MATE FLOATS!

TASK: *MATE Floats Under the Ice!*

Once again, this year the preview mission focuses on *MATE Floats!* and includes all of the details of this task as well as hints and specifications for building a vertical profiling float (non-ROV device). The mission outlined below will be included in the competition manuals as **one of the tasks** for the 2026 competition season.

MATE Floats! 2026 is inspired by the National Science Foundation (NSF)-funded GO-BGC Project. The goal of GO-BGC is to build a global network of profiling floats with chemical and biological sensors to monitor circulation, chemistry, biology, and overall ocean health. Scientists, engineers, and technicians are using NSF grant funds to build and deploy 500 robotic ocean-monitoring floats around the globe. GO-BGC hit the 300 mark, with 325 out of the targeted 500 GO-BGC floats deployed or en route to be deployed from research vessels.

Given the location of the 2026 MATE World Championship, this year's *MATE Floats!* mission scenario takes place UNDER the ice. For regional competitions, this translates to a simulated under-ice task; for companies competing at the World Championship, this means operating under an ice sheet grown in the National Research Council's (NRC) ice tank. At 90 meters long, 12 meters wide, and 3 meters deep, the NRC's ice tank is one of the largest facilities of its kind in the world. With temperatures ranging down to -25 °C , this indoor, refrigerated facility simulates realistic Arctic and northern marine conditions and has the ability to grow ice at 2.5 millimeters an hour.

Operating floats in polar waters where they may encounter ice is a real-world challenge faced by GO-BGC float technicians. Sensors and antennas, not to mention the float itself, run the risk of being damaged if the float attempts to surface with an ice sheet overhead. There is also the possibility of floats becoming entrained in sea ice and crushed. Therefore, floats deployed in polar waters must be engineered with ice-avoidance capabilities and with the ability to store data during under-ice profiles and delay transmission until the float is clear to surface in open water. "Ice-avoidance capabilities" translates to sensors measuring water temperature and chemistry to assess if ice is detected as the float ascends to the surface, along with the decision-making capability (i.e., an ice-avoidance algorithm) to reverse course and descend rather than continuing to surface.

Simulating this within the context of a MATE ROV Competition mission task presents some challenges, especially without the ability to replicate the precise real-world conditions – even in an ice tank – that would allow a float with ice-avoidance capabilities to detect ice and reverse course

So, instead of ascending to the surface and transmitting data to the mission station, companies participating in the 2026 MATE ROV Competition are challenged to design and build a float that ascends to a specific depth below the surface and holds that position for a defined period of time before initiating another descend to depth. Only after the float is recovered is it tasked with transmitting its data to the mission station.

This task involves the following steps:

Design and construct an operational vertical profiling float

- **Prior to the competition, design and construct a vertical profiling float – 5 points**
- **Float communicates with the station prior to descending – 5 points**
- **Float completes two vertical profiles under the ice**
    - **Vertical profile 1**
        - **Float completes first vertical profile using a buoyancy engine – 10 points**
        - **Float maintains a depth of 2.5 meters for 30 seconds – 5 points**
        - **Float maintains a depth of 40 cm for 30 seconds – 5 points**
            - **Float breaks the surface or contacts the ice sheet – 5 point penalty**
    - **Vertical profile 2**
        - **Float completes second vertical profile using a buoyancy engine – 10 points**
        - **Float maintains a depth of 2.5 meters for 30 seconds – 5 points**
        - **Float maintains a depth of 40 cm for 30 seconds – 5 points**
            - **Float breaks the surface or contacts the ice sheet – 5 point penalty**
- **After recovery, float communicates with (transmits data autonomously to) the station**
    - **Float communicates data to the mission station – up to 10 points**
        - **Float communicates all data packets – 10 points**
        - **Float communicates at least one data packet – 5 points**
    - **Profile is graphed as depth over time – 10 points**

    OR

- **Company does not design and construct a vertical profiling float, or float does not communicate data to the mission station after recovery**
    - **Data provided by MATE is used to graph depth over time – 10 points**

Total points = 70 points

Product Demonstration Notes:
Prior to the competition, companies must build a float capable of completing a vertical profile (i.e., traveling from the surface to a depth of 2.5 meters, maintaining depth for 30 seconds, ascending to a depth of 30 cm and holding at that depth for 30 seconds) and collecting and transmitting data to the mission station.

