (A)</b>		Max	270 mm	
		Min	250 mm	
<b>Length (B)</b>		Max	460 mm	
<b>Height (C) (with 10mm blocks under chassis)</b>		Min	117 mm	
<b>Width</b>	<b>With body</b>	Max	195 mm	
	<b>Without body</b>	Max	190 mm	
<b>Weight</b>	<b>Foam or Rubber Tires</b>	Min	1320 gr	
<b>Wheels</b>	<b>Diameter</b>	<b>Foam</b>	Max 53 mm	
		<b>Rubber</b>	Max 50 mm	
		<b>All Types</b>	Min 47 mm	
	<b>Width</b>	<b>Foam</b>	Max 28 mm	
		<b>Rubber</b>	Max 26 mm	
		<b>All Types</b>	Min 24 mm	
<b>Tires</b>	<b>Diameter</b>	<b>All Types</b>	Max 67 mm	
		<b>Rubber</b>	Min 63 mm	
	<b>Width</b>		Max 28 mm	
			Max 24 mm	
<b>Rear Wing</b>	<b>Chord</b>		Max 45 mm	
	<b>Width</b>		Max 190 mm	
	<b>Side dam</b>	<b>Length</b>	Max 40 mm	
		<b>Height</b>	Max 20 mm	
<b>Tire Type</b>	<b>Carpet Surface</b>		Foam or Rubber	
	<b>Paved Surface</b>		Only Rubber	
	No capped tires allowed			
<b>Battery</b>	<b>Size</b>		Max 2s	
	<b>Type</b>		Only LiPo	
	<b>Voltage</b>		Max 8.40v	
<b>Transmission</b>	<b>Type</b>		Only Single Speed	
<b>Suspension</b>	<b>Front</b>		Only Independent	
	<b>Rear</b>		Only Independent	
<b>Drive</b>	<b>Type</b>		Only 4wd	
<b>Chassis</b>	<b>Ground Clearance</b>	<b>Foam</b>	Min 4 mm	
		<b>Rubber</b>	Min 5 mm	
<b>Track</b>	<b>Lane Width</b>	<b>Carpet</b>	Min 8 ft	
		<b>Pavement</b>	Min 10 ft	

### 1.10.4 Body rules:

- 1.10.4.1. Bodies must resemble 2 or 4 door cars that have raced in a full-scale Touring Car series. See Global Body Specifications below.
- 1.10.4.2. No stickers may be used on top of body to meet height requirements, but may be place on the roof where no measurements are taking place.
- 1.10.4.3. The rear of the body may not be cut higher than 35mm above race surface (incl. assumed ride height of 5mm). This is equivalent to a maximum of 40mm when the chassis is resting on 10mm blocks or a maximum of 50mm when the chassis is resting on 20mm blocks (see Global Body Specification Dimension "S" on page 19 of these rules).
- 1.10.4.4. No windows may be cut out.

1.10.5 Wing rules:

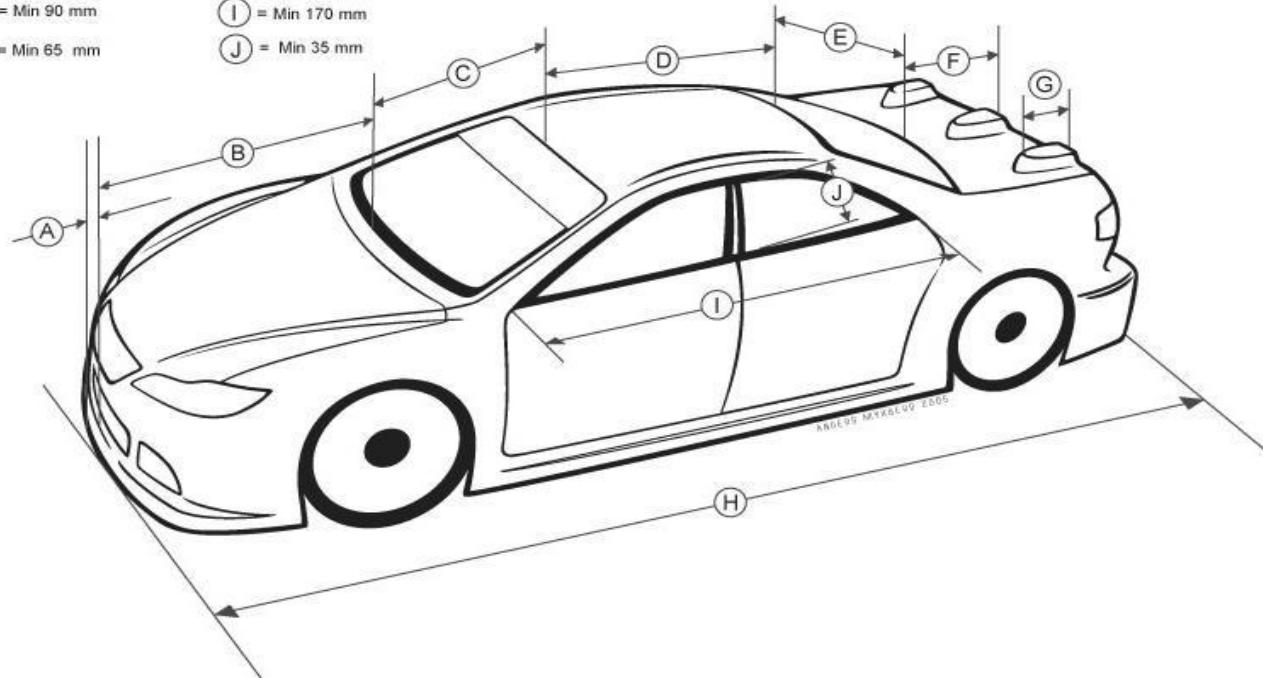
- 1.10.5.1. Only one wing is allowed, fixed to the same place as the wing on the full-size vehicle.
- 1.10.5.2. The wing must be fastened to the rear deck of the body, not directly to any part of the chassis of the vehicle.
- 1.10.5.3. The rear edge of the wing or side dams may not extend beyond the rear of the body more than 10 mm.
- 1.10.5.4. No part of the wing may extend above the roofline of the body..

**\*\* GLOBAL BODY SPECIFICATIONS \*\***

**GLOBAL BODY SPEC ( GBS for Electric Sedans )** 

(A) = Max 10 mm  
(B) = Min 105 mm  
(C) = Max 85 mm  
(D) = Min 90 mm  
(E) = Min 65 mm

(F) = Max 65 mm  
(G) = Max 25 mm ( Max 3 posts )  
(H) = Min 410 mm  
(I) = Min 170 mm  
(J) = Min 35 mm



# GLOBAL BODY SPEC ( GBS for Electric Sedans )

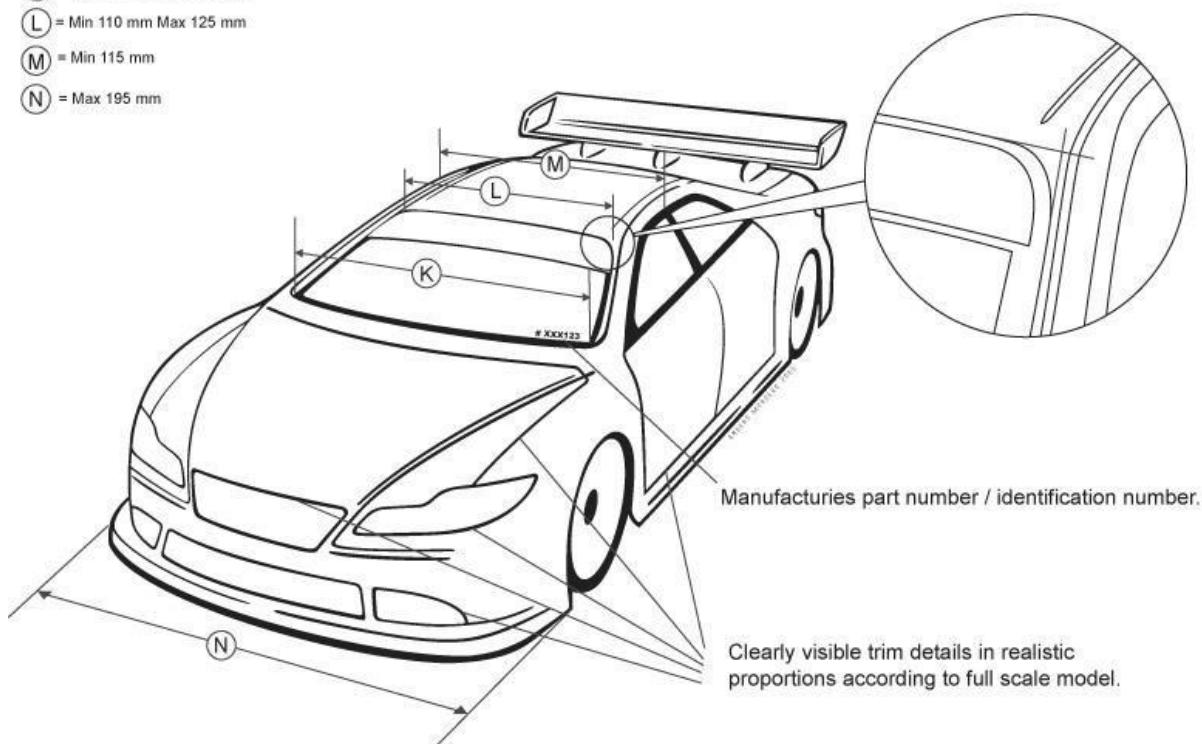


(K) = Min 140 mm Max 155 mm

(L) = Min 110 mm Max 125 mm

(M) = Min 115 mm

(N) = Max 195 mm



# GLOBAL BODY SPEC ( GBS for Electric Sedans )



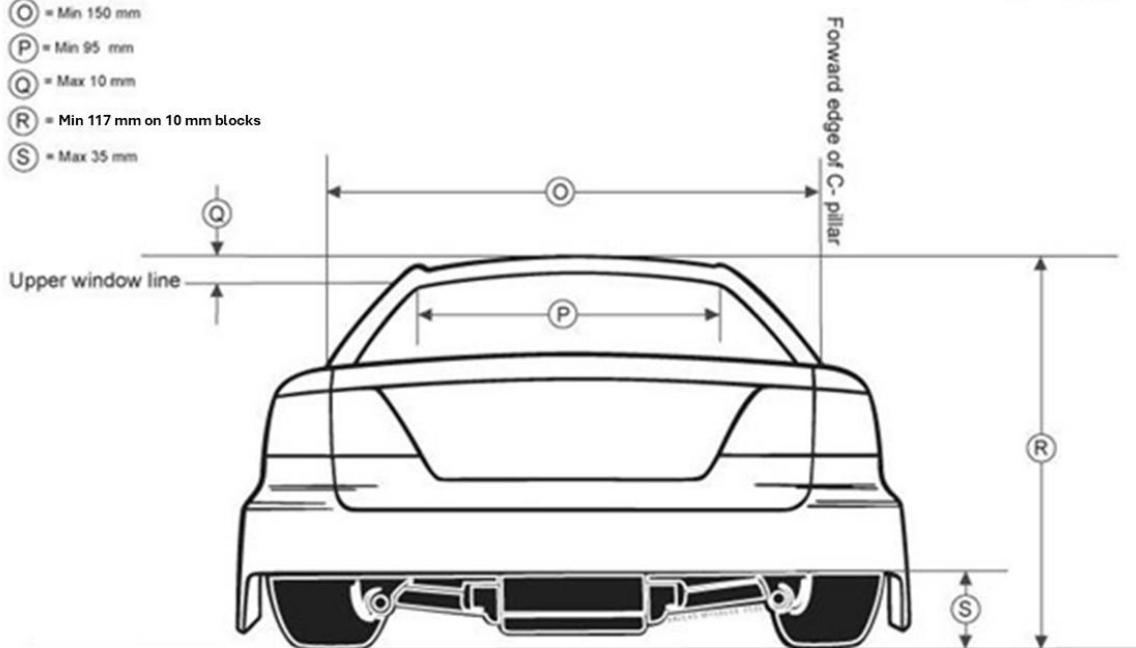
(O) = Min 150 mm

(P) = Min 95 mm

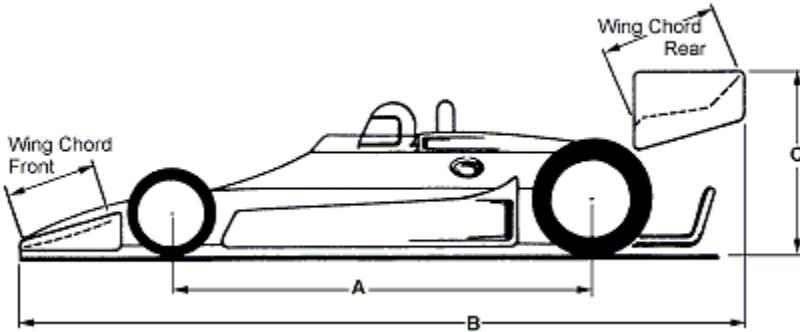
(Q) = Max 10 mm

(R) = Min 117 mm on 10 mm blocks

(S) = Max 35 mm



## 1.11 1/10 SCALE ELECTRIC ON-ROAD FORMULA ONE (F1)



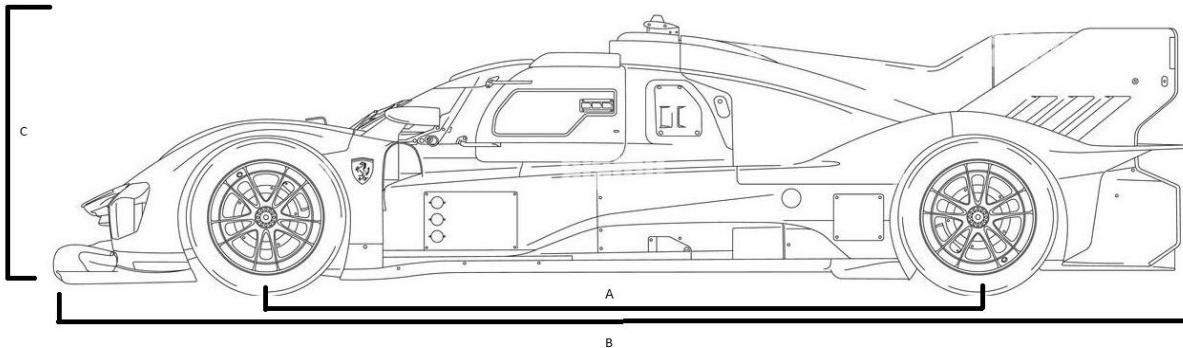
### 1.11.1 Dimensional Specifications:

Item		Limit	Specification
<b>Wheelbase (A)</b>	Max	285 mm	
	Min	229 mm	
<b>Length (B)</b>	Max	559 mm	
<b>Height (C)</b>	Max	140 mm	
<b>Width</b>	Max	190 mm	
<b>Weight</b>	Min	1020 gr	
<b>Wheels</b>	Diameter	Max	36 mm
		Min	32 mm
<b>Tires</b>	Width	Max	44 mm
		Min	19 mm
<b>Front Wing</b>	Diameter	Max	64 mm
		Min	38 mm
<b>Rear Wing</b>	Width	Max	44 mm
		Min	19 mm
<b>Width</b>		Max	251 mm
<b>Front Wing</b>	Chord	Max	51 mm
	Width	Max	229 mm
<b>Rear Wing</b>	Side dam	Length	Max
		Height	Max
<b>Tires</b>	Composition	Race Director's Discretion	Pre-mounted Rubber or Foam
<b>Battery</b>	Size	Max	2s
	Type	Only	LiPo
	Voltage	Max	8.40v
<b>Transmission</b>	Type	Only	Single Speed
<b>Rear Suspension</b>	Axle	Only	One-piece
	Suspension	No	Independent Suspension
<b>Track</b>	Lane Width	Min	8 ft
<b>Race Length</b>	Qualifier	Std	5 min
	Main	Std	5 min

### 1.11.2 Body style: Bodies must closely resemble open wheel, single seat cars used in Formula-One. CART, IRL or other similar full-size series.

## 1.12

## 1/10 SCALE ELECTRIC ON-ROAD LE MANS HYPERCAR (LMH)



## 1.12.1 Dimensional Specifications:

Item		Limit	Specification
<b>Wheelbase (A)</b>		Max	270 mm
<b>Length (B)</b>		Max	485 mm
<b>Height (C) (with 10mm blocks under chassis)</b>		Min	TBD
Width	With body	Max	195 mm
	Without body	Max	190 mm
Weight	Total Weight w/ Body	Min	1320 gr
	Body Weight (race ready)	Min	80 gr
Tires	Rubber	Diameter	Min 63 mm
		Width	Max 24 mm
Battery	Size	Max	2s
	Type	Only	LiPo
	Voltage	Max	8.40v
Transmission	Type	Only	Single Speed
Suspension	Front	Only	Independent
	Rear	Only	Independent
Drive	Type	Only	4wd
Speed Control	Mode	Only	Blinky
Chassis	Ground Clearance	Min	5 mm
Wing	Width (front to back, perpendicular)	Max	40 mm
	Height (top to bottom, perpendicular)	Max	15 mm
	Chord (top rear to bottom front)	Max	43 mm

## 1.12.2 Body and Wing rules:

- 1.12.2.1. Body must closely resemble a production-based vehicle that has actually been raced in the full-scale LMH-1 class. Only bodies on the ROAR-approved LMH list are allowed.
- 1.12.2.2. Only wings provided with the body by the manufacturer may be used; no modifications (additions or subtractions) to the stock wing are allowed except that tape may be used to repair a damaged or torn wing. A full rear bumper is required.
- 1.12.2.3. No lightweight bodies allowed. No more than 5 grams can be added to the body, after paint and decals are applied, to meet minimum weight specification for this class.
- 1.12.2.4. Top of the wing must be level with or lower than the top of the roof.
- 1.12.2.5. Tire fender wells must remain fully covered and may not be cut out or vented in any way.
- 1.12.2.6. Front splitter must be trimmed along the manufacturer's cut lines and the splitter may not be enlarged or reduced compared to the manufacturer's stock dimensions.

## 1.13 1/10 SCALE ELECTRIC ON-ROAD FRONT WHEEL DRIVE (FWD)



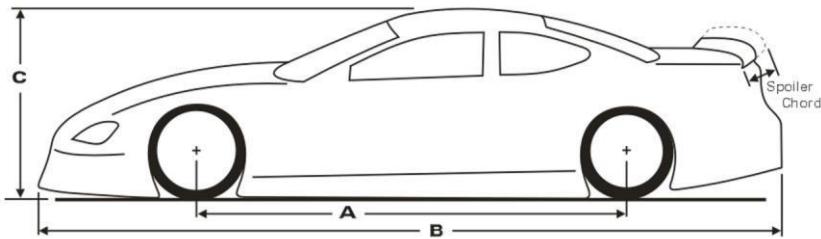
### 1.13.1 Dimensional Specifications:

Item		Limit	Specification
<b>Wheelbase</b> (measured from center of front axle to center of rear axle)		Max	270 mm
<b>Body Length</b>		Min	410 mm
		Max	440 mm
<b>Width</b>	With body mounted on car	Max	195 mm
	Without body mounted on car	Max	190 mm
<b>Weight</b>	<b>Total Weight with Body</b> (race ready)	Min	1250 gr
	<b>Body Weight</b> (in full race ready paint & trim)	Min	70 gr
<b>Tires</b>	Rubber	Min	63 mm
		Max	24 mm
<b>Battery</b>	<b>Type, Size (# of cells) &amp; Fully-charged Voltage</b>	Max	LiPo 2s & 8.40v
<b>Transmission</b>	<b>Front-Wheel Drive</b> (no power to rear wheels)	Only	Single Speed Gearing
<b>Suspension</b>	<b>Front</b>	Only	Fully Independent
	<b>Rear</b> (No Diff, Spool or Single Solid Axle allowed)	Only	Fully Independent
<b>Drive</b>	<b>Front Wheel Drive</b> (Spool or Diff are allowed)	Only	2 wheel drive
<b>Speed Control</b>	<b>No Variable or Dynamic ESC Timing to Motor</b>	Only	Fixed Timing ("Blinky")
<b>Chassis</b>	<b>Ground Clearance</b>	Min	5 mm
<b>Rear Wing</b>	<b>Width</b>	Max	180 mm
<b>Roof Height</b>	<b>Measured w/ chassis resting on 10 mm blocks</b>	Min	130 mm
<b>Brushless Motor</b>	# of Wire	Recommended, but not required, for Carpet	25.5T
	Winds	Recommended, but not required, for Asphalt	21.5T

### 1.13.2 Body and Wing rules:

- 1.13.2.1. Only hatchback style bodies on the ROAR-approved list are allowed. FWD bodies must closely resemble production-based vehicles similar to those that are run in the full-scale TCR series. No GT, Sedan TC, LMH, VTA, LMP, GTP or other non-hatchback Rally bodies are allowed in the FWD class.
- 1.13.2.2. A single rear wing is allowed but not required. It must be mounted directly to the rear body posts in the OEM molding without using any shims or spacers to raise the wing. Only Lexan wings provided with the body by the OEM manufacturer may be used; no aftermarket, custom, prototype, 3D-printed, or multi-plane rally-style wings are allowed. Rear wings must be cut along the OEM trim lines; no other modifications (additions or subtractions) to the stock OEM wing are allowed. Tape may be used to repair a damaged wing provided the original dimensions of the OEM wing remain substantially the same. Other than the rear wing, no other wings or spoilers may be added to the hood, roof or chassis.
- 1.13.2.3. Wheel wells must be cut to reveal the entire tire sidewall. The lower side skirts of the body may be trimmed above the OEM cut line only as much as is necessary to prevent rubbing or cutting the track surface. Aesthetic trim details (exhaust pipes, side mirrors, door handles) may be added to the body provided that they do not materially alter the basic shape or aerodynamic characteristics of the stock body. No other modifications, including cutting air vents or reducing the length or width of the front splitter, may be made to the OEM body shell.

## 1.14 1/12 SCALE ELECTRIC OVAL



### 1.14.1 Dimensional Specifications:

Item		Limit	Specification
<b>Wheelbase (A)</b>		Max	9.25"
		Min	7.25"
<b>Length (B)</b>		Max	16.0"
<b>Height (C)</b>	<b>Foam Tires</b>	Min	3.375"
	<b>Capped Tires</b>	Min	3.5"
<b>Width</b>		Max	7.0"
<b>Weight</b>	<b>Foam Tires</b>	Min	30 ounces
	<b>Capped Tires</b>	Min	30 ounces
<b>Wheels</b>	<b>Diameter</b>	Max	1.5"
		Min	1.3"
<b>Tires</b>	<b>Width</b>	Max	1.5"
		Min	0.5"
<b>Rear Wing</b>	<b>Diameter</b>	Max	2.1"
	<b>Width</b>	Max	1.5"
<b>Rear Spoiler</b>	<b>Side dam</b>	Length	Max 2.5"
		<b>Height</b>	Max 1.75"
<b>Chord</b>	<b>With wing</b>	Max	0.5"
	<b>No wing</b>	Max	1.5"
	<b>Width</b>	Max	6.75"

1.14.2 Tire type: Foam or Capped

1.14.3 Battery Cells: 1 Cell LiPo (Maximum voltage = 4.20v).

1.14.4 Transmission: Single speed only

1.14.5 Rear suspension and drive:

1.14.5.1. Single, one-piece drive axle only

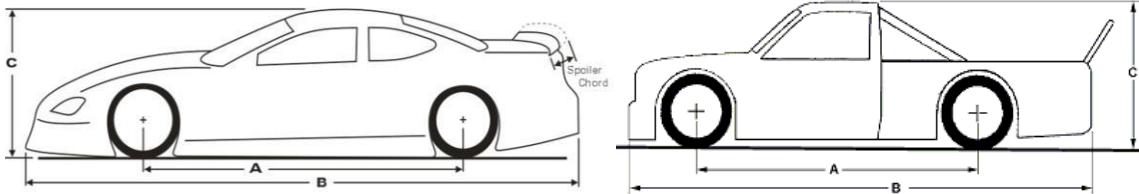
1.14.5.2. No independent suspension allowed.

1.14.6 Body style: Bodies must resemble NASCAR-type stock cars.

1.14.7 Ground clearance:

1.14.7.1. Carpet surfaces: Minimum 3mm under all parts of the vehicle excluding the spur gear.

## 1.15 1/10 SCALE ELECTRIC OVAL



1.15.1 Dimensional specifications:

Item			Limit	Specification			
				Car	Truck		
<b>Wheelbase (A)</b>			Max	11.0"			
			Min	9.0"			
<b>Length (B)</b>			Max	20.0"			
<b>Height (C)</b>	<b>Foam Tires</b>		Min	4.25"	4.5"		
	<b>Capped Tires</b>		Min	4.5"	4.75"		
<b>Width</b>			Max	9.875"			
			Min	7.25"			
<b>Weight</b>	3200 LiPo	<b>Foam Tires</b>	Min	38 ounces			
		<b>Capped Tires</b>	Min	41 ounces			
	Open LiPo	<b>Foam Tires</b>	Min	41 ounces			
		<b>Capped Tires</b>	Min	43 ounces			
	4 cell	<b>Foam Tires</b>	Min	41 ounces			
<b>Wheels</b>	<b>Diameter</b>		Max	2.0"			
			Min	1.625"			
	<b>Width</b>		Max	2.0"			
			Min	0.75"			
<b>Tires</b>	<b>Diameter</b>		Max	2.6"			
			Max	2.0"			
	<b>Width</b>		Min	0.75"			
			Max	3.0"			
<b>Rear Wing</b>	<b>Width</b>		Max	9.0"			
	<b>Side dam</b>	<b>Length</b>	Max	3.75"	Not allowed		
		<b>Height</b>	Max	2.0"	N/A		
<b>Rear Spoiler</b>	<b>Chord</b>	<b>With wing</b>	Max	0.75"	N/A		
		<b>No wing</b>	Max	2.0"	2.0"		
	<b>Width</b>		Max	9.875"	9.875"		

1.15.2 Tire type: Foam or Capped

1.15.3 Battery: 2s LiPo; Maximum voltage = 8.40v.

1.15.4 Transmission: Single speed only

1.15.5 Rear suspension and drive: Single, one-piece drive axle only; no independent suspension allowed.

1.15.6 Body rules

1.15.6.1. Bodies must resemble NASCAR-type stock cars or trucks.

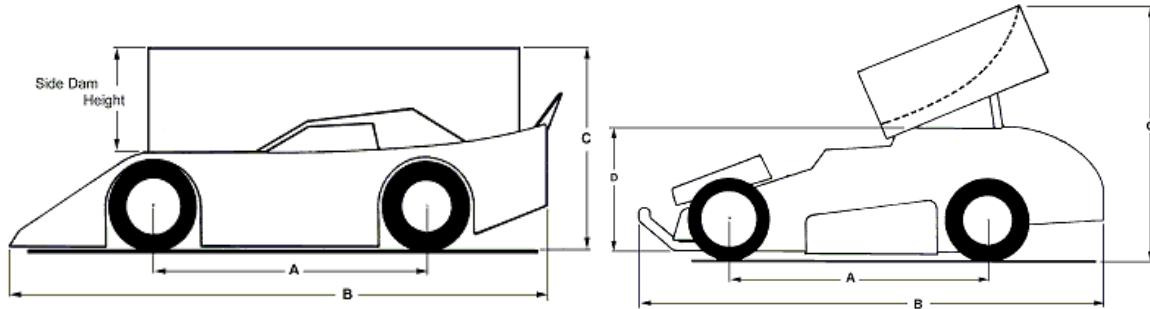
1.15.6.2. On truck bodies the tailgate section may be removed, but the side panels must remain intact.

