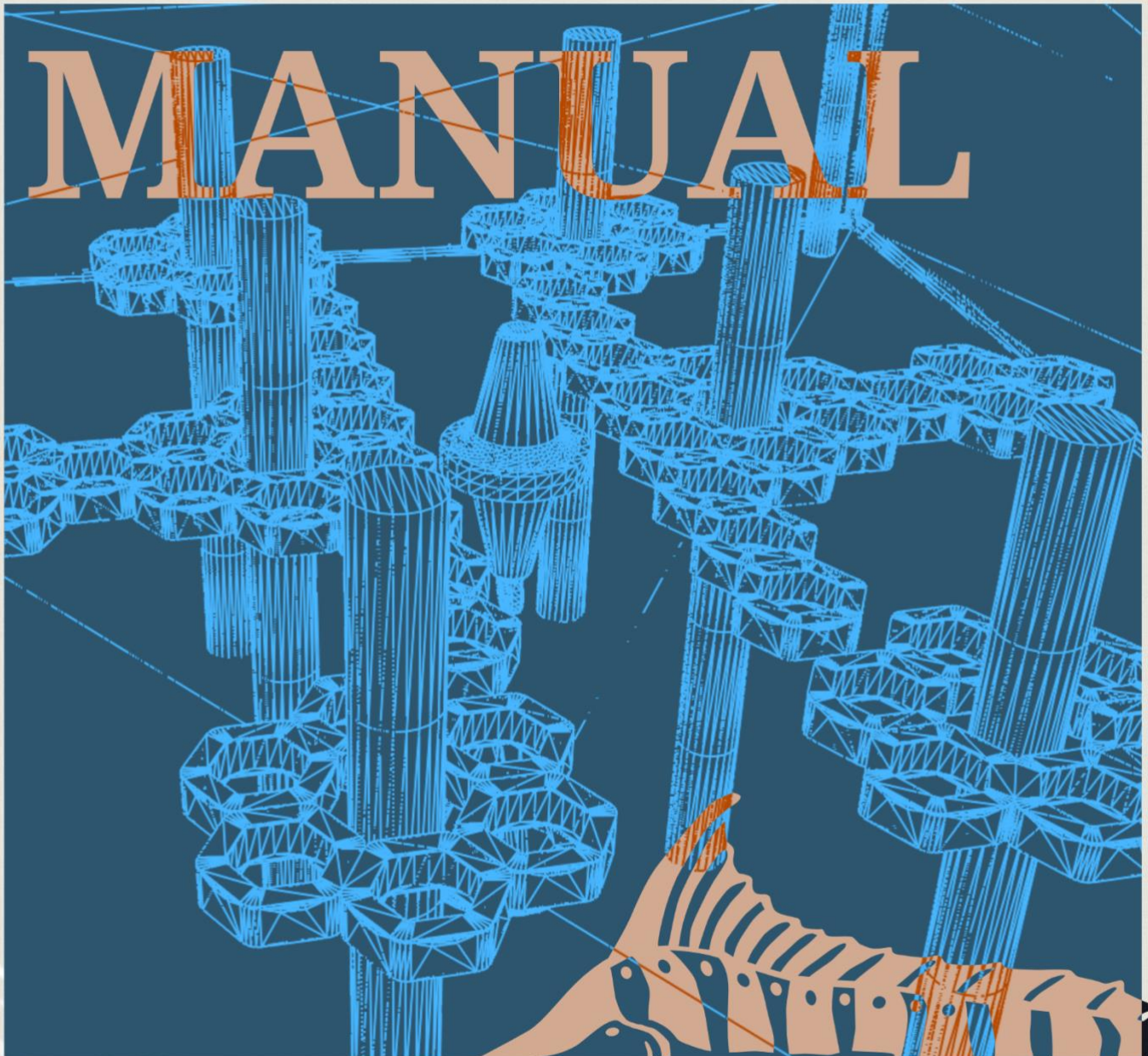


MARLIN ROBOTICS 2026



GAME



Version 1.0
BY POLYMATE



MARLIN ROBOTICS

2026 GAME MANUAL

Link Lockdown

Version 1.0

August 2026



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Change Log

This Game Manual is a living document. Every published release carries a version number and a release date, both shown on the cover page.