Companies must design their float with a buoyancy engine. A buoyancy engine moves fluid from inside the float to outside the float, displacing seawater and changing the density of the float. Using motors to move air or liquid does constitute a buoyancy engine. Using motors as thrusters to directly move the float, by turning a propeller or emitting a jet of water, is not a buoyancy engine. The float must also be capable of communicating data to a receiving device (i.e., the receiver) located at the surface at the mission station. The company is responsible for designing and constructing both the transmitter on the float and the receiver that displays the data at the mission station.

Companies must submit a non-ROV device document outlining their float design, detailing its operation, and demonstrating that it does not violate any safety rules. This document must also detail the onboard battery design, fuse size for safe discharge of the current, and how the float communicates with the company's receiver at the mission station. See DOC-004 for more details. This non-ROV device document must be submitted in advance of the competition. Companies will receive 5 points for designing and building a float. Successfully designing and building a float is defined as submitting a non-ROV device document that meets the requirements of DOC-004, i.e., the float has a buoyancy engine to move the float vertically in the water column and transporting the float to the product demonstration station.

Companies competing at an EXPLORER class regional may or not be required to submit float documentation. Contact your regional coordinator or visit your regional contest's website to determine if you must submit your float design document prior to the competition. IF REQUIRED BY THE REGIONAL COMPETITION, COMPANIES MUST SUBMIT FLOAT DOCUMENTATION OR THEY WILL NOT BE RECEIVE POINTS FOR DESIGING AND BUILDING THE FLOAT.

Companies may hand-launch the float at the side of the pool. Once deployed, the float must communicate with the mission station to receive points for communication. Deploying the float is defined as the float no longer in contact with any station personnel and floating on the surface. Once the float has been deployed, it must communicate to the receiver located on the surface at the shore station. Companies are responsible for constructing both the transmitter on the float and the receiver at the shore station.

The float must communicate (i.e., transmit) the following information to the mission station, referred to as the defined data packet:

- Company number (provided by MATE a few weeks prior to the competition)
- Time data (UTC or local or float time [float time would be time since float starts recording])
- Pressure data and/or depth data

- Any additional data as required by the company to complete this task

Pressure data must be displayed in pascals (pa) or kilopascals (kpa).
Depth data must be displayed in meters (m) or centimeters (cm).

Pressure/depth data must correlate to a set time transmitted from the float. For example, a defined data packet from EXPLORER 01 could be:

EX01 1:51:42 UTC 9.8 kpa 1.00 meters

NOTE: MATE is requiring WHAT data is transmitted (i.e., company number, time, pressure/depth). Companies must determine HOW to transmit that data and should consider that there will be other companies transmitting data at same time.

Companies will receive 5 points when their float is deployed into the water and successfully transmits the defined data packet to the receiver at the mission station upon deployment. Successfully transmitting the information is defined as the station judge seeing at least ONE defined data packet from the float on a screen or display at the mission station. The float only needs to transmit ONE defined data package prior to descending, but companies will not be penalized for sending additional defined data packets. The receiver should not receive transmissions from any source other than the float. The float must transmit the defined data packet before starting its first vertical profile. If the float does not transmit and has not started its first vertical profile, companies may recover the float and attempt repairs. If the float descends before transmitting, companies can continue with the remaining float tasks but will not receive points for transmitting before the first vertical profile.

The float should attempt to complete two vertical profiles.

The float will be considered to be under the ice. For teams at a regional competition, ice will be assumed to be on the surface. At the World Championship, this task will be conducted in the NRC's tank with an ice sheet between 1 cm and 5 cm thick at the surface. Companies will hand-launch their floats through a 1 meter x 1 meter hole cut into the ice sheet. The water in the tank will be comprised of an EGADS (ethylene glycol, aliphatic detergent, and sugar) solution. The EGADS water solution has a specific gravity of approximately 1.025 but can vary slightly. Companies should consider bringing warm clothing, especially gloves that may become wet when deploying the float, for working in the cold environment and water of the ice tank.