1.15.6.3. The truck box must be covered flush with the top of the box and must be painted.

1.15.7 Wings and/or side dams are not allowed on trucks.

1.15.8 Ground clearance: Minimum pre-race is 4mm.

## 1.16 1/10 SCALE ELECTRIC DIRT OVAL



### 1.16.1 Dimensional specifications:

Item	Limit	Specification	
		Modified Stock Car	Sprint Car
<b>Wheelbase (A)</b>	Max	11.5"	
	Min	9.0"	10.0"
<b>Length (B)</b>	Max	22.0"	18.0"
<b>Height (C)</b>	Max	11.0"	
<b>Width</b>	Max	9.875"	
<b>Weight – 2WD</b>	<b>2WD</b>	Min	50 ounces
	<b>4WD</b>	Min	52 ounces
	<b>Truck</b>	Min	50 ounces
<b>Wheels</b>	<b>Diameter</b>		2.15"
	Min		1.5"
<b>Width</b>		Max	2.0"
<b>Tires</b>	<b>Diameter</b>		3.544"
	<b>Width</b>		2.0"
<b>Rear wing and/or side dam</b>	<b>Chord</b>		Max
	Max		N/A
	<b>Width</b>		
	<b>Side dam</b>	<b>Length</b>	14.0"
	<b>Height</b>	Max	5.5"
			4.0" above wing surface
<b>Front wing</b>	<b>Chord</b>		Max
	Max		N/A
	<b>Width</b>	Max	
	<b>Side dam</b>	<b>Length</b>	
	<b>Height</b>	Max	
<b>Spoiler</b>	<b>Chord</b>		Max
	1.5"		N/A
<b>Width</b>		9.875"	

1.16.2 Tire type: Foam, Rubber or Capped

1.16.3 Battery: 2s LiPo; Maximum voltage = 8.40v.

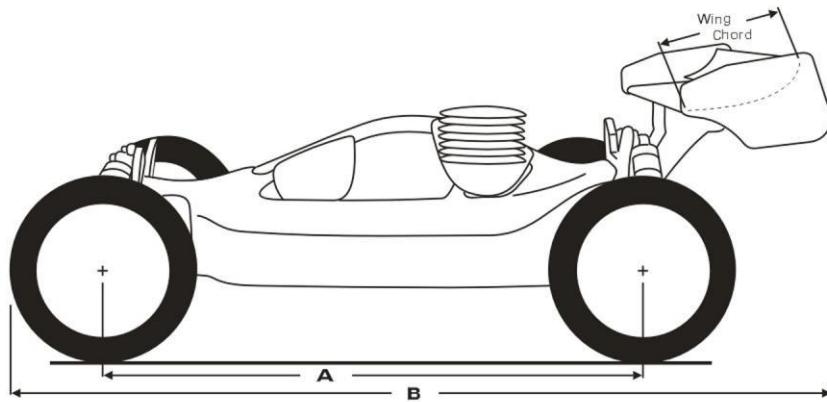
1.16.4 Transmission: Single speed only

1.16.5 2WD or 4WD allowed; Independent Rear Suspension required.

1.16.6 Body rules: Bodies must resemble NASCAR-type stock cars or trucks, modified Stock Cars, Sprint Cars or Off-road trucks. Sprint cars must have headers, nerf bars, rear tail section, and roll cage.

## 2. FUEL VEHICLE CLASS SPECIFICATIONS

### 2.1 1/8 SCALE FUEL OFF-ROAD BUGGY (IFMAR CLASS)

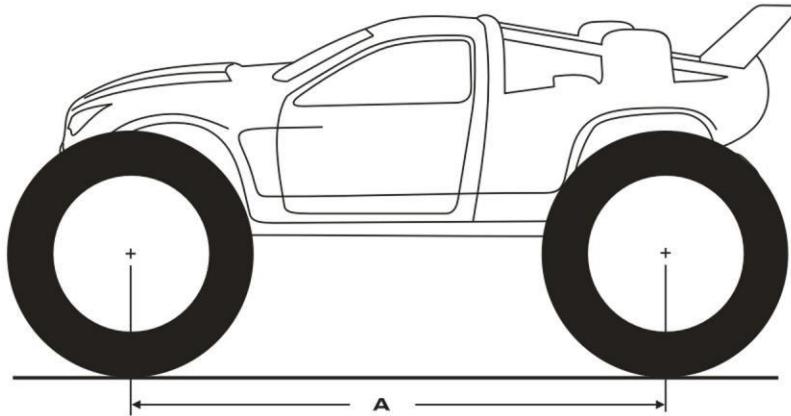


#### 2.1.1 Dimensional Specifications:

Item	Limit	Specification
<b>Wheelbase (A)</b>	Max	330 mm
	Min	270 mm
<b>Length (B)</b>	Max	730 mm
<b>Width</b>	Max	310 mm
<b>Height (measured with suspension fully compressed)</b>	Max	250 mm
<b>Weight</b>	Min	3200 gr
<b>Wheels</b>	Mounting Bead Diameter	Min/Max 79.00 mm / 83.50 mm
	Overall Diameter	Max 88.50 mm
	Width	Max 44.45 mm
<b>Tires</b>	Diameter	Max 119.38 mm Min 109.22 mm
	Width	Max 46.99 mm
	Type	Only Rubber
	Side dam	Length Max 100 mm Height Max 70 mm
<b>Rear Wing</b>	Chord	Max 85 mm
	Width	Max 217 mm
<b>Engine</b>	Size	Only .21 Open
<b>Exhaust Outlet</b>	Inner	Max 8 mm
	Length	Min 15 mm
<b>Fuel Tank</b>	Size	Max 125 cc
<b>Transmission</b>	Type	Only Single Speed
<b>Drive</b>	Type	Either 2wd or 4wd
<b>Suspension</b>	Front	Only Independent
	Rear	Only Independent
<b>Body</b>	Buggy or other off-road style body that resembles an actual off-road racing non-truck type vehicle.	
<b>Track</b>	Lane Width	Min 10 ft
<b>Race Length</b>	Qualifier	Std 5-10 min
	Lower Main	Std 15-30 min
	A Mains	Std 30-60 min

- 2.1.2 No tires created for other vehicle types even if they meet the specifications will be allowed.
- 2.1.3 Cutting or modifying the tread is allowed. Modifying the tire carcass is prohibited. Trimming the mounting bead of a tire in order to fit a legal rim is allowed. Cutting tires from same class to fit wheels of same is not allowed, regardless if it fits minimum tire dimensions. Cutting tires from one class to another class is not allowed regardless of dimensions.
- 2.1.4 All tire measurements reference the carcass dimensions and do not include the tread depth or width.

## 2.2 1/8 FUEL OFF-ROAD TRUCK (TRUGGY)



- 2.2.1 Dimensional Specifications:

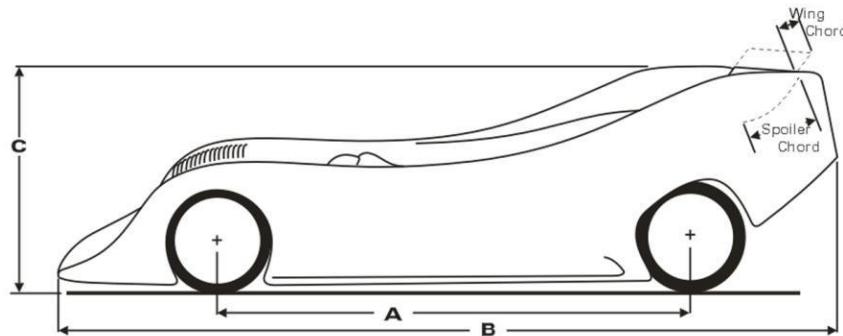
Item	Limit	Specification
<b>Wheelbase (A)</b>	Min	305 mm
<b>Weight</b>	Min	3900 gr
	Max	6067gr
<b>Fuel tank capacity</b>	Max	150 cc
<b>Rear Wing</b>	Side Dam Length	Max 100 mm
	Side Dam Height	Max 70 mm
	Chord	Max 77 mm
	Width	Max 217 mm
<b>Wheels</b>	Mounting Bead Diameter	Max 101.6 mm (.4")
	Mounted Width	Min 56 mm
	Overall Diameter	Max 102 mm
<b>Tires</b>	Diameter	Min 137 mm
	Width	Min 60 mm
<b>Engine</b>	Size	Only .21 or .28 Open
<b>Exhaust Outlet</b>	Inner	Max 8 mm
	Length	Min 15 mm
<b>Fuel Tank</b>	Size	Max 150 cc
<b>Transmission</b>	Type	Only Single Speed
<b>Drive</b>	Type	Either 2wd or 4wd
<b>Suspension</b>	Front	Only Independent
	Rear	Only Independent
<b>Track</b>	Lane Width	Min 10 ft
<b>Race Length</b>	Qualifier	Std 5-10 min
	Lower Main	Std 15-30 min
	A Mains	Std 30-45 min

2.2.2 Tires:

- 2.2.2.1. No tires created for other vehicle types even if they meet the specifications will be allowed.
- 2.2.2.2. Cutting or modifying the tread is allowed. Modifying the tire carcass is prohibited. Trimming the mounting bead of a tire in order to fit a legal rim is allowed. Cutting tires from same class to fit wheels of same is not allowed, regardless if it fits minimum tire dimensions. Cutting tires from one class to another class is not allowed regardless of dimensions.
- 2.2.2.3. All tire measurements reference the carcass dimensions and do not include the tread depth or width. LP tires are referenced for the minimum 1/8 Truck size and measure the absolute minimal diameter allowable in the 1/8 Truck class.

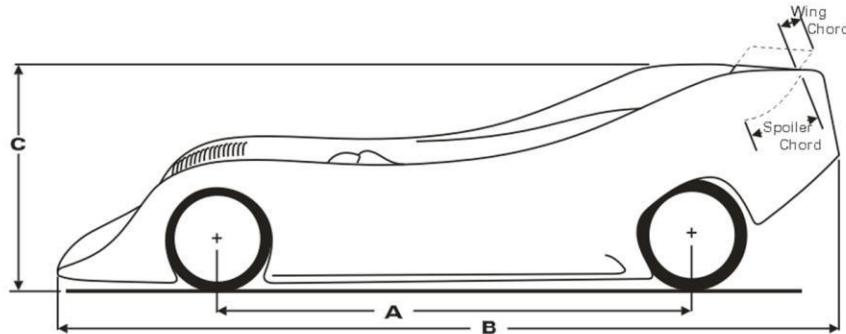
2.2.3 Bodies:

- 2.2.3.1. Full size truck or SUV only (no buggy or car bodies allowed). Bodies must resemble a full size racing truck. ROAR will follow IFMAR rules when they apply.
- 2.2.3.2. Bumpers are optional. If used, they may not extend further than 1" past the body, front or rear, and may not exceed the width across the outer edges if the tires to each side.
- 2.2.3.3. Skid Plates must not extend further than 1" past the body, front or rear. Metal skid plates and chassis components are only allowed if safely attached and pose no danger to drivers, pit persons, or turn marshals.
- 2.2.3.4. 3 channel radios are permitted. Control is limited to throttle, brake, forward speed shifting, and steering.



## 2.3.1 Dimensional specifications:

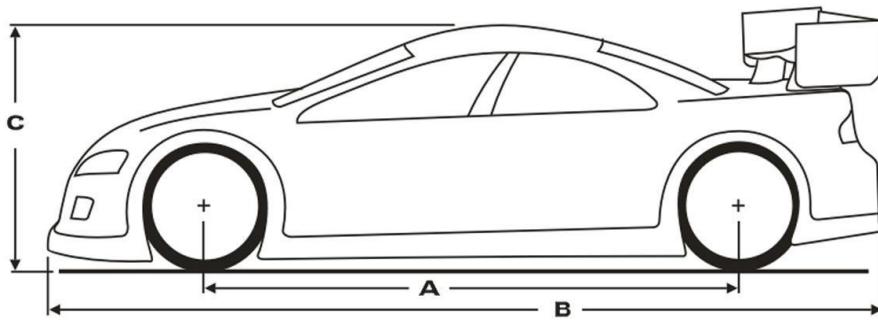
Item		Limit	Specification
<b>Wheelbase (A)</b>	Max	279 mm	
	Min	229 mm	
<b>Length (B)</b>	Max	483 mm	
<b>Height (C)</b>	Min	118 mm	
<b>Width</b>	Max	251 mm	
<b>Weight</b>	<b>Suspension</b>	Min	1814 gr
	<b>Pan Chassis</b>	Min	1474 gr
<b>Wheels</b>	<b>Diameter</b>	Max	54 mm
		Min	41 mm
	<b>Width</b>	Front	30 mm
		Rear	51 mm
<b>Tires</b>	<b>Diameter</b>	Front	76 mm
		Rear	81 mm
	<b>Width</b>	Front	30 mm
		Rear	51 mm
	<b>Type</b>	Only	Foam
<b>Rear Spoiler</b>	<b>Chord</b>	Max	51 mm
	<b>Width</b>	Max	251 mm
<b>Rear Wing</b>	<b>Chord</b>	Max	76 mm
		Max	229 mm
	<b>Side dam</b>	Length	95 mm
		Height	51 mm
<b>Transmission</b>	<b>Type</b>	Max	Two speed
<b>Engine</b>	<b>Size</b>	Only	.15 Open
<b>Exhaust Outlet</b>	<b>Inner</b>	Max	6.5 mm
	<b>Length</b>	Min	15 mm
<b>Fuel Tank</b>	<b>Size</b>	Max	80 cc
<b>Rear Suspension</b>	<b>Pan Class</b>	Only	One-piece axle
	<b>Suspension Class</b>	Only	Independent
<b>Drive</b>	<b>Type</b>	Only	Rear Wheel
<b>Body</b>	<b>Style</b>	Only	Can-Am/GTP/WSC
<b>Track</b>	<b>Lane Width</b>	Min	10 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	4 min
	<b>Lower Main</b>	Std	15-30 min
	<b>A Mains</b>	Std	30-60 min



## 2.4.1 Dimensional Specifications:

Item	Limit	Specification	
		235mm	200mm
<b>Wheelbase (A)</b>	Max	280 mm	270 mm
	Min	228 mm	230 mm
<b>Length (B)</b>	Max	490 mm	460 mm
<b>Height (C)</b>	Max	150 mm	125 mm
<b>Width</b>	<b>without body</b>	Max	250 mm
	<b>with body</b>	Max	250 mm
<b>Weight</b>	Min	2000 g	1725 gr
<b>Wheels</b>	<b>Diameter</b>		Max 54 mm    51 mm Min 49 mm    47 mm
	<b>Width</b>	<b>Front</b>	Max 30 mm    31 mm
<b>Tires</b>		<b>Rear</b>	Max 50.8 mm    31 mm
<b>Diameter</b>	<b>Front</b>	Max 76.2 mm    67 mm	
	<b>Rear</b>	Max 81.3 mm    67 mm	
<b>Width</b>	<b>Front</b>	Max 30 mm    31 mm	
	<b>Rear</b>	Max 50.8 mm    31 mm	
	<b>Type</b>	Only	Foam
<b>Rear Spoiler</b>	<b>Chord</b>	Max	50.8 mm    50 mm
	<b>Width</b>	Max	250 mm    200 mm
<b>Rear Wing</b>	<b>Chord</b>	Max	76.2 mm    50 mm
	<b>Width</b>	Max	228 mm    200 mm
	<b>Side dam</b>	<b>Length</b>	Max 95.25 mm    50 mm
		<b>Height</b>	Max 50.8 mm    35 mm
<b>Transmission</b>	<b>Type</b>	Max	Two-Speed
<b>Engine</b>	<b>Size</b>	Only	.15 Open    .12 Open
<b>Exhaust Outlet</b>	<b>Inner</b>	Max	6.5 mm    5.2 mm
	<b>Length</b>	Min	15 mm    15 mm
<b>Fuel Tank</b>	<b>Size</b>	Max	80 cc    75 cc
<b>Drive</b>	<b>Type</b>	Only	4wd
<b>Body</b>	<b>Type</b>	Only	ROAR Approved
<b>Track</b>	<b>Lane Width</b>	Min	10 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	4 min
	<b>Lower Main</b>	Std	15-30 min
	<b>A Mains</b>	Std	30-60 min

## 2.5

**1/10 SCALE .12 ON-ROAD FUEL TOURING CAR 4WD (IFMAR CLASS)**

## 2.5.1 Dimensional Specifications:

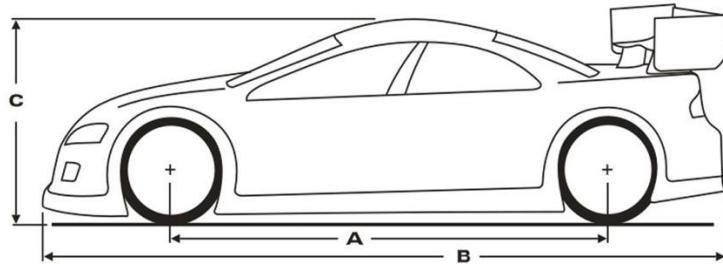
Item	Limit	Specification
<b>Wheelbase (A)</b>	Max	270 mm
	Min	230 mm
<b>Length (B)</b>	Max	460 mm
<b>Height (C) (with 20mm blocks under chassis)</b>	Min	130 mm
<b>Width</b>	Without Body (excluding stinger)	Max
	With Body (including stinger)	Max
<b>Weight</b>	Min	1650 gr
<b>Wheels</b>	Diameter	Min
	Width	Max
<b>Tires</b>	Width	Max
	Type	Either
<b>Rear Wing</b>	Chord	Max
	Width	Max
<b>Race Length</b>	Side dam	Length
		Height
<b>Transmission</b>	Type	Max
<b>Engine</b>	Type	Only
<b>Suspension</b>	Type	Only
<b>Exhaust Outlet</b>	Inner	Max
	Length	Min
<b>Fuel Tank</b>	Size	Max
<b>Drive</b>	Type	Only
<b>Race Length</b>	Qualifier	Std
	Lower Main	Std
	A Mains	Std

## 2.5.2 Body and Wing rules:

- 2.5.2.1. Bodies must resemble a 2 or 4-door vehicle that has run in a full-size Touring Car series.
- 2.5.2.2. Only one wing allowed; fitted in the same place as the wing on the original vehicle
- 2.5.2.3. The wing must be fastened to the rear deck of the body, not to the chassis of the vehicle
- 2.5.2.4. No part of the wing may extend above the roofline of the body.
- 2.5.2.5. The rear of the body may not be cut out higher than 60mm above the ground, measured with the chassis resting on 20mm high blocks.

## 2.6

## 1/10 SCALE .15 FUEL TOURING CAR 2WD



## 2.6.1 Dimensional Specifications:

Item		Limit	Specification
<b>Wheelbase (A)</b>		Max	280 mm
		Min	260 mm
<b>Length (B)</b>		Max	490 mm
<b>Height (C)</b>		Min	115 mm
<b>Width</b>		Max	250 mm
<b>Weight</b>		Min	1814 gr
<b>Wheels</b>	<b>Diameter</b>	Max	51 mm
		Min	41 mm
<b>Tires</b>	<b>Diameter</b>	Front	30 mm
		Rear	51 mm
	<b>Width</b>	Front	75 mm
		Rear	80 mm
	<b>Type</b>	Front	30 mm
		Rear	51 mm
<b>Rear Wing</b>		Only	Foam
	<b>Chord</b>	Max	76 mm
	<b>Width</b>	Max	229 mm
	<b>Side dam</b>	Length	95 mm
		Height	51 mm
<b>Transmission</b>	<b>Type</b>	Max	Two-Speed
<b>Engine</b>	<b>Size</b>	Only	.15 ROAR/IFMAR
<b>Exhaust Outlet</b>	<b>Inner</b>	Max	5.2 mm
	<b>Length</b>	Min	15 mm
<b>Fuel Tank</b>	<b>Size</b>	Max	80 cc
<b>Rear Suspension</b>	<b>Type</b>	Only	Independent
<b>Drive</b>	<b>Type</b>	Only	Rear Wheel
<b>Track</b>	<b>Lane Width</b>	Min	10 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	4 min
	<b>Lower Main</b>	Std	15-30 min
	<b>A Mains</b>	Std	30-60 min

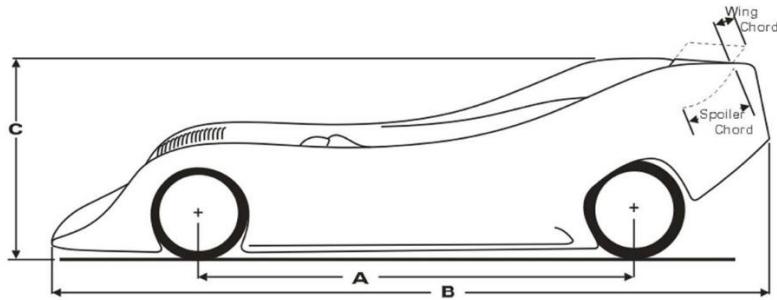
## 2.6.2

## Body and Wing rules:

- 2.6.2.1. Bodies must resemble a 2 or 4-door vehicle that has run in a full-size Touring Car series.
- 2.6.2.2. Only one wing allowed; fitted in the same place as the wing on the original vehicle
- 2.6.2.3. The wing must be fastened to the rear deck of the body, not to the chassis of the vehicle
- 2.6.2.4. No part of the wing may extend above the roofline of the body.
- 2.6.2.5. The rear of the body may not be cut out and must retain the bumper molding lines.

## 2.7

## 1/8 SCALE ON-ROAD FUEL (IFMAR CLASS)



## 2.7.1 Dimensional Specifications:

Item		Limit	Specification
<b>Wheelbase (A)</b>	Max	330 mm	
	Min	270 mm	
<b>Length (B)</b>	Max	637 mm	
<b>Height (C) to top of wing</b>	Max	180 mm	
<b>Width (see 2.7.2)</b>	Max	267 mm	
<b>Weight</b>	4WD class	Min	2350 gr
	Pan Class		2270 gr
<b>Wheels</b>	<b>Diameter</b>		Max 54 mm Min 44 mm
	Width	Front	Max 37 mm
<b>Tires</b>	Width	Rear	Max 64 mm
	<b>Diameter</b>		Front Max N/A Rear Max N/A
	<b>Width</b>		Front Max 37 mm Rear Max 64 mm
	<b>Type</b>		Only Foam
	<b>Rear Spoiler</b>		Chord Max 77 mm Width Max 267 mm
<b>Rear Wing</b>	<b>Chord</b>		Max 79 mm
	<b>Width</b>		Max 267 mm
	Side dam	Length	Max 76 mm
<b>Transmission</b>	<b>Height</b>		Max 38 mm
	Type		Max Three-speed
<b>Engine</b>	<b>Size</b>		Only .21 cc
<b>Exhaust Outlet</b>	<b>Inner</b>		Max 8 mm
	<b>Length</b>		Min 15 mm
<b>Fuel Tank</b>	<b>Size</b>		Max 125 cc
<b>Rear Suspension</b>	<b>Type</b>		Only Independent
<b>Drive</b>	<b>Type</b>		Either 2wd or 4wd
<b>Body</b>	<b>Style</b>		Only Can-Am, Sports/GT, WSC
<b>Track</b>	<b>Lane Width</b>		Min 12 ft
<b>Race Length</b>	<b>Qualifier</b>		Std 4 min
	<b>Lower Main</b>		Std 15-30 min
	<b>A Mains</b>		Std 30-60 min

2.7.2 Upper body widths will be checked by placing a caliper or similar tool, legs down, across the top of the body at any point

## 2.8 1/8 SCALE GT8 FUEL ON ROAD

### 2.8.1 Dimensional Specifications:

Item		Limit	Specification
<b>Wheelbase (A)</b>	Max	330 mm	
	Min	270 mm	
<b>Length (B)</b>	Max	730 mm	
<b>Height (C) (measured with suspension fully compressed)</b>	Max	250 mm	
<b>Width</b>	Max	310 mm	
<b>Weight</b>	Min	3500 grams	
<b>Wheels</b>	<b>Mounting Bead Diameter</b>	Max	79.00 mm / 84 mm
	<b>Overall Diameter</b>	Max	89 mm
	<b>Width</b>	Max	45 mm
<b>Tires</b>	<b>Diameter</b>		Max 119 mm Min 109 mm
	<b>Width</b>		Max 47 mm
	<b>Type</b>		Only Rubber
	<b>Side dam</b>	<b>Length</b>	Max 80 mm
<b>Rear Wing</b>		<b>Over Roof</b>	Max 10 mm
<b>Chord</b>	Max	79 mm	
<b>Width</b>	Max	310 mm	
<b>Body</b>	<b>Width</b>	Max	317 mm
<b>Transmission</b>	<b>Type</b>	Max	Two-speed
<b>Clutch</b>	<b>Shoe Type only</b>	Max	4 shoes
<b>Engine</b>	<b>Size</b>	Only	.21 cc
	<b>Port</b>	Only	5
	<b>Multi window exhaust ports</b>	Only	None
<b>Carburetor</b>	<b>Bore</b>	Max	7 mm
<b>Fuel Tank</b>	<b>Size</b>	Max	150 cc
<b>Exhaust Outlet</b>	<b>Inner</b>	Max	8 mm
	<b>Length</b>	Min	15 mm
<b>Pipe</b>	<b>Noise</b>	Max	85 db
	<b>Inside diameter</b>	Max	8 mm
	<b>Length outlet</b>	Max	15 mm
	<b>Internal moving parts</b>	Only	None
<b>Track</b>	<b>Lane Width</b>	Min	12 ft
<b>Race Length</b>	<b>Qualifier</b>	Std	4 min
	<b>Lower Main</b>	Std	15-30 min
	<b>A Mains</b>	Std	30-60 min

2.8.2 Pipes: Must meet ROAR guidelines; rubber extensions to stinger allowed

2.8.3 Chassis: Any 1/8 scale buggy-based shaft driven nitro powered car. Any off-road conversion is OK. Front of chassis may have front kickup or may be flat. Chassis with Kickup cannot be altered to change original manufacturers design.

2.8.4      Body and Wing:

- 2.8.4.1. Any commercially available Sports Car / GT Car style body with no engine head exposed beyond the body.
- 2.8.4.1. Sports Cars: Closed wheel cars designed specifically for racing in full-size series such as, GTP.
- 2.8.4.2. GT Cars: Modified versions of two door street cars
- 2.8.4.3. Bodies must include full front and rear fascia's (bodies are to be trimmed to the factory cut lines, front and rear), and conform to the rules herein that limit openings in the body for the purposes of re-fueling, starting, engine tuning, and antenna holes.
- 2.8.4.4. Wings and spoilers can be used if they are the original with the body and cut on the factory lines. Wings must be attached to the body.
- 2.8.4.5. All wheel wells must be cut out and rear of the bodies should maintain tail lamps and cannot be completely cut out.
- 2.8.4.6. 1 refueling hole allowed, must be over the tank opening and a maximum of 60mm in any direction.
- 2.8.4.7. 1 starting hole allowed, must be over the glow plug and have a maximum diameter no greater than 30mm.
- 2.8.4.8. 1 antenna hole allowed, maximum diameter of 10mm.
- 2.8.4.9. Engine tuning holes are allowed, but only for the purpose of adjusting carburetor needles.
- 2.8.4.10. Bodies should be neatly finished with headlights, grille and tail lights (see Rule 9.1.4).
- 2.8.4.11. No wedge style Bodies

2.8.5      Wheels: No dish wheels allowed

### **3. RULES FOR 1/5-SCALE FUEL CLASSES**

The following rules are additional rules for the 1/5-scale class. In most cases, the rules in this section are designed to further define the General Rules. Unless there is a stated direct override to a General Rule, the General rule applies.