From v1.0 onwards, every published release will be recorded in the table below, newest release first. Each entry names the Sections and rules that changed and summarizes what changed. Unless an entry says otherwise, a change takes effect on its release date and applies at every event held on or after that date. Where a change affects a Match already played, the result of that Match stands.

Teams are responsible for competing under the current version. Editorial corrections (typographical fixes, formatting, and figure updates that do not alter the meaning of a rule) are logged but are not treated as rule changes.

Version	Release date	Section / rule	Summary of change
v1.0	11 August 2026	—	First public release of the MARLIN Robotics 2026: Link Lockdown Game Manual,

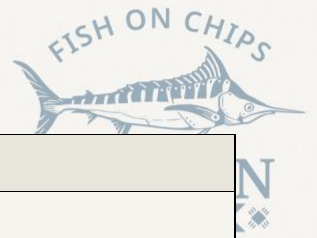


Quick Reference Guide

Scoring Rules	
<u><SC1></u>	All Scoring statuses are evaluated after the Match Period ends
<u><SC2></u>	Autonomous Bonus Score is evaluated after the Autonomous Period
<u><SC3></u>	Hex Link Scored criteria
<u><SC4></u>	Mooring Scored criteria
<u><SC5></u>	Berthing criteria
<u><SC6></u>	Beacon Scored criteria

Safety Rules	
<u><S1></u>	Play things safe
<u><S2></u>	Participants must be accompanied by a responsible Adult
<u><S3></u>	Water safety equipment must be accessible

General Game Rules	
<u><G1></u>	Treat everyone with respect
<u><G2></u>	MARLIN Robotics is a student-centered program
<u><G3></u>	Use common sense
<u><G4></u>	The Robot must represent the Team's skill level
<u><G5></u>	Keep your Robot together
<u><G6></u>	Don't clamp your Robot to the Pool
<u><G7></u>	Only Drive Team Members, and only in the Alliance Station
<u><G8></u>	Hands out of the Pool
<u><G9></u>	Controllers must stay connected to the Pool
<u><G10></u>	Autonomous means "no humans"
<u><G11></u>	All rules still apply in the Autonomous Period
<u><G12></u>	Don't destroy other Robots, but be prepared to encounter defense
<u><G13></u>	Offensive Robots get the "benefit of the doubt"
<u><G14></u>	You can't force an opponent into a penalty
<u><G15></u>	No Holding for more than a 5-second count
<u><G16></u>	Use Scoring Elements to play the game
<u><G17></u>	Capsizing



Specific Game Rules	
<SG1>	Starting a Match
<SG2>	Height above water is limited
<SG3>	Keep Scoring Elements and Pool Elements in the Pool
<SG4>	De-scoring is allowed
<SG5>	Anchorage capacity is limited
<SG6>	Robots may never be fully submerged

Robot Rules	
<R1>	One Robot per Team
<R2>	Robots must represent the Team's skill level
<R3>	Robots must pass inspection
<R4>	At the start of the Match: 300mm × 500mm footprint, 250mm maximum height
<R5>	500mm maximum height above the waterline at all times
<R6>	MARLIN Robotics electronics only; no modifications
<R7>	MARLIN Robotics batteries only; no modifications
<R8>	Structure may only be official MARLIN parts, Team-made Fabricated Parts, or commercial springs, fasteners, O-rings and bearings
<R9>	Robots must be waterproof and safe for pool use
<R10>	Robots must have legal Identification Flags
<R11>	One single, unified Robot; no splitting apart
<R12>	Robots must not resemble Scoring Elements or Pool Elements