A vertical profile under the ice is defined as the float on the surface and descending to and maintaining a depth of 2.5 meters (+/- 33 cm) for 30 seconds. After maintaining depth at 2.5 meters, the float must ascend to a depth of 40 centimeters (+/- 33 cm) but should not break the surface or contact the ice. The float must maintain a depth at 40 cm for 30 seconds. A float that breaks the surface at any time after descending, or contacts the ice sheet, will be penalized 5 points on that vertical profile.

Companies will receive 10 points for successfully completing their first vertical profile. Successfully completing a vertical profile is defined as the float descending to 2.5 meters (+/- 33 cm) then ascending to 40 cm (+/- 33 cm) using a buoyancy engine. For example, a float that descends to the bottom of the pool, then ascends to the surface would be considered to have completed a vertical profile. In this example the float did descend to 2.5 meters (and went beyond that), and then ascended to 40 cm (and went beyond that as well) This float would not receive points for maintaining depth at either 2.5 meters or 40 cm and would also be penalized for breaking the surface / contacting the ice sheet, but the float would be considered to have completed a vertical profile.

During the vertical profile, the float must maintain a depth of 2.5 meters for 30 seconds. Companies will receive 5 points for successfully maintaining a depth of 2.5 meters for 30 seconds. This is defined as the bottom of the float at 2.5 meters of depth (+/- 33 cm) for 30 seconds. The bottom of the float should be used for calculating this depth, i.e., the bottom of the float should be at 2.5 meters (+/- 33 cm). After recovery and transmission, the data packets should show seven (7) sequential data packets where the depth is 2.27 meters to 2.83 meters. Companies must display all data packets on a screen for the station judge; the company should point out the seven sequential data packets at the proper depth. If the float drifts outside of this range at any time during the 30 seconds, the float must return to the designated range for an entirely new 30 second period. For example, if the float maintains depth at 2.76 meters for 20 seconds but then descends to 2.91 meters (outside of the given range), the float must ascend back into the range for an entire 30 seconds, not just the remaining 10 seconds from the first attempt at maintaining of depth. If the float's depth/pressure sensor is not at the bottom of the float, communicate the offset to the station judge. For example, if the float's depth/pressure sensor is 25 cm above the bottom of the float, when the bottom of the float is at 2.5 meters, the pressure sensor would be at 2.25 meters. Thus, the proper range for the depth/pressure sensor would be 2.58 meters to 1.92 meters. Communicate that adjusted range to the judge prior to deployment.

After maintaining a depth of 2.5 meters, the float should ascend to 40 cm (+/- 33 cm), just beneath the surface of the ice sheet. Companies will receive 5 points for successfully maintaining a depth of 40 cm for 30 seconds. This is defined as the top of the float at 40 cm of depth (+/- 33 cm) for 30 seconds. The top of the float should be used for calculating this depth, i.e the top of the float should be at 40 cm (+/- 33 cm). After recovery and transmission, the data packets should show seven (7) sequential data packets where the depth is 0.07 meters to 0.73 meters. Companies must display all data packets on a screen for the station judge; the company should point out the seven sequential data packets at the proper depth. If the float drifts outside of this range at any time during the 30 seconds, the float must return to the designated range for an entirely new 30 second period. For example, if the float maintains a depth at 52 cm for 20 seconds but then descends to 75 cm (outside the given range), the float must ascend back into range for an entire 30 seconds, not just the remaining 10 seconds from the first maintaining of depth. If the float's depth/pressure sensor is not at the top of the float, communicate the offset to the station judge. Communicate that adjusted range to the judge prior to deployment.

As noted, if at any time during a vertical profile the float breaks the surface or contacts the ice sheet, companies will be penalized 5 points for that vertical profile.

Companies must show the station judge data packets confirming the proper depth range. There must be seven sequential data packets spanning 30 seconds (0, 5, 10, 15, 20, 25 and 30) for each depth. If the float is not recovered, or if the float does not transmit data packets to the receiver, companies will not be awarded points for maintaining depth.

The float should then attempt to complete a second vertical profile. Companies will receive 10 points for successfully completing a second vertical profile using a buoyancy engine. Successfully completing a vertical profile is defined as the float descending to 2.5 meters (+/- 33 cm) then ascending to 40 cm (+/- 33 cm).