#### **3.1 BODY RULES – SEDAN AND GT**

- 3.1.1 All vehicle bodies used in ROAR-sanctioned events must be realistic 1/5-scale models of an existing full-size vehicle. No mixing of vehicle designs is allowed.
- 3.1.2 Bodies must be ABS plastic or Lexan.
- 3.1.3 Bodies may not be reshaped (modified) from their original molding.
- 3.1.4 Bodies must cover the tires above their horizontal centerline when viewed from above.
- 3.1.5 Excessive "crash" damage must be repaired or the body replaced before the body shell will be allowed to compete in Level 3-5 events.
- 3.1.6 All bodies used in the STC class must be ROAR or IFMAR approved.
- 3.1.7 The Sports/GT and "Sportsman" classes may use any body that is within the written Specifications in 3.10 and complies with rule 3.1.1.
- 3.1.8 Bodies must be painted except for window areas, which must be clear or semi-transparent (see Rule 9.1.7).
- 3.1.9 No holes other than those specifically allowed below are permitted unless they existed on the full-size vehicle, in which case the openings in the body must be accurate in scale and position relative to the full-size vehicle, to within 10%. The responsibility for proof of scale accuracy lies with the driver of the vehicle.
- 3.1.10 Antenna holes, body mounting holes, and exhaust outlet holes (max. .8 inch (20mm) larger diameter than the outlet pipe diameter) are allowed.
- 3.1.11 Windshields may not be cut out.
- 3.1.12 All window cutout(s) must be within the molded lines for the window areas, with the exception of the corners that may have a radius no larger than .75" measured from the corner.
- 3.1.13 Side windows may be cut out for cooling. It is not allowed to mold air channels into the side windows for cooling. When windows are cut out, they must be completely cut out in a single hole.
- 3.1.14 If the rear window is cut out, it must be completely cut out unless the cut out is only for access to the Shut-off Switch. In this case, a single hole may be cut out inside a rear window area, located to allow easy access to the Shut-off Switch.
- 3.1.15 Drilling or cutting a series of holes in windows is not allowed.

#### **3.2 BODY RULES – FORMULA CARS**

- 3.2.1 All vehicle bodies used in ROAR-sanctioned events must be realistic 1/5-scale models of an existing full-size vehicle. No mixing of vehicle designs is allowed
- 3.2.2 Bodies must be ABS plastic or Lexan.
- 3.2.3 Bodies may not be reshaped (modified) from their original molding.
- 3.2.4 Excessive crash damage must be repaired or the body replaced before the body shell will be allowed to compete in Level 3-5 events.
- 3.2.5 Bodies must be painted except for window areas, which must be clear or open. No tinting of windows is allowed.
- 3.2.6 All cutouts must exist also in the full-size vehicle. Cuttings for engine and fuel tank are allowed in the area of the tank seal, starting device and adjusting screws for carburetor i.e. choke, neutral gear etc.
- 3.2.7 Antenna holes and body mounting holes are allowed.

### **3.3 BUMPER RULES – NON-FORMULA CARS**

- 3.3.1 Front foam bumpers are mandatory. The foam bumper must extend 1.4 inches (35mm) past the hard chassis and/or plastic bumper on all sides. The minimum bumper height is 1.5 inches (40mm).
- 3.3.2 No inflexible material for body shell mounting may protrude from the body more than .4 inches (10mm).

### **3.4 ENGINE RULES**

- 3.4.1 Only single-cylinder, two or four stroke, naturally aspirated, spark ignition engines equipped with pull-starters are allowed.
- 3.4.2 No Wankel-type, rotary valve, or fuel-injected engines are allowed.
- 3.4.3 The maximum displacement allowed is 1.4ci (23cc).
- 3.4.4 The engine case must be a single casting. The engine case must be factory- original. No billet-machined cases are permitted.
- 3.4.5 The cylinder and cylinder liner must be of one casting. No slip-in or independent liners (sleeves) allowed. Chrome plating or Nikasil coating of the cylinder bore is allowed.
- 3.4.6 The cylinder head may be a separate part machined from billet as long as the head is commercially available.
- 3.4.7 The maximum number of transfer ports (defined as the ports that allow the fresh air/fuel mixture into the combustion chamber) is limited to four (4).
- 3.4.8 The transfer ports must be open to the piston along their entire length in the cylinder. The piston must be used as the inner wall of the transfer port.
- 3.4.9 The side walls of the transfer ports must be parallel. No "lost wax casting" methods or other means may be used to provide "sweeping" side walls of the transfer ports.
- 3.4.10 The crankshaft must be of split-shaft configuration. No half crankshafts are allowed.
- 3.4.11 The connecting rod must be of one-piece construction.
- 3.4.12 The engine must be air-cooled by a flywheel-mounted fan.
- 3.4.13 Only passive ignition systems using one sensor (rpm) are allowed.
- 3.4.14 Ignition timing must be fixed. No mechanical timing advance/retard mechanisms allowed.
- 3.4.15 Resistor type spark plugs must be used. A metal-shielded resistor-type plug cap is recommended.
- 3.4.16 Variable exhaust timing/porting is not allowed.
- 3.4.17 Exhaust pipes with movable parts are not allowed. Sound eliminating fiber or like materials are not defined as moving parts within an exhaust system.
- 3.4.18 The maximum carburetor venturi diameter is .5 inch (13mm). An air filter must be fitted to the carburetor.
- 3.4.19 This rule only applies to ROAR level 3-5 events. There will only be two engines allowed for each class entered. These two engines must be checked in at the beginning of this event and logged for the class(s) in which they will be run. Only the primary of these engines may be used, for Qualifying as well as the Mains. The secondary engine may be used only in case of catastrophic failure of the primary engine. Catastrophic failure is defined by the primary engine being unable to operate. If the secondary engine is used, the damaged engine will be stored in the technical inspection area or another safe place until the end of the event. The engine used to set the driver's best qualifying time must be used in their main event. If the qualifying engine is deemed unable to operate prior to starting the mains, then the secondary engine will be allowed but the driver must start their main from the pit.

## **3.5 MUFFLER RULES**

- 3.5.1 All vehicles raced at a ROAR-sanctioned event must be equipped with muffler that complies with the following specifications.
- 3.5.2 The muffler/pipe must be of a multiple chamber design with an internal or external silencer. The maximum inside dimension of the exhaust outlet pipe is .5 inches (13mm). On STC and Sports/GT vehicles, the muffler stinger may not extend more than .4 inches (10mm) outside of body. On Formula vehicles, the muffler stinger must exit within the body shell side pods and point down towards the track surface.
- 3.5.3 Maximum noise level allowed is 85 dB(A) measured at a 90-degree angle to the direction of travel of the vehicle at a distance of 33 feet, 3 feet above the ground, with the engine at maximum throttle and at all speeds. The Race Director may decide on a different method of noise measurement as long as the results are the same. If there is no noise level equipment available, the Race Director can decide whether a vehicle that produces a noise level in excess of other cars will be allowed to compete.

## **3.6 FUEL RULES**

- 3.6.1 Only unleaded 'corner gas station' automotive pump gasoline available to the general public may be used. The use of aviation or racing gasoline that is not street legal automotive pump gasoline is specifically prohibited unless the race is to be run with event-provided gasoline. For events where event-provided gasoline will be used, the octane and type of fuel must be disclosed on all advertisements and entry forms. An additional fee may be added to the entry fee to cover the cost of the gasoline. The Race Director or Technical Inspector can require any contestant to use event-provided gasoline at any time prior to racing.
- 3.6.2 The only additive allowed in the gasoline is mass-produced two-stroke oil. When event-provided gasoline is used, the type and percentage of the oil used in the fuel must be disclosed on all advertisements and entry forms.
- 3.6.3 Maximum fuel system capacity is 700cc, including fuel lines. The capacity of fuel tanks will be measured using one of the procedures specified in Section 9.2.8. During a post-main inspection only, a maximum tolerance of +1% (7cc) will be allowed in the tank size.

## **3.7 TIRE RULES**

- 3.7.1 Tires must be black and of semi-pneumatic rubber construction. Foam tires are not allowed.
- 3.7.2 Foam inserts are allowed.
- 3.7.3 Tire traction compounds, other tire chemicals/additives, or chemical tire cleaners are not allowed.
- 3.7.4 New design, limited availability, or prototype tires may be banned from an event at the discretion of the Race Director.
- 3.7.5 In case of rain or other wet track conditions the use of rain tires may be allowed by the Race Director.

## **3.8 RADIO AND SERVO RULES**

- 3.8.1 Three channel radios are permitted, but the only functions allowed are steering, throttle, and brake.
- 3.8.2 No onboard traction control or other electronic aids are allowed, other than other than fail-safe systems.
- 3.8.3 A fail-safe radio/servo system is highly recommended, but not mandatory
- 3.8.4 It is highly suggested, but not mandatory, that separate battery systems be used, one for the radio receiver and a separate pack to power the control servos.

## **3.9 SAFETY RULES**

- 3.9.1 No refueling is allowed after the warm-up period for a race has begun, and no refueling is allowed during the running of any Qualifier or Main event.
- 3.9.2 In the case of an unforeseen delay after the warm-up has started for a Main event only, the Race Director should impound the cars at a pre-disclosed location until such time that the cars have cooled to the point where they can be safely refueled. When the race is ready to be restarted, cars will be allowed another 3-minute warm-up prior to the start.
- 3.9.3 Vehicles should have a fail-safe system that will positively return the vehicle's throttle to an idle position if the vehicle loses electrical power or its radio signal.
- 3.9.4 It is NOT recommended that the receiver battery used in any vehicle have a higher voltage than the voltage listed in the manufacturer's specifications for the radio receiver or servos being used.
- 3.9.5 Vehicles must have brakes in good working condition. Brakes must be capable of stopping a vehicle from racing speeds and must be able to hold the vehicle motionless with the engine running.
- 3.9.6 A shut off switch must be fitted to all vehicles, and its position on the vehicle must be marked on the body by a 20mm diameter white circle bordered in red, containing the letter "E" in red, centered in the circle. This marking must be located next to the switch or the access hole for the switch and must be kept clean. For STC and Sports/GT cars, the switch must be located either in the rear window area, or accessible through the rear window if this is cut out. . For Formula cars, the shut off switch must be accessible from the top of the vehicle with body on and clearly marked in accordance with this rule.

## **3.10 CLASS RULES**

- 3.10.1 Vehicles are divided into two classes by body type:
  - Super Touring Car (STC) (This is the official IFMAR World Championship class))
  - Sports GT (GT).
  - Formula Cars.
- 3.10.2 All classes may run together if there are insufficient entries to split into separate classes. Cars should not be split into separate classes if this will result in three or less cars running in a separate class.
- 3.10.3 For safety and cost control reasons, Formula cars should not be run at the same time as closed-wheel cars.
- 3.10.4 For Level 4 events, STC must be run as a separate class.
- 3.10.5 No "Stock" or "Sportsman" class is currently defined, as there is no general agreement on specifications for a "stock" engine. Race Organizers may define their own parameters for a 'stock engine environment' to suit a Sportsman class, such as 40 minute A-Mains. These parameters must be stated on the event's entry form and available to each entrant at the track.
- 3.10.6 Only the results of the Super Touring Car (STC) class will be used for the purposes of qualifying drivers for the IFMAR World Championships at qualifying events.
- 3.10.7 Transmission: Single speed only.
- 3.10.8 Rear suspension and drive:
  - Independent suspension allowed
  - Rear wheel drive only Specifications:

### 3.10.9 1/5 SCALE SUPER TOURING CAR (IFMAR CLASS) & SPORTS/GT

#### 3.10.9.1. Dimensional Specifications

Item	Limit	3.10.9.2 IFMAR Super Touring	3.10.9.3 Sports/GT
<b>Width</b>	Max	395 mm	
	Min	362 mm	
<b>Width (at widest point of body, excluding mirrors)</b>	Max		16.59"
<b>Length</b>	Min	798 mm	
<b>Height (measured at 6mm ground clearance)</b>	Min	248 mm	
<b>Ground clearance (measured with 10kg weight added to vehicle)</b>	Min	2.0 mm	
<b>Ground clearance at normal ride height</b>	Min		.236"
<b>Weight (without fuel)</b>	Max	12.0 kg	23.4 lbs.
	Min	9.5 kg	
<b>Wheels</b>	<b>Diameter</b>	Max	107 mm
<b>Tires</b>	<b>Diameter</b>	Max	136 mm
<b>Tire/Wheel Assembly</b>	<b>Width - Front</b>	Max	75 mm
	<b>Width - Rear</b>		80 mm
<b>Wing: only one single-element, painted or opaque wing allowed, no dihedral angles.</b>	<b>Width</b>	Max	300 mm
	<b>Chord</b>	Max	60 mm
	<b>Height above deck at centerline of vehicle</b>	Max	60 mm
	<b>Side dam height</b>	Max	60 mm
	<b>Side dam length</b>	Max	60 mm
			2.36"

#### 3.10.9.2. 1/5 SCALE SUPER TOURING CAR (IFMAR CLASS) Body & Wing Rules:

- 3.10.9.2.1 : Bodies must resemble FIA Class 2 or Class N, four door cars only, with a minimum full scale length of 165.4 inches (4200mm).
- 3.10.9.2.2 All dimensions must be within scale +/- 5% of the full-size vehicle represented.
- 3.10.9.2.3 The body must cover the outer edge of the tires at the center of the axle when viewed from above.
- 3.10.9.2.4 The leading and trailing edges of the wing must be parallel.

#### 3.10.9.3. 1/5 SCALE SPORTS/GT CLASS Body & Wing Rules:

- 3.10.9.3.1 All dimensions must be within scale +/- 5% of the full-size vehicle represented.
- 3.10.9.3.2 If there is doubt about the eligibility or dimensional accuracy of a body, it is the responsibility of the driver to provide proof of compliance with these rules.
- 3.10.9.3.3 No part of the wing or side plates may extend above the roofline of the vehicle.
- 3.10.9.3.4 The leading and trailing edges of the wing must be parallel, except where proof is provided of a different shape on the full-size vehicle.

### 3.10.10 1/5 SCALE FORMULA CLASS

#### 3.10.10.1. Dimensional Specifications:

Item	Limit	Specification
<b>Width across outer edges of tires</b>	Max	450mm
<b>Width across widest point of side pods</b>	Max	90% of actual width across tires
<b>Side Pod height</b>	Max	Level with the top of the front tires
<b>Height (at 6mm ground clearance)</b>	Max	250mm
<b>Weight (without fuel)</b>	Min	10,000g
<b>Wheelbase</b>	Max	635mm
	Min	605mm
<b>Front overhang (ahead of front wheel)</b>	Max	230mm
<b>Rear overhang (behind rear wheel centerline)</b>	Max	120mm
<b>Tires (see Note1)</b>	Diameter	Max 149mm Min 135mm
	<b>Width – front</b>	Max 75mm Min 60mm
<b>Tires</b>	<b>Width - Rear</b>	Max 85mm Min 5mm wider than front
	<b>Wheels (See Note 2)</b>	Diameter Max 85mm Min 75mm
<b>Wing - Front</b>	<b>Width</b>	Max 375mm
	<b>Chord</b>	Max 120mm
	<b>Height</b>	Max Centerline of front wheels
<b>Wing – Rear</b>	<b>Side profile</b>	Max 95mm wide X 120mm
	<b>Number of wing elements</b>	Max 2
	<b>Width</b>	Max Distance between inner edges of rear tires

Note 1: Front and rear tires must have the same diameter.

Note 2: No mixture of maximum and minimum tolerances on wheels and tires is allowed. If wheels are on maximum size, then tires may not be on minimum size, etc.

#### 3.10.10.2. Body and Wing rules:

- Bodies must resemble full-size vehicles raced in Formula One, CART, IRL or similar open-wheel classes.
- All dimensions must be within scale +/- 5% of the full-size vehicle represented.
- If there is doubt about the eligibility or dimensional accuracy of a body, it is the responsibility of the driver to provide proof of compliance with these rules.
- The front wing assembly must be mounted to the chassis in such a way that it can bend up or down in case of an accident.
- Front wings are considered part of the body shell, and must therefore be repaired immediately should they be damaged or fall off the vehicle during a race.
- Rear wings may be removed if damaged, but are not required to be replaced during the race.
- All vehicles must start the qualifiers and mains with all wings present.

### **3.11      QUALIFYING RULES**

- 3.11.1    Qualifiers will be 5 to 10 minutes in length with a 3-minute warm-up period.
- 3.11.2    The number of qualifying rounds will be up to the Race Director, but a minimum of 3 rounds is suggested.
- 3.11.3    When an event is not a ROAR Level 3-5 event, a suggested method for qualifying would be: Begin the clock as an IFMAR style run. After a 3-minute warm-up period, sound a starting horn. At the end of the run sound a finish tone or horn. Highest number of laps in the shortest time will set the mains. The actual method of qualifying must be announced before qualifying begins.
- 3.11.4    If the event is a ROAR Level 3-5, the IFMAR qualifying method will be used.
- 3.11.5    The best two of three (3) qualifying rounds using the ROAR Qual-Points System will be used to set the mains.
- 3.11.6    The mains will be set with two (2) bump ups.
- 3.11.7    For other scoring system protocols, like single lap, scorekeeping deviations must be requested from ROAR. The main consideration at Level 3-5 events is the capability of the scorekeeping system to handle the type of qualifying desired. The (approved) scorekeeping system will be disclosed on all racing flyers and entry forms. At Level 5 events, the first-place finisher in sub-mains will bump up to the next level. At Level 5 events, the top 9 qualifiers will automatically be placed in the A-Main.

### **3.12      RACING RULES**

- 3.12.1    All races must be preceded by a 3-minute warm-up period.
- 3.12.2    A staggered standing start or rolling start in qualifying formation may be used at the discretion of the Race Director.
- 3.12.3    Races will be run using air horns, loudspeakers and/or flags to alert drivers of a caution situation.
- 3.12.4    Signal definitions:

<b>Caution type</b>	<b>Horn/PA signal</b>	<b>Flag Signal</b>	<b>Action</b>
1	Single 2-second blast	Green Flag	All clear, continue racing
2	Two 1-second blasts	Yellow Flag	Caution – slow driving required on all parts of the track
3	Three 1-second blasts	Red Flag	Stop immediately

- 3.12.5    Under Caution #2 (Yellow flag) condition, all racers must bring their cars to a slow controllable speed and are not allowed to pass.
- 3.12.6    Under Caution #3 (Red Flag) condition, all racers must stop their vehicles immediately wherever they are on the track surface.
- 3.12.7    A Caution #2 or #3 (Yellow or Red Flag) condition must be called prior to anyone going onto the racetrack. No corner marshals or mechanics are allowed on the track during practice or racing without a caution being called. Marshals will wait until race vehicles come to a slow, controlled pace before entering racing area. Track maintenance must be done under a caution condition.

### **3.13      PENALTIES**

- 3.13.1    Rough driving, or passing under a Caution #2 (Yellow Flag) will incur a ten- second stop-and-go penalty. A second offense may result in disqualification at the discretion of the Race Director.
- 3.13.2    Failure to obey a Caution #3 (Red Flag) will result in disqualification from the race in which the offense occurred.

## **4. GENERAL RULES**

### **4.1 GENERAL**

- 4.1.1 Background: ROAR (Remotely Operated Auto Racers) began in 1967 to promote and regulate radio-controlled auto racing for fuel powered model cars. Over the years, ROAR has developed and refined the rules to govern the racing of both electric and fuel powered cars at ROAR-sanctioned events.
- Guide the development of the sport
  - Provide for its growth and welfare
  - Establish minimum requirements for participation in the sport
  - Ensure fair and equitable application to all aspects of the sport and its participants.
- 4.1.2 These rules govern the conditions at all ROAR-sanctioned events. ROAR members participating in (or making application to participate in) a ROAR- sanctioned event, ROAR-affiliated clubs or tracks presenting (or making application to present) a ROAR-sanctioned race, and manufacturers making application for the approval of products for use at ROAR-sanctioned events are deemed to have agreed to comply with all ROAR Rules and with any decisions made by ROAR officials.
- 4.1.3 ROAR may act at any time during the preparation for, the running of, or after a ROAR-sanctioned event to change anything that ROAR believes to be contrary to the best interest of the sport or the organization. This includes denying or rescinding ROAR sanction for an event. A ROAR-sanctioned event is a sporting event, and ROAR will always consider the sporting interest before anyone's financial interest, including that of the event organizer.
- 4.1.4 These rules are the sole property of ROAR. The use of these rules, or of previous versions of these rules by any organization or individual without the prior written consent of ROAR is forbidden. This consent will not be unreasonably withheld, but it must be requested together with sufficient information to assure the ROAR Executive Committee that the use of these rules will not bring ROAR into disrepute.
- 4.1.5 Any separation of rules into categories is strictly for the convenience of ROAR.
- 4.1.6 General rules and procedures contained in Sections 1 through 7 of these Rules apply to all classes.
- 4.1.7 Any addition to the rules and technical specifications mentioned herein, ROAR issues and maintains specific procedures for adherence by promoters, track owners, manufacturers, and affiliated clubs at ROAR-sanctioned events, and procedures governing products submitted to ROAR for approval.
- 4.1.8 It is the responsibility of members, track owners, and race sponsors to meet all rules and specifications contained in this rulebook, in the National Guidelines for the current year posted on the ROAR website.
- 4.1.9 The use of the words "vehicle" or "vehicles" in these rules is intended to include both cars and trucks.
- 4.1.10 In the case of any conflict or inconsistency between any provision in these ROAR Rules and a rule or guideline published in the ROAR Nationals Guidelines, the ROAR Rules take precedence over the National Guidelines until the Executive Committee resolves the conflict by formally modifying one or both of these documents..
- 4.1.11 ROAR-sanctioned races are defined as follows:
- Level 1: Local track races and series
  - Level 2: Multi-city Series Championships and other regional races
  - Level 3: Regional and State Championships
  - Level 4: ROAR Championships, multi-regional or super regional open events
  - Level 5: ROAR RMT (Race Management Team) National Championships.

4.1.12 Member tracks are eligible to run any of these races, subject to the sanction procedures in place for the relevant level. It is recommended that a track run a Level 2 event before a Level 3, and a Level 3 event before a Level 4 event. It is strongly recommended the region director evaluate the sanction requests for levels of experience prior to submitting the event to the calendar located at [www.roarracing.com](http://www.roarracing.com).

4.1.13 SANCTIONING PROCEDURES:

- Sanction Numbers are issued by the ROAR Competition Director for Level 5 events and by the Regional Directors for Level 2-4 events.
- All entry forms and other advertising for Level 5 events must carry the ROAR Sanction number.
- Level 5 events must be sanctioned by the ROAR Executive Committee, under signature of the ROAR Competition Director. The term "ROAR National" cannot be used in conjunction with any event that has not been so sanctioned by the Executive Committee. Level 5 events must be attended by the Race Management Team (RMT) or by decision of the ROAR ExCom another method of management of the event.

## 4.2 REVISION POLICY

4.2.1 These rules supersede all previous editions of the ROAR rules.

4.2.2 These Rules will be revised as needed.

4.2.3 Members, ROAR Officials, Track Operators, and Industry Affiliates are encouraged to send suggested rules additions or changes directly to the chairpersons of these committees. Proposals or suggestions may be submitted to any member of the ROAR Executive Committee, but these submissions will be referred to the relevant Section Chairpersons for discussion and acceptance before being reviewed by the ROAR Executive Committee.

4.2.4 The ROAR Executive Committee will review all proposals submitted by the Section Chairpersons and must approve these proposals for them to be included in the ROAR rulebook.

4.2.5 For Level 3-5 events, the final interpretation of any questioned ROAR rule is the responsibility of the Designated ROAR Official for that event. Special rulings may be made by the Designated ROAR Official at an event to amend, suspend, or modify existing rules to account for conditions arising from the location of the event, the condition of the course, weather conditions, or other circumstances requiring such a ruling. Such special rulings will be effective for the event in question only, with no precedence being established for any subsequent event.

## 4.3 COST CONTROL

4.3.1 ROAR is dedicated to controlling the cost of racing and making it affordable for entry level drivers to become involved in the sport.

4.3.2 Members are encouraged to submit suggestions to the President, Section Chairpersons or ROAR Administrator that will help in controlling or lowering the costs while maintaining a fair playing field.

4.3.3 Tracks are encouraged to offer cost-controlled classes that will allow new drivers to enter the sport with a minimum investment and others to participate at a reasonable cost.

4.3.4 In offering cost-controlled classes, tracks may specify the batteries, bodies, chassis, gear ratios, motors, tires, etc. that may be used. Care should be taken not to restrict usage of any of these items to a single manufacturer.

## **4.4 INDEMNITIES**

- 4.4.1 No ROAR member, Industry affiliate, event organizer or sponsor, or track owner, will have any claim against ROAR, its agents, officers, officials or employees, for loss or damage of any kind related to or originating from delays, postponements or cancellations of all or part of an event because of inclement weather, equipment failure, or any other reason.
- 4.4.2 No driver, pit crewmember or sponsor will have any claim for damages, expenses, lawsuits, or otherwise against a promoter, track operator, or ROAR, its officials, agents, or employees, arising from damage to any vehicle, personal injury, or monetary loss of any kind whatsoever. Drivers, pit crewmembers, and sponsors waive any claim they may have against a promoter, track operator, or ROAR, when they participate in any racing activity conducted under these rules.
- 4.4.3 The specifications and standards contained in these rules are intended as a guide with respect to safety and for the equitable conduct of races, and for no other purpose, either expressed or implied. The use of these rules by any association, organization, manufacturer or individual is entirely voluntary and ROAR will accept no responsibility for consequences resulting from their application.
- 4.4.4 No implied or expressed warranty of safety shall result from the publication of, or compliance with these rules. They are intended as guidelines for the conduct of the sport and are in no way a guarantee against injury of any sort to participants, spectators or others.
- 4.4.5 ROAR accepts no responsibility whatsoever for the failure or malfunction of any product built according to these rules, nor for the consequences of such failure or malfunction. Similarly, ROAR accepts no responsibility whatsoever for the failure or malfunction of any item of equipment used at a ROAR-sanctioned event, nor for the consequences of such failure or malfunction.
- 4.4.6 ROAR is not liable for the actions or decisions of any individual, race promoter, manufacturer or organization using these rules.

