EFRA ANNUAL GENERAL MEETING

HOTEL Mercure/Lyon, France
France
1st to 2nd of November 2008

Minutes Electrics - Common-

SATURDAY 1st OF NOVEMBER 2008.

1. CHAIRMAN'S WELCOME — Heiner Martin – Frank Mostrey

The Electric Chairmen opened the meeting at 14H15

2. APOLOGIES FOR ABSENCE GENERAL PART ELECTRICS

Apologies have been received from: Slovenia, Russia, Ireland, Hungary
Member Countries presents, section subscription,:

COUNTRY	PRESENT	SECTION SUBSCR
AUSTRIA	M Koitsch	
BELGIUM	K Bultynck	
CROATIA	A Dujic	
CYPRUS		
CZECH REP.	V Strupek	
DENMARK	R L Tzen	
Bulgaria	V Kartodvok	
FINLAND	~~Matti~~ Loupasarvi	
FRANCE	Vialla Caillaud	
GEORGIA		
GERMANY	J Dragani	
GREAT BRITAIN	C Hardisty J Spence r R Crosgrove	
GREECE	N Vakalakopoulos	
HOLLAND	F Heinsbroeck	
HUNGARY		
IRELAND		
ITALY	A Forato A Lolli	
LUXEMBOURG	J Streff J Mersch	
NORWAY	JA Olsen	
POLAND	E Kowalczyck	
LITHAUNIA	E Urbonas	
ROMANIA		
RUSSIA		
SLOVAK REP.		
SLOVENIA		
SPAIN	J Lobregat	
SWEDEN	W Lindner	
SWITZERLAND	P Imboden	
TOTAL		

Other persons present:
LRP: S Kohler Team Orion O Jansen

3. MINUTES OF 2007 SECTION MEETING

3rd – 4th of November 2007 - Brussels, Belgium: Matters arising from the minutes: None

The minutes were checked and accepted as written at the AGM 2007.
The following person was elected to check the minutes of this year: Holland

8. RULE PROPOSALS Does / May affect all Electric Sections)

APPENDIX 3A. ELECTRIC ***GENERAL.***

THE RULE SHOULD BE AMENDED TO READ

1.1.9 A 220-volt electrical supply must be available at EC meetings with one outlet for every four drivers in close proximity to their pitting area. All safety precautions must be observed. ***An alternative independent source of power supply must be available, such as a generator, providing sufficient power for all the drivers to charge their batteries in case of main power source problem***

Proposed by: EL.M.E Greece Seconded by: Italy ☐ Rejected

THE RULE SHOULD BE AMENDED TO READ

2.1 REBUILDABLE 19T SPEC. BRUSHED MOTORS.
Then use numbered rules as currently shown.

2.2 MODIFIED BRUSHED MOTORS.
Then remove first line — a) Brushed motor and continue with rules as currently shown.

2.3 **MODIFIED BRUSHLESS MOTORS. This to replace the current 2.2 b)**
Then number (not letters) the current rules as shown.

Then Add:

2.4 'SPEC' BRUSHLESS MOTORS. (17.5T, 13.5T and 10.5T 'wind' limit)

The following rules have been agreed by various International organisations.

1 Only sensored motors are allowed in the Spec. classes.
2 The motor has to be rebuildable. Ball bearings are allowed. The motor must be constructed to allow easy replacement of the; rotor, bearings and front End-Bell.
3 Sensor connection requirements:
The motor must use a six-position JST ZH connector model number ZHR-6 or equivalent connector with 6 JST part number SZH-002T-P0.5 26-28 awg. contacts or equivalent.
Wire sequence must be as follows: -
Pin #1 - Black wire ground potential
Pin #2 - Orange wire phase C
Pin #3 - White wire phase B
Pin #4 - Green wire phase A
Pin #5 - Blue wire temp control, 10 k Thermistor referenced to ground potential
Pin #6 - Red wire + 5.0 volts d.c. +/- 10%.
Compatible speed control must use the 6 position JST header part number X-6B-ZR-SMX-TF (where the X denotes the style of the header), or equivalent.
The motor power connectors have to be clearly marked A, B, C.
A for phase A. B for phase B. C for phase C
It is not mandatory that sensored Speed Controls have to be used, or that the sensor 'harness' has to be connected.
4 The Can. (Based on `05` size specifications).
The overall dimensions of the assembled motor do not include: - solder tabs, lead wires or the original manufacturer's logo or name.
Overall maximum diameter is 36.02mm measured at whatever point yields the maximum dimension. Overall minimum diameter is 34.0 mm measured at whatever point yields the minimum dimension. Maximum length is 53.0 mm measured from the mounting face of the motor to the furthest point of the end bell. Minimum length is 50.0 mm measured from the mounting face of the motor to the furthest point of the end bell. Motor mounting holes must be on nominal 25.0/25.4 mm centres.
5 The Stack/Stator: Slot-less stators are not allowed. The stator must be continuous laminations having the same overall shape, being 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 for the three slots of copper coil wires and the three grooves