During the second vertical profile, companies will receive 5 points for successfully maintaining a depth of 2.5 meters for 30 seconds. This is defined as the bottom of the float at 2.5 meters of depth (+/- 33 cm) for 30 seconds. Data packets should show seven (7) sequential data packets where the depth is 2.27 meters to 2.83 meters, offset for the position of the sensor. Companies should indicate to the station judge the seven data packets at the proper depth for the second vertical profile.

Companies will receive 5 points for successfully maintaining a depth of 40 cm for 30 seconds. This is defined as the top of the float at 40 cm of depth (+/- 33 cm) for 30 seconds. When the float is recovered to the surface and data packets received, the data packets should show seven (7) sequential data packets where the depth is 0.07 meters to 0.73 meters, offset for the position of the sensor. Companies should indicate to the station judge the seven data packets at the proper depth for the second vertical profile

After successfully completing the second vertical profile, the in-water portion of the float task is complete. The float can be recovered. Recovery is defined as the float being returned to the surface, side of the pool. At regional competitions, the company's ROV should recover the float to the surface, side of the pool. At the World Championship, an ROV piloted by MATE staff will recover the float to the surface side of the pool. In the ice tank at the World Championship, companies should inform the station judge that they are ready to recover their vehicle. The station judge will stop their mission time and allow the MATE ROV to recover their float.

If a penalty occurs, or if the float does not maintain the proper depth for 30 seconds, companies will not receive full points for that vertical profile. It is up to the company to decide when they are ready to recover the float and therefore when the in-water portion of the float task is complete.

If upon recovery and transmission it is discovered that the float did not maintain the proper depth, companies will not receive points for that portion of the task. Companies are not permitted to return their float to the water to attempt to complete additional profiles. If prior to recovery the company believes their float may not have maintained depth, or if the company knows their float contacted the ice or breached the surface, companies may have the float complete additional vertical profiles in an attempt to increase their score. If the float completes an additional vertical profile that would receive a higher score, companies may use that score instead of the penalized profile score.

Companies may not mix and match portions of a vertical profile, the entire vertical profile must be considered. For example, if during the first vertical profile, the float does not maintain depth at 2.5 meters but does maintain depth at 40 cm (and does not break the surface), companies would receive 15 points for that vertical profile. If during a subsequent profile (beyond the two profiles required), the float maintains depth at 2.5 meters, maintains depth at 40 cm, but breaks the surface, companies would still only receive 15 points for that vertical profile; companies are not permitted to pair not breaking the surface in the first profile with maintaining the proper depth in the subsequent profile.

Companies are permitted to include visual cues (e.g., colored LEDs or other devices) that can be detected from the surface to signify a successful profile. For example, a company could have a blue LED signal when their float is within the 2.5 meter range, and a green LED signal for when their float is within the 0.4 meter range. A company member on the surface could track the timing of these visual cues in order to determine if the float needs to continue profiling or whether it can be recovered. Visual cues are optional and will not influence scoring but may help the company to determine when to recover their float.

Once recovered onto the pool deck, the float should communicate data by transmitting data packets wirelessly to the receiver. Companies will receive 10 points when the float successfully communicates all of its data packets to the shore station. Successfully communicating all data packets is defined as showing the station judge one data packet from every 5 seconds of both vertical profiles. If the float does not communicate all data packets but successfully communicates at least one data packet from the vertical profiles, the company will receive 5 points. Successfully communicating at least one data packet, but not all data packets, is defined as at least one data packet from the vertical profiles being shown to the station judge. This data packet must be from after the float descends; it cannot be a data packet from before the float began vertical profiles.

Companies will use the data packets received from the float to graph depth over time. Companies will receive 10 points for successfully graphing depth over time. Successfully graphing depth over time is defined as showing the station judge a graph with time on the X axis and depth on the Y axis. Companies must graph the data received from their vertical profiles, and there must be at least 20 data packets included on the graph. If the float did not collect and transmit 20 data packets, the company will not be able to graph its data and may instead elect to graph the data provided by MATE. Companies must use a computer or device to graph the data; companies may not draw a graph by hand. Data points may be entered (or cut and pasted) to a device by hand.

