

BRCA Electric Board Rules 2012.

Updated Dec. 2011

The BRCA Electric Board will be known by the acronym EB.

NOTE: For 2012:

As advised in 2011, the older technologies of NiCd/NiMH Batteries and Brushed Motors are no longer submitted for inclusion on the homologation lists that the EB maintain. Consequently, the rules covering these technologies have been removed from the following pages and are not published in the 2012 Handbook (Rule Nos. have been amended to accommodate the changes). The rules and homologation lists covering these items will remain available on the BRCA website.

1. Electric Board Principles.

1.1 The powers of this committee are exclusive to the areas of electric motors, rechargeable batteries and the electronic devices used in the control of electric scale models. It will serve the BRCA sections that use these items.

1.2 All BRCA Sections that use items listed in (1.1) above are entitled to be represented on the EB. The representatives are expected to give a true impression of the usage, availability and worth of named components so that the committee as a whole can decide what effect their use has on the sport element of the BRCA as a whole.

1.3 Manufacturers and/or their UK representatives may be invited to present or introduce new items at these meetings.

1.4 The EB will draw up homologation lists for motors and rechargeable batteries that are for the use of the BRCA Electric Sections.

1.5 The EB will investigate tools and procedures and provide such to the BRCA sections to enable them to control the use of items on homologation lists. Funding for this will be raised from homologation fees.

1.6 The EB will not allow the use of any components that would compromise any single section's rules, but any single section may choose not to allow the use of items on the homologation lists.

1.7 All findings, homologation lists or announcements will be published on the official BRCA website.

1.8 Anything not itemised by the EB on the relevant homologation list is specifically not allowed for use at BRCA Sanctioned events.

1.9 The EB reserves the right to remove products from the relevant homologation lists, if it is found that :-

Items are not readily available for purchase within acceptable lead times.

The technical specification/design differs from the homologated sample.

Incorrect information being supplied relating to any item.

This would not include items that ceased to be available due to being superseded by new products.

1.10 Any proposals to the EB for changes to principles or rules have to come via. an Electric Section. All proposals will be circulated to all Electric Sections before a decision is taken.

2. Homologation Procedure & Price Limits.

2.1 Before any item is added to an homologation list, the BRCA Electric Board Homologation Officer will need to be satisfied that any new Motor or Battery submitted for approval, has originated from a recognised distributor and will be available for purchase via. a UK outlet.

New items submitted for homologation/approval should be sent to :-
Paul Worsley, 23 Prince Rupert Road, Stourport-on-Severn, Worcs. DY13 0AS.

The EB will review and set maximum retail price limits for Motors and Batteries. These prices may be amended, subject to any UK fiscal changes. The maximum retail prices for the year starting 1st. April 2012 are as follows :-

2S Lithium Based battery pack (max. 7.4v)	-- £95.00
1S Lithium Based battery pack (max. 3.7v)	-- £50.00
Modified Brushless Motor.	-- £95.00
'Spec.' Brushless Motor.	-- £90.00

Motors

2.2 Manufacturers, Importers and Distributors should note, that if a range/type of motor is to be retailed with a choice of magnetic rotor design, then a sample of each rotor design must be submitted. Any design variants are required to be submitted for homologation before being allowed at BRCA sanctioned events. All variants homologated must be available for retail purchase.

Motor homologation fees :- All motors £40.00. Cheque payable to the BRCA. This fee is payable for each individual type or range of motor, and will entitle that type or range to be included on the homologation list when the EB Homologation Officer is satisfied with the eligibility and availability of the motor. The motor will remain on the relevant homologation list for a period of five years from the date of first registration with no further fees being payable during this time.

2.3 Manufacturers and importers are requested to review the homologation lists annually and advise the EB Homologation Officer when a particular type or range ceases to be available for sale. That type or range will then be deleted enabling the current lists to be maintained at a manageable size. (It is not intended that previously homologated motors cease to be eligible when they are removed from the lists – event scrutineers within the UK should not turn away competitors using old motors just because they are no longer shown on the current homologation lists).

Batteries – Lithium Based (LiPo/LiFe) Packs.

2.4 Any new LiPo/LiFe battery has to be received by the BRCA Electric Board Homologation Officer by :-

- 2S -- 1st. Dec. each year.
- 1S -- 1st. July each year.

LiPo/LiFe Homologation fees:- 2S Battery -- £40.00.
1S Battery -- £25.00.

The prices cover each submission received, which could contain more than one battery.

Each individual battery must be supplied with:-

Safety test certification in accordance with; UN Manual of Test and Criteria ST/SG/AC.10/11/Rev.5, Part 3, Sub-Section 38.3, Tests T1 to T8.

Technical Spec. sheet detailing the recommended charging rate, the maximum voltage when charging, case material, case wall thickness and method of sealing the case, the battery weight (max tolerance +/- 4%).