for the screws used to hold the entire assembly together. Stator minimum length 19.3 mm, maximum 21.0 mm. The thickness of the stator laminations is 0.35 +/- 0.05 mm. The inside diameter of the stator must accept a 'plug gauge' of 14.50 mm +0/-.005 diameter, clearing the stator, plus its windings and the electrical collection ring at any end of the stator.

6 The Winding: Only three slot (phase) "Y" (star) wound stators are allowed. No delta wound stators allowed. Only circular (round) pure copper magnet wire permitted. The three slotted stator must be wound with: -

17.5T Class:- 17.5 turns of 2 x 20 awg. (or 0.80 mm).
13.5T Class: - 13.5 turns of 2 x 21 awg. (or 0.71 mm), & 2 x 23 awg. (or 0.56 mm).
10.5T Class: - 10.5 turns of 2 x 20 awg. (or 0.80 mm), & 2 x 22 awg. (or 0.65 mm)
09.5T Class: _ 9.5 turns of

7 The Rotor: Shaft diameter must be 3.175mm where the pinion gear locates. Only one piece, two pole Neodymium bonded or sintered, or Ferrite (ceramic) magnetic rotors are permitted. Magnet length will be 25.00 +/- 1.00mm, not including any non-magnetic balancing aids. Magnet outside diameter will be 12.20/12.51mm (min./max. with no further tolerance) for the entire length of the magnet. The shaft outside diameter where the magnet is mounted will be 7.25mm +/- 0.15mm, with this diameter extending beyond the magnet to facilitate measurement.

8 All motors must have the original manufacturer's logo or name moulded/engraved into the end bell/plate. A unique marking or feature that is difficult to remove must be incorporated into the assembled motor to identify the motor is either a 17.5T, 13.5T or 10.5T Spec. class motor.

Proposed by: B.R.C.A Great Britain Seconded by: Holland The proposal: ☐ ***Amended By France*** ☐ ***Passed Unanimously***

THE RULE IS NEW

2. MOTORS FOR ELECTRIC CARS

2.2 Add a general rule specifying standard brushless motors including 9.5, 10.5, and 13.5 turns.

Proposed by: F.V.R.C France Withdrawn by France

THE RULE SHOULD BE AMENDED TO READ

2.1. Rebuildable 19T brushed and 10.5 / 13.5 brushless Spec Motors

The Can.

1. Can diameter, before any surface finish is applied, is 36.02 mm max. The overall length of the assembled motor is 53.0 mm max., measured from the mounting face of the motor to the furthest point of the end bell, not including solder, tabs or lead wires. Only ceramic magnets can be used (Cobalt and rare earth magnets are not allowed). There is no limit on the number of magnets used. Current is supplied to the armature commutator by 2 brushes.
2. The can will be stamped with the name of manufacturer and '19 Spec'.
3. Ball-raced bearings are allowed.
4. The can will incorporate a slot to locate the end bell at a designated timing advance of 24 degrees maximum.

The can will have two pairs of mounting holes. The pairs of mounting holes can be positioned by either of the following :-

a) Both pairs within the space between the magnets. The line through the mid-point between each pair of mounting holes must pass through the centre of the can and is determined as being zero degrees.

b) One pair within the space between the magnets. The line through the centre of these holes must pass through the centre of the can and is determined as being zero degrees. The second pair will be at 90 degrees to the zero degree line.

The zero degree line will be marked on one side of the can to indicate zero degrees.

The centre of each magnet (or assembly of magnets) on each side of the can will be at 90 degrees to the 0 degree centre-line, with a tolerance of +/- 2 degrees.