At a regional competition, recovery of the float and data transmission, as well as graphing of that data must occur within the 15-minute product demonstration time. At the World Championship, companies will have 15 minutes for the task, but the time will stop for the MATE ROV to recover their float. Once the float is recovered and in possession of a member of the company, the station judge will restart the product demonstration time and the company will have the remaining time to receive communication from the float and graph the data. Data transmission and graphing may happen at a data station away from mission station. If that is the case, time will not restart until the company arrives at the data station.

Data will be available from MATE if the company does not build a float or if the float fails to communicate after it is recovered from the water. Likewise, if the float does not communicate at least 20 data packets from the profile, data will be available from MATE. Graphing MATE data replaces graphing profile data AND the float communicating all data packets to the shore station. Companies that graph MATE data may still earn points for completing vertical profiles and transmitting at least one data packet.

Companies that choose to use MATE data should inform the station judge that they require this data. The judge will then provide a set of time and depth data to the company. Once a company requests data from MATE, they can no longer receive points for communicating all data packets to the station or for graphing data from their own float.

Companies will receive 10 points for successfully graphing depth over time. Successfully graphing depth over time is defined as showing the station judge a graph with time on the X axis and depth on the Y axis. Companies must use a computer or device to graph the data; companies may not draw a graph by hand. Data points may be entered (or cut and pasted) to a device by hand.

*Regional competitions may take place in pools that are shallower than 2.5 meters +/- 33 cm. If that is the case, contact your regional coordinator or visit your regional contest's website to determine what depth the float should maintain depth at and what depth you must reach before you start your ascent for collecting sensor data.

Float Specifications:
The float must be less than 1 meter in overall height.
The float must be less than 18 cm in diameter/length/width.
The float may not have an airline to the surface or a rope/line to the surface or the bottom.
The entire float must be less than 1 meter in length, including an antenna for broadcasting data.
The float must be less than 1 meter in length for the entire mission, it cannot have multiple compartments that separate, nor may it raise or lower any objects beyond the 1-meter limit.

New for 2026!!!
Companies are **REQUIRED** to have a U-bolt on their float to aid recovery by the MATE Competition ROV under the ice. This U-bolt must be a #310 U-bolt or a U-bolt of larger diameter (larger than 5 cm in width). This U-bolt must be easily accessible. This U-bolt may protrude beyond the 18 cm maximum diameter of the float. MATE recommends additional means (beyond a single U-bolt) for the MATE Competition ROV to recover the float; this could be additional U-bolts or other ways for the ROV to grab and recover the float. The easier the float is to recover, the more time a company will have to evaluate the data.

The float must operate independently; it cannot be connected to the shore by a tether, and the ROV cannot interact with the float other than during recovery.

Any air used on the float must be stored on the float. Floats may not have an airline to the surface. All electrical power to the float MUST go through a single fuse. The float will operate as a non-ROV device (see 3.3.1 Non-ROV Device Power Specifications for additional rules on powering a non-ROV device). Small button batteries are allowed to power timing devices on the float. All other batteries must adhere to the non-ROV device battery rules.

DOC-004: Non-ROV device design document: Companies will be required to submit a written and photographic description of their non-ROV device. This document is limited to 2 pages in length. Companies must measure the full load amps of the float device and determine their fuse size from this measurement. This non-ROV device design document must contain:

- A photo or diagram of the non-ROV device.
- The type of batteries used.
- A photo of all battery packs.
- A photo of the fuse(s) used on the ROV.
- Fuse determination showing the full load amps measurements for both waiting mode and buoyancy change mode.

For the *2026 MATE Floats!* task, this document must also include:

- A description of the buoyancy engine used to complete vertical profiles.
- A description of how the float communicates with the shore side receiver. If any commands are given to the float after deployment, those communications must also be described.
- A description of how the battery pack was designed to safely fulfill the full load amps needs and the voltage requirements of the float device.

A SID of the non-ROV device document must be included with the non-ROV device design document. This SID must be one page in length and is in addition to the 2 pages required for the non-ROV device design document (i.e. DOC-004 can be a total of 3 pages, 2 pages for a description, one page for a SID). The SID must include:

- A fuse using a standard fuse symbol
- Full load amps fuse measurements

3.3.1 Non-ROV Devices

The vertical profiling float qualifies as a non-ROV device in 2026.