## **4.5 ENVIRONMENT, HEALTH AND SAFETY**

- 4.5.1 **TOBACCO PRODUCTS** All ROAR tracks and clubs should provide adequate smoking and chewing facilities to separate (or at least place downwind) the use of tobacco, vapor and electronic smoke products from those with children or those wishing not to be confronted by tobacco smoke and wastes. Since laws vary across North America, this rule remains a recommendation. ROAR cannot make something illegal that lies outside of our jurisdiction. Otherwise, ROAR would outlaw the use of tobacco products at all ROAR events. Smoking is prohibited on the drivers stand, pit lane and while marshaling.
- 4.5.2 Open flames or smoking are prohibited within 50 feet of areas where fuel (either nitro or gasoline) is present.
- 4.5.3 Racing activities must always provide for the maximum safety of all individuals including spectators, drivers, pit crews, and officials. Care should be taken when organizing unusual or unfamiliar racing formats or events, to ensure that safety is not compromised.
- 4.5.4 The safety of spectators is of prime importance and must be considered when laying out tracks and spectator areas. A positive means of stopping a vehicle must be provided between the track area and any area accessible to spectators, drivers, officials, or pit crews. The main consideration for selecting this barrier will be the protection of the individual and not protection of the cars or convenience of operation. Barriers must meet the specifications contained in section 5.1 .
- 4.5.5 The safety of officials, drivers, and pit crews is of equal importance, but it is assumed that they are more aware of any potential danger. Barriers as specified in section 2.1. Track Barriers shall be provided between the racing surface and the areas used for the pits and the drivers' stand, and to protect those officials who must occupy relatively fixed positions near the racing surface.
- 4.5.6 Everyone in the racing area and pits, including spectators, must wear closed- toe shoes. Anyone behind the spectator control barrier is not included in this requirement, provided there is a positive means of preventing entry to the racing area.
- 4.5.7 Disabled cars will be taken off the track. No repair work will be allowed on the track or the infield while a race is taking place.
- 4.5.8 A driver may not operate a vehicle while positioned outside the designated driving area or drivers' stand, or on any surface other than the racing surface or designated pit lane (where relevant)

- 4.5.9 The Race Director must ensure that all drivers, pit crewmembers, and spectators are in a safe position while the cars are on the track.
- 4.5.10 Prior to operating a vehicle, all drivers must sign in and give officials the radio frequencies that will be used. Except in the case of a driver using a 2.4GHz DSM/DSS system, Race officials must approve any changes to these frequencies.
- 4.5.11 All drivers operating vehicles in practice sessions or working on a vehicle in the pits with its radio on, must comply with the appropriate frequency control system in use at the facility, or have approval from a race official. At facilities using the “clip off” system, the driver must display the frequency clip prominently, preferably on the antenna of the transmitter. At facilities using the “clip on” system, the driver must ensure that a clip or other marker displaying his name is attached to the correct frequency identifier on the frequency board before turning on his transmitter.
- 4.5.12 Drivers must turn their radios on before turning their vehicle on or starting its engine. Drivers must also turn their vehicle off or stop its engine before turning their radios off. All fuel-powered cars on the track or in the pits must be controlled by a working radio, be on a test stand, or be in the hot pit area. Drivers are NOT permitted to turn on any transmitter (except for 2.4 ghz DSS/DSM radios) during any race unless they are officially participating in that heat or main or practice session.
- 4.5.13 Race Officials may inspect any component of a vehicle at any time and may prohibit said vehicle from running if a safety hazard is suspected and cannot be corrected before the race begins.
- 4.5.14 Off-road cars with exposed gears must be equipped with gear covers. Vehicles found without gear covers at pre-race inspection will not be allowed to compete in that race, and vehicles found without gear covers at post-race inspection will be disqualified from that race unless adequate proof can be provided that the cover was forcibly lost during the race.
- 4.5.15 At all ROAR events, functioning portable UL approved 2-1/2-pound minimum, ABC rated dry chemical or halon fire extinguishers, equipped with capacity gauges, must be in the pits and at trackside. Tracks must have two (2) 5-gallon buckets of sand one at pit entrance and pit exit. Also, the track must have several 5-gallon buckets of sand placed in the racers pit/table/chair area.
- 4.5.16 At fuel events, provisions for the proper disposal of waste fuel must also be in place.
- 4.5.17 A suitable, weatherproof first aid kit, composed of individually packaged supplies, must be available at all events, and a telephone number for medical assistance should be posted on the first aid kit, at the Race Control area, and near all phones.
- 4.5.18 For safety reasons, if an auxiliary battery is used in any vehicle to provide power to the radio system, this battery should not have a higher voltage than the voltage listed in the manufacturer's specifications for the radio receiver and servos being used.
- 4.5.19 **The use of flammable liquids for the purpose of cooling overheated engines is strictly prohibited.** A min of two half-gallon containers of water must be available in the pits for cooling overheated engines.

## 4.6 OFFICIALS

- 4.6.1 ROAR wants to assure the fair application of these rules at Roar-sanctioned races of all levels. The number of officials required to conduct an event depends on the event level. As the number of entries at, or the importance of the outcome of an event, increases, so does the need to increase the number of officials to handle the required duties. The Race Director needs to have extensive staff coordination and delegation experience to successfully manage a ROAR Level 4 or 5 events.
- 4.6.2 Level 1 races have the minimum requirements for officials, needing only a Race Director, Technical Inspector and Scorekeeper. The list of officials below provides guidance as to the duties to be handled at the different levels. Having quality, knowledgeable personnel and the racer's respect of the host's ability to apply ROAR rules is paramount in having an event go well. When all participants (racers, officials, organizers, etc.) are aware of their position and corresponding responsibilities, the event will go smoothly.
- 4.6.3 Refreshments and necessary relief time should be provided for any officials who, because of their race duties, may have difficulty getting time for these necessities on their own. Complimenting members of your work force with refreshments is highly appreciated.

4.6.4 Any rule listing an Official indicates the lowest ranking Official given authority by ROAR to take action on the rule. This does not limit or restrict a higher ROAR Official from imposing a similar, overriding, or more immediate action.

#### 4.6.5 REQUIREMENTS FOR RACE OFFICIALS

Official Name	Event Level	ROAR Membership
<b>Designated ROAR Official</b>	3,4	Full
	5	Full – ExCom or Representative
<b>Race Director</b>	1,2,3	Full
	5	Full – ExCom or Representative
<b>Referee</b>	3, 4, 5	Full
<b>Technical Inspectors</b>	All	Full
<b>Scorekeepers</b>	All	Full
<b>Registration Controller</b>	All	Full
<b>Radio Impound Deputies</b>	3,4,5	Single-event
<b>Track maintenance (non-official)</b>	All	Single-event
<b>Snack Sales (non-official)</b>	All	None
<b>Sanitary &amp; facility maintenance (non-official)</b>	All	None
<b>Crowd Control (non-official)</b>	3,4,5	None

#### 4.6.6 Authorities and Responsibilities:

- 4.6.6.1. The Race Director and Referee are responsible for making immediate official judgments and/or applying penalties according to the ROAR rules through the course of an event.
- 4.6.6.2. In the event of disagreements among Officials, the final decision lies with the Official highest on the chain of command who witnessed the incident.
- 4.6.6.3. The Designated ROAR Official, Race Director, and Referee may not hold any other duties. Other Officials may assume more than one duty if necessary, although one Official per duty is ideal. For Levels 3-4 events these officials may race or participate but only if they have an announced co-official who will assume those duties when the participation takes place
- 4.6.6.4. The Designated ROAR Official, Race Director, and Referee cannot race or participate as a pit person in the hot pit area in Level 5 events at which they are officiating. The DRO, Race Director, and the Referee will be acknowledged at the first drivers' meeting. If these officials require relief from their duties a public announcement shall be made naming their replacement.
- 4.6.6.5. The ROAR Officials at level 3-5 events represent ROAR and therefore have taken the responsibility to ensure that the ROAR rules are interpreted and applied correctly. This person is the Senior Official at the event.
- 4.6.6.6. The Race Director, Designated ROAR Official, and/or Referee will have the authority to penalize or disqualify any driver for the violation of these rules.
- 4.6.6.7. The Race Director will have overall responsibility for the conduct of an event according to these rules.
- 4.6.7. Race personnel will be directly responsible to the Race Director. The Race Director is responsible to the Designated ROAR Official during the event and ultimately to the ROAR Executive Committee.
- 4.6.8. Any finding, penalty, or disqualification assessed at an event is final for that event but will not imply or create a precedent for any other event unless specifically confirmed as such by the ROAR Executive Committee.
- 4.6.9. For procedural and technical rulings and policies at an event, the chain of command and authority, from lowest to highest, is: (1) Race Official; (2) Race Director; (3) Designated ROAR Official.

## 5. TRACK SPECIFICATIONS

### 5.1 BARRIERS

- 5.1.1 Barriers must be supported in such a manner that sharp contact will not cause them to fall over or become ineffective, thus allowing cars to pass through an opening.
- 5.1.2 All barriers must be in good condition, not deteriorated by weather or other causes.
- 5.1.3 Permanent features of the race site, such as curbs or grassy areas, may be utilized.
- 5.1.4 Spectator control must be established at least five feet outside the barriers. For fuel on-road courses, control should be established at least ten feet outside the barriers. For 1/5-scale courses, control should be established at least 25 feet from high-speed areas of the track.
- 5.1.5 Minimum barrier specifications are as follows: (metal barriers may be substituted)

Class	Outer Barriers			Inner Barriers		
	Thickness	Height	Material	Thickness	Height	Material
<b>1/12 &amp; 1/10 Electric On-Road</b>	0.5"	3.5"	Plywood	1.5"	2.0"	Wood or PVC*
<b>1/10 Off-Road Electric &amp; Fuel</b>	0.5"	3.5"	Plywood	3" diameter		PVC Pipe
<b>1/10 On-Road Fuel</b>	0.7"	7.5"	Plywood	1.5"	3.5"	Wood
<b>1/8 Off-Road Fuel</b>	0.7"	7.5"	Plywood	3" diameter		PVC Pipe
<b>1/8 On-Road Fuel</b>	0.7"	7.5"	Plywood	1.5"	3.5"	Wood
<b>1/5 On-Road</b>	0.7"	7.5"	Plywood	1.5"	3.5"	Wood

\*Note: Flex-Track type Inner Barriers need only conform to minimum height restriction.

- 5.1.6 In addition to the barriers specified above, the following should be used to protect any spectator areas:
  - On Road Courses: the spectator areas in high speed portions of the track should be separated by a catch fence. This should be wire fence or construction netting at least 24" high, placed 5' or more from the outer barrier (catch fence), capable of retaining a vehicle at speed, must be placed in all areas where the cars are traveling in excess of 25mph. It must be positioned either behind the 10 inch outside barrier or placed at a minimum of 16 inches from the marking lines of the track if no other outside barrier is used. This barrier must be made of a material capable of stopping a retaining wall.
  - 1/5-scale On-Road Courses: a three-foot high secondary barrier (catch fence), capable of retaining a vehicle at speed, must be placed in all areas where the cars are traveling in excess of 25mph. It must be positioned either behind the 10 inch outside barrier or placed at a minimum of 16 inches from the marking lines of the track if no other outside barrier is used. This barrier must be made of a material capable of stopping a 1/5-scale vehicle.
- 5.1.7 All barriers, portable or permanent, should be linked in such a manner that they present a surface toward the track that will not damage a vehicle if it makes contact in a grazing manner while proceeding around the track. Overlapping of barriers must always be away from the direction of travel.
- 5.1.8 A positive means of stopping a vehicle that leaves the racing surface must be provided.
- 5.1.9 Supplemental barriers sufficient to stop a vehicle must be placed in any area where swinging wide or loss of control could result in a vehicle going beyond the outer retaining barrier. Such barriers should be no closer than 18" to any portion of the racing surface.
- 5.1.10 The outer limits of the track must have barriers that will prevent cars from leaving the racing surface under normal racing conditions. These barriers must be easily distinguishable to the drivers.
- 5.1.11 Lanes must be sufficiently separated by either natural or artificial barriers to prevent cars from crossing into oncoming traffic. Where tracks have multiple layouts, those sections not in use must be separated from the racing configuration by barriers or other deterrents that prevent cars from using these sections.

- 5.1.12 Tapered boards, highway dots, or similar deterrents should be placed approximately 6" inside the inner-boundary turn markings to discourage corner cutting. Such devices may not be higher than 2" and must be tapered to allow cars to ride over them. They should be firmly secured to prevent movement onto the racing surface.
- 5.1.13 No device may be used on a high-speed portion of the track or at the end of a high speed straightaway that may cause a vehicle to be launched upward if struck. Plow discs or similar devices may not be used at the end of high-speed straights.

## 5.2 RACING FACILITIES

- 5.2.1 For fuel-powered racing, a pit lane must be provided that has a convenient and safe entrance and exit to and from the racing surface. It must be separated from the racing surface by a barrier of the same specifications as the inner barriers for the class of cars being raced. There must be a second barrier of at least the same specifications of the outer barrier between the pit lane and the working pit areas.
- 5.2.2 All refueling, repairing, or servicing of cars must be accomplished with the vehicles fully behind the barrier between the pit lane and the working pit area, and not in or over the pit lane. Off road cars may be placed on top of the exterior pit walls for servicing provided the wall has been designed so that the car is secure and stable.
- 5.2.3 A hot pit area, where fuel engines can be started and tested, should be provided that is separate from the racing pit area.
- 5.2.4 A drivers' area or stand must be provided that gives all drivers an essentially equal view of the track during practice and competition. Two and one-half feet (30 inches) of space per driver is the recommended minimum. Elevated drivers' stands are recommended provided they are constructed in such a manner as to afford safety to all drivers standing on them. Flooring material will be secured and capable of holding all drivers. A railing or other safety device is recommended for any stand over 18" above the ground. Please consult your local building code for final ruling. If stairways are required, they must be constructed to meet local safety codes.
- 5.2.5 An area that is accessible to handicapped drivers must be provided which allows an unobstructed view of the track.
- 5.2.6 All indoor tracks must be adequately lit for the entire width and length of the racing surface. Any inoperative light bulb must be replaced at the first available opportunity between races.

## 5.3 SURFACES

5.3.1 Water hazards of any type are strictly prohibited. Water hazards are defined as permanent features of the track that contain standing water. Puddles formed by rain or by the watering of an off-road track are not defined as hazards, although precautions should be taken to avoid damage being caused to cars by having to negotiate such puddles.

5.3.2 Surface (lane) widths for each class/scale are:

Scale / Class	Surface	Minimum Lane Width
<b>1/12 Electric On-Road</b>	Carpet or paved	6 feet
<b>1/10 Electric Off-Road</b>	Off-road	8 feet
<b>1/10 Electric On-Road</b>	Carpet	8 feet
<b>1/10 Electric On-Road</b>	Paved	10 feet
<b>1/10 Electric CART/F1/IRL</b>	Carpet or Paved	8 feet
<b>1/8 Electric Off-Road</b>	Off-road	10 feet
<b>1/10 Fuel On-Road</b>	Paved	10 feet
<b>1/10 Fuel Off-Road</b>	Off-road	8 feet
<b>1/8 Fuel On-Road</b>	Paved	12 feet
<b>1/8 Fuel Off-Road</b>	Off-road	10 feet
<b>Monster Truck</b>	Off-road	10 feet
<b>1/5 Fuel On-Road</b>	Paved	12 feet

5.3.3 On-road paved track surfaces must be asphalt or finished concrete with smooth expansion joints. The race direction is clockwise for road courses. A change in race direction is permitted if notification is included in the race flyer.

5.3.4 Off-road courses may be kept damp or left dry at the Race Director's discretion provided that, when qualifying, an Off-Road track's surface condition (damp or dry) must be maintained through the entire round as necessary to help provide approximately the same conditions for all racers in a given class. The planned schedule for watering the track should be posted in advance. Race direction is optional, but clockwise is recommended.

5.3.5 Off-road jumps should be designed so that they minimize damage to cars in the normal course of racing, do not pose a hazard to turn marshals, and do not interfere with timing and lap scoring. Special care should be taken when placing jumps close to the entry or exit from the pit lane to ensure that cars entering or exiting the pits are not damaged by cars negotiating the jump

## **6. DRIVER RULES**

### **6.1 GENERAL DRIVERS RULES**

- 6.1.1 ROAR membership is required to participate in any ROAR-sanctioned event.
- 6.1.2 Only ROAR members having current full year memberships may participate in Level 5 ROAR National Championships, either as drivers or pit crewmembers. Drivers entering these events must present proof of current annual membership or join prior to participating.
- 6.1.3 Single event memberships may be offered at Level 1-4 events. The price of such memberships will be credited to the driver if that driver elects to upgrade to a full membership during the same calendar year.
- 6.1.4 The Race Director of a Level 1-3 event has the right to refuse any entry application for a valid reason. The approval of the ROAR Executive Committee or the designated ROAR Official is needed for entry refusal of a ROAR member at Levels 4-5 sanctioned events. Drivers may withdraw from a class during an event but once withdrawn, cannot participate later as a driver in that class of that particular event.
- 6.1.5 All drivers must attend the drivers' meeting. Racing rules, approved deviations and event- specific rule interpretations or procedures will be covered during this meeting. Pertinent executive decisions and temporary necessary rule changes must be disclosed during Driver's Meetings. The Race Director may give a one-lap penalty on the best qualifier or best A-Main of drivers that do not attend or cause unnecessary delay of a drivers' meeting.
- 6.1.6 A driver will not permit another driver to compete for him in any race (qualifying heat or Main), and no non-driver will be allowed to operate a vehicle on the track during a ROAR-sanctioned event. A non-driver is any person not entered and registered as a driver for the event in question.
- 6.1.7 No person under suspension by the Executive Committee will be permitted to participate in any ROAR- sanctioned event or be allowed to enter the working pits or race area of such events.
- 6.1.8 Drivers are responsible for the actions and conduct of their pit crew. Pit crewmembers must be, at the minimum, single event ROAR members if they are to be in the working pits, hot pits, or race area of levels1-3 events and full members for all other sanctioned events.
- 6.1.9 During qualifying, one pit member per vehicle will be allowed in the hot pits. During the mains, two are allowed.
- 6.1.10 The Radio Impound and timing/scoring areas are off limits to all participants unless otherwise directed.
- 6.1.11 Drivers are not allowed to stand on any device on the drivers stand that brings their waist level above the railing height. Should a shorter driver need to be elevated to see over the railing, the driver may use a small step stool or small step-ladder however at no time should their waist (measured at the belt-line) be above the railing. The stool or step-ladder must be removed from the driver stand following the conclusion of the race and before the next race begin. Drivers may not use milk crates, 5-gallon buckets or other improvised stands in lieu of a proper step-stool or step-ladder. Race Director has the final as to whether the means chosen to provide a driver with elevated perspective is sufficiently safe for the driver, other competitors on the drivers stand, any anyone else that may come into close proximity with that driver. Failure to abide by this will result in a 1 lap penalty or DQ.

## **7. RADIO CONTROL EQUIPMENT**

### **7.1 RADIO FREQUENCY RULES**

- 7.1.1 Radio control systems used in ROAR competition are limited to the following channels:
  - 2.4GHz DSM/DSS systems
  - 75 MHz Surface Radio systems
- 7.1.2 Drivers using 50 MHz and 53 MHz radios must have an FCC Amateur Radio license issued for that radio in their possession.
- 7.1.3 All radio equipment must conform to FCC rules for U.S. operations.
- 7.1.4 The use of radios operating on 29 MHz, 72 MHz, 40 MHz, or Citizens Band (26-27 MHz) channels is prohibited.

### **7.2 GENERAL RADIO EQUIPMENT AND ELECTRONIC SPEED CONTROL RULES**

- 7.2.1 Except in the case of 2.4GHz DSM/DSS systems, radios must display the clip for the frequency used during practice. Radios must be able to change frequencies. At Level 3-5 events, two alternate frequencies are required.
- 7.2.2 Transmitters are limited to the manufacturer's recommended voltage. External transmitter battery packs are not permitted.
- 7.2.3 Except in 1/5 scale class vehicles, radio systems are limited to the use of two channels, operating two servos, or a combination of one servo and one electronic speed controller. More than one function is allowed per device, but a servo is limited to one output shaft. Control is limited to forward, brake, and steering. The use of reverse in competition is not allowed. On 1/5 scale vehicles, three channels and more than two servos may be used, but control is limited to forward, brake and steering.
- 7.2.4 For all classes that require fixed motor timing (aka "blinky mode"), the Electronic Speed Controller (ESC) must be rendered incapable of changing that timing mode by any remote means. ESCs with built-in Bluetooth, NFC, Infrared, Wi-Fi, or other means of wireless remote programming capability will not be allowed to compete in ROAR-sanctioned events.
- 7.2.5 Any ESC programming module must be completely disconnected and removed before the vehicle is submitted for pre-race technical inspection. The ESC programming module must remain disconnected and out of the car until the race is finished and post-race inspection has been completed. ESC programming modules are not allowed in the tech inspection area, in the pre-race staging area, on the driver's stand, or in the post-race impound area.
- 7.2.6 All ROAR-approved ESCs must have the most recent ROAR-approved software version installed. It is the driver's responsibility to provide the means for updating the ESC software if necessary. Beta versions of ESC software will not be considered for ROAR approval and will not be allowed to run in ROAR-sanctioned events. Any modifications or revisions to the previously approved ESC software requires a new ROAR inspection and approval before being allowed to run in a ROAR sanctioned event.
- 7.2.7 At present, ROAR does not require inspection or approval for ESC's that do not have a non-timing (aka "blinky") mode. However, ROAR reserves the right to adopt new rules imposing such requirements if it is deemed necessary to protect the safety and/or integrity of RC racing.

## **8. COMPETITION RULES**

### **8.1 GENERAL COMPETITION RULES**

- 8.1.1 ROAR aims to promote family-oriented racing. Unruly or unsportsmanlike conduct will therefore not be tolerated. Individuals judged by the Designated ROAR Official or Race Director to be in violation of the spirit of this rule will be disqualified and requested to leave the race area.
- 8.1.2 For Level 3-5 sanctioned events, any deviation from ROAR rules must have been applied for in writing and approved by the ROAR Executive Committee (by signature of the Competition Director for Level 5 events or Track Director for Levels 3-4) in advance of the event, and must be prominent on entry forms and all advertisements. Deviations at Level 1 and 2 events must be prominent on all entry forms and advertisements but does not need written ROAR Executive Committee approval.
- 8.1.3 The race lengths specified for each class are mandatory for Level 3-5 events. At lower level races, race length is optional, but must be announced in advance.
- 8.1.4 Race lengths are:

<b>Scale / Class</b>	<b>Race Length: Qualifiers</b>	<b>Race Length: A Mains</b>	<b>Race Length: Other Mains</b>
<b>1/12 Electric On-Road</b>	8 minutes	8 minutes (see Note)	8 minutes
<b>1/10 Electric Off-Road</b>	5 minutes	5 minutes (see Note)	5 minutes
<b>1/10 Electric On-Road</b>	5 minutes	5 minutes (see Note)	5 minutes
<b>1/10 Fuel On-Road</b>	7 minutes	45 - 60 minutes	15 – 30 minutes
<b>1/10 Fuel Off-Road</b>	5-10 minutes	45 - 60 minutes	15 – 30 minutes
<b>1/8 Fuel On-Road</b>	7 minutes	45 - 60 minutes	15 – 30 minutes
<b>1/8 Fuel Off-Road</b>	5-10 minutes	30 - 60 minutes	15 – 30 minutes
<b>1/8 Fuel Truck</b>	5-10 minutes	30 - 45 minutes	15 - 30 minutes
<b>1/8 Electric Off-Road</b>	5-10 minutes	5 - 20 minutes	5 - 10 minutes
<b>1/5 Fuel On-Road</b>	5 minutes	30 minutes	15 – 30 minutes

**Note:** See Rules for details of the triple A-Main system used for these classes.

### **8.2 GENERAL VEHICLE RULES**

- 8.2.1 All vehicles entered for a ROAR-sanctioned event must comply with the dimensional requirements contained in this rulebook for the relevant class.
- 8.2.2 Vehicle batteries must be securely mounted. Receiver and servo power for electric vehicles may come from an electronic speed controller equipped with Battery Elimination Circuitry (BEC) or from a separate battery pack used for this purpose only.
- 8.2.3 The use of traction control sensing devices, active suspension devices, and steering control devices aided by gyroscopes or accelerometers (G-force sensors) of any kind is strictly prohibited. Sensors may be used for the purpose of passive data recording but not for adjusting the performance of the vehicle while in motion.
- 8.2.4 No roll-over antennas are allowed unless noted in the class rules. Roll-over antennas are defined as any vertical antenna strong or stiff enough to support the weight of the vehicle when resting on the tip of the antenna and one side of the vehicle.
- 8.2.5 Multiple speed transmissions are not allowed unless noted in the class rules.
- 8.2.6 Any material used to add weight to a vehicle in order to comply with the minimum weight requirements for the class must be securely attached to the vehicle chassis. If such ballast falls off the vehicle during a race for any reason (including crash damage regardless of fault), and the vehicle is underweighted at the post-race technical inspection, the vehicle will be disqualified for that run. For all fuel classes, chassis weights must be securely mounted with solid mechanical fasteners such as bolts or screws.
- 8.2.7 No hazardous bumpers, nerf bars, chassis extensions, or other objects protruding from the vehicle are allowed.

## **8.3 VEHICLE CLASS DEFINITIONS**

- 8.3.1 For the purpose of establishing specific rules, vehicles used in ROAR competition are divided into various classes according to the following criteria: Scale, Drive configuration, Type of power, Track surface and configuration, and/or Body style.
- 8.3.2 Scale Definition: 1/12<sup>th</sup> scale, 1/10<sup>th</sup> scale, 1/8<sup>th</sup> scale, or 1/5<sup>th</sup> scale
- 8.3.3 Drive configurations definition:
  - Two wheel drive (2WD), where power is transmitted to the rear wheels only
  - Four wheel drive (4WD), where power transmitted to all four wheels. Vehicles that are driven by the front wheels only are classified as four wheel drive (FWD).
- 8.3.4 Type of power: Vehicles may be powered by electric motors or by fuel engines. Electric motors are further classified by wind of the motor. For example, Spec 25.5, Spec 21.5, Spec 10.5, Spec 17.5 for Stock classes, Spec 13.5 for Super Stock classes and lower winds to be considered for modified classes. Fuel engines are classified primarily by fuel type, and then by engine displacement.
- 8.3.5 Track surface and configuration: Authorized surfaces include carpet, dirt, and pavement. Surface and configuration can be combined in many ways to provide a variety of racing venues.
- 8.3.6 Body style: A wide variety of bodies are authorized for use in ROAR competition. These are covered in detail in the Body Rules section.
- 8.3.7 ROAR reserves the right to specify what motors can be used in each race class based on the size, configuration and racing surface of the track at any ROAR-sanctioned event. All ROAR-sanctioned events must clearly state the motor wind required for a given race class in all promotional materials.
- 8.3.8 Provisional, Demonstration or Exhibition classes are those being raced where the level of interest or participation does not warrant National Championship status. Rules may be provided for these classes, and they may be run at all levels, unless specifically prohibited. Cost controlled classes are authorized and encouraged. See Cost Control Rules.

## **8.4 DRIVER CLASS CATEGORIES & ELIGIBILITY REQUIREMENTS**

- 8.4.1 Drivers may also be categorized according to various criteria. Juniors and Masters Categories, as well as Novice and Beginner's categories. Any driver category may be linked with any vehicle class. Drivers not qualifying for these categories compete in an open category.
- 8.4.2 When Juniors and Masters categories are run, the following rules will apply:
  - Juniors must be 15 years old or younger on the final day of the event.
  - Masters must be at least 40 years old or 45 if on road fuel, on the first day of qualifying.
  - At Level 4 & 5 events, proof of age is required for entry in the Juniors or Masters categories. Proof of age for Juniors is provided by means of a Birth Certificate, and for Masters by means of a government-issued ID or Driver's License.
  - At Level 5 events, Juniors and Masters may enter other classes in the open category, but not in the same vehicle type.
- 8.4.3 When Novice or Beginner categories are run, the following rules will apply: (a) The definitions used to determine Beginner and Novice must be clearly stated on the event entry form or otherwise publicized before the event; -(b) Beginner and Novice categories may be offered at events up to and including level 3 only.
- 8.4.4 In order to encourage closer competition, ROAR reserves the right to establish driver eligibility requirements within and between classes. All such restrictions must be shown in the race promotion materials and on the race registration form.
- 8.4.5 ROAR may require drivers to identify the specific make and model of their motor, ESC, battery, tires, radio, chassis, and/or body in order to register for or participate in a ROAR-sanctioned event.