5. Magnets must be permanently glued to the motor can and may not be removed. No magnet shims are allowed (e.g. an extra shim that could be added on the end of the magnet or between the tips to change performance). Flux collector/timing rings are allowed as long as their only purpose is to secure the end bell to the motor can. Such rings may not extend between the magnet tips.
6. The motor can must have inspection holes/slots between magnet tips so that the armature may be viewed for inspection. These holes/slots may be no closer than 5.00mm from either the

open end or mounting face of the motor can. The view through the inspection holes/slots must not be obstructed by anything covering the holes/slots (e.g. motor label).
The End-Bell.
7. Ball-raced bearings are allowed.
8. The end bell will incorporate a 'tab', which when assembled to the slot in the can must result in a designated timing advance of 24 degrees maximum. When the end-bell assembly is secured to the can, the brush hoods will be aligned at 90 degrees to the can zero line, plus the allowed timing of 24 degrees maximum.
Brush hoods/tubes will be assembled at 180 degrees apart. The centre of the brush hood/tube will be in-line with the centre of the armature.
9. End bells must be marked with the manufacturer's name.
The Armature.
10. The shaft diameter is 3.175 mm.
The rotor to have three poles with windings. Length of stack is to be 21.00mm min. to 22.80mm max (both dimensions measured with epoxy/ hysol insulation coating removed). The thickness of the 'stack' laminations is 0.35mm +/-0.05mm. The width of the stack web will be 3.50mm minimum with epoxy/hysol insulation removed.
The armature has to be permanently marked (or tagged) by the manufacturer, showing the number of windings and the name of the manufacturer.
11. The commutator slots must be aligned with the centre of the individual poles, with a tolerance of +/- 2 degrees.
12. The armature will be wound using a single wind of round 19 AWG (American wire Gauge) copper wire giving 19 Turns. It is not mandatory to use the 'Mabuchi' cross wrap technique for winding the armature. There is no plus tolerance on the wire diameter. Armatures must be machine wound, 'hand winding' is not permitted. It is not mandatory to use a locking device between the commutator and the armature stack.
13. Tabs on the armature's commutator may only be "compression welded". No after-market welding, soldering or silver brazing will be permitted.
14. Epoxy balancing of armatures will not be permitted.
15. Only full stack armatures with no cut-outs are allowed. No split, skewed, tri-rotors etc. are allowed. Longitudinal slots/grooves parallel to the armature shaft in the pole crowns are not allowed on any armature introduced after 01.01.02. The crowns of each pole must be symmetrical in cross section, with a constant crown radius. Steps in the crown are not allowed.
16. No modifications to the OEM armature stack may be made, other than the drilling/grinding of balancing holes. Modifications to the OEM designs, including (but not limited to) excessive drill holes, milling or turning to lighten or enhance the performance of the armature are not allowed.
17. The armature shaft does not have to extend beyond the end bell, but any extension has to have a reduced diameter to form a parallel step. Timing.
18. The overall timing of the assembled motor is determined by the allowed tolerances of the individual assemblies, (Ie. Magnet position, Commutator position, Location of End-bell to Can).
General.
19. No modifications to the OEM construction/design of the motor can, end bell, or armature will be permitted. (e.g. adding or removing material from the armature stack, changing the dimensions or orientation of brushes or brush hoods, relocating spring posts).
20. The armature, motor can, and end bell must all be from the same OEM and can contain only components from the same model. No hybrid motors or mixing of parts from different models will be permitted.
21. All motors used in EFRA sanctioned events must have their original motor builders label(s) substantially intact to be eligible.
Organiser may offer one "handout" motor to all competitors entered in the "Spec Car Motor" class. Where "handout" motors are used, the competitor may not make any changes to magnets or springs during the event.
Costs of the handout motor (without profit to the organiser) may be charged to the competitor

Brushless

22 Only sensored motors are allowed in the Spec, classes.

23 The motor has to be rebuildable. Ball bearings are allowed. The motor must be constructed to allow easy replacement of the; rotor, bearings and front End-Bell.

24 Sensor connection requirements:-

The motor must use a six-position JST ZH connector model number ZHR-6 or equivalent connector with 6 JST part number SZH-002T-P0.5 26-28 awg. contacts or equivalent.