Competition Rules	
<C1>	Head Referees have final authority on all gameplay and Robot rulings
<C2>	Drive Team Members may immediately appeal a Head Referee's ruling
<C3>	The Event Partner has final authority on all non-gameplay decisions
<C4>	Be prepared for minor Pool variance
<C5>	Pools may be repaired at the Event Partner's discretion
<C6>	Qualification Matches follow the Match Schedule
<C7>	Each Team plays at least six Qualification Matches
<C8>	Matches may result in a Tie
<C9>	Qualification Matches determine ranking and Eliminations seeding
<C10>	Elimination Matches follow the Elimination Bracket
<C11>	Ties in Elimination Matches lead to limited replays
<C12>	Match replays are allowed but only under specific conditions
<C13>	Disqualifications



SECTION 1

INTRODUCTION

Overview

This section introduces the MARLIN Robotics Competition and MARLIN Robotics 2026: Link Lockdown.

The MARLIN Robotics Competition

The MARLIN Robotics Competition is a competitive maritime robotics program designed to immerse students in the challenges of engineering for aquatic environments. Unlike traditional land-based robotics competitions, MARLIN Robotics requires teams to design, build, and operate unmanned surface vehicles (USVs) that float, navigate, and manipulate objects on the surface of a pool.

Maritime engineering represents one of the most interdisciplinary challenges in the engineering world. Designing a robot that must operate at the air-water interface forces students to grapple with buoyancy, hydrodynamic drag, waterproofing, corrosion resistance, and propulsion efficiency—concepts that rarely surface in land-based competitions. These are real constraints that professional marine engineers face every day.

MARLIN Robotics 2026: Link Lockdown is played on an approximately 3m × 2m water-filled Pool by two or four Teams, with each Team adding one Robot to the Pool. The game features fifty-six (56) floating hexagonal Hex Links that must be magnetically attached to Alliance Bollards of the same color as the Hex Links, three (3) submerged Moorings that must be retrieved and returned to the Alliance Starting Area, and a central Anchorage that rewards end-of-period positioning. Matches are three minutes long, beginning with a twenty-second Autonomous Period followed by a two-minute-forty-second Driver Controlled Period.

The rules contained in this Game Manual are designed to simulate the constraints that define any real-world engineering project. They are intended to promote creativity without punishing innovation, and to encourage fair play while rewarding competitive excellence.



How to read this game manual

The rules in this game manual are intended to work together to create a system of constraints. These rules are not intended to be understood independently of one another or in isolation from other information contained in this document. Many situations may require Teams, referees, or other volunteers to use logic from multiple places in the manual to properly form an interpretation. It is critical that the entire manual is read and understood, not just parts. Information in the game manual is presented in the following ways:

- ∞ General Definitions establish the meaning of a term regarding this document. Sometimes, these definitions may not perfectly match a more commonly accepted dictionary definition. In that case, the MARLIN definition takes precedence. If there is no MARLIN definition for a term, it can be reasonably assumed that a dictionary definition can be used.
- ∞ General Game Rules establish the baseline rules for competition that Teams must always adhere to. These include, but are not limited to, conduct at an event, roster eligibility, competition integrity, and authority and enforcement. General Game Rules also begin to outline the rules that Teams must follow in every MARLIN game and help prevent the game from devolving into immediate chaos.
- ∞ Scoring Rules define how points are earned and evaluated. Specific Game Rules describe what Robots and Drive Team Members may and may not do during a Match, specifically for this season's game. These rules are subject to change from year to year, depending on how the game is designed and meant to be played.
- ∞ Robot Rules define how Robots may be built and configured.
- ∞ Competition Rules describe how competitions are run, and how Teams are ranked at events.

Note: There are also blue boxes of text placed in some areas of the Game Manual. These are intended to provide further clarification and guidance in places that the game designers have decided will probably benefit from things said in a different way or presented differently. Boxes are meant to supplement but do not replace rules and definition.