ELEC-NRD-001: The vertical profiling float cannot be powered from the surface. If the float is powered, it must use onboard batteries. Voltage is limited to **12 VDC maximum**; amperage is limited to **5 amps maximum**. All power for the non-ROV device must go through a single fuse (see ELEC-NRD-005).

ELEC-NRD-002: The vertical profiling float non-ROV device may not utilize thrusters nor include any cameras. Vertical profiling floats cannot use a camera onboard to take images or video of sensor data and transmit those images/videos to the surface station.

NEW for 2026!!! New battery limitations are in place. Read the following information carefully!
ELEC-NRD-003: Onboard power is allowed for non-ROV devices. If onboard batteries are being used, the following specifications must be met.

- NiMH (Nickel Metal Hydride) and AGM (Absorbed Glass-Mat) batteries only. **Alkaline batteries are not allowed**.
- NiMH battery packs consisting of 9-volt, AA, C or D cell batteries are allowed. See table below for maximum amperage allowed for each battery type.
- Larger NiMH and AGM (Absorbed Glass-Mat) 12-volt batteries are also allowed. This includes large (brick sized) batteries.
- No other size or chemical composition is allowed. 12-volt outdoor, re-chargeable batteries are not allowed. **Hi discharge LiPo batteries are not allowed**.
- Batteries are mounted in a manner that they are not loose inside the container.

All batteries are limited to the maximum allowed current shown in this table. Above this current, batteries will overheat.

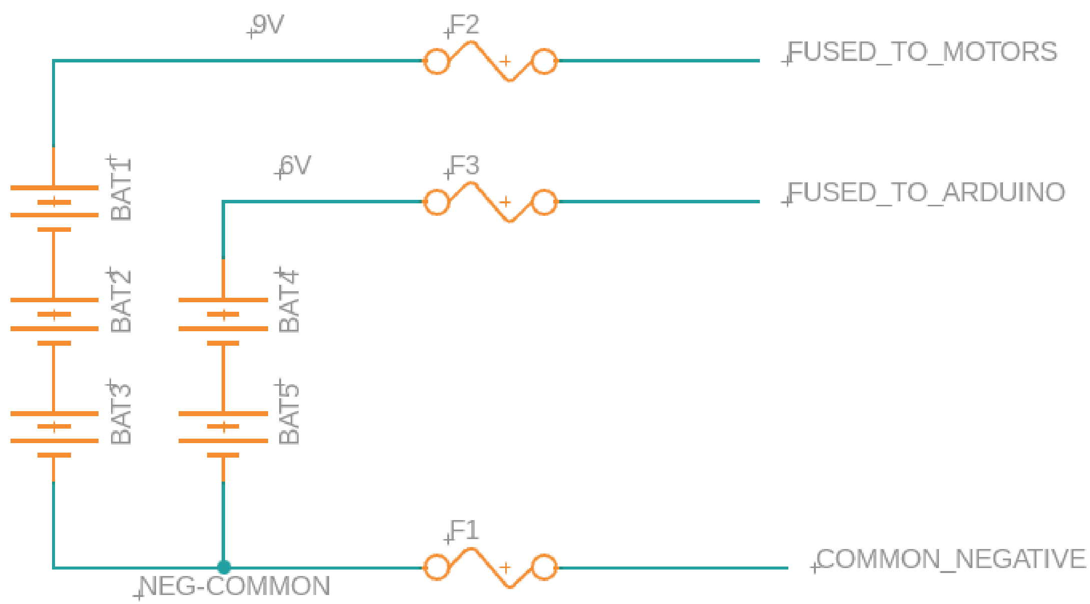
Battery Type	Maximum Fuse Size
NiMH AA	2.0 A
NiMH C or D	5.0 A
NiMH 9-volt	200mA
NiMH* / AGM 12V	5.0 A

*The 5.0 amp maximum fuse size for NiMH 12 volt batteries refers only to the larger, brick sized batteries. 12-volt battery packs, consisting of multiple AA or 9-volt batteries, require the smaller fuse size for those batteries.