Wire sequence must be as follows: -

Pin #1 - Black wire ground potential

Pin #2 - Orange wire phase C

Pin #3 - White wire phase B

Pin #4 - Green wire phase A

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

Pin #6 - Red wire + 5.0 volts d.c. +/-10%.

Compatible speed control must use the 6 position JST header part number X-6B-ZR-SMX- TF (where the X denotes the style of the header), or equivalent.

The motor power connectors have to be clearly marked A, B, C.
A for phase A. B for phase B. C for phase C
It is not mandatory that sensored Speed Controls have to be used, or that the sensor 'harness' has to be connected.
25 The Can. (Based on '05' size specifications).
The overall dimensions of the assembled motor do not include: - solder tabs, lead wires or the original manufacturer's logo or name.
Overall maximum diameter is 36.02mm measured at whatever point yields the maximum dimension. Overall minimum diameter is 340mm measured at whatever point yields the minimum dimension. Maximum length is 53.0mm measured from the mounting face of the motor to the furthest point of the end bell. Minimum length is 50.0mm measured from the mounting face of the motor to the furthest point of the end bell. Motor mounting holes must be on nominal 25.0/25.4mm centres.
26 The Stack/Stator: Slot-less stators are not allowed. The stator must be continuous laminations having the same overall shape, being 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 for the three slots of copper coil wires and the three grooves for the screws used to hold the entire assembly together. Stator minimum length 19.3mm, maximum 21.0mm. The thickness of the stator laminations is 0.35 +/- 0.05mm. The inside diameter of the stator must accept a 'plug gauge' of 14.50mm +0/-.005 diameter, clearing the stator, plus its windings and the electrical collection ring at any end of the stator.
27 The Winding: Only three slot (phase) "Y" (star) wound stators are allowed. No delta wound stators allowed. Only circular (round) pure copper magnet wire permitted. The three slotted stator must be wound with: -
13.5TClass: - 13.5 turns of 2 x 21 awg. (or 0.71 mm), &2x23awg. (or 0.56mm). 10.5TClass: - 10.5 turns of 2 x 20 awg. (or0.80mm), & 2 x 22 awg. (or0.65mm)
28 The Rotor: Shaft diameter must be 3.175mm where the pinion gear locates. Only one piece, two pole Neodymium bonded or sintered, or Ferrite (ceramic) magnetic rotors are permitted. Magnet length will be 25.00 +/-1 .OOmm, not including any non-magnetic balancing aids. Magnet outside diameter will be 12.20/12.51 mm (min./max. with no further tolerance) for the entire length of the magnet. The shaft outside diameter where the magnet is mounted will be 7.25mm +/- 0.15mm, with this diameter extending beyond the magnet to facilitate measurement.
29 All motors must have the original manufacturer's logo or name moulded/engraved into the end bell. A unique marking or feature that is difficult to remove must be incorporated into the assembled motor to identify the motor is either a 13.5T or 10.5T Spec. class motor.

Proposed by: Nomac Netherlands Withdrawn by Holland

THE RULE SHOULD BE AMENDED TO READ

3.7 Any new NiCd or NiMH must be commercially available for a reasonable time before it can be used at an EFRA event. Therefore any new cells have to be submitted to the EFRA Section Chairman.
Approval process:
~~For 2008, a minimum of six individual cells have to be received by December 31st. 2007, together with a written technical specification/data sheet from the original cell manufacturer, which must include: - dimensions and weights with associated tolerances. Samples submitted are required to closely represent the weight range stated.~~
For 2009, a minimum of six individual cells have to be received by 1st. December 2008, together with a written technical specification/data sheet from the original cell manufacturer, which must include: - dimensions and weights with associated tolerances. Samples submitted are required to closely represent the weight range stated. Additional documentation is required to show that a minimum of 20,000 individual cells have been received by distributors or commercial outlets associated to the hobby industry within the EFRA countries, by 31st. Dec 2008. Subject to the Chairman being satisfied that the new cell conforms with technical specifications and commercial availability, the cell will be legal for use from the following April 1st. Cells received after the above submission dates will not be included on the EFRA approved list for the following year. Any changes to the technical specifications or visual appearance of the cell/ heat shrink after the original approval will require re-approval.

Proposed by: B.R.C.A Great Britain Seconded by: Norway : ☐ Passed Unanimously

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THE RULE IS NEW

3.10 When a battery is approved two consecutive years, the difference if it exists (label, weight, etc) should be highlighted in the list.

