# Explicit rules requirements of ESF;

* **EV.4.2.4;** The accumulator segments contained within the accumulator must be separated by an electrically insulating and fire resistant barrier (according to UL94-V0, FAR25 or equivalent). (Documentation of segment separation must be provided in the ESF)
* **EV.6.1.1;** The layout of electrical devices designed by the team must be documented accurately in the ESF
* **EV.6.1.4;** GLV systems must not be included in the accumulator container except for required purposes. Exceptions include the AIRs, HV DC/DC converters, the AMS and the IMD. The galvanic isolation of any LV wiring within the accumulator container, and where appropriate elsewhere, must be described within the ESF
* **EV.6.5.13;** In the case that a locking Helicoil or an approved positive locking mechanism is required that cannot easily be inspected at Electrical Technical Inspection, information about this item must be included in the ESF
* **EV.6.9.4;** If a discharge circuit is needed to meet **EV.7.2.3,** it must be designed to handle the maximum discharge current for at least 15 seconds. This must be part of the ESF
* **EV.8.1.8;** The ESF must include all details of internal and external over current protection including documentation from manufacturer for the particular series and parallel configuration, and string voltage

**EV.10.1 Electrical System Form (ESF)**

* **EV.10.1.1;** Prior to the event all teams must submit clearly structured documentation of their entire electrical system (including control and Tractive System) on the Electrical System Form (ESF).
* **EV.10.1.2;** The ESF must visualize the interconnection of all electric components including the voltage level, the topology, the wiring in the vehicle and the construction and build of the accumulator(s).
* **EV.10.1.3;** Teams must present data sheets with rated specifications for all Tractive System parts used and show that none of these ratings are exceeded (including wiring components). This includes stress caused by the environment (high temperatures, vibration, etc)
* **EV.10.1.4;** Use the format provided and submit the ESF as described in section **DR- Document Requirements**.
  + Small pictures and small schematics should be put inside the text for easy reference
  + Data sheets and large schematics should be put in the appendix

# Things that need to be done for ESF;

* **2.1;** schematic of the HV system, means placement of TSMP, discharge resistor and energy meter needs to be finalised - Vardon
* **2.2;** Fusing diagram needs to be finalised - Michael
* **3.1;** Finalised shutdown circuit schematic. - Michael
* **3.1.1;** CAD models of all switches and locations involved in shutdown circuit. -TIM
* **3.4**; BSPD details – Matt
* **3.4.3;** BSPD schematic – Matt
* **3.5;** BMS faulting and latching description - Tyler
* **4.1.2**; TSAL schematic -Michael
* **4.1.3;** CAD models of TSAL light location - TIM
* **4.2.1;** TSMP Measurement point Spec -Vardon, Nic, Michael
* **4.2.2;** CAD TSMP measurement point location - TIM
* **4.2.3;** TSMP Measurement point protection description -Vardon, Nic, Michael
* **4.2.4**; TSMP resistors must be speced -Vardon, Michael
* **4.2.5**; CAD TSMP Resistor location –TIM, need to determine this location!!
* **4.2.6**; TSMP measuring method -Vardon
* **4.3.2**; CAD HVD location -TIM
* **4.3.3;** how are HVD connections protected -Vardon
* **4.3.4;** HVD demo method -Vardon
* **4.4;** RTD demo –Vardon, Dom
* **4.5.1;** Discharge circuit specs -Vardon
* **4.5.3;** Discharge circuit operation -Vardon
* **5.1;** Accumulator HV schematic -Vardon, Tyler
* **5.2.1**; Cell specifications -Vardon
* **5.2.3;** Cell connections –Vardon
* **5.2.3**; CAD/photo to show how cells are mounted to each module -TIM
* **5.2.4;** Parallel Cell Overcurrent Protection -Vardon
* **5.2.5;** description of cell mounting –Vardon
* **5.2.5**; CAD/photo to show cells mounted in container -TIM
* **5.3;** CAD/photo to show maintenance plugs. -TIM
* **5.3.4**; positive locking mechanism demonstration -Vardon
* **5.4;** Precharge circuit details -Vardon, Nic
* **5.5**; BMS specifications -Tyler
* **5.6;** AIR specifications -Vardon
* **5.7;** Accumulator Indicator -Michael
* **5.8;** Accumulator Container Mechanical -Vardon
* **5.8.2;** AIR and fuse separation model - TIM
* **5.9;** Charging details –Tyler
* **5.9.2;** Charging shutdown circuit – Tyler
* **5.9.3;** Charging TS circuit – Tyler
* **6;** Motor Controller -Vardon, Nic, Matt
* **7.1;** Energy meter details -Vardon, Nic, Michael, Matt, Dom
* **7.2;** Firewall -Vardon, Tim
* **7.3;** Grounding -Matt, Michael
* **8 Appendix;** location of SDS’s -Everyone