SECTION 2

THE GAME

Pool Overview

The MARLIN Robotics 2026: Link Lockdown Pool is an approximately 3m × 2m Pool set up as illustrated in Figure PO-1. The Pool consists of the following:

- ∞ Fifty-six (56) Hex Links
 - Twenty-eight (28) of these Hex Links shall have their red side facing upwards
 - Twenty-eight (28) of these Hex Links shall have their blue side facing upwards
- ∞ Four (4) Alliance Bollards – Two (2) per Alliance
 - Two (2) Red Alliance Bollards
 - Two (2) Blue Alliance Bollards
 - One (1) in each corner of their Alliance's side of the pool
- ∞ Three (3) Moorings, submerged along the centerline of the Pool
- ∞ One (1) Anchorage, a rectangular area in the center of the Pool, with capacity for up to three (3) Berthed Robots in Qualifications Matches, and up to one (1) Berthed Robot in Elimination Matches
- ∞ Two (2) Alliance Starting Areas, each a 2m × 0.4m rectangle along the short edge of the Pool on each Alliance's side
- ∞ One (1) 15mm wide black Centerline
- ∞ One (1) Beacon, placed at a random position along the Centerline by the Head Referee or a Scorekeeper Referee before the Match begins

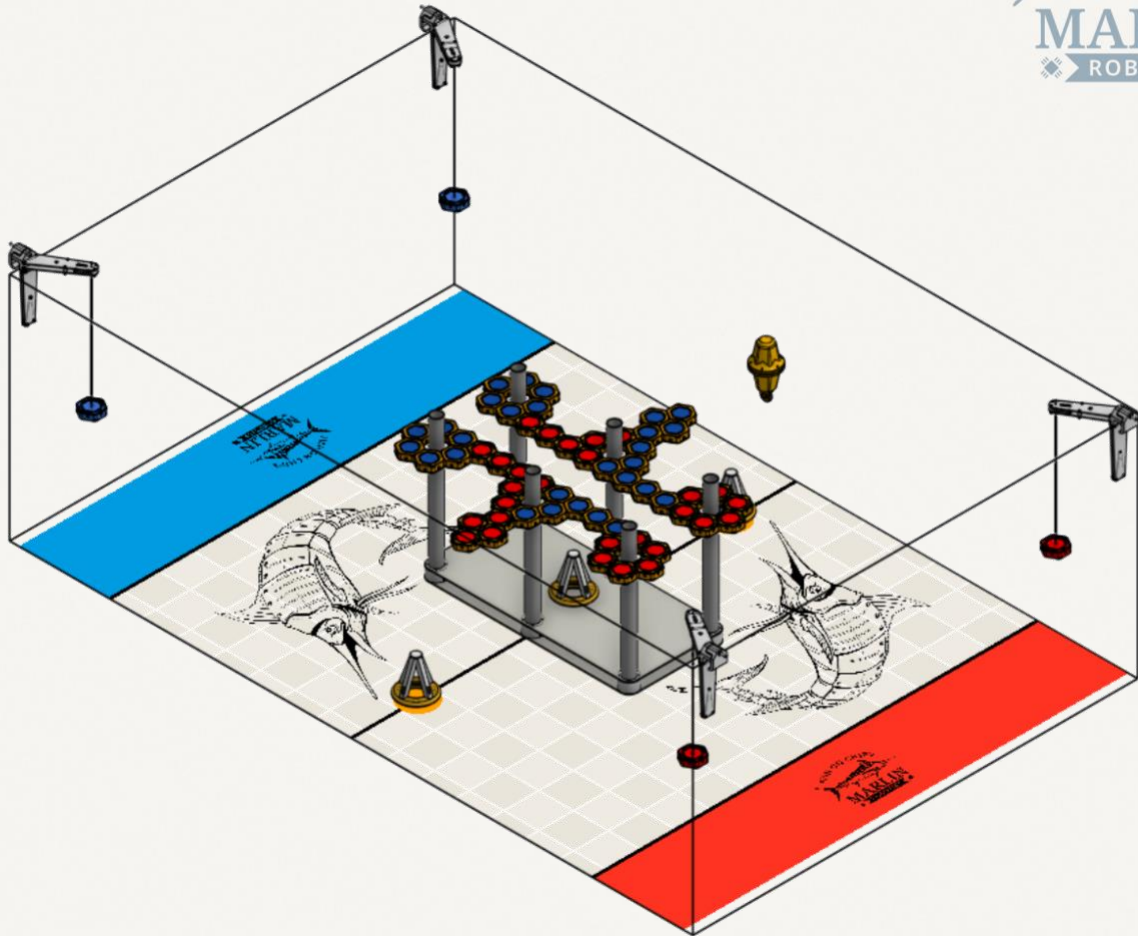


Figure PO-1: Isometric view of the Pool contents in its starting configuration, with the Pool Perimeter's walls removed for visibility of the Pool Elements and Scoring Elements.