Proposed by: F.V.R.C France Seconded by: Italy
The proposal: Is withdrawn by France

THE RULE IS NEW

3.11 Rules for Lithium Polymer (LiPo) Batteries

1. Lithium Polymer (Li-Poly/LiPo) battery packs must have a hard, protective case that completely envelopes the cell(s). The case should be made from ABS or a similar material. The two halves of the case must be factory sealed in a way that any attempt to open the case will destroy the case. The only opening in the case that is allowed, is for the exit of wires.
The maximum case size is as follows: -
Length: 139.0mm.
Width: 47.0mm. (The max. width includes any side exit wires).
Height: 23.5mm.). (additional chassis location protrusions are allowed)
Saddle-Pack cells are allowed, but must comply with the above dimensions. Saddle-Pack cells must have a combined dimension of 139.0mm max when placed end to end.
2. Individual cells used in the construction of the battery pack shall be rated at 3.7 volts nominal. Individual cells may be wired in parallel, but the maximum connection 'In Series' is two, to give a Final pack voltage of 7.4v nominal.
3. 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 internal connection points for these wires clearly marked positive and negative so the user can apply the lead wires.
4. The case must have the original suppliers label intact, stating the rated voltage and the pack capacity. Maximum capacity is 5,500 mah. **The Brand name/logo shall be easily readable.**
5. All LiPo packs must be charged with a LiPo-capable charger using the industry standard CC/CV (Constant Current/Constant Voltage) charge profile.
6. LiPo batteries may be charged to a maximum of 8.44V. Overcharging is a serious safety hazard and will not be tolerated.
7. Any competitor found to be charging cells using a charger that is not specifically designed for LiPo cells, or using a charge profile other than the industry standard CC/CV, will be disqualified from the event.
Any competitor found to have charged LiPo cells to above 8.40V **will be disqualified from the event.**

In addition to the details above, it is requested that EFRA associated Members that distribute LiPo cells should advise on any further safety requirements and approval procedures.

Proposed by: B.R.C.A Great Britain seconded by Finland,, ☐ **Amended By Belgium**

4. The case must have the original suppliers label intact, stating the rated voltage and the pack capacity. Maximum capacity is 5,500 mah. The Brand name/logo shall be easily readable.

- 6: LiPo batteries may be charged to a maximum of **8.40V**. Overcharging is a serious safety hazard and will not be tolerated.
- 7: Any competitor found to have charged LiPo cells to above **8.40V** will be disqualified from the event.
- 1: Height is ~~25.0~~mm) **Additional chassis protrusions are allowed.**

23,5 ☐ **The amended rule Passed Unanimously but has to be renumbered**

THE RULE IS NEW

3.11 LITHIUM POLYMER BATTERIES (LiPo) - SPECIFICATIONS, TESTING AND APPROVAL
1 HARD CASING
1.1 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. EFRA 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 it 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 in 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 EFRA sanctioned events.

2. SPECIFICATIONS

2.1 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. It is advised that "Corally style" plugs are used, so that the wires can be replaced if necessary. And that there is no need to open the case in order to replace 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 3.7 VDC and the pack shall be maximum 2 cells in series.

3. TESTING AND APPROVAL

3.1 EFRA Impact/Drop Test

3.1.1 The cells of the battery pack shall experience no loss of mass, no leakage, no venting, no rapid disassembly, and no rise in temperature. The case shall not splinter or shatter in a manner that would create shrapnel and potentially puncture the cell inside.

3.1.2 The fully charged battery pack shall be dropped from a height of 150 cm to a flat concrete floor. The battery pack shall land flat on the floor during the drop.

3.2 EFRA Overcharge Test

3.2.1 The battery pack shall not display rapid disassembly resulting from thermal runaway.

3.2.2 The fully charged battery pack shall be charged to a value up to 12.0 VDC at a rate of 1 times the capacity of the cells in the battery pack for a period of 30 minutes (Example: 5000 mAh charge rate is 5 Amps).

3.3 EFRA External Short Circuit Test

3.3.1 The battery pack shall not display rapid disassembly resulting from thermal runaway.

3.3.2 A 0.1 Ohm resistance shall be applied to a fully charged battery pack at room temperature (20 deg Celcius +/- 5 degrees). The test is concluded when the temperature of the battery pack returns to within 5 deg of room temperature.