2.5 Subject to 2.1 & 2.7 (above), the new battery will be included on the BRCA homologation list(s) and will be allowed at BRCA sanctioned events from:-

- 2S Batteries -- 1st April following addition to the list(s)
- 1S Batteries -- 1st Sept. following addition to the list(s).

The interpretation being that new batteries will NOT be homologated during the 'Racing Year' or season for any Section.

3. Rules – Rechargeable Batteries.

Individual Electric Sections to decide which battery rules are used within their classes of racing at BRCA Sanctioned events.

Lithium Based (LiPo/LiFe) Battery Packs.

The storage, charging and use of Lithium based batteries (LiPo/LiFe) can give rise to serious safety implications. The BRCA will publish guidelines for the safe use of these batteries on the BRCA website. It is imperative that the guidelines are studied and adhered to.

3.1 Lithium based (LiPo/LiFe) 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 **or pin type connectors**.

3.2 All Lithium Based (LiPo/LiFe) Batteries must comply with the weights specified on the BRCA homologation list. The maximum tolerance for manufacturers is +/- 4%.

The maximum case sizes allowed are as follows:

2S Batteries: (Stick & Saddle):

Length: 139.0 mm.

Width: 47.0 mm. (The max. width includes any side exit only wires).

Height: 25.1 mm. (Chassis location features extra to this dimension are allowed)

Saddle-Pack cells are allowed, and must comply with the above width and height dimensions. Saddle-Pack cells must have a combined length dimension of 139.0mm max. when placed end to end.

1S Batteries: (Stick):

Length: 93.0 mm.

Width: 47.0 mm. (Side exit wires are allowed outside this dimension)

Height: 18.5 mm. (Chassis location features extra to this dimension are allowed)

3.3 Individual cells used in the construction of the battery pack shall be rated at (LiPo 3.7v/LiFe 3.3v) nominal. Individual cells may be wired in parallel.

For 2S Batteries: The maximum connection 'In Series' is two, to give a Final pack voltage of (LiPo 7.4v/LiFe 6.6v) nominal.

For 1S Batteries: Cells can only be connected in parallel, to give a Final pack voltage of (LiPo 3.7v/LiFe 3.3v) nominal.

3.4 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 internal connection points for these wires clearly marked positive and negative so the user can apply the lead wires. Any type of metal connections that are incorporated in the battery pack must be substantially below the major surface of the plastic casing, to prevent any 'short circuit' if placed on a conductive surface. It is strongly advised that the link wire for Saddle Pack cells utilises a plug which will separate with any undue force.

3.5 The case must have the original suppliers label intact stating:

The unique Part # for the pack, The rated voltage, The chemistry (LiPo/LiFe) and The rated energy capacity in **Wh**. The brand name/logo shall be easily readable.

3.6 All LiPo/LiFe batteries must be charged using a LiPo/LiFe-capable charger using the industry standard CC/CV (Constant Current/Constant Voltage) charge profile.

3.7 LiPo/LiFe batteries may be charged to a maximum of:-

2S Batteries may be charged to a maximum of 8.40v (LiPo) resp. 7.40v (LiFe).

1S Batteries may be charged to a maximum of 4.20v (LiPo) resp. 3.70v (LiFe).

LiPo/LiFe drive batteries must be charged in a 'Lipo sack' at all times.

LiPo sack is defined as a receptacle designed for the purpose of charging LiPo/LiFe

batteries and of a suitable construction as to contain a LiPo/LiFe fire. Overcharging is a serious safety hazard and will not be tolerated.

3.8 Any competitor found to be charging cells using a charger that is not specifically designed for LiPo/LiFe batteries, or using a charge profile other than the industry standard CC/CV, will be penalised at the event.

Any competitor found to have charged LiPo/LiFe batteries to above the maximum voltage values as detailed in 3.7 (above) will be penalised at the event. Section officials are advised to monitor these procedures and act accordingly.

3.9 Modification to the original battery case by removal of material or any modification that could be deemed to affect safety is not allowed.

3.10 The use of any additional heating of any type to heat a LiPo/LiFe Battery is not allowed. The use of any cooling devices or “freeze” sprays of any type to cool a LiPo/LiFe battery is not allowed.

4. Rules – All Classes of Electric Motors.

4.1 There are currently two Classes of Electric Motors, for which the EB approve and control homologation lists. (The older technology ‘Brushed’ Motor homologation lists will remain available on the BRCA website):-

Modified Brushless Motors.

‘Spec.’ Brushless Motors (10.5T, 13.5T, 17.5T, 21.5T).

Brushless Motors have to comply with the rules in this section (4) and further rules detailed in sections 5 or 6.

4.2 All motors must meet BRCA specifications before they will be approved by the BRCA Electric Board. Newly approved motors must be included in the homologation lists published on the BRCA website prior to being legal for use in BRCA sanctioned meetings.