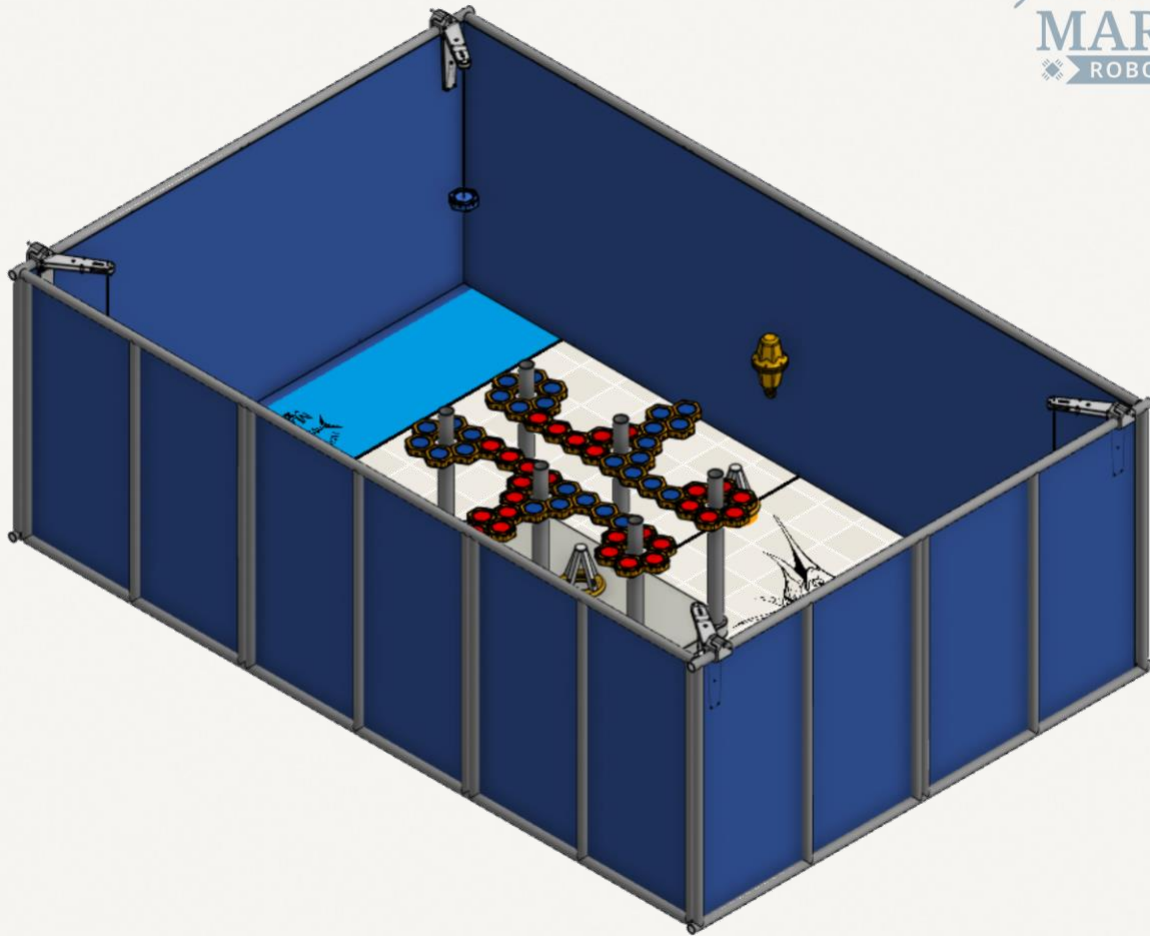


Figure PO-2: Isometric view of the Pool contents in its starting configuration, including the Pool Perimeter