4 LITHIUM POLYMER BATTERY PACK APPROVAL

See Appendix 3, rule 3.7 for EFRAs approval procedures. For LiPo batteries 4 complete packs must be sent in. Furthermore there is no demand as to minimum distributed cells as long as the batteries are commercially available in Europe.

5 GENERAL INFORMATION ABOUT LITHIUM POLYMER BATTERIES (TO EDUCATE DRIVERS)

5.1 CORRECT TYPE OF CHARGER

5.1.1 LiPo packs must be charged with chargers capable of the industry standard "CC/CV" (Constant Current/Constant Voltage) charge profile.

5.2 MAXIMUM CHARGE

5.2.1 LiPo batteries may be charged to a maximum of 8.40 V +/- 0.04 V. Overcharging is a serious safety hazard and will not be tolerated.

5.3 CHARGE INSIDE A FIRE MITIGATION DEVICE

5.3.1 All LiPo packs used for motor power must be charged inside a "Lipo Sack" or similar fire mitigation device proven to withstand a minimum of an 8.4 V 5000 mAh lithium polymer pack failing destructively without showing external flame. EFRA will include a list of recommended charging containers on the approved battery list.

5.4 LIPO BATTERY PACK DAMAGE

5.4.1 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.

5.4.1.1 Do not over discharge LiPo 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 LiPo 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 does not 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.

5.4.1.2 The maximum safe temperature of a LiPo pack is 60 degrees Celsius. Generally the pack temperature will increase for about 5-10 minutes 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/taller 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 IB4200s vs. NiCad 2400s on a modified motor) Exceeding 60 degrees Celsius pack temperature causes damage, and the pack is also less efficient at near critical temperatures.
5.4.1.3 Only charge LiPo 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 (3 cells) and so on. EFRA legal LiPo packs are all maximum two cells. That is 3.7v or 7.4v packs so set your charger accordingly. Some chargers ask for the cell count of the pack (one cell, two cells, and so on) so you would set it for a one or two cell pack. The next setting is the charging rate. LiPo 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 1000 to get your proper charging rate. For a 4800 mAh pack, 4800 mAh divided by 1000 = 4.8 Amp charge rate. For a 3200 mAh pack = 3.2 Amps, and a 5000 mAh pack = 5.0 Amps. A maximum of 1C charge rate should always be used.
5.4.1.4 LiPo 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 5000 mAh pack driven all the way to cutoff, charge it until you have 2500 mAh 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 5000 mAh pack, discharge 2500 mAh from it before long term storage.
5.4.1.5 There are six main root causes for lithium ion/polymer battery fires.
5.4.1.5.1 External thermal damage – lithium polymer cells will get damaged by external heat.
Most manufacturers recommend keeping the cells under 60 deg Celsius. At about 90 degrees Celsius, 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) – 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.
5.4.1.5.2 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, it 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.
5.4.1.5.3 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. Do not store you
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.
5.4.1.5.4 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.
5.4.1.5.5 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. 5.4.1.5.6 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 microshort 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. EFRA believes that hard cases will greatly minimize the chance of external mechanical damage to the cells.

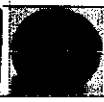
Illustration 1:

APPROVED BATTERY LIST, Jan. 2008.

Only cells detailed below are approved for EFRA Sanctioned Events in 2008.

EUROPEAN FEDERATION RADIO CONTROLLED AUTOMOBILES.

All Cells measured after cycling at 1C. Diameter measurements include 'Printed' shrink only.
Battery packs must be able to be disconnected within the Car quickly without the use of tools. Direct soldering is not allowed.
It is advisable to restrict charge rates to 1C.