To determine a NiMH battery's maximum fuse size, see the individual battery's mAH (milliamp hours) rating. Divide that number by 1000. For example, if a NiMH AA battery has a rating of 2300 mAH, its maximum current would be 2.3 amps, requiring a 2-amp fuse. If a NiMH battery has a rating of only 1900 mAH, its maximum current would be 1.9 amps, requiring a 1-amp fuse. The above table was derived from the general mAH from the types of batteries in question.

ELEC-NRD-004: Battery fusing for non-ROV devices is an important consideration and the following rules must be adhered to.

- A single fuse must be utilized that will shut down all power sources in the non-ROV device if the fuse blows.
- A fuse (5 amps max) must be installed within 5 cm of the battery positive terminal.
- All fuses, when installed, must be able to be visibly inspected for amperage through a clear housing or immediately after an opaque NRD device housing is removed without the need to uncover the fuse.
- ***Note for 2026!!!*** Cartridge, ATO type blade fuses or MINI blade fuses CAN be used for fusing NiMH and AGM batteries. The fuses to select from are 1A, 2A, 3A, 4A and 5A fuses. These fuses provide easy visual inspection for amperage using industry standard color codes.
  Fuse Reference: ATO fuse MINI fuse
  These fuses are all rated for 32VDC and are color coded for amperage.
- All blade fuses MUST correspond to the standardized color codes listed on the fuse links above. All cartridge fuses must be readily accessible and have the current stamped on the end of the fuse. Minimum DC voltage for the fuse must be 32 volts.
- The maximum distance from a battery pack to any fuse is 5 cm.
- Batteries in Series: No voltage over a nominal 12V is allowed. This means no more than eight 1.5V alkaline batteries in series.
- Batteries in Parallel: Batteries may be placed in parallel to increase the current available to the system within the following limits:
  - In no case shall the current from the pack exceed 5A.
  - The number of series strings in parallel is used as a multiplier to determine the fuse size. For example, using AA batteries, the maximum fuse size is 2.0 amps. If two battery strings are placed in parallel, the maximum fuse size is 2 amps (2 * 2.0A = 4.0 Amps).
- ***Note for 2026!!!*** For systems with multiple battery packs, the battery packs should be connected on the negative terminals with the fuse (5 amps max) located off of the common negative terminal connection. Each individual battery pack should also be fused with the properly sized fuse for that battery pack. Note that a single battery wired in parallel is considered a battery pack. For example, five NiMH 9-volt batteries wired in parallel, the maximum fuse size is 1 amp (5 * 0.2A = 1.0 A). Each 9-volt battery would need to be individually fused at 0.2A as well.



ELEC-NRD-005: Full Load Amps Value. Companies MUST measure the full load amps (FLA) of their device during waiting mode (motors off) AND during buoyancy change mode (motors on). The type of battery pack allowed for their system can be determined using the full load amps measurement (See ELEC-008E in the competition manual for more information).

Using the non-ROV device full load amps values, companies should select the standard fuse closest to their FLA.

ELEC-NRD-006: The enclosure housing must be designed so that it will open if the pressure inside the housing is greater than the outside pressure.

There are two allowable methods for pressure relief:

1. A pressure relief hole of a minimum of at least 2.5 cm in diameter. This hole can be plugged up with a rubber stopper but must be friction fit. Threads or other fastening methods are not allowed. Holes less than 2.5 cm in diameter will not pass safety inspection.
2. The enclosure is built in a manner that an end cap will pop off if under pressure. This can be an internal or external cap with O-rings to provide sealing. The sealing diameter of the end cap must be 2.5 cm in diameter or greater (this limits the smallest ID of an enclosure to 2.5 cm).

Additional notes:

- Under no condition should the housing be built with fasteners to hold the housing together. There must be at least one 2.5 cm or larger opening that serves as a pressure release.

Note for 2026!!!

- Utilization of pressure release valves are not acceptable as they cannot be tested at the competition site.
- Pop-off end caps that utilize a tightening mechanism (hose clamp, Twist-Tite) are not allowed.

ELEC-NRD-007: A SID must be submitted for any non-ROV device that uses electrical power