## **8.5 TECHNICAL INSPECTION**

- 8.5.1 Each vehicle must satisfactorily pass a pre-event technical inspection before being allowed to compete. Failure to submit a car for pre- or post-race inspection will cause results from that race to be disqualified.
- 8.5.2 All rules must be strictly adhered to. No vehicle will be allowed to race until it has been cleared to do so by the Technical Inspection Team. Any violation must be corrected, and reinspected, before the vehicle is allowed to race.
- 8.5.3 All vehicles must pass technical inspection prior to or after every race, or both. For A Mains both pre and post-race inspections are required. Any vehicle found to be illegal during a pre-race inspection will not be allowed to race in that condition. Vehicles found to be illegal during a post-race inspection will be disqualified from that race. Any vehicle presented for pre-race Technical Inspection that is found to have a LiPo battery with a voltage greater than that specified for the relevant class will be disqualified from that round (see Rule #11.2.4.5.1).
- 8.5.4 Technical inspections include but are not limited to checking the vehicle's height, length, width, and minimum weight (with personal or handout transponder installed). No parts of the car other than the spur gear and tires may be at less than the minimum ground clearance for a specific class.
- 8.5.5 During width measurements, vehicles must roll freely in the tech box at ride height. This will be verified by lifting the rear of the box to 45 degrees above horizontal, and the car must roll forward under its own weight.
- 8.5.6 All dimensions or other specifications quoted as "maximum" include all manufacturing or other tolerances. No further tolerance is allowed above any maximum specification.
- 8.5.7 Bodies must remain as originally approved. Flaring front fenders or making any other aerodynamic modification is not permitted. Any weight(s) affixed to the body in order to meet a minimum body weight requirement must remain firmly attached to the body throughout the race; failure to do so will result in disqualification for that run regardless of what caused the weight to detach.
- 8.5.8 The minimum vehicle weights listed in the Class specifications include transponders. No distinction is made between personal and "handout" transponders. For all fuel classes vehicle weights are measured without fuel in the tanks.
- 8.5.9 The Designated ROAR Official, Technical Inspectors, and the Race Director have the right to subject any vehicle to mechanical or visual inspection (to include photographing) or impound at any time. It is the driver's responsibility to tear down a vehicle for inspection if required to do so. Failure to abide by this rule will be Disqualification from that class and possible 1 year suspension from any ROAR sanctioned event.
- 8.5.10 The Race Director has the right to limit admission to any area used for tech inspections, No member of the media may be in the technical inspection area at any time.
- 8.5.11 During post-race inspection, the effects of normal wear and race distortion or damage should be taken into consideration. For post-race inspections, a "cooling-off" period of no more than 10 minutes may be allowed to eliminate any temperature effects on sizes, capacities, etc. For post-race weight inspection, the scale used to determine pre-race weights takes precedence over any other scale in the event conflicting weights are observed between scales.
- 8.5.12 ROAR reserves the right to impound any motor, battery, or ESC that appears to fail technical inspection for the duration of the race event. In addition, ROAR reserves the right to permanently confiscate any motor, battery or ESC that fails technical inspection provided that it pays the owner the full retail price (including tax) for that equipment. Such confiscations, although rare, are necessary to allow ROAR technicians to confirm that all production versions of ROAR-approved equipment continue to conform the same specifications as the samples originally submitted for inspection.
- 8.5.13 For all vehicles raced on carpet, the front and rear axles may not extend beyond the wheel nuts. Off-road vehicles raced on carpet must have protective covers installed on the shock towers. This rule is intended to prevent accidentally damaging the racing surface if the vehicle is upended.
- 8.5.14 For all events raced on carpet, all traction compound must be completely wiped off the tires before placing the vehicle on the racing surface (including pit lane). No wet tires anywhere on the carpet.

## **8.6 TURN MARSHALING**

### **8.6.1 RESPONSIBILITIES**

- 8.6.1.1. Drivers must marshal for their designated race and be in position by the 1 minute call to race unless granted an exception by the Race Director.
- 8.6.1.2. Qualified ROAR members may substitute with the approval of the Race Director. It is the original driver's responsibility to find a substitute and he is responsible for the actions of that substitute.
- 8.6.1.3. Drivers who bump up are not required to marshal if their previous main contained at least 12 drivers.
- 8.6.2. Turn marshals are not permitted to repair vehicles. Marshals are allowed to correct a body tuck provided it does not interfere with other cars running in the same race. Marshals will take disabled vehicles to the closest outer edge of the racetrack as soon as possible.
- 8.6.3. A vehicle running on the track has the right-of-way over a vehicle that has gone off the track, turned over, or otherwise had problems.
- 8.6.4. When marshaling a vehicle, it should be returned to the point where it left the racing surface. Care must be exercised not to interfere with on-coming vehicles.
- 8.6.5. Only the designated marshals are permitted to handle vehicles on the racetrack during a race. No one else may enter the racetrack to repair or retrieve a vehicle.
- 8.6.6. Marshals for 1/5 scale classes can be a pit crew member. No one, marshals or otherwise may enter the racetrack area until a Yellow Flag condition is called, and all vehicles have slowed to a controlled pace.
- 8.6.7. Turn Marshals at level 4 and 5 events are required to wear the provided safety vests at all times while marshaling on the track. It is advised that level 1-3 events also provide safety vests for marshals. Safety vests must meet ANSI level 2 or greater.

## **8.7 SCORING**

- 8.7.1. For Level 2, 3, and 4 events, a computer scoring program is required that is capable of recording and sorting driver and class information, setting up qualifying heats, creating standings from qualifiers according to the Qualifying system specified for the event, setting up the main events, and running all the races. The program must be capable of receiving and processing information from existing transponder systems. When personal transponders are used, these must be fastened to the vehicle in a permanent manner. The race director can direct the placement of transponders, and can require a change of position in the event of bad reception. If a transponder is not installed, is lost, or falls out during a race, the driver will not be scored in that race. The driver is responsible for ensuring that the correct transponder is fitted to the vehicle, or that the correct personal transponder number has been provided for the scoring program. If duplicate transponder numbers are received at registration then the original AMB transponder number has priority over the duplicate. Placing a transponder in a location that may damage the transponder is prohibited. Final results will be based on the transponder counts.
- 8.7.2. The timing loop/bridge (finish line) should be located where reliable hits will be obtained, and where it is unlikely that a vehicle can miss being counted. For fuel main events the loop should be located within a quarter lap prior to the entrance of the refueling pits. If a vehicle does miss the loop due to a racing incident that is witnessed by a race official, obvious on the race print out, or is verified on a videotape, the driver will get credit for the lap. No driver involved in a racing incident whose lap is not counted as a result of the incident will be required to reenter the racing surface at sharp angle or reverse direction in order to be counted.
- 8.7.3. All vehicles must carry an identifying number positioned so that it can be seen from the front of the vehicle. Numbers must be dark numerals on a light background. Minimum number size is 1.5" high with .25" stroke. Numbers may not be trimmed to eliminate the background color. The Race Director reserves the right to require a specific location for vehicle numbers. At a Level 3-5 event the Race Director may disqualify a driver whose vehicle has illegal, wrongly placed or missing numbers. Only ROAR provided numbers may be used at Level 4 or 5 events.

- 8.7.4 Regardless of the length of the race, at the completion of the time, the end of the race will be announced via PA system, horn, or other audio method. All drivers must then complete the lap they are running. The driver will be credited with the time and lap of the final lap. In cases where two drivers have the same number of laps in the same round, the driver with the lower elapsed time will be positioned higher in the racing order.

## 8.8 QUALIFYING RULES

- 8.8.1 A driver's official time will be the total laps completed by his vehicle and the total time elapsed from the starting time, as determined by the method of qualifying, until the vehicle crosses the finish line on the final lap. If the final lap is not completed, the driver will be credited with the number of full laps finished and the time for those laps. For example, a driver who completes 20 laps in 3:50.00 outqualifies a driver with 20 laps in 4:02.00.
- 8.8.2 When IFMAR qualifying is used, each vehicle is running against its own clock, and not against the other vehicles. Vehicles will be started individually, or rows of two or three if lap times are short. The interval between vehicles or rows must be such that all vehicles cross the starting line before the first vehicle crosses for the second time. At the conclusion of the designated race time, drivers will be instructed to continue racing until their name or number is called or the Race Director announces that "the race is finished."
- 8.8.3 Qualifying positions for any one round will be determined based on most laps and shortest time.
- 8.8.4 Qualifying positions for main events at all Level 1-4 events and at 1/5 scale will be determined by using the driver's single fastest qualifying heat, in descending order, until the field is completed, unless otherwise specified by the Race Director or by the ROAR Executive Committee.
- 8.8.5 At level 5 events for all classes, except 1/5 scale, qualifying positions will be determined using the ROAR Qualifying Points system (see Section 14.3.6).
- 8.8.6 The winner of each class will be the driver in the A main who finishes with the most laps in the least elapsed time, and whose vehicle is found to be legal on post-race inspection. A triple A-Main system will be used for National Championship classes at electric Level 5 events and may be used at lower level races or in Exhibition classes at the Race Director's discretion. A driver who wins the first two A-Mains must sit out the third and final main.
- 8.8.7 Vehicles may not be pushed across the finish line. Vehicles must cross the line under their own power. Non-operating vehicles will be removed from the track. In fuel classes cars are not allowed to be restarted once the master clock has expired.
- 8.8.8 For purposes of qualifying and racing, the driver is scored, and not the vehicle. A driver must race the vehicle that he/she presents for technical inspection. Unless supplemented by event rules, a driver or a vehicle may not be changed during a qualifying run or during a main event. Qualifiers and Mains are deemed to start with the starting signal or green flag.
- 8.8.9 Unless otherwise specified in the Nationals Guidelines, the standard format for Level 5 events, except fuel on-road, is four qualifying rounds. Fuel on-road will run four to six rounds of qualifying. At Levels 3-4 events, a minimum of three qualifying rounds is required. For all other ROAR sanctioned races a minimum of two qualifying rounds is required. All of the above is dependent on favorable weather conditions.

## 8.9 STARTING – ELECTRIC RACES

- 8.9.1 The purpose of a starting procedure is to give each vehicle a fair start from its assigned grid position. Two methods are authorized for electric racing. These are the full-field start and the IFMAR, or staggered start. All mains will use a full-field start. Qualifying heats may use either method.
- 8.9.2 The starting grid should be on the longest straightaway and/or far enough from the first corner to allow vehicles to be under control before reaching it. The grid should be in a staggered pattern with 2 or 3 vehicles per row, and 3 to 4.5 feet between vehicles from front to rear. For 1/8 Off Road the distance should be 7 to 8 feet between vehicles.
- 8.9.3 For full-field starts, all vehicles should start on the computer tone or other signal given by the Race Director or Starter.

- 8.9.4 For IFMAR starts, vehicles are started at approximately 1 to 3 second intervals by the starter calling vehicle numbers or driver names. On tracks with short lap times, vehicles should be started by rows at 1-second intervals. On tracks with longer lap times, vehicles may be started from a single line on the track. This line should be far enough from the timing loop to allow vehicles to reach normal speed.
- 8.9.5 A grace period before the start of a race may be allowed at the discretion of the Race Director but this must be announced at the drivers' meeting before racing begins. Only one grace period per race is allowed and it may not exceed two minutes.
- 8.9.6 Restarts are permitted if the Race Director believes one or more drivers have gained an unfair advantage.

## **8.10 STARTING – NITRO FUEL RACES**

- 8.10.1 For qualifying races, it is recommended that IFMAR starts be used, with the vehicles starting at one to two second intervals from a staging area such as the pit lane. If rolling IFMAR starts are used then the vehicles may fuel and proceed towards the loop anytime once the timing loop is announced as 'hot'.
- 8.10.2 For main events and full field start qualifiers, a Le Mans-type start is recommended. For main events the vehicles should be lined up diagonally, at least ten (10) feet apart, on the longest straight by qualifying time, fastest qualifier at the front. For Le Mans starts, vehicle mechanics must be clear of the racing surface to prevent injury and all drivers must have clear visibility of their vehicles.
- 8.10.3 Vehicles will be called to the track three minutes prior to the start of a race. They will be given a minimum of 2-1/2 minutes for warm up and practice. Thirty seconds before the start, they will be called to the starting line for refueling, final preparation, and lineup. At the three-second mark, the flag will be touched to the ground and all mechanics will place their vehicles on the ground and release them. Within the next three seconds, and after all vehicles are released, a tone or lifting the flag will start the race.
- 8.10.4 The Race Director will make every effort not to delay the start of a race. Vehicles will not be allowed on the track before the three (3) minute warm up period. After the three-minute period is announced, the start will be as close to three minutes as possible.
- 8.10.5 A grace period during the warm-up before the start of the A-Main event may be allowed at the discretion of the Race Director but this must be announced at the drivers' meeting before racing begins. Only one grace period is allowed, and it may not exceed two minutes.

## **8.11 FREQUENCY CONFLICTS**

- 8.11.1 In cases of frequency conflict, the higher qualified driver will have first choice of frequency. Second highest qualifying driver will have second choice of frequency, etc. For example, driver A is on Red and is qualified for the A main. Driver B is also on Red and is also qualified for the A main. Driver A is qualified first, and as such, would get first choice of frequency. Driver A can elect to retain Red, in which case driver B would have to change; or he can choose any other legal frequency, which could cause another driver to change. The Race Director may require driver A to retain Red if an unsportsmanlike act is judged to be transpiring.
- 8.11.2 If there are seven drivers on 27 MHz in a main event, the slowest driver will have to change to an approved channel in the 75 MHz range or DSS/DSM. If the slowest driver cannot or will not change to an open, approved 75 MHz or DSS/DSM channel, the driver will be disqualified. (Courtesy and fair play should be called for by the Race Director to see if another driver in the main can change frequency if the slowest driver cannot change to a 75 MHz channel or DSS/DSM.)

## **8.12 EVENT ELIGIBILITY**

- 8.12.1 Except as provided herein and below, any ROAR member in good standing is eligible to enter any ROAR-sanctioned event.
- 8.12.2 Drivers who are currently qualified for or have participated in two of the previous IFMAR World Championships are not eligible to enter stock classes at Level 3-5 events. Other restrictions may be imposed on entering the Stock and Modified Off-road Nationals.

- 8.12.3 To be eligible to enter a specific class or classes at a Level 3-5 event, a driver may be required to meet qualifying and pre-entry requirements established by the ROAR Executive Committee.
- 8.12.4 Regional Championships may be entered by any driver from the host region or adjacent regions which share the same border. Drivers are allowed only one Regional Championship title per class per scale per calendar year. A title winning driver may only enter a different class or scale at subsequent Regional Championships for the remainder of the calendar year.
- 8.12.5 Members who are not US or Canadian citizens wishing to compete in National Championships must (present permanent resident visas) have been resident in the USA or Canada for at least 12 months prior to the event. Proof of residency may be required. In the case of a member too young to be issued a driver's license, this proof must be based on the driver's license or identity document of the member's legal guardian.

## **8.13 BLACK FLAG**

- 8.13.1 A black flag will be given to a driver whose driving, vehicle operation, or performance constitutes a hazard to the other vehicles in the race. This includes insufficient skills to compete in the class, unsportsmanlike driving, and intentional hitting of other vehicles, intentional short coursing, intentional corner cutting, intentional blocking when being overtaken, illegal or improper vehicle numbers and other such acts.
- 8.13.2 When a driver is given the Black Flag, it means that driver must pull his/her vehicle off the track immediately. The driver must remain on the drivers stand until that race is fully concluded.
- 8.13.3 A black flag ruling may be used at any time for unsportsmanlike conduct or abusive language to other drivers or race officials.
- 8.13.4 A driver who receives three warnings in an event from a referee or race official will be black-flagged.
- 8.13.5 Any vehicle that loses its body or that cannot be controlled properly due to radio problems, race damage, or missing parts will be black-flagged.

## **8.14 DISQUALIFICATION**

- 8.14.1 Failure to comply with any of these rules, not limited to items covered in this section, may result in disqualification by the Race Director. Disqualification may be for a single class or for the entire event.
- 8.14.2 Disqualification means that the driver will not be allowed to race or continue racing. Any driver who is disqualified for the entire event may be required to leave the racing facility. There will be no refund of entry fees to a disqualified driver.
- 8.14.3 Any of the following actions on the part of a driver or member of his crew will result in mandatory disqualification from an event:
  - 8.14.3.1. Not having a current ROAR membership, failing to complete or sign required registration forms, or submitting an application, registration, or other ROAR form with a falsified signature.
  - 8.14.3.2. Using other than an authorized FCC frequency.
  - 8.14.3.3. Not taking a vehicle or radio to the inspection area when directed to do so.
  - 8.14.3.4. Operating a vehicle near the track that could endanger others in the area.
  - 8.14.3.5. Drinking intoxicating beverages, using illegal substances, or showing evidence of being under the influence of an intoxicating beverage or illegal substance in the pits or the race area.
  - 8.14.3.6. Taking part in a protest demonstration in the pits, on the track, or in the surrounding area before, during, or after a race.
  - 8.14.3.7. Entering restricted areas or event scoring areas without proper authorization.
  - 8.14.3.8. Threatening or assaulting any other person at the race event. Doing so will result in suspension of ROAR membership for a minimum of one year.
  - 8.14.3.9. Turning on a radio during a race to affect another driver's vehicle.

- 8.14.4 The following offenses by a driver or member of his crew may result in disqualification if deemed appropriate by the Race Director. If not deemed appropriate, the minimum penalty will be no score for the race in question. A second offense of the same type may result in immediate disqualification:
- 8.14.4.1. Using an engine, motor, battery, ESC, body, or any other part that does not comply with the event rules. Drivers are solely responsible for knowing whether or not these components are on the most current ROAR Approval lists before attending a ROAR-sanctioned event.
  - 8.14.4.2. Subjecting a Race Official to abusive, threatening or demeaning language at any time during the race event.
  - 8.14.4.3. Altering the timing mode of the electronic speed control, by any means, in a class that requires fixed timing (aka "blinky mode"), after the vehicle has passed through race inspection.
  - 8.14.4.4. Except in the case of 2.4GHz DSM/DSS systems, using other than an assigned frequency.
  - 8.14.4.5. Allowing another individual to substitute for them in a race. In this case, both drivers may be subjected to disqualification.
  - 8.14.4.6. Ignoring a black flag or any other driving instructions given by the Race Director.
  - 8.14.4.7. Deliberate bumping or blocking of other vehicles in a race. If a driver threatens to interfere with other cars, and is subsequently involved in significant car-to-car contact, that driver will automatically be deemed to have caused such contact intentionally and is subject to penalty.
  - 8.14.4.8. Not submitting his vehicle for technical inspection prior to or following completion of a race (when such inspections are required).
  - 8.14.4.9. Loss of ballast used to make the vehicle meet legal weight. (See rule 8.2.6)
  - 8.14.4.10. Use of illegal or banned tire-cleaning or traction chemicals or compounds.
  - 8.14.4.11. Use of an illegal, unmarked or otherwise improper tire when the 'Handout tire' rules are in force.
- 8.14.5 Infractions must be witnessed by a Race Official and brought to the attention of the driver before a penalty or sanction is assessed. Track infractions will be announced during the race. However, it is the responsibility of the driver to observe track rules even if the infraction is not announced at the exact time it took place.
- 8.14.6 A disqualified or penalized driver may protest the decision of the Race Director to the highest-ranking ROAR Official assigned to the event. The decision of the highest-ranking ROAR Official will be final. Such protest must follow the protest procedure outlined in rule 8.16.
- 8.14.7 Failure to abide by charging specifications with Lithium battery technology. (i.e.: overcharging). Also, failure to use a charging sack or other protective device while charging a lithium battery. The first offense shall result in a round DQ and the second offense shall result in an event DQ. In the event of DQ from the entire event, the Executive Committee shall review suspension of membership for a period of up to one year from the date of incident
- 8.14.8 Leaving the drivers stand after a race has commenced but prior to the conclusion of that race without permission from the Race Director. Penalty for 1<sup>st</sup> offense is one lap off of best run; penalty for 2<sup>nd</sup> offense is disqualification from that class.

## **8.15 PENALTIES**

- 8.15.1 Failure to comply with any ROAR rules, not limited to those items covered in this section, may result in a penalty being assessed by the Race Director.
- 8.15.2 Time penalties will be added to the time recorded for the race in which the penalty is incurred.
- 8.15.3 Lap penalties incurred during a race will be subtracted from the total laps recorded for the race in which the penalty was incurred. Lap penalties that are incurred due to a penalty statement of assessment to best qualifier or main in this section will apply.
- 8.15.4 The Race Director may assess "stop and go" penalties, with or without delay, instead of time penalties. During a "stop and go" penalty, the vehicle must be stopped in the pit lane or other designated area, and must not interfere with or otherwise the safe passage of other vehicles still in the race.

## 8.15.5 JUMPED STARTS

### 8.15.5.1. Definition:

- A jumped start is any movement of a vehicle between the time the Starter announces the start time and the starting signal.

### 8.15.5.2. Penalties:

- Electric Classes: If one or more vehicles jump start, a false start will be declared, and the grid will be re-formed. If the same vehicle moves a second time, it will be moved back the length of the grid from its original starting position.
- Fuel Classes: A ten second penalty will be assessed for a jumped start in a qualifier using a girded stationary start, and a one lap penalty will be assessed for a jump start in a main race. Neither type of race will be re-started for a jumped start. For IFMAR qualifying starts, when a driver starts out of turn, a stop and go penalty may be assessed if the driver does not pull over and allow the other vehicles to pass before continuing.
- All Classes: If a jumped start is not called by the officials immediately at the start of a race but can be verified afterwards by at least two race officials using any recording device, a ten second penalty will be added to that offenders' particular qualifying time or if a main event, a one lap penalty will be assessed.

## 8.15.6 CORNER CUTTING OR SHORT-COURsing is Prohibited

- Definition: Corner cutting or short-coursing is any deliberate or accidental maneuver that shortens the length of the marked course for a vehicle traveling around the track.
- Penalties: Cutting a marked corner will incur a ten second penalty and short-coursing will incur a one lap penalty (see penalty chart at end of this section).
- Exceptions: If the driver stops his vehicle in the area where the corner cutting or short-course infraction occurred and allows the vehicle that was immediately behind him (prior to the infraction) to pass, then no penalty is applicable provided the driver reenters the race flow properly (see §8.15.7, below). If a corner marshal returns a vehicle to the location where the corner cutting or short-course infraction initially occurred, then no penalty is applicable.

## 8.15.7 IMPROPER RE-ENTRY TO THE RACING SURFACE:

8.15.7.1. Definition: Improper re-entry is any maneuver that adversely affects the ability of other drivers in the race to safely operate their vehicles in the vicinity of the vehicle re-entering the racing surface, whether from the pit lane or any other point.

8.15.7.2. Penalty: Improper re-entry that, in the judgement of race officials, impedes or interferes with any on-coming car will incur a ten second penalty. Improper re-entry that causes a collision between any two cars will incur a one lap penalty.

8.15.8 Refueling, repairing, or servicing a vehicle in the pit lane or on the racing surface (see rule 5.2.1): a "stop and go" shall be assessed

8.15.9 Driving in the opposite direction to the racing direction while on the racing surface: A One-lap penalty in that qualifier or main.

**Note:** This rule applies to normal racing laps, to any driving prior to the start of any race and to any driving for the purpose of re-negotiating a cut corner or correcting a short-coursing infringement.

8.15.10 Evidence of Infractions: In addition to the eyewitness observations of the Race Director and/or other designated race referees, ROAR officials may elect to review video recordings from the event to verify and adjudicate any alleged infraction of the applicable rules. The judgement of the Race Director is final in all such matters.

8.15.11 Failure to be present in designated turn marshal position 1 min prior to start of race: A one-lap penalty from the best qualifier or the main. If a driver fails to turn marshal after his/her final race of an event, this penalty will be imposed at the next ROAR National event that the driver attends.

- 8.15.12 Failure by a driver to maintain a closed throttle or zero speed setting while his vehicle is in the hands of a marshal: A ten second penalty in that qualifier or main.
- 8.15.13 Repairing a vehicle while marshaling: For Level 3-5 events: A ten second penalty in the marshal's previous qualifier or main.
- 8.15.14 Failing to respond in a timely way to an Official directive: One lap penalty subtracted from the best qualifier or main.

Action	During Qualifier	During Main
<b>Improper re-entry to racing surface</b>	10 second penalty	10 second penalty
<b>Corner Cutting</b>	10 second penalty	10 second penalty
<b>Short Coursing</b>	1 lap penalty for each incident	1 lap penalty for each incident
<b>Refueling in pit lane or on the racing surface</b>	Stop and go penalty	Stop and go penalty
<b>Interfering with another vehicle when placing car back in pit lane after refueling</b>	10 second penalty	10 second penalty
<b>Driving in opposite direction on track</b>	1 lap penalty	1 lap penalty
<b>Failure to turn marshal</b>	1 lap penalty from best qualifier	1 lap penalty from best main
<b>Failure to reduce throttle while in hands of a turn marshal</b>	10 second penalty	10 second penalty
<b>Repairing a car while turn marshalling</b>	10 second penalty	10 second penalty
<b>Failing to respond to a Race Officials request</b>	1 lap penalty from best qualifier	1 lap penalty from best main

## 8.16 PROTESTS

- 8.16.1 Protests may be submitted against:
- Vehicles or parts of vehicles
  - Technical issues
  - Results
  - Race procedures, policies or decisions.
- 8.16.2 Protests considered by the Race Director to be frivolous or unsportsmanlike will not be accepted.
- 8.16.3 Protests may only be submitted by drivers properly entered in the event which is the subject of the submitted protest.
- 8.16.4 All protests must be submitted to the Race Director in writing. An official protest form may be found in APPENDIX B.
- 8.16.5 Protests must be delivered to the Race Director within fifteen minutes of the posting of results of the protested qualifying round or main.
- 8.16.6 Protests must be accompanied by a \$20 fee per item protested, plus the retail replacement cost for each item protested if a tear-down is requested or required to evaluate the protest.
- 8.16.7 Vehicle or technical protests involving the qualifying heats of an event may only be submitted by another driver in the same vehicle class being protested.
- 8.16.8 Vehicle or technical protests involving a particular Main event may only be submitted by another driver in the same Main.
- 8.16.9 Any engine or motor that is protested may only be torn down for internal inspection at the end of the event. The engine or motor will be marked at the time of protest in such a manner that it can be identified at the end of the event.
- 8.16.10 A driver, who has a protest lodged against his vehicle, or any part thereof, is required to make the vehicle available for inspection. Failure to do so will result in disqualification.

## **8.16.11 VEHICLE OR TECHNICAL PROTESTS**

- 8.16.11.1. The driver lodging the protest must deliver the written protest and protest fees to the Race Director prior to the initiation of the inspection of the protested vehicle. Those allowed to attend the inspection will be as follows (where relevant):
  - The protester
  - The protested driver
  - The protested driver's mechanic
  - The Technical Inspector
  - The Race Director
  - The Designated ROAR Official
- 8.16.11.2. Designated representatives may replace any of the above.
- 8.16.11.3. The driver or mechanic may be required to dismantle the vehicle under the supervision of the Race Officials.
- 8.16.11.4. If the protested vehicle or part is found to comply with the sections of the rules for which it was protested, the protest fees including the item's retail replacement cost (if the item was destroyed by the examination) will be given to the protested driver.
- 8.16.11.5. If the protested vehicle or item is found not to comply with the sections of the rules for which it was protested, the protest fees will be returned to the protesting driver, and the protested driver disqualified.