Origin of Supply	Cell Name, Shrink Details	Illustration only	Alternative view.	Manufacturer Data.	EFRA measured Specification,	Approval Date
LRP	VTEC 4000 Longlife SC-4000UP			VTEC 4000. NiMH. "Longlife" SC-4000UP Man. Data - 67/71 grm.	Range EFRA samples. Dia. 22,87/22,93 mm. Ht. 42,82/43,00 mm. Wt. 68,4/69,8 grm.	01.01.2008

Origin of Supply	Hard case Details	Illustration only	Alternative view.	Manufacturer Data.	EFRA measured Specifications	Approval Date
Reedy	Reecy Lipo #703 5800 Pro 20C			Plug type: No plug Wire: 12 AWG Balance Port: Yes* *Spec BP: Reedy XX Rec charger: Reedy XX	Height: 23.1 mm H w/ nubs: 25.1 mm Width: 46.0 mm Length: 139.0 mm Weight: 265 grams Config: Stickpack	01.01.2009

Proposed by: NMF/RC Norway **Seconded by: Denmark**

The proposal:. ☐ **Amended By Great Britain seconded by Belgium**

☐ **Passed Unanimously with following agreement:**

The committee has the mandate to set up the homologation process and a set of driver guidelines for safe use of Lipo batteries

The EFRA handbook will include, where to find the different guidelines for use and homologation . A copy of the guidelines for the end-user must be included in the driver's packages for EC's

The chairmen are commissioned to adapt the rules in appendix 3 to the new Lipo batterie situation were necessary

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THE RULE IS NEW

7.1.1 European Championships are held in the following classes:
1/10 Off-Road
1/12 Modified
1/10 Touring Cars
1/12 with spec motors
1/10 Touring Cars Indoors

Proposed by: EFRA Executive **Seconded by: Belgium** ☐ **Passed Unanimously**

THE RULE SHOULD BE AMENDED TO READ

9.1.1 Free practice for E.C. events must be allowed as stated in the concerned timetable. No practice or racing is allowed on the track for ***21*** days preceding this (see also General rule 8.1.).

Proposed by: EL.M.E Greece ☐ *Not Seconded*

THE RULE SHOULD BE AMENDED TO READ

9.2.2 Qualifying heats: the delayed start procedure (Staggered Start) will be used and a verbal start signal, mentioning the car number, will be given for each car. Cars must start when directed by the **Start Official**. Cars not starting when directed may start after the last car has crossed the lap counting loop.

Proposed by: B.R.C.A Great Britain **Seconded by: Norway** ☐ ***Amended by Great Btritain***

BY: "Race control" **iso Start Oficial** **The amended proposal:** ☐ **Passed Unanimously**

THE RULE SHOULD BE AMENDED TO READ

9.4.2 Qualifying will be by fastest time for 1/12th, by the 2 fastest times added together, for 1/10th Off-road to cope with changing track and/or weather conditions. **For 1/10th On-road see App. 3 rule 9.4.2b.**

If the 'Round by Round' qualifying method is used, the number of Rounds to count are as follows :- Six Rounds three to count, Five Rounds two to count, Four Rounds two to count, Three Rounds two to count, Two Rounds one to count. Less than two Rounds completed event null and void. All other qualifying Round scores will be discarded. Qualifying Round has to be completed for any Heats in that Round to be counted.

If the intended maximum number of Rounds cannot be completed, due to weather or unforeseen circumstances, the number of Rounds to count will follow the same format. .

Highest qualifying position in each Round will score zero (0) points, second place 2 points, third place 3 points, fourth place 4 points and so on. In every Round, in the event of a tie the points will be equally awarded to each driver and the first next driver not tying will get one point less.

Proposed by: B.R.C.A Great Britain **Seconded by: Holland** ☐ **Passed Unanimously**

THE RULE SHOULD BE AMENDED TO READ

10.2 The winner determined from the combined A finals will be the champion. If the A finals cannot be completed, the awards will be made **based** on the **final** Qualifying positions.

Proposed by: B.R.C.A Great Britain

Seconded by: Holland ☐ **Not Seconded**

The proposal:

☐ **Passed Unanimously**

THE RULE SHOULD BE AMENDED TO READ

10.5 The winner of a final gets 1 point; the second gets 2 points and so on up to 10 points for the 10th driver. **In the event of a tie regarding time in a Final, the points will be equally awarded to each driver and the next driver not tying will be two points more.**

Proposed by: B.R.C.A Great Britain

Seconded by: Italy **The proposal** ☐ Passed Unanimously :

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10. ANY OTHER BUSINESS,

None

11. ITEMS FOR GENERAL DISCUSSION.

France would like the approval lists to highlight minor changes between old and new in ordr to avoid confusion

Finland insists to take into account the changing after homologations to make packs fit into cars

The Section Chairman thanks all participants for a constructive meeting, and being no further business the meeting was closed at 1615 in order to proceed with the section meetings