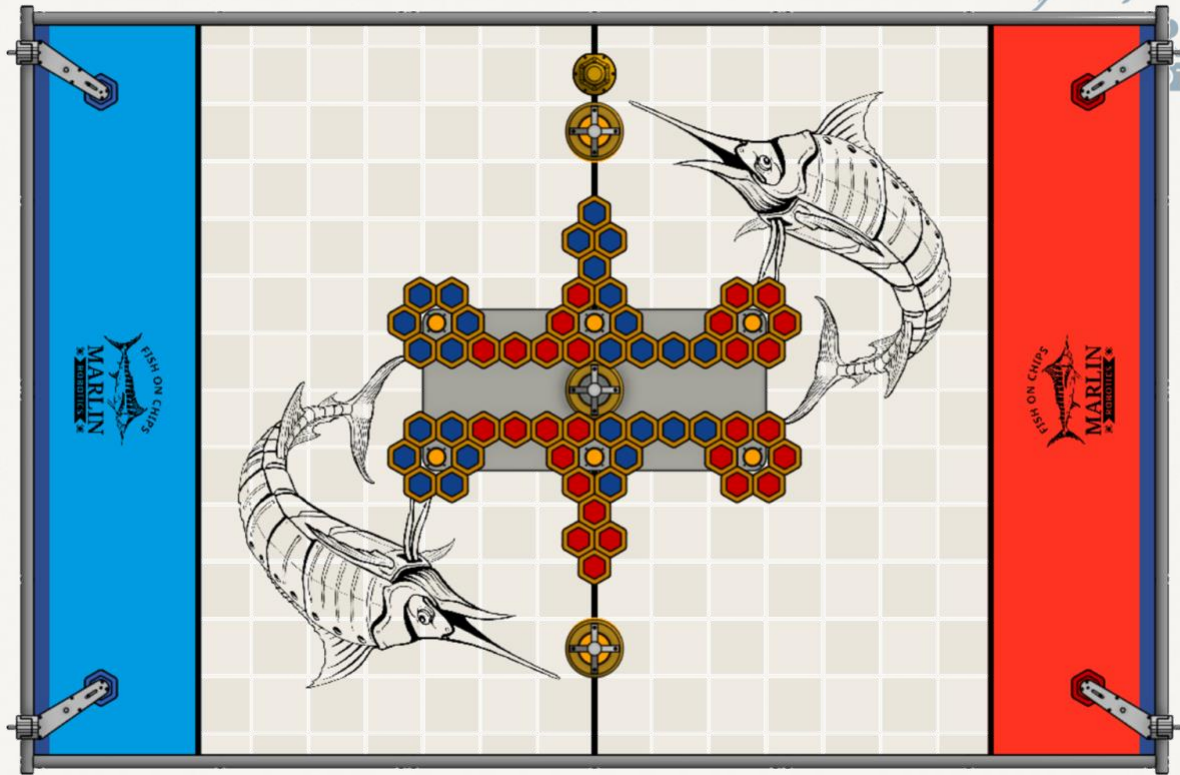


Figure PO-3: Top view of the Pool in its starting configuration. Red and Blue Alliance Starting Areas on opposite sides, Anchorage (center rectangle), Alliance Bollards (red/blue circles in corners), and Mooring locations (yellow circles along centerline).

Note: The illustrations in this section of the Game Manual are intended to provide a general visual understanding of the game. Some figures may highlight or change the appearance of certain Pool and Scoring Elements to emphasize or clarify intent. Teams should refer to official Pool specifications, found in Appendix A, for nominal Pool dimensions.



General Definitions

Autonomous Bonus – A point bonus awarded to the Alliance that satisfies the conditions detailed in [<SC2>](#) during the Autonomous Period.