## **8.16.12 ORGANIZATIONAL PROTESTS**

- 8.16.12.1. Only ROAR members taking part in the event may make this type of protest.
- 8.16.12.2. They must personally deliver a written protest on the official protest form along with a \$20 protest fee to the Race Director.
- 8.16.12.3. The protest must be filed within 15 minutes of the associated development that defines the results, procedures or policies being protested.
- 8.16.12.4. The protest must explain the problem and have a solution. If ROAR rules are referred to in the arguments, they must be quoted or referred to by rule number.
- 8.16.12.5. If the Race Director determines the protest is valid, the protest fee will be returned. For levels 3-5 events, if the Race Director determines the protest to be valid, he will meet with the Designated ROAR Official for discussion of a possible solution for this issue. For level 1 and 2 events, the Race Director may make the decision alone, but it is recommended that the solution be discussed with the other officials at the event.
- 8.16.12.6. If changes are made to any rules or procedures for the event as the result of a valid organizational protest, the Race Director must submit a written report of the protest and the action(s) taken to the ROAR President within two weeks of the completion of the event.
- 8.16.12.7. If the Race Director determines the protest to be invalid, the fee will be kept and the protest denied.

## **8.17 AWARDS**

- 8.17.1. Awards for Level 2, 3, and 4 events should be plaques or trophies appropriate to the event being conducted. Awards at Level 1 events are at the discretion of the Race Director, and are not required when points are awarded leading to end of series or season awards. If awards are given at this level, ribbons, small plaques, or small trophies are recommended.
- 8.17.2. At Level 2 and 3 events it is recommended that a minimum of 15% of the entry fees be spent on awards. At level 4 events 15% of the total entry fees is the required minimum budget for awards and will be determined using the total entry fee amount collected by the registration deadline date, thirty days before the event. The style and quality of the awards will be the same throughout all classes and presented to at least the first three place finishers of all Mains. Level 5 events that are considered ROAR Nationals, ROAR will contract for awards that are of the style and quality representing the event.

- 8.17.3 No cash prizes or cash compensation awards are allowed at ROAR-sanctioned events. Any ROAR Club or Track conducting such an event may have its annual club membership voided and may be barred from holding a ROAR-sanctioned event for a period of one year from the violating event.
- Note:** This ruling does not apply to individual non-sanctioned events that are publicized as being non-sanctioned, but does apply to any regularly scheduled level 1 events, as these are automatically considered to be ROAR-sanctioned events. See rule 4.1.12.
- 8.17.4 All ROAR drivers participating in events outlined in rule 8.17.3 may have their memberships revoked, and will not be eligible for reinstatement for a period of one year.
- Note:** ROAR does not restrict its members from competing in non-sanctioned events. This ruling therefore does not apply to ROAR drivers competing for cash prizes in non-sanctioned events held by non-affiliated clubs or tracks or affiliated tracks advertising non-ROAR sanction with the exception of level 1, club events.
- 8.17.5 Merchandise, whether donated or purchased, may not be given as race awards. The use of merchandise certificates as race awards by a club is permitted, but the cash value cannot exceed the cost of an appropriate award. Selling raffle tickets for donated door prizes is not recommended unless this has been specifically agreed to by the prize donor. Door prizes donated by manufacturers should be given away using a random selection process. Selling raffle tickets for organizer purchased prizes is allowed.

## 9. BODY, BUMPER AND WING RULES

### 9.1 BODY RULES

- 9.1.1 Bodies used in ROAR-sanctioned events must resemble vehicles used in full scale racing for the type of event being conducted. The ROAR Executive Committee will specify which body styles may be used in competition at sanctioned events.
- 9.1.2 Only ROAR-approved bodies may be used in sanctioned events. Manufacturers are solely responsible for knowing when a prior body approval expires and for initiating the renewal process.
- 9.1.3 Body Approval process:
- 9.1.3.1. An Approved Body List is maintained by the ROAR Technical Director, and published on the ROAR website ([www.roarracing.com](http://www.roarracing.com)). If a body is not on the approved body list, it is not legal for use at ROAR-sanctioned events.
  - 9.1.3.2. The ROAR Administrator or Technical Director can provide full details of the submission process on request.
  - 9.1.3.3. To be approved, bodies MUST conform to the provisions of rules 9.1.15 through 9.1.16.3, plus any dimensional requirements in the Vehicle Class Specifications itemized in sections 1 and 2 of the ROAR rulebook. The body manufacturer, distributor or other entity must submit a picture and sample of the body to ROAR, along with the required fee, and must be a current ROAR Industry Affiliate member in good-standing throughout the full 4-year term of each approved body.
  - 9.1.3.4. All approved bodies are required to have the manufacturer's ID and Body number molded into the lower portion of the windshield or on the body below the point where a windshield would have been on the full scale counterpart. Otherwise, the proof of the legality of a questionable body is the responsibility of the driver.
- 9.1.4 Throughout an event, the body must be complete, neatly finished, painted, and trimmed. Detailed headlights, signal markers, grille and taillights appropriate for each vehicle are strongly recommended but not required. These details should be in significant contrast to the body in order to make them clearly visible. No clear areas except windshields, windows and wing are allowed. No clear areas or stripes through body colors are permitted. No objectionable or suggestive art, decals, or lettering will be permitted.

- 9.1.4.1. The lack of front fascia details may not be the subject of disqualification at the conclusion of an event. An official may, however, require that a competitor apply such details to the body at any time. If the request is made prior to the start of any organized practice round, qualifier or main event, the driver may not request any additional time beyond the predetermined grace period to comply with the requirement. Failure to comply will prevent the driver from further participation in the event until such a time as the requirement is fulfilled.
- 9.1.5 Sharp or otherwise dangerous parts or features on a body are not permitted.
- 9.1.6 All vehicles must have a readily removable body. The body and chassis must be securely joined at all times while the vehicle is on the track. Rubber bands are not allowed for this purpose. If a body comes off a vehicle during a race, the vehicle must be taken off the track and the body properly replaced before the race may be resumed.
- 9.1.7 All molded-in windows must be clearly identified. Side and rear windows may be cut out unless otherwise stated in class rules or specifications. Open windshields are not allowed, except for holes defined in the relevant class rules or specifications. Windshields must remain reasonably transparent. Light windshield tinting is permitted provided the inner workings of the vehicle can still be visually inspected without removing the body. A sunshade band at the top of the windshield is permitted.
- 9.1.8 For closed-wheel bodies, no portion of the chassis, wheel, tire, or equipment may extend beyond the body except to the rear.
- 9.1.9 Servos, receivers, batteries, and servo savers are not allowed to protrude through the original body shell. The diameter of the antenna hole in the body may not exceed 0.375" inch.
- 9.1.10 Wheel cutouts are allowed on the side plane of the body. They may not extend into the horizontal plane of the body. Wheel cutouts may not exceed the dimensions specified in the relevant class rules or specifications.
- 9.1.11 Cooling holes: Bodies for on-road fuel-powered cars (other than touring vehicle bodies) may have up to 1/3 of the windshield cut out. Bodies used on off-road fuel-powered cars may have up to 1/2 the windshield cut out. For touring vehicle windshields, one cooling opening is permitted, limited to a maximum of 60mm in any direction. Cooling holes are not allowed for electric powered vehicles.
- 9.1.12 A refueling hole is permitted in the body for fuel-powered cars in accordance with following restrictions:
- 9.1.12.1. The hole must be centered directly above the fuel tank filler neck.
- 9.1.12.2. For bodies where the fuel filler cap extends above the body when open, such as Sports/Can Am or off-road buggy bodies, the clearance of the hole to the filler cap must not exceed 0.375" in any direction.
- 9.1.12.3. For closed-roof bodies, such as Touring Car bodies, where the filler cap does not extend above the body roofline when open, the hole may be a maximum of 30mm in any direction, and may not intersect with any other hole in the body. Small holes for use of the glow igniter and carburetor tuning are allowed provided they are not excessively large for these intended applications.
- 9.1.13 Any minimum or maximum body height requirements apply across the entire width of the rear body plane and must be met at all points along that line. Those same height requirements do not apply to the left and right rear quarter-panels (behind the rear wheels but in front of the rear bumper). No holes may be made in the rear body plane in order to reduce air resistance or alter the rear downforce characteristics of the OEM body shell.
- 9.1.14 Body components must remain on the vehicle, except for accidental race damage.

9.1.15 The following body types are authorized for use on the various track surfaces:

**9.1.15.1. OFF ROAD BODIES**

- Buggy and truck bodies used in ROAR-sanctioned events should resemble those used in full scale off-road and stadium racing. Sedans, out-of-scale truck, and van bodies are prohibited.

**9.1.15.2. ON-ROAD BODIES**

- Category 1 - Sports Cars: Closed wheel cars designed specifically for racing in full-size series such as CanAm, GTP, WSC, ALMS, etc.
- Category 2 - GT Cars: Modified versions of two door street cars such as GT, GT-1, Trans Am, and T-1 Touring Cars.
- Category 3 - Touring Cars: Two- or four-door sedans that bear a reasonable resemblance to those that have competed in a full-size Touring Car series.
- Category 4 – Open Wheel Cars: Single seat, open wheeled cars that compete in CART, Formula 1, IRL and other similar formats.

9.1.16 All body approvals will be subject to scrutiny of the respective or collective advisory committees regarding compliance to the "spirit of the rules."

9.1.16.1. Affiliate manufacturers desiring to obtain an advisory opinion may submit drawings to ROAR Technical Director for a provisional approval. A provisional approval does not constitute a final approval. Final approval may only be determined upon receipt and evaluation of a production body.

9.1.16.2. Modifications by the manufacturer to approved bodies are not permitted. Modified versions of approved bodies must carry a new ID number as outlined in rule 9.1.3.4, and must also be approved. Any modifications to approved bodies without a new ID number and separate approval will void all prior approvals of the body in question.

9.1.16.3. At its discretion, ROAR may grant approval to any body in the absence of a submission from the manufacturer or other entity.

9.1.17 Add-on lighting of any kind (e.g. electric or chemical) is not permitted to function during race competitions (including all practice, seeding, qualifying or mains). Add-on lighting is allowed to function during Concours competitions provided it is turned off during actual race competitions.

## **9.2 BUMPER RULES**

9.2.1 Bumpers are not required in all classes, but when used, they must be shock absorbing and non-metallic, with no sharp edges. For safety, rigid bumpers, such as fiberglass and composites, are not permitted.

9.2.2 Will not extend forward of the body except on off-road cars. The bumper may not extend to the side beyond the outer edge of the tires.

9.2.3 Rear bumpers must be made of a solid material with rounded edges and may not extend to the side beyond the outer edges of the tires and may not extend beyond the rearmost part of the body except in off-road vehicles.

## **9.3 SPOILER RULES**

9.3.1 Definition: a spoiler is a flat plate attached to a body or to the trailing edge of a wing in order to increase down force and traction when a vehicle is traveling at speed. Except for F1/Indy Cars and Sprint Cars with front and rear wings, they are always located at the upper rear portion of the body.

9.3.2 Many R/C racing bodies have molded spoilers. In some classes, additional material may be added to increase the height of the spoiler. Where this is permitted by the class rules or specifications, the dimension specified includes the molded spoiler.

9.3.3 Spoilers may not extend beyond the width of the body.

9.3.4 Where permitted, add-on spoiler material must be securely fastened to the body.

9.3.5 Spoiler side plates when used must conform to the class specific rules.

9.3.6 Spoilers may be clear or painted and may carry stickers.

## **9.4 SIDE DAMS**

- 9.4.1 Definition: Side dams are flat plates applied to the sides of bodies to increase the directional stability of the vehicle when traveling in a straight line, or to the sides of wings to increase the efficiency of the wing. The use of side dams is permitted in some classes, as indicated in class rules or specifications.
- 9.4.2 Side dams are normally used as a part of a wing set. The only exception to this rule is the modified stock vehicle, which may use one side dam attached to the body. If used, the top must be securely fastened to the opposite side of the body at the front and rear of the dam.

## **9.5 WINGS**

- 9.5.1 Definition: Wings are aerodynamic devices attached to vehicles to increase down force and traction when a vehicle is traveling at speed. The dimensions of wings vary depending on the class of racing and are described in class rules or specifications.
- 9.5.2 Only single element or two-element wings may be used, and then only when allowed by the class rules.
- 9.5.3 **WING MOUNTINGS**
  - 9.5.3.1. Wings should be mounted using wire or some other secure mounting system and be no closer than 1/4" to the body except as provided below. The distance between the wing and the body is measured between the rear deck of the body and the flat portion of the wing chord.
  - 9.5.3.2. Off-road wings may be mounted using wire or fastened directly to the chassis. There is no minimum clearance for off-road wings. Front wings are allowed if utilized on the body's full-scale counterpart. If allowed, front wing dimensions are specified in the class rules.
  - 9.5.3.3. On-road wings, when permitted, may be mounted directly to the body without clearance. Front wings are allowed if utilized on the body's full-scale counterpart. Driver must show proof of full-scale utilization.
  - 9.5.3.4. In some classes, wings and spoilers may be used in combination. When allowed by the class rules, separate specifications are provided.

# **10. WHEEL AND TIRE RULES**

## **10.1 GENERAL RULES**

- 10.1.1 All cars used in ROAR competition must be designed to have four wheels that support it while in motion. No three-wheeled cars or cars with dual wheels in any position are permitted.
- 10.1.2 Any wheel manufactured for R/C vehicle competition may be used as long as it meets the class specifications. Wheels will be secured to the axles by means of lock nuts, screws, or quick-release axle ends. Nuts or axles will not protrude more than 1/16" beyond the outer edge of the tire. When nuts and/or axles extend beyond the wheel or tire, they will be included when measuring the vehicle's overall width.
- 10.1.3 Any tire produced for R/C competition may be used as long as it meets the definitions below and the specifications for the class. Tires must be securely fastened to the wheels. Rubber tires used for off-road classes may only be used in the classes for which they were originally manufactured. The modification of tires from one class to fit vehicles of another class is not allowed.

## **10.2 WHEEL RULES**

- 10.2.1 The mounting bead diameter is defined as the functional adhesion point where the tire and wheel meet. If a particular wheel style has multiple heights on the outer diameter the mounting bead is always the one closest to the center of the wheel.
- 10.2.2 The maximum diameter is defined as the largest diameter allowed on the wheel. These "ribs" are intended to center the tire during the mounting process and create a channel for the adhesive material to rest in a confined space.

- 10.2.3 The width of the wheel is defined at the functional edge to edge dimension which constitutes the structure for tire mounting. For appearance purposes the wheel face is allowed to protrude past the edge to edge dimension as long as it does not exceed the maximum allowed width of the tire or extend passed the sidewall of the tire. Wheel face protrusions should not contain any geometry or potential relative mounting features which would enable a tire to extend further or connect to the wheel intended for enhanced performance.
- 10.2.4 Internal locking rings may only be used to retain the tire. Rings cannot be used to increase wheel size or to stiffen the sidewall.
- 10.2.5 Stick-on wheel disks are not allowed. Unless other means are authorized by the Race Director, the disks must be secured to the wheel by the axle nut or screws.
- 10.2.6 Quick-change wheel hubs and/or tire changes are not permitted for use in any competition classes except for those exempted herein. Quick-change wheels and hubs shall be defined as any mechanism that permits rapid change of wheels/tires during the course of competition. Wheels shall only be affixed by a threaded nut or screw, which must be unthreaded and threaded for wheel removal and installation. A wheel/tire may be changed during competition only if damaged. Tire wear does not constitute damage. Compliance with additional wheel attachment specifications in the Vehicle Class Specifications, rules sections 0 and 0 must also be observed.
  - 10.2.6.1. Classes exempt from quick-change wheel hubs/tire change rules: 1/8 Fuel On-Road and 1/10 Fuel and Electric Off-Road Truck
  - 10.2.6.2. Classes exempt from wheel/tire change rule: 1/10 On-Road Fuel Touring Car 4WD

### **10.3 TIRE RULES**

- 10.3.1 Tires used in R/C competition are defined as follows:
  - 10.3.1.1. Rubber: A tire molded using rubber or similar synthetic material. Tires may be smooth, spiked, or treaded. Foam inserts are allowed but may not be bonded or glued to the tire. Pre-built rubber tire/insert/wheel combinations are allowed as long as inserts are not bonded or glued to the tire.
  - 10.3.1.2. Foam: A tire composed solely of foam rubber. Tires may be bonded to the wheel. No bonded coatings are allowed.
  - 10.3.1.3. Capped: A tire molded using rubber or similar synthetic material which is bonded or laminated to a core of foam rubber.
- 10.3.2 Tires that may be used in the various classes are described in the type or class rules.
- 10.3.3 Silicone capped or coated tires are not permitted in any class.
- 10.3.4 Tires will be black except for sidewall lettering. Foam tires may have an identifying foam stripe.
- 10.3.5 No metal, rigid plastic or synthetic spikes or sections may be added to the tires.
- 10.3.6 No more than 1/16" of wheel rim may be exposed on the outside of the wheels.
- 10.3.7 Tread width cannot exceed maximum wheel width unless specifically allowed in class specifications. Thread width shall be defined as the full width of the tire for foam tires. The corner radius of a tire will not factor into overall width measurements. For rubber tires, any feature protruding from the carcass including sidewall (except brand logos and/or part number) will be considered part of the tread. Any attempt to enlarge brand logos, part numbers or graphic elements to serve as part of the tread will not be permitted.
- 10.3.8 The use of commercially available traction compounds and/or tire cleaners at any ROAR event is at the discretion of the Race Director and any bans or special requirements must be disclosed in advertising, on race entry forms, and in track rules. At carpet races, tire cleaners and traction compounds that can coat the track are not allowed.
  - 10.3.8.1. For health and safety reasons, diesel fuel, and any personally developed traction chemicals and/or tire cleaners are not allowed at any ROAR event.
  - 10.3.8.2. Using an open flame to heat tires and/or burn tires is not allowed at any ROAR event.

# CLASS-SPECIFIC RULES

The following rules are additional rules for specific classes. In most cases, the rules in this section are designed to further define the General Rules. At no time are these class-specific rules to be used without regard to the General Rules, which apply to all vehicle types and classes. If a rule in this section differs from a General Rule, this section's rule takes precedence.

## 11. RULES FOR ELECTRIC CLASSES

### 11.1 GENERAL ELECTRIC VEHICLE RULES

- 11.1.1 "Roll-over" antennas are allowed in on-road classes only, not in any off- road classes. The exposed ends of such antennas must be fitted with a button or ball having a diameter of at least 5/16".
- 11.1.2 For those electric classes where a "straight axle" is specified, the following definition applies: In a straight axle design, there must be a fixed relationship between the axle and the motor. No relative movement is allowed between the rear axle bearings and the motor case, and all suspension action must be applied to the motor, transmission and both rear wheels as a unit.
- 11.1.3 All chassis (including optional/aftermarket) in all electric classes (except those specifically noted) MUST accept batteries up to the maximum dimensions allowed for its application. Chassis must have at least 1 standard configuration (standard configuration to be saddle or stick pack) to fit a battery of maximum dimensions for that class or it will not be considered legal, and the racer will be disqualified. Foam blocks/spacers are permitted to help secure any approved size battery in its position. Electronics may also be located within the battery area when "shorty" or smaller legal batteries are used, provided that "permanent" mounts for the aforementioned don't preclude the installation of full-size battery or saddle pack of maximum dimensions. The only exception is 1/8 off-road where it's common to use two battery packs to achieve the maximum 4S configuration, or to use a single 4S battery, which has a different specification. Only under these circumstances will the fitting of either configuration be considered legal, but the production chassis must still conform to batteries of the maximum allowable dimensions. Should a question arise as to whether the chassis will accept a full-size pack it will be up to the racer to prove that the chassis meets all requirements.

### 11.2 BATTERY RULES

#### 11.2.1 BATTERY APPROVALS

- 11.2.1.1. The approval of new battery types, makes, or capacities must be posted on the [www.roarracing.com](http://www.roarracing.com) website. The Executive Committee has final approval over battery legality.
- 11.2.1.2. Only manufacturers, distributors, or commercial-level assemblers in good standing with ROAR may submit batteries for approval. All batteries must be submitted by ROAR industry affiliates.
- 11.2.1.3. Battery approvals will be processed upon submission of sample packs and payment. The submission date will be defined as the day AFTER the samples are received by the ROAR battery lab. All unique samples will require full completion of the approval request form available on the [www.roarracing.com](http://www.roarracing.com) website under the "Approvals" link. Samples must be sent via couriers that provide accurate and accessible tracking data via the internet.
- 11.2.1.4. The standard approval process for batteries submitted by a manufacturer or exclusive US distributor will require two sample battery packs of each type seeking approval, to be received at least three FULL weeks prior to the desired approval date (not counting the day of receipt), such as an event, for example. The approval fee for new batteries will be \$100 for each unique battery type submitted. No refunds will be available in the event the approval(s) is not completed by the desired date. Payment must be received before testing will start.
- 11.2.1.5. Under no circumstances will an approval be accepted less than three FULL days prior to the start of a ROAR Level 4 or 5 Sanctioned event (not including the day of receipt). The start of an event will be defined as the first day of open practice. Manufacturers, distributors and retailers who obtain an approval less than three weeks prior to the event will be required to have at least 30 packs available for sale through a trackside or nearby affiliated hobby shop, or via direct sales, without prejudice to any prospective buyers (competitors, etc.).

- 11.2.1.6. Resellers desiring approval for the EXACT same battery from a manufacturer or distributor that has already received approval may simply submit a sample for a secondary approval under their own trademarked name only under the following conditions:
  - 11.2.1.7. Reseller must have the written permission of the manufacturer or distributor that received the original approval (verification must be received by Battery Lab, the ROAR President and/or the ROAR Technical Director by mail or email from the company principle) within the aforementioned timeframes.
  - 11.2.1.8. All UN documentation and specifications must be sent in as outlined on the approval form
  - 11.2.1.9. The reference pack(s) is submitted exactly as it will be sold, including all the proper labeling.
  - 11.2.1.10. A complete Battery Approval Request form containing accurate information accompanies each battery seeking approval. The form is available on the [www.roarracing.com](http://www.roarracing.com) website under the "Approvals" link.
  - 11.2.1.11. The interior cells and external label match the capacity and C-rating of the original approved battery, and the manufacturer's name and internal serialized code matches that of the approved battery. Secondary approvals are only valid as long as the primary approval is valid and is at the discretion of the holder of the original approval. If for certain reasons, a primary approval is invalidated, for a rule's infraction for example, all secondary approvals may be invalidated. This is subject to the discretion of the ROAR President or Executive Committee.
  - 11.2.1.12. In the event an approval is abandoned (e.g. dissolution of the agreement between manufacturer and distributor of a currently approved battery, loss of affiliate status, etc.), the approval will revert back to the original manufacturer or a new distributor, subject to the discretion of the ROAR President.
  - 11.2.1.13. All batteries must be actually available and in stock or have been in stock for retail purchase from at least three (3) North American retail sources before approval can be finalized.
  - 11.2.1.14. Battery approvals remain valid for a period of four (4) years from the date of initial inspection. Manufacturers must submit a recently manufactured sample for a new inspection, and pay the required inspection fee, if they desire to extend the previous approval for an additional four years. Manufacturers are solely responsible for knowing when a prior battery approval is due to expire and for initiating the renewal process.

## 11.2.2     **LABELING OF BATTERIES**

- 11.2.2.1. The battery's label must have indelible markings that include the original manufacturer's name, the rated capacity of the cell, the CONSTANT "C" rating (clearly identified as "Constant"), and it must be serialized to distinguish different versions of cells from the manufacturer. The capacity and constant C rating must also be visible on the exterior battery label, identified as "XXXX mAh" where "XXXX" represents the capacity in milliamp hours, and "XXC Constant" where "XX" indicates the manufacturer-provided CONSTANT C-rating
- 11.2.2.2. Any indication that the original manufacturer-applied label has been changed or tampered with will make the LiPo battery pack illegal. Aftermarket wraps/decals MUST NOT replace the original label. Should the original label be removed, the product will be ruled an unapproved product which could subject the racer to disqualification.

## **11.3 GENERAL BATTERY RULES**

- 11.3.1 If protested, it is the driver's responsibility to prove the legality of his battery(s).
- 11.3.2 Batteries may not be charged or changed during a standard-length race. Batteries may be changed during an Endurance race.
- 11.3.3 Unless otherwise specified in the class requirements, a maximum of a 2s / 7.4v LiPo battery is permitted in any vehicle motor power pack used in ROAR-sanctioned competition.
- 11.3.4 Drivers are responsible for the proper disposal of batteries that are no longer useable. No batteries should be discarded in ordinary trash containers and may not be abandoned at race sites. It is recommended that tracks promote safety and non-pollution by providing an approved disposal container for unusable batteries.
- 11.3.5 **Running Change to Cell:** Manufacturers that make a running change without re-submitting the item for Lab review will forfeit the approval of that product, and possibly all related products from the manufacturer for a period of time to be determined by ROAR. Any new component (especially a different composition of cell) will need to be submitted for a new inspection and approval. The LiPo Approval Inspection includes specifications our Race Management Teams can confirm in the field. If during the race inspections, a pack appears outside the original parameters, the Racer/User could be subject to disqualification for using an altered product. Deliberate attempts to use products that are not approved may result in a disqualification of no more than one year for one or all of a manufacturer's related products, at the discretion of the ROAR President and the Executive Committee.

### **11.3.6 LITHIUM POLYMER BATTERIES (LiPo)**

- 11.3.6.1. Lithium Polymer battery packs may be used to power electric racing cars if a Certification of Compliance has been received and accepted by ROAR from the manufacturers of the battery packs. The Certification of Compliance indicates that the Lithium Polymer cells internal to the battery packs have been tested in accordance with UN T1-T8, the United Nations Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10.11/Rev.4) and passed the acceptance criteria. Lithium Polymer battery packs that do not have UN certification must pass the ROAR tests listed below and performed by the ROAR LiPo Test laboratory. Certification of Compliance to these test requirements and acceptance criteria shall be provided by the Original Manufacturer of the batteries. The Certification of Compliance will apply to all Lithium-Polymer products from the Original Manufacturer and provided on a one-time basis. The Certification of Compliance can be sent directly to ROAR by the Original Manufacturer or supplied to ROAR by the Value-Added Manufacturer that distributes the batteries. A Value-Added Manufacturer must also provide ROAR a Statement of Origin identifying the Original Manufacturer of the cells used in the battery pack and the number of battery packs provided for sale within North America. The Value-Added Manufacturer performs the assembly of cells into battery packs, installs the hard protective case and provides the electrical hook up points. The Original Manufacturer is the manufacturer of the individual cells.
- 11.3.6.2. LiPo battery packs must have a hard, protective case that surrounds the cell(s) in the racing application. A factory encased hard shell pack is mandated for race durability reasons that stem from the vulnerability of LiPo cells to physical damage. Any physical distortion, denting or puncture to the cells will cause either an immediate or long-term safety risk. A hard-cased pack reduces this risk significantly by protecting the cells from crash damage, battery ejection, and general wear and tear at the track. ROAR defines the "hard case" as a case made of ABS or similar type material. The case shall consist of two (2) halves with each half being constructed from a single mold that is not easily pliable and retains its shape without any exterior or interior support. Both the top and bottom sections of the case must be secured together by glue, double-sided tape or heat seal with such a manner that separation of the case to remove or replace the cells will destroy the case and/or label and render it unusable in competition. The case must be installed by the manufacturer or Value-added manufacturer no end User installed cases are acceptable. The case will protect the cells from damage on all sides and will completely cover all cells having only openings for wire connections. Any modification to the factory approved hard case will make the pack ineligible for participation in ROAR events.

