1. General Requirements
   1. Designs deviating from the MINIONs specification must ensure complete interoperability and compatibility with existing designs.
   2. All parts shall remain attached to the MINIONs during launch and operation. No additional debris shall be created. No MINION may shed any solids or liquids that could be deemed pollution.
   3. Total stored chemical energy must not exceed 100 Watt-Hours. (United States Code of Federal Regulations – 49 CFR 175) (100Wh is equivalent to a 5V, 20000mAh battery)
2. Mechanical Requirements
   1. General Mechanical Requirements
      1. MINIONs enclosures should be IP68 and NEMA 6P rated against dust and water for all devices to be deployed above 5m depth. For devices being deployed beyond this depth, designers need to ensure that the enclosure is waterproof at the depth for the duration of the mission at least. (In accordance with ISO 20653:2013 and IEC 60529)
      2. The enclosure must be fastened to the platform with M4 (ISO 261:1998) nuts and bolts.
      3. The configuration and physical dimensions shall be defined at a later stage.
      4. A maximum of 8 MINIONS enclosures can be accommodated on the MINIONS platform.
   2. Materials
      1. All metals used in the construction of the enclosure and platform must be either Type 316 stainless steel (Society of Automotive Engineers (SAE) Steel Grades) or 5052 aluminium (The Alloy Association Inc. International Alloy Designations for Wrought Aluminium Alloys. 5052 formerly designated as AlMg2.5 in ISO 209-1.)
      2. Where other metals are used, the designer must ensure the chosen metals have similar or better corrosion resistance in marine environments in accordance with ISO9223 and ISO9226. (include corrosion rates of 316 and 5052?)
      3. All plastic must be HDPE, LDPE or PETG (if 3D printed). (The Society of the Plastics Industry (SPI) Plastic Types)
      4. Where other plastics are used, the designer must ensure that the material has a water absorption rate less than 0.30% in accordance with ISO62.

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1. Electrical Requirements
   1. The communication protocol for external busses shall be RS485.
   2. The standard supply voltage should be 5V. Many components require this voltage, and this allows both 5V and 3.3V components/peripherals to be used (with the use of level shifters, regulators etc).
   3. All MINIONS devices must incorporate battery circuit protection to avoid unbalanced cell conditions. The protection circuitry should ensure charge and discharge voltage limits, charge and discharge current limits and cell-balancing if multiple cells are used. Correct charging and discharging procedures/cycles, specific to the chosen battery, must be followed.
2. Operational Requirements
   1. No MINION may shed any solids or liquids that could be deemed pollution.
   2. All equipment that is deployed must be retrieved once the mission is complete. No part of the MINION node/s, platform, mooring system, or any other part must remain at sea once the mission is complete.
   3. MINIONS must comply with their country’s radio licence agreements and restrictions.
      1. Standardise LoRa? – Other devices will only be able to talk to mine if they use LoRa