4.3 If an approved type/range of motor is changed in any substantial way, it must be resubmitted for approval, and must be available at UK outlets incorporating such changes. Examples:- can colour, label design, stack or stator designs, rotor designs or design change of any of the major components or assemblies. Any variants of interchangeable components produced by the motor manufacturer, must be available at UK outlets and be submitted for approval before being allowed. Addition or removal of screw-fixing heatsinks is allowed. Change of end-bell colour is allowed providing all design features are maintained.

4.4 The swapping of components between approved motors, (a.k.a. hybrids) is not allowed.

4.5 All approved motors are subject to checking at any time by the BRCA Homologation Officer to verify that they are still in compliance with BRCA specifications.

4.6 All motors used in BRCA sanctioned meetings must have their original motor builders label(s) substantially intact to be eligible.

5. Rules - Modified Brushless Motors.

The following rules have been agreed by EFRA and various International organisations.

5.1 All motors are subject to the rules in section 4.

5.2 Sensored or sensorless motors are allowed.

5.3 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/plate.

5.4 If the motor is sensed:-

It 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

5.5 The Can. (Based on `05` size specifications).

The overall dimensions of the assembled motor do not include :- solder tabs, lead wires or the original manufacturers logo or name.

Overall maximum diameter is 36.02mm measured at whatever point yields the maximum dimension. Overall minimum diameter is 34.0mm 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.

5.6 If the stator cannot be easily removed from the assembled motor for technical verification of sizes or construction, then the Can/Sleeve must have:

Slots or holes that will allow measurement of the stator length.

Slots or holes to allow visual appraisal of the laminates used in the stator.

Rule to be applied to any new range of motor starting 01.01.12. Existing motors without these features are not excluded.

5.7 The Stack/Stator : The stack or back-iron must be continuous. The laminations have to be one after the other without anything in between. Stack/back-iron minimum length 19.3mm, maximum 21.0mm. The thickness of the stack/back-iron laminations is 0.35 +/- 0.05mm. All laminations must be of the same material. 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.

5.8 The Winding: Only three slot (phase) "Y" (star) or delta wound stators are allowed. Only circular (round) pure copper wire permitted. No turn limit.

5.9 The Rotor: Shaft diameter must be 3.175mm where the pinion gear locates. Only one piece, two pole Neodymium or Ferrite magnetic rotors are permitted (bonded or sintered). Magnet minimum length 23.0 mm, maximum 27.0 mm. Magnet minimum diameter 12.0mm, maximum 15.5mm. The original Rotor can be changed providing the replacement: complies with the above specifications, has been approved, is supplied by the motor manufacturer and is available retail.

5.10 All motors must have the original manufacturer's logo or name moulded/engraved by the manufacturer into the end bell/plate.

6. Rules - Spec. Brushless Motors.

(21.5T, 17.5T, 13.5T and 10.5T)

The following rules have been agreed by EFRA and various International organisations. Motors in the Brushless Spec. classes have specific design features that differ from modified versions. Brushless Spec. motors must conform to Section 5 rules (Brushless modified) with the following exceptions.

6.1 All motors are subject to the rules in section 4.

6.2 Only sensed motors are allowed in the Brushless Spec. classes. Sensor connection requirements are as 5.4 (Brushless Modified)

It is not mandatory that sensed Speed Controls have to be used, or that the sensor 'harness' has to be connected.

6.3 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.

6.4 If the stator cannot be easily removed from the assembled motor for technical verification of sizes or construction, then the Can/Sleeve must have:

Slots or holes that will allow measurement of the stator length.

Slots or holes to allow visual appraisal of the laminates used in the stator.

Rule to be applied to any new range of motor starting 01.01.12. Existing motors without these features are not excluded.

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

21.5T Class:- 21.5 turns of 2 x 21 awg. (or 0.724mm) max. wire dia.

17.5T Class:- 17.5 turns of 2 x 20 awg. (or 0.813 mm) max. wire dia.

13.5T Class: - 13.5 turns of 2 x 21 awg. (or 0.724 mm) max. wire dia.
and 2 x 23 awg. (or 0.574 mm) max. wire dia.

10.5T Class: - 10.5 turns of 2 x 20 awg. (or 0.813 mm)
and 2 x 22 awg. (or 0.643 mm) max. wire dia.

Dimensions are before lacquer coating

6.6 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.

6.7 All motors must have the original manufacturer's logo or name moulded/engraved by the manufacturer 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 21.5T, 17.5T, 13.5T or 10.5T Spec. class motor. Spec. motors introduced from 2011 onwards must have; the 'wind' # etched/engraved onto the outer surface of the motor on a part of the motor that cannot easily be separated from the stator windings. They must also be identified as Spec. class motors.

NOTE: The above rules form the basis for Brushless Spec. motors. If it is found that variations of these motors from different manufacturers give large differences in performance, then electrical tests may be adopted.