11.3.6.3. LiPo/LiFe maximum case dimensions:

11.3.6.3.5 The maximum 1s brick/stick case:

Length: 93mm; Width: 47mm; Height: 18.5mm

11.3.6.3.6 The maximum 1s saddle case:

Length: 93mm to be measured as two packs end to end as a maximum  
Width: 46mm; Height: 23mm

11.3.6.3.7 The maximum 2s brick/stick case:

Length: 139mm; Width: 47mm; Height: 25.1mm

11.3.6.3.8 The maximum 2s saddle case:

Length: 139mm to be measured as two packs end to end as a maximum  
Width: 47mm; Height: 25.1mm

11.3.6.3.9 The maximum 3s or 4s brick/stick case:

Length: 165mm; Width: 52mm; Height: 52mm

11.3.6.4. The battery pack shall have leads extending from the case for the positive and negative electrical connections using wire of adequate size to handle discharge rates acceptable to racing applications. Alternatively, the case shall have external connection points for these wires clearly marked positive and negative so the user can apply the lead wires. Markings on the case are required stating the rated voltage and capacity of the battery. The Value-Added Manufacturers name and/or logo shall be easily readable on the case. Individual cells used in the construction of the battery shall be rated at 3.7v nominal. A 1s 3.7v nominal battery pack shall be 1 cell wired in series, a 2s 7.4v nominal battery pack shall be 2 cells in series, a 3s 11.1v nominal battery pack shall be 3 cells in series and a 4s 14.8v nominal battery pack shall be 4 cells in series. Multiple cells in parallel may be used.

#### **11.3.6.5. LIPO BATTERY CHARGING AND DISCHARGING**

11.3.6.5.1 LiPo battery packs must be charged with chargers capable of the industry standard CC/CV (Constant Current/Constant Voltage) charge profile. No other charge profiles are permitted.

11.3.6.5.2 LiPo battery maximum charge voltage (measured with all electronics turned OFF):

- 1s LiPo batteries may be charged to a maximum of 4.20v.
- 2s LiPo batteries may be charged to a maximum of 8.40v.
- 3s LiPo batteries may be charged to a maximum of 12.60v
- 4s LiPo batteries may be charged to a maximum of 16.80v
- 2s LiFe batteries may be charged to a maximum of 7.40v.

11.3.6.5.3 Racers who present vehicles at pre-race technical inspection with a battery voltage up to 0.02v per cell over the maximum voltage listed in 8.3.2.5.2 will be given one opportunity to reduce the voltage or to replace the battery with one within the voltage limits. Racers must leave the inspection area and rejoin the inspection line while replacing batteries or reducing voltage. In no case will the start of a race be delayed due to a racer using this provision. Racers who present vehicles at pre-race technical inspection with a battery voltage greater than 0.02v per cell over the maximum voltage listed in 8.3.2.5.2 will be disqualified from that round of racing. Racers who use the option of reducing voltage or replacing the battery and fail on their second attempt will be disqualified from that race

11.3.6.5.4 LiPo battery maximum charge rate- Please follow the written instructions provided with the battery by the manufacturer.

- 11.3.6.5.5 Maximum temperature for a charged LiPo battery pack shall be determined by the race director and posted in tech. For indoor races temp must be no greater than 90°F or 5° above ambient room temperature, whichever is greater.
- 11.3.6.5.6 The use of cooling device and or freeze sprays of any type to cool a LiPo battery is strictly prohibited.
- 11.3.6.5.7 All Lithium Polymer packs used for motor power must be charged or discharged inside a "LiPo-Safe Sack" or similar fire mitigation device proven to withstand a minimum of a 8.4v 5000mAh for 2s or 14.8v 5000 mAh for 4s Lithium Polymer pack failing destructively without showing external flame. Charging or discharging of multiple batteries in a single "LiPo Sack" is not allowed. Charging or discharging of multiple li - poly battery packs simultaneously shall be done with each battery in its own individual fire mitigation device.

## **11.4 ELECTRIC BRUSHLESS MOTOR RULES**

### **11.4.1 GENERAL**

- 11.4.1.1 Sensor based motors are required in classes that specify a spec wind motor (25.5t, 21.5t, 17.5t, 13.5t and 10.5t). Sensored or sensor-less motors may be used in all other classes (mod classes). Only circular (round) pure copper magnet wire permitted.
- 11.4.1.2 Motors must be designed so that owners can easily replace the rotor, bearings and front end-bell using commonly available tools. These parts shall be available for separate purchase. Ball bearings are allowed and may be made of steel, ceramic or a hybrid of steel and ceramic materials.
- 11.4.1.3 Motors used in 10<sup>th</sup> scale classes other than 4x4 Short Course Truck will be 540 (05) sized motors as defined in the following sections of the rules. Motors used in 4x4 Short Course Truck may be 540 or 550 size as defined herein. Motors used in 8<sup>th</sup>-scale classes will conform to rules for 8<sup>th</sup> scale motors.
- 11.4.1.4 Beginning on September 1, 2025 no solid glue, filler, or epoxy coatings may be added to the wires after they have been wound around the stator. A small amount of lacquer may be applied to secure the completed stator assembly provided that all wires can be easily unwound and removed by hand without the use of heat or solvents. The wire itself must be insulated such that the electrical circuit through the windings can only be completed from the two ends forming the designated minimum number of turns. All prior approvals for stock and superstock motors (10.5 – 25.5 turns) that fail to meet this requirement will be automatically terminated at 11:59pm (EST) on December 31, 2026.

### **11.4.2 Motor approvals**

- 11.4.2.1 All motors used in ROAR-sanctioned competition must be on the most current list of approved brushless motors posted on the ROAR website. Instructions and requirements for submitting motors for approval can be found on the ROAR website. Motor approvals shall be valid for 4 years from date of approval. After the initial 4-year approval period expires for any given motor, the manufacturer must re-submit current production samples of that motor to ROAR for a new inspection if they desire that it remain on the list of approved motors for another 4 year period. Manufacturers are solely responsible for knowing when a prior motor approval is due to expire and for initiating the renewal process.
- 11.4.2.2 All motors must have the original manufacturer's logo or name molded, engraved or etched on to the end bell. Spec wind motors (25.5t, 21.5t, 17.5t, 13.5t and 10.5t) must have the number of wire turns etched on to the stator stack where it is plainly visible without disassembling the motor.
- 11.4.2.3 Changes, other than normal production variations, to any area of an approved motor require re-approval of the motor. Examples of specific changes which require re-approval include but are not limited to: addition of lacquer or other compounds to windings, can color; end piece construction and color; stator length; number of stator laminations; thickness, diameter or shape of stator laminations; wire diameter; can length, can diameter, and the size, shape or number of cooling vents provided.

- 11.4.2.4. Modification of approved motors from their approved configuration and materials by manufacturers, importers or competitors is not permitted. No part of the motor may be replaced, altered or omitted except as noted below; this includes alterations to increase timing capability, addition of other coatings, rewinding or shortening of wires, etc. No hybrid motors (mixing of parts between approved brushless motors) allowed. Motors may be rebuilt as follows:
- Fasteners may be replaced with other fasteners of similar type and size. Unless explicitly prohibited by specific class rules, the original fasteners/screws may be replaced with fasteners/screws composed of steel, aluminum, titanium or other metal alloys.
  - Bearings may be replaced with any bearing of the same size as originally used. Unless explicitly prohibited by specific class rules, steel bearings may be replaced with ceramic or steel/ceramic hybrid bearings of the same size as originally used.
  - Sensor assemblies, end caps, sleeves, stators may only be replaced with components identical in construction and function to that used in the original motor approval
  - Standard rotors may be replaced with the “option” rotor approved by ROAR for the specific motor model number. Rotors from other motor manufacturers or other motors by the same manufacturer may not be used.
- 11.4.2.5. Resistance measurements will be made during the approval process on all Spec wind motors. The approval listing for each spec wind motor will specify the minimum resistance allowed to compete in a ROAR sanctioned event. The minimum resistance value shall be calculated and published based on 99% of the lowest measured resistance between any two poles as recorded by the ROAR inspector during the initial approval process using an Insteek GOM 802/804/805 milliohm meter and a motor temperature of 25°C (77°F). If the resistance value measure between any two poles is less than the minimum value shown on the ROAR-Approved list for that make and model, that motor will not be allowed to compete in a ROAR sanctioned event. Since the resistance values shown on the ROAR Approved List already include a 1% tolerance for manufacturing variability, no further allowance will be applied or allowed during motor inspections at a race.

#### **11.4.3 Availability for Purchase**

- 11.4.3.1. Manufacturers, distributors or commercial-level motor tuners who submit motors for approval must provide suitable evidence (for example, a commercial invoice) of having manufactured or imported a minimum of 200 complete motors of each spec wind being considered for approval or a total of 200 complete motors of all mod winds combined following confirmation of conformance to specifications by the Independent Lab and before final approval by the Executive Committee.
- 11.4.3.2. In cases where availability is confirmed more than 30 days following completion of inspection; ROAR reserves the right to make the official approval date the date on which evidence of availability is confirmed rather than the date motors were submitted.

#### **11.4.4 Optional Rotors –approval and use**

- 11.4.4.1. Effective September 1, 2025, for all Spec wind classes only, ROAR will approve the use of only two rotors for each unique motor manufacturer model number: one standard rotor and one option rotor. Rotors that are approved for use in any given motor model will be shown on the official ROAR-approved listing for that motor model. Rotors not shown on the official approval listing may not be used at a ROAR-sanctioned event.
- 11.4.4.2. The ROAR Technical Inspection Team will treat rotor inspection as a serious part of race inspection at the nationals and all of the technical data from the original Motor/Rotor submissions is stored in a secure database. The Inspection Team will disallow the use of any unapproved "option" rotors at ROAR-sanctioned events.
- 11.4.4.3. Manufacturers must submit both the standard rotor and the option rotor at the same time a new motor model is submitted for ROAR inspection and approval. Any change in specifications for either the standard rotor and/or option rotor will require a new ROAR inspection and approval along with a new inspection fee.

## 11.4.5 General technical specifications for brushless motors

### 11.4.5.1. If the motor is sensored:

It must use a six position JST ZH connector model number ZHR-6 or equivalent connector with 6 JST part number SZH-002T-PO.5 26-28 awg contacts or equivalent. Wire sequence must be as follows:

Pin #1-ground potential

Pin #2-phase C

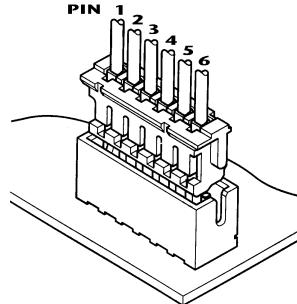
Pin #3-phase B

Pin #4-phase A

Pin #5-temp control, 10 k Thermistor referenced to ground potential

Pin #6+- 5.0 volts =/-10%

For clarification pin #1 is on the left-hand side of the above connector with the wires exiting the top of the connector and the plastic tangs that hold the contacts in the housing are facing forward. See drawing below.



Sensored type compatible speed controls must use the six position JST header part number X-6B-ZRSMX-TK (where X denotes the style of the header) or equivalent. The power motor wire connections must be clearly marked A, B, C on both speed control and motor. A for phase A; B for phase B; C for phase C.

- 11.4.5.2. The sensor assembly and associated electronics, including the ESC, may not provide dynamic timing (i.e. timing which varies with motor speed or load) when in "blinky" mode.
- 11.4.5.3. Electronic speed controls must only allow changes timing modes (e.g. boost, turbo, softening, etc.) by connecting an external setup box or wireless module. It must not be possible to make such changes from the radio transmitter or by buttons on the ESC itself when it is in "blinky" mode.
- 11.4.5.4. If the stator cannot be easily removed for inspection from the outer sleeve of 540 and 550 sized motors, then the outer sleeve must have:
  - Slots or holes that allow measurement of the stator length using conventional measuring tools
  - Slots or holes to allow visual inspection of the laminations and the number of laminations used in the stator. A single slot long enough to count the laminations or two or more closely spaced parallel slots to allow counting the number of laminations are examples of acceptable constructions.
- 11.4.5.5. If the stator laminations are coated with an insulating material, then the manufacturer must provide two areas which are clear of the insulating material approximately 180 degrees apart and in line with any slots or holes to facilitate measurement of the stator stack length.
- 11.4.5.6. If the nodal (common ring) is coated with an insulating material, then the manufacturer must provide an area clear of this material to facilitate measuring the resistance between each motor tab and the nodal ring.

- 11.4.5.7. The stator lamination plates must be constructed in a manner where they are symmetrical (all 3 slots must be of the same size and shape) and must be arranged so that the slots for the wires are parallel to the axis of the rotor (i.e. may not be skewed around the rotor axis). Removal of sharp edges is allowed in the winding area on the end laminates only to offset damage to wire coatings subject to the conditions set forth in Rule #11.3.7.1. Removal must be confined to the top and bottom lamination in the stack and cannot affect the thickness of the lamination or the width of the wire winding web.
- 11.4.5.8. Motor Cooling: Any active (powered) motor cooling (such as Peltier devices and liquid cooling), other than a single standard fan with a diameter not greater than 40mm, are strictly prohibited. Motor heat sink devices directly contacting or attached to the motor must be made of cast aluminum only, no other materials are allowed. Air scoops or ventilation slits on the motor can, or other passive cooling techniques, including rotors with integrated fan blades, are allowed. Motor must be at or above ambient room temperature before the start of the race.

#### **11.4.6      540 (05) Motor Size Specifications:**

- 11.4.6.1. Overall outer diameter of the motor is 36.02 mm maximum and 34.00 mm minimum when measured at whatever point yields the maximum dimension, excluding solder tabs, screwheads or lead wires. The outer sleeve of the motor must be round within 0.3mm.

The outer diameter must be concentric with the space formed for the rotor by the stator laminations.

Maximum length is 53.00mm, Minimum length is 50mm measured from the mounting face of the motor to the furthest most point of the end bell, not including solder tabs, lead wires or original manufacturer's logo or name. Motor mounting holes must be on (25.00-25.40mm) centers.

#### **11.4.7      540 (05) Spec Wind Motors**

- 11.4.7.1. For ROAR Spec motors defined in these regulations, the stator construction must be continuous laminations having the same overall shape, one after the other without anything in between. The laminations must be of one homogeneous material without cut-outs, holes or hollow sections other than the three slots for the round copper coil wires and three slots for the screws used to hold the entire can together. The top and bottom laminate in the stator stack may be deburred or chamfered only on the wire winding web/leg so long as the overall thickness of these end laminates is the same as other laminates in the stack and so long as the measured width of the wire winding leg or web of these end laminates is the same as other laminates in the stack. This requirement effectively restricts any deburring or chamfering to only the top and bottom laminates in the stator. For all ROAR Spec Motors the overall stator length (parallel to the motor shaft) shall be a minimum of 19.3 mm and a maximum 21.0 mm. The thickness of the laminations shall be 0.35+/-0.05mm. A 'go-no-go' gauge 14.500 +0.000/-0.005 mm diameter shall pass into the stator, clearing the stator plus its windings and the electrical collection ring at the end of the stator.
- 11.4.7.2. Only three slot "Y" wound stators are permitted for all spec winds. No delta wound or slot less stators are allowed. Only circular (round) pure copper magnet wire permitted.
- 11.4.7.3. Rotors for ROAR Spec Motors: External shaft diameter must be 0.125 inches (3.175mm). Only one piece, two pole Neodymium sintered, or Ferrite (Ceramic) magnetic rotors are permitted. The magnet length shall be 25.0 +/-1.00mm not including any non-magnetic balancing material. The magnet outside diameter shall be a maximum of 12.51 mm and a minimum of 12.30 mm, with no additional tolerance, for the entire length of the magnet. The shaft outside diameter, where the magnet is mounted, shall be 7.25 +/-0.150mm for the entire length of the magnet. This dimension must be measurable without destroying the rotor.
- 11.4.7.4. Rotors for ROAR Spec Wind motors must be identified with the manufacturers name or logo and the part number of each unique rotor design. All rotors must have legible markings etched or engraved on the flat portion of the output shaft which allows for easy identification of the rotor part number without needing to disassemble the motor.

- 11.4.7.5. **ROAR Spec 25.5 motor:** The three slotted stator must be wound with 25.5 turns of two strands of wire with a maximum diameter of 0.643mm per slot. Effective September 1, 2025 the physical specifications set forth in Rule #11.4.7.1, Rule #11.4.7.2, Rule #11.3.7.3 and Rule #11.4.7.4 shall also apply to the ROAR Spec 25.5t motor. All 25.5t motors previously approved based on a minimum stator length of 19.7 mm and a maximum rotor diameter of 12.3 mm will remain legal for use until the prior approval naturally expires or the motor is removed from the ROAR-approved list in accordance with Rule #11.3.1.4 (whichever comes first). Drivers may replace the 12.3mm rotor in previously approved 25.5t motors with any ROAR-approved 12.5mm rotor that was produced by the same manufacturer for 13.5, 17.5 or 21.5 Spec motors of the same model series; for example, any 12.5mm rotor approved for the R1-V21 series may be installed in a 25.5t R1-V21 motor.
- 11.4.7.6. **ROAR Spec 21.5 motor:** The three slotted stator must be wound with 21.5 turns of two strands of a maximum diameter of 0.724mm per slot.
- 11.4.7.7. **ROAR Spec 17.5 motor:** The three slotted stator must be wound with 17.5 turns of 2 strands of a maximum diameter of .813 mm per slot.
- 11.4.7.8. **ROAR Spec 13.5 motor:** The three slotted stator must be wound with 13.5 turns of 2 strands of a maximum diameter of 0.724 mm and two strands of a maximum diameter of 0.574 mm per slot.
- 11.4.7.9. **ROAR Spec 10.5 motor:** The three slotted stator must be wound with 10.5 turns of 2 strands of a maximum diameter of 0.813 mm and two strands of a maximum diameter of 0.643mm per slot.
- 11.4.7.10. Effective on September 1, 2025, the minimum resistance allowed to compete in a ROAR-sanctioned event will be determined individually for each unique manufacturer and model number in accordance with ROAR Rule #11.3.2.5.
- 11.4.7.11. National or Regional Championships sanctioned by ROAR must allow the use of any motor on the most current ROAR-approved list for that class. Race classes that require exclusive use of a Spec motor produced by a single manufacturer shall be designated as "Exhibition Classes" at ROAR National and Regional events. Examples of such Exhibition Classes include, but are not limited to, USGT and USVTA.

#### **11.4.8 540 (05) Modified 2 pole Motors**

- 11.4.8.1. For ROAR Modified motors defined in these regulations the stator construction must be continuous laminations having the same overall shape, one after the other without anything in between. The laminations must be of one homogeneous material without cut-outs, holes or hollow sections other than the 3 slots for the round copper coil wires and 3 slots for the screws used to hold the entire can together. Overall stator length parallel to the motor shaft shall be a minimum of 19.3mm and a maximum 21.0 mm. The thickness of the laminations shall be 0.35 +/- 0.05 mm. Stack inside diameter to be a minimum of 12.50 mm to a maximum of 16.0 mm.
- 11.4.8.2. Rotors for 2 pole Modified Motors: External shaft diameter must be 0.125 inches (3.175mm). Only one piece, two pole Neodymium sintered, or Ferrite (Ceramic) magnetic rotors are permitted. The magnet length shall be 23.00mm –27.00mm not including any non-magnetic balancing material. The magnet outside diameter shall be a maximum of 15.50 mm, minimum of 12.00mm no tolerance, for the entire length of the magnet.

#### **11.4.9 540 (05) Modified 4 pole Motors**

- 11.4.9.3. The stator construction must be continuous laminations having the same overall shape, one after the other without anything in between. Laminations must be of one homogeneous material without cut-outs, holes or hollow sections other than the twelve (12) slots for the round copper coil wires and three slots for the screws used to hold the entire can together. The overall stator length parallel to the motor shaft shall be a maximum of 25.0mm. The thickness of the laminations shall be a minimum of 0.18 +/- 0.05mm. A "go / no go" gauge 18.00 +0.00 / -0.005mm diameter shall pass into the stator, clearing the stator plus its windings and the electrical collection ring at the end of the stator.
- 11.4.9.4. Only twelve (12) slot stators are permitted. No slot-less stators are allowed. Only circular (round) pure copper magnet wire permitted.

- 11.4.9.5. Only four (4) piece, four-pole magnetic rotors are permitted. The magnet length shall be a maximum of 25.5mm not including any nonmagnetic material. The magnet outside diameter shall be a maximum of 19.0mm, no tolerance, for the entire length of the magnet. This dimension must be measurable without destroying the rotor.
- 11.4.9.6. Motors using rotors with a 0.125 inch (3.175 mm) shaft are allowed in all 10<sup>th</sup> scale mod classes. Motors using rotors with 5mm shafts are only allowed in the 4x4 SCT class.

#### 11.4.10 1/8th Brushless Motor Dimensions

- 11.4.10.1. Maximum overall length of the motor can is 77.00 mm measured from the mounting face of the motor to the furthest most point of the rear end bell (not including solder tabs, lead wires or original manufacturer's logo or name). Motor mounting holes must be on 1.00-inch (25.40mm) centers.
- 11.4.10.2. The maximum outside diameter of a motor stator is 39.0 mm.
- 11.4.10.3. The external diameter of the rotor shaft shall be 5mm (0.197 in.).
- 11.4.10.4. Motors must be either a 2 pole or a 4 pole design with a maximum 12-slot stator.

#### 11.4.11 550 Motors for 10th scale 4x4 Short Course Truck (SCT) Class Only

- 11.4.11.1. Can: Diameter is 36.02 mm, maximum. Overall length is 73.0 mm, maximum, measured from the mounting face of the motor to the furthest most point on the endbell, not including solder tabs, lead wires, sensor plug or housing, or the manufacture's logo or name. Motor mounting holes must be on 25.00 mm - 25.40 mm centers.
- 11.4.11.2. Stator: Only 2-pole or 4-pole, 3 slot motors allowed. Motor stator minimum length is 34.85 mm with a maximum length of 42mm. The thickness of the laminations shall be 0.35mm +/- .05mm. A 'go-no-go' gauge 14.500 +0.000/-0.005mm diameter shall pass into the stator, clearing the stator plus its windings and the electrical collection ring at the end of the stator.
- 11.4.11.3. Rotor: External shaft diameter may be either 3.175 mm or 5mm. Only one piece, two pole Neodymium sintered, or Ferrite (Ceramic) magnetic rotors are permitted. The magnet length shall be a minimum of 39.0 mm and maximum of 46.0 mm not including any nonmagnetic balancing material. The magnet outside diameter shall have a minimum of 12.3mm and a maximum of 14.0mm, no tolerance, for the entire length of the magnet.

## 12. "NITRO" FUEL CLASS RULES

The following rules are additional rules for nitro-fueled vehicles. In most cases, the rules in this section are designed to further define the General Rules. At no time are these rules to be used without regard to the General Rules, which apply to all vehicle types and classes.

### 12.1 FUEL SPECIFICATIONS

- 12.1.12 Fuels may contain only methanol, nitro methane, coloring agent, and a lubricant.
- 12.1.13 The following additives are specifically prohibited: hydrazine, hydrogen peroxide, propylene oxide, and toluene.

### 12.2 GENERAL VEHICLE SPECIFICATIONS

- 12.2.1 All fuel-powered vehicles must be equipped with a working brake system capable of stopping the vehicle and holding it motionless with the engine running.
- 12.2.2 All vehicles must be equipped with a working de-clutching device capable of allowing the vehicle to stand stationary with the engine running.
- 12.2.3 Any event official may check engines, fuel tank capacities, carburetors, and other specifications at any time.
- 12.2.4 Antennas must be flexible. "Roll-over" antennas are not permitted in any fuel class.

#### 12.2.5 EXHAUST RULES:

- 12.2.5.1. All vehicles are required to use a muffler or tuned pipe through which the exhaust gas must pass.
- 12.2.5.2. A muffler or tuned pipe approved by ROAR, EFRA or IFMAR -must be used in all ROAR- sanctioned events.
- 12.2.5.3. Exhaust discharge must be parallel to the ground or lower.
- 12.2.5.4. The maximum allowable sound level is 85 decibels, measured at ninety degrees to the direction of travel of the vehicle from a distance of 33 feet; 3 feet above the ground, with the vehicle at maximum throttle and at all speeds. A Radio Shack sound meter (Part #33-2055) or equivalent should be used to check the sound level.
- 12.2.5.5. Any vehicle that loses its muffler will be black-flagged and not scored until repaired.
- 12.2.5.6. The muffler or tuned pipe outlet must have a single, round, constant inside diameter, with its end cut at 90 degrees to its centerline. The inner diameter of the exhaust outlet must be circular within the maximum size specified in the table. Oval or misshapen stingers that may not accept a plug gauge of the specified size but measure oversize using other measurement devices are not permitted.
- 12.2.5.7. Muffler dimensions are specified according to engine size, as follows:

Exhaust Outlet Specification	.12 ROAR/	.12 OPEN	.15 ROAR/	.15 OPEN	.21 OPEN
Maximum inner diameter	5.2mm	5.2mm	5.2mm	6.5mm	8.0mm
Minimum length	15.0mm	15.0mm	15.0mm	15.0mm	15.0mm

#### 12.2.6 DRIVE AND TRANSMISSION SPECIFICATIONS

- 12.2.6.1. All gearboxes must be on a single shaft. Multiple-speed transmissions are allowed for some on-road classes (see vehicle specifications), but not for off- road racing except for the Monster Truck class. Automatic or variable overdrive systems are not allowed.
  - 12.2.6.2. Hydraulic or viscous drive systems are not allowed.
- 12.2.7 **THROTTLE SAFETY SPRING:** cars must incorporate a positive action return device (i.e. a spring) attached directly to the carburetor throttle arm to provide positive closure in the event of linkage failure.

#### 12.2.8 FUEL TANK SPECIFICATION

- 12.2.8.1. Fuel tanks must be securely mounted.
- 12.2.8.2. Maximum fuel system capacities are 75cc for .12 engines, 80cc for .15 engines, and 125cc for .21 engines.
- 12.2.8.3. There are three approved ways to determine the fuel capacity of a vehicle. The first way is by pouring the correct amount into the vehicle's system, and the second way pumps the fuel out of the vehicle's system into a measurement container. The Race Director must ensure that all waste fuel is disposed of properly.
- 12.2.8.4. To check a tank capacity the first way, drain all fuel from the system including fuel and pressure lines. Pinch off the pressure line at the tank and disconnect the fuel line from the carburetor. Using a graduated cylinder, measure the proper amount of the driver's fuel. The graduated cylinder is read at the bottom of the fuel's meniscus when viewed from the side of the cylinder at eye level. Pour the fuel into the tank, allowing fuel line and filter (if fitted) to fill. The fuel should fill the tank to the top of the filler neck, or to a point where fuel overflows or is forced out when the lid is closed. If it does not, the tank is oversize, and a fixed insert must be used to reduce the tank capacity.

- 12.2.8.5. To check the tank capacity the second way, fill the tank to the top of the filler neck. Make sure all fuel lines are full. Attach a fuel pump or large capacity syringe to the end of the tank-to-engine fuel line. Transfer the fuel completely out of the vehicle's system into a graduated cylinder or another accurate liquid measuring device. (Reading a graduated cylinder is described above, in this rule.) If there is more fuel retrieved than allowed, the tank is oversize, and a fixed insert must be used to reduce the tank capacity.
- 12.2.8.6. To check the tank capacity the third way, take off pressure lines, fill the fuel tank completely, remove the fuel pipe from the carburetor inlet and make sure the fuel line is full. Connect an air pump to the pressure nipple and measure fuel amount with a Calibrated glass. The amount of fuel pressed into the glass will be considered as the total content of the fuel system.
- 12.2.8.7. A 10 minute cool down period may be allowed for tanks close to the limit (less than 3cc). This decision can only be made by the DRO or Race Director.
- 12.2.8.8. Fuel must be at ambient temperature.
- 12.2.8.9. All refueling, repairing, or servicing of cars must be take place with the vehicle fully behind the barrier between the pit lane and the working pit area, and not in or over the pit lane. When pitting the car for fuel the fueling apparatus cannot be in the tank while over the pit lane. Unintentional waving of the fueling apparatus over the pit lane will not be penalized unless fuel is spilled in the pit lane and not immediately cleaned up. Off road cars may be placed on top of the exterior pit walls for servicing provided the wall has been designed so that the car is secure and stable. After refueling, cars being placed back in pit lane must not impede or interfere with other cars entering or exiting pit lane.

## **12.3 ENGINE SPECIFICATIONS**

- 12.3.1 Only single-cylinder, two-stroke, normally aspirated, air-cooled, glow-ignition engines utilizing standard or turbo plugs are permitted in ROAR-sanctioned events.
- 12.3.2 No forced aspiration systems, liquid cooling systems or fuel pressurization systems (other than by means of exhaust pressure applied directly to the vehicle's fuel tank) are allowed.
- 12.3.3 Any carburetor may be used as long as the bore does not exceed the maximum allowable for the engine size. Restrictors may be used to achieve the legal diameter but must be securely fastened in place.
- 12.3.4 Other than in the bearings, ceramic parts are not allowed in any engine raced in ROAR-sanctioned events.
- 12.3.5 Engine dimensions/requirements for ROAR legal engines:

<b>Engine Type</b>	<b>Maximum Displacement</b>	<b>Max. Carburetor Bore (see **Note)</b>
<b>.12 ROAR/IFMAR</b>	.129ci - 2.11cc	5.5mm
<b>.12 OPEN</b>	.129ci - 2.11cc	5.5mm
<b>.15 OPEN</b>	.152ci - 2.50cc	7.0mm
<b>.21 OPEN</b>	.214ci - 3.50cc	9.0mm
<b>.28 OPEN</b>	.284ci - 4.66cc	9.0mm

\*\*Note: Measured directly above the spray bar or needle of the carburetor.

- 12.3.6 For .12 ROAR/IFMAR class engines the maximum number of ports including the exhaust port is FOUR.
- 12.3.7 Inlet Noise Silencer device "INS" box shall be required for level 3,4 and 5 event for on-road 1/10th and 1/8th scale competition. Roar will utilize the IFMAR approved list of acceptable devices available in the "RULES" area of the IFMAR web site. No performance modifications will be allowed to the INS box. Modification will be determined by comparison to sample device as provided by the manufacturer and under control of a ROAR representative. Tolerance for this purpose will be +/- .1mm.

## **13. IFMAR WORLD TEAM RULES**

### **13.1 GENERAL**

- 13.1.1 The International Federation of Model Auto Racing (IFMAR) is the sanctioning body for all World Championships (WC). ROAR is one of four voting member Blocs of IFMAR, the others being the European Federation of Radio Controlled Automobiles (EFRA), the Far East Model Car Association (FEMCA) and the Fourth Association of Model Auto Racing (FAMAR). ROAR is the only organization in Canada and the United States entitled to send drivers to a WC.
- 13.1.2 IFMAR WC events are held for electric and fuel cars on off-road and on-road tracks. Individual events are held every other year, and normally rotate between EFRA, FAMAR, FEMCA, and ROAR the schedule for rotation can be found at [www.ifmar.org](http://www.ifmar.org).
- 13.1.3 Entries are limited depending on event. ROAR is normally allocated 30 entries for each WC, and may receive additional entries because of providing host bloc venues, ownership of previous world titles and other IFMAR reallocations if these are not used by the other blocs. Entries not used by ROAR are returned to IFMAR for reallocation.
- 13.1.4 Ceremonial apparel will be provided to each racer as filled out on the entry flyer for the Worlds event. Additional supplies of clothing will be provided to racer upon payment in full to ROAR for the item(s). This clothing will signify team affiliation with ROAR and the countries associated with ROAR. This clothing is mandatory to be worn during the opening ceremony should the racer choose to participate. The racer is also required to maintain behavior fitting the respect of the ceremony as it deserves, this includes removal of hats during the national anthem(s) and respectful attitudes towards other blocs and countries. Failure to abide by this will result in suspension of ROAR membership the following year with Executive Committee review.

### **13.2 SELECTION POLICY**

- 13.2.1 ROAR has adopted a general policy for selecting the members of a WC team. Those eligible for the team include ROAR members whose membership is in good standing with ROAR and not under any review by the Executive Committee.
- 13.2.2 ROAR will mail or contact in other means each eligible member of the team an entry flyer stating status as qualified or alternate from mailing information as provided by the racer on membership forms or otherwise notified. Each entry flyer will state racer status, class for which racer is eligible to participate, required deadline date for return of paid in full entry flyer and address to where the entry flyer is to be mailed.
- 13.2.3 All ROAR member drivers who raced the Main event at the previous WC in that class are automatically qualified to participate and only upon receipt of paid in full entry flyer PRIOR to the deadline date with current membership status are enrolled to participate.
- 13.2.4 The top finishers (the exact number depends on the number of pre-qualified drivers from the prior WC) in that class from the previous year's ROAR Nationals are automatically qualified to participate and only upon receipt of paid in full entry flyer PRIOR to the deadline date with current membership status are enrolled to participate.
- 13.2.5 If ROAR events other than ROAR Nationals are to be used to qualify drivers for the ROAR WC Team, those events will have secondary priority to ROAR National events.
- 13.2.6 If more than one class is run at a WC, as is the case with 2WD and 4WD off- road, the team will consist of the A main drivers in both classes from the previous WC and the top finishers in those classes at the previous year's ROAR Nationals. These positions will be allocated based on the number of entries in the two classes at the ROAR Nationals.
- 13.2.7 Drivers qualified for a WC must keep their membership current through the dates of the scheduled IFMAR event or they will lose their eligibility.
- 13.2.8 Since there are normally some drivers who are eligible, but not able, to attend the WC, a system for selecting alternates has been established. Any driver wanting to be considered as an alternate may send a resume of racing experience to the ROAR Administrator.

- 13.2.9 In the event a waiting list must be created for eligible participants to the scheduled IFMAR event, the ROAR Administrator will maintain this list based on date of receipt of paid in full entry form and verified membership status through the dates of the event.

## 14. NATIONALS POLICIES

### 14.1 GENERAL

- 14.1.1 The National Championship events are the premier ROAR events. They are governed by the rules contained in this book and by specific rules contained in the Nationals Guidelines.
- 14.1.2 Only National Championship events confirmed by the ROAR Executive Committee are allowed to use the term "ROAR Nationals" in their promotional efforts. All advertising must state "<Year> ROAR <Class> Nationals". Sponsors or other co-hosts may be referred to as such, but the event must be clearly billed as the "ROAR Nationals" and cannot be referred to in conjunction with any sponsor, manufacturer, or another event.
- 14.1.3 The ROAR Executive Committee must approve any deviations from the National Guidelines or ROAR Rules. The ROAR National Guidelines are available from the ROAR Administrator or may be downloaded from the [www.roarracing.com](http://www.roarracing.com) website, and may be used by any member track wanting to conduct races using the National's format. National Policies (in this rulebook) and/or the current year's ROAR National Guidelines may supersede other rules in this rulebook.
- 14.1.4 The ROAR Executive Committee will designate the classes and scales that will receive the National Championship designation. IFMAR world championship classes will be the main basis for selecting required classes. Other classes or scales may be offered in support of the event, but will not receive National Championship designation unless pre-approved by the ROAR Executive Committee.
- 14.1.5 If it appears that a National event for a specific class has become more of a regional event, the ROAR Executive Committee may consider the elimination of National Championship status for that class.
- 14.1.6 Local procedures and rules that conflict with ROAR rules are not allowed.
- 14.1.7 The official race results will be made equally available to all media upon request.

#### 14.1.8 SITE SELECTION

- 14.1.8.1. The Executive Committee will meet in the early Fall to make the final site confirmations. These will be based on the recommendations of the Class Committees.
- 14.1.8.2. To provide the widest possible exposure and opportunity to compete, the location of the individual National events will be rotated as much as possible.
- 14.1.8.3. In selecting Nationals sites, the Executive Committee must make every effort to avoid having the same Nationals, or any other Nationals, at the same location two years in a row. ROAR will try to avoid using the same location on a repetitive basis.

### 14.2 ENTRY RULES

- 14.2.1 The maximum number of classes that may be entered by an individual driver at a single Level 5 event is three, unless otherwise indicated in the National Guidelines.
- 14.2.2 At any single Level 5 event, a driver entering a stock class may not enter in any modified class and a driver entering a modified class may not enter in any stock class. An exception shall be made to allow stock drivers to enter a modified class when that chassis class is only offered as a modified class. Either modified class or stock class driver may enter in a Super Stock class.
- 14.2.3 A recommended maximum of six classes may be offered at any single National event. These classes must be applied for by the Host Club in their bid for the event, and must be published on all advertising, and on the event entry form.
- 14.2.4 Juniors', Masters', Demonstration and Provisional classes may be included at the discretion of ROAR Executive Committee.

14.2.5 All ROAR Nationals will open online 90 days prior to the event. Entries will only be accepted as completely filled out online, payment in full for all classes chosen and current membership status through the dates of the event. For participants the year prior national event, 7 day early entry is available with contact to the Administrator and Competition Director with payment in full and current membership status through the dates of the event.

14.2.5.1. Entries that are published as 'verified' on the ROAR website are the only entries that are confirmed as participants in the event.

14.2.5.2. Should the event 'sell' out with paid and verified entries, a waiting list will be generated by accepting paid in full and current membership status entries based on date of receipt, not post mark date of the mailed entry flyer. All mailed entries are logged with date of acceptance as received and filed accordingly at the Administrator's office.

14.2.5.3. All unverified entries published must immediately correct the membership status issue or other reason for not being verified or will be refunded their entry fee money or will be moved to the waiting list.

#### 14.2.6 DEFINITIONS AND RESTRICTIONS

14.2.6.1. Juniors are drivers age 15 or under on the final day of the race. Proof of age will be required.

14.2.6.2. Minimum Masters Driver's age is 45 for fuel on road classes. All others must be age 40 or above as of the first day of qualifying. Proof of age is required.

14.2.6.3. Juniors and Masters may enter other classes, but not in the same type vehicle.

14.2.7 Entries may not be transferred from one driver to another without the express permission of the Race Director.

### 14.3 RACING RULES

14.3.1 The specific Nationals track and/or track layout will not be run on for a period of 3 days prior to the RMT controlled practice day. Except for one day of Host controlled practice to take place the day prior to the RMT controlled practice day. If the host opts not to host its own practice day, then the Nationals track and/or layout will not be run on for a period of 3 days prior to the RMT controlled practice day.

14.3.2 Qualifying will use IFMAR Starts. On a track with low lap times, starting will be by rows.

14.3.3 All cars must cross the timing loop prior to the start of every race to verify correct transponder operation and proper vehicle numbers.

14.3.4 MyLaps/AMB brand personal transponders will be required at level 5 races. These must be uniquely numbered per driver. No sharing of Personal Transponders between drivers is allowed. An individual driver may use a single Personal Transponder for all vehicles entered and raced solely by that driver.

14.3.5 Except for 1:5 scale events, qualifying will be based on the ROAR Qual-Points System; 1/5 scale events will use each entrant's single fastest laps/time in a heat to determine the qualifying order.

#### 14.3.6 ROAR QUAL-POINTS SYSTEM

14.3.6.1. Under this system, the Top Qualifier in each round gets zero points, second gets two points, third gets three points, etc., increasing by one point per position.

14.3.6.2. The final Qualifying order will be determined by the sum of each driver's best two rounds' points.

14.3.6.3. First level ties will be broken by the best single finishing rank. Thereafter, ties will be broken using the best single laps/time result from each driver's best two points rounds.

14.3.6.4. In cases where only two rounds of Qualifying could be completed, the final Qualifying order is based on the single best points, with points from the second best round being used as the first tie breaker, and the fastest laps/time from the best points round will be used as the second level tie breaker.

14.3.6.5. Round 1 qualifying heats will sort drivers based on their single best rank from all available seeding rounds. Ties will be broken based on each driver's fastest 3 consecutive laps in seeding rounds.

#### **14.3.7 MAIN EVENTS**

- 14.3.7.1. Except for the Modified race classes, there shall be a minimum of 10 drivers in the A Mains. For the Modified race classes, drivers whose average lap time from their best qualifying run is more than 10% slower than that of the TQ time shall be excluded from the A-mains.
- 14.3.7.2. A triple A Main system will be used for all National Championship electric classes, including juniors and Masters Classes, if offered. A single Main event will be used for all lower Mains. Triple-A Mains for Exhibition classes are at the Race Director's discretion.
- 14.3.7.3. A-Main events will use the ROAR Qual-Points system described in §14.3.6.1 & §14.3.6.2 above. Tie breakers will be applied in the following order: 1) Best single finishing rank (example: driver with ranks of 2 & 4 finishes ahead of another driver with ranks of 3 & 3); 2) Most laps in the least time from the driver's single fastest run of the two scoring finishes originally used to compute the driver's Qual Points in the Triple-A mains.
- 14.3.7.4. A driver who wins the first two mains of a triple A Main event must sit out of the third Main.
- 14.3.7.5. Any deviation from this format must be approved by the ROAR Executive Committee in advance.
- 14.3.7.6. The finishing order of the race will be determined by the order in which the cars reach the finish line. This will take precedence in the event there is a conflict with the results reported by the computer. The fact that a vehicle crosses the finish line outside the limits of the racing line will not be cause for a penalty unless it results in an advantage over another vehicle. A Race Official is required to observe and record the order of the finish of all A-Mains.
- 14.3.7.7. If a race is interrupted by weather before it reaches the halfway point then the cars are returned to the entrants and the race is restarted in qualifying order, one second apart, from the pits when weather permits. If the interruption is after the halfway point then the race is considered complete and the results will be based on the last completed lap for each driver at that time.

#### **14.4 EQUIPMENT USAGE RULES**

- 14.4.1. Only ROAR-approved electric motors (incl. "option" rotors), batteries, ESCs, and bodies may be used in National Championship events. Motors, batteries, ESCs, and bodies must be dated on the approval list found at [www.roarracing.com](http://www.roarracing.com) fourteen (14) days prior to the event to be eligible for use.
- 14.4.2. If deemed necessary by the Executive Committee, equipment used in Provisional or demonstration classes or scales may be excluded from the fourteen-day requirement.
- 14.4.3. Motors, batteries, bodies and electronic speed controls used in Stock and Super Stock electric classes must be readily available (*i.e.*, in-stock and ready to ship) through retail outlets at least 14 days prior to the event in order to be legal for use in the event..
- 14.4.4. Vehicles must pass a minimum tech inspection prior to and/or after every race. Illegal cars will not be allowed to run. A minimum tech inspection consists of but is not limited to: vehicle dimensions, weight, proper engine/motor, legal body, assigned frequency (except in the case of 2.4GHz DSM/DSS systems), tires, battery voltage, ESC timing, and vehicle number. The Race Director, Technical Inspectors or the Designated ROAR Official may call for inspections at any time.
- 14.4.5. Tire traction chemicals or other chemicals that emit odors that could be offensive or are labeled as hazardous should not be permitted at indoor events or in pits that are indoors. Use of traction compounds at any ROAR event is at the discretion of the Race Director and any/all bans or special requirements must be disclosed in advertising and on race entry forms.

14.4.6     **HANDOUT OR CONTROLLED MOTOR RULES:** ROAR uses stated product rules at level 5 national championships. Below is for the use of information only should a host opt to provide handout product for an event lower than level 5

14.4.6.1. Handout or controlled motors will be used in all stock and super stock electric classes. The term "Handout Motor" includes but not limited to the following components:

- Cans
- End bells
- Bush hoods
- Bushings
- Armatures
- Rotors

14.4.6.2. All handout motors will be right hand drive only.

14.4.6.3. Drivers may not use their own stock motors or stock motor components when the event requires that Handout motors be used. All motors must be inspected by the ROAR RMT Technical staff prior to the start of qualifying. Participants will be limited to a maximum of 3 ROAR approved motors. All ROAR stock and super stock motor rules shall apply.

14.4.6.4. There is no requirement to impound stock motors overnight. If this is done, drivers must be informed of this when they are issued their motors for the first time.

14.4.7     **HANDOUT OR CONTROLLED TIRE RULES:** ROAR uses stated product rules at level 5 national championships. Below is for the use of information only should a host opt to provide handout product for an event lower than level 5

14.4.7.1. The following classes are defined as requiring handout or controlled tires at Level 5 events:

- Off-Road classes except Modified, Provisional or Demonstration classes.
- All Electric Touring Car pavement classes.
- All Electric Touring Car carpet classes when rubber tires are specified.
- All 1/8 Nitro/Electric GT classes

14.4.7.2. Handout or controlled tires are allocated to the vehicles entered, and not to the drivers.

14.4.7.3. Tire sets or pairs may not be exchanged between a driver's entries, or with another driver.

14.4.7.4. Handout or controlled procedure:

- The Host and ROAR pick the tires to hand out. Any business agreement is between the host and the tire's provider, not ROAR.
- For control purposes, the participant will present unopened packages of tires selected by the host to be used at the event to the ROAR RMT Technical staff prior to the start of qualifying.
- If the handout or controlled tire and insert assemblies are not pre-built, drivers must mount their handout or controlled tires and return the completed assemblies to technical inspection. Technical inspection will permanently mark the wheels with the driver's vehicle entry ID number and tire set number. Drivers may use their own inserts.
- If the handout tire assemblies are pre-built, Technical Inspection must mark the wheels with each driver's vehicle entry ID number and tire set number before the set is given to the driver. Drivers may not use their own inserts.
- Technical Inspection must keep records of handouts at registration and must control further handout purchases, where allowed.
- Super Glue (*i.e.*.. cyanoacrylate adhesive) may be applied to tire sidewalls. Other modifications to handout tires and wheels, apart from normal wear and tear, are not allowed.

14.4.7.5. Additional tire use:

- Drivers are limited to a maximum of four sets of tires for vehicles qualified for triple A-Mains, and to a maximum of three sets of tires for vehicles qualified for all single Mains.
- The minimum use allowed is 1 tire pair (1/2 set), as long as the driver is within his 'number of sets' limit.

14.4.7.6. No substitutes or exchanges can be made for any tire or set of tires except where there is clear evidence of a manufacturing defect and the tire or tires have not been used or modified in any way (including removing the seam or gluing the sidewall..

14.4.7.7. Technical inspectors will check each vehicle for proper driver/vehicle ID/Tire number(s). Inserts do not need to be checked. Vehicles without proper handout tires will not be allowed to run.

14.4.7.8. The use of an illegal, unregistered or otherwise improper tire will result in immediate disqualification from that race heat or main.

## **15. CONCOURS SCORE SHEET**

## APPENDIX A

### A. GENERAL INFORMATION ABOUT LI-POLY BATTERIES

- A LiPo battery pack is damaged when any of the following rules are broken. The damage is cumulative and cannot be reversed. These rules provide the safest operation and longest pack life. Going outside these rules may result in a destructive pack failure.
- Do not over discharge Lithium Polymer battery packs and use a Proper ESC cutoff voltage. Some newer speed controls give you the option to set a cutoff voltage, and some do not. The cutoff voltage setting is working properly when the ESC does not allow the motor to spin anymore when the pack voltage reaches this set cutoff. A Lithium Polymer battery is damaged when it goes below a set voltage whether under load or not. The lower the voltage and the longer it stays low, the more damage is occurring to the cells. If your ESC doesn't have a setting for cutoff voltage, we strongly suggest not using any LiPo pack with it unless you have a secondary device to cut off the motor at the correct voltage. By the time the pack "feels soft" at the end of the run or you notice any decrease in power, the pack has already been damaged. Consult your LiPo pack manufacturer for the proper low voltage cutoff since this value varies based on manufacturer.
- The maximum safe temperature of a Lithium Polymer pack is 140 deg.. F. Generally the pack temp will INCREASE for about 5-10mins after the run is over, so measure the temperature of the pack immediately after the run and then again about 10 minutes later. The faster the car is geared, the more amps the motor is drawing and the battery is delivering. The less capable of outputting high current (amps) the pack is, the more it will heat up with the same load (think IB4200's vs. NiCad 2400's on a mod motor) Exceeding 140deg.F pack temperature causes damage, and the pack is also less efficient at near critical temperatures.
- Only charge Lithium Polymer packs with a charger that uses the industry standard CC/CV charging algorithm for Lithium based batteries. There are two settings you will need to either set or verify on your charger each and every time before you begin charging a pack. The first is the pack voltage or cell count (each charger uses different nomenclature). If your charger is asking for the voltage of the pack, the choices are 3.7v (one cell), 7.4v (two cell), and 11.1v and beyond (3+cells) packs so set your charger accordingly. Some chargers ask for the cell count of the pack (one cell, two cells, and etc.) so you would set it for a two cell pack. The next setting is the charging rate. Lithium Polymer battery packs not only show no performance benefit from charging at higher than recommended rates, but they can be damaged by charging rates that are too high. The standard charging rate is "1C" which means the actual capacity of the pack in Milliamp hours. We charge in Amps not Milliamps, so divide the Milliamp Hours (mAh) of your pack by 1,000 to get your proper charging rate. For a 4800mAh pack, 4800mAh divided by 1,000 = 4.8 Amp charge rate. For a 3200MAh pack = 3.2 Amps, and a 5000MAh pack = 5.0 Amps. Unless specifically recommended by the manufacturer with no loss of cycle life, a maximum of 1C charge rate should always be used.
- Lithium Polymer packs that will not be run for more than a month or two should be stored approximately half charged. Do not store them fully charged and do not store them near fully discharged (down to 6.0v) or damage will occur. The best way to know the charge state of a LiPo is to use the mAh displayed on your charger when charging from fully discharged. For a 5000mAh pack driven all the way to cutoff, charge it until you have 2500mAh back into the pack and disconnect it from the charger for storage. Or use the discharge function on your charger, and discharge a fully charged pack to 1/2 of its capacity. So for a fully charged 5000mAh pack, discharge 2500mAh from it before long term storage.
- There are six main root causes for lithium ion/polymer battery fires. External Thermal Damage – Lithium Polymer cells will get damaged by external heat. Most manufacturers recommend keeping the cells under 60 deg. C or 176 deg. F. At about 90 deg. C (194 deg. F), the cell will start to balloon up as the electrolytes starts to break down and the internal layers start to delaminate. If the temperature is extremely severe (approx. 190 deg. C or 375 deg. F) – the cell will go into thermal runaway and you will have a flaming mess. The thermal volatility is directly related to the cell chemistry used by the manufacturer.

- Overcharge – Lithium Polymer cells are extremely non tolerant to an overcharge condition. A standard charge profile is CC/CV to 4.200V. Drastically overcharging a cell just once is a sure way to send a cell into thermal runaway. Overcharging a cell slightly but repeatedly is also extremely detrimental for a cell. For example, if you charge a cell to 4.300V, the lithium ions start plating on the electrodes forming lithium metal. Lithium ions are not flammable, but lithium metal is. Every slight overcharge cycle will plate more and more lithium metal resulting in a battery that is very prone to igniting. The best way to prevent overcharging is to charge through a balancer and to avoid chargers that do not charge with the standard 4.200V CC/CV charge profile.
- Over discharge - over discharging by itself is not dangerous, but it will destroy the cell. Over discharging below the recommended cutoff voltage will cause the copper to start dissolving in the electrolyte. The dissolved copper will then start plating on the electrodes which may start an internal short circuit within the cell. The safety of the cell is compromised once the plating action starts and the next charge/discharge cycle will be of concern since there is now an internal short circuit. Don't store your cells completely discharged. All cells have a small self-discharge when left alone and if the self-discharge takes the cell down below its minimum voltage, then the cell will be destroyed. It is recommended to disconnect the battery from all electronics (remove from speed controls, disconnect lithium polymer receiver packs from regulators etc.) since most electronics have a small current drain even in the "off" position.
- External Short Circuit – Lithium Polymer batteries have extreme current capability. When these cells are shorted out, the excessive current drain will cause the battery to overheat and possibly cause the cells to go into thermal runaway resulting in a possible fire.
- Internal Short Circuit - this is mostly caused by contaminants getting into the cell at the cell manufacturing level. Contaminants can poke through the separator over time causing an internal short where one of two things can happen. An internal short result in the cell having a high self-discharge rate. Or an internal short can cause localized heat buildup and initiate a thermal runaway condition – and thus another possible fire. Another source of internal shorts is the punching process the manufacturer uses to stamp out the anode and cathode electrodes. Some manufacturers use a low cost steel rule die and others manufacturers use a die that costs a couple orders of magnitude more. The lower cost steel die punches tend to leave burrs on the electrodes, while the higher cost dies do not. Burrs have a tendency to puncture the separator and create micro-shorts. This micro-short will create an area of localized heat. In most cases, this will cause the cell to expand (puff up). In bad cases, this localized heat may be enough to ignite the cell. Every time you charge a cell, the cell will expand about 5% in the thickness dimension. This expansion/contraction may cause the burr to eventually rub through the separator. The vibrations and shock from RC use also causes the burr to rub against the separator. The infamous Sony recall was largely attributed to burr type contaminants.
- External Mechanical Damage - A lithium polymer battery is made up of 20-30 layers of a very thin sheet copper anode, a thin plastic separator and a thin aluminum cathode. The vacuum sealed aluminum pouch keeps even pressure on the anode/cathode pairs. A dent can create a micro-short by making the stiff metal anode or cathode poke through the soft plastic separator. This micro short will create an area of localized heat. The cell will expand and then becomes a possible fire hazard. Another repercussion of a dent is that some layers of the cell will become delaminated and thus inactive. This means that the working layers will need to work harder to provide current and thus generate more heat in a localized area. ROAR believes that hard cases will greatly minimize the chance of external mechanical damage to the cells.

## **APPENDIX B: ROAR OFFICIAL PROTEST FORM**

<b>Event:</b>	<b>Date:</b>		
<b>Class:</b>	<b>Heat:</b>		<b>Round:</b>
<b>Protest type:</b>	<b>Scoring:</b>	<b>Procedure:</b>	<b>Rule:</b>
			<b>Equipment:</b>

<b>Driver's name:</b>	<b>ROAR Number:</b>
<b>Driver's signature:</b>	<b>Fee Included: \$</b>

<b>Protest escalated to Designated ROAR Official:</b>		<b>Yes:</b>	<b>No:</b>
<b>Ruling:</b>	<b>Protest upheld:</b>	<b>Protest rejected:</b>	
<b>Reason:</b>			
<b>DRO Name:</b>		<b>DRO Office:</b>	
<b>DRO Signature</b>		<b>Date:</b>	<b>Time:</b>