Adult – Anyone who is not a Student or another defined term (e.g., Head Referee).

Alliance – A group of students consisting of either one or two Teams, which are playing to score points in a Match. In any Match, there is one Red Alliance and one Blue Alliance.

- ~ In a Qualifications Match, an Alliance consists of two Teams.
- ~ In an Eliminations Match, an Alliance consists of one Team.

Competition Manager Software – A software used by referees to schedule Matches, record Disablements and Disqualifications, and record Match outcomes.

Defensive – a category of strategies, Robot Actions, and/or Robot statuses that can be employed by a Team during a match; see rules [<G12>](#) and [<G13>](#) for more information. A Robot is Defensive while it is engaged in actions that cannot increase its Alliance's score for the current Match and instead limits an opponent's ability to score or play the game. A Robot can be in possession of a Scoring Element and capable of scoring but still be Defensive based on its actions. Examples include, but are not limited to:

- ~ De-scoring in a way that does not increase points for the Robot's own Alliance
- ~ Limiting access to a portion of the Pool while not attempting to score
- ~ Holding, blocking, impeding or otherwise restricting or controlling an opponent's movements
- ~ Actively blocking an opponent from scoring

Defensive Robot actions or Robot statuses are not automatically Violations. However, Robot actions or statuses that are performed or achieved in a Defensive manner are more likely to be Violations, and Teams should be more careful when employing Defensive strategies. See rules [<G12>](#) and [<G13>](#) for more information.

Disablement – A penalty applied to a Team for a safety Violation. A Team that receives a Disablement is not allowed to operate their Robot for the remainder of the Match, and the Drive Team Member(s) will be asked to place their controller(s) down.

Disqualification – A penalty applied to a Team for a Major Violation. A Team that receives a Disqualification in a Qualification Match receives zero (0) Match Score and zero (0) Schedule Difficulty Points. At a Head Referee's discretion, repeated Violations and/or Disqualifications for a single Team may lead to Disqualification for the entire competition.



Drive Team Member(s) – A Student who stands in the Alliance Station during a Match and operates a Robot belonging to the Student’s Team. Adults are not allowed to be Drive Team Members. See rules [<G7>](#), [<G8>](#), and [<G9>](#).

Entanglement – A Robot status. A Robot is Entangled if it has grabbed, hooked, or attached to an opposing Robot or a Pool Element. See rule [<G12>](#).

Event Partner – A coordinator responsible for running a competition, who serves as an overall coordinator for the volunteers, venue, event materials, and all other event considerations.

Pool Floor – The solid top surface of the bottom of the Pool.

Head Referee – A Referee who is an impartial volunteer who is responsible for enforcing the rules in this manual as written. Head Referees are the only people who may discuss ruling interpretations or scoring questions with Teams at an event.

Holding – A Robot status; see rule [<G15>](#) for more information. Holding is legal until it exceeds the limits in [<G15>](#).

MARLIN VSCode Extension – The official MARLIN Robotics extension for Visual Studio Code, installed on a Team Laptop. The MARLIN VSCode Extension runs the Team’s Python code on the Team Laptop and translates it into the commands that operate the Team’s Robot hardware through the Robot Controller. It is the only official MARLIN Robotics software that runs on a Team Laptop, and it is what allows an otherwise ordinary laptop to interface with MARLIN Robotics hardware.

Match – A three (3) minute period of game play split into two Match Periods: one (1) Autonomous Period and one (1) Driver Controlled Period, during which Teams play a defined version of Link Lockdown to earn points.

- **Autonomous Period** – a twenty second (0:20) Match Period during which Drive Team Members are not allowed to operate the Robot, and the Robot must act by itself autonomously using software and sensors.
- **Driver Controlled Period** – a two minute and forty second (2:40) Match Period during which Drive Team Members operate their Robots via controllers connected to the Pool control system.
- At the three-minute (3:00) mark, all Robots must cease operation. Drive Team Members must place their controllers down. After a 5-second settling period detailed in [<SC1>](#):



- Berthing bonus is evaluated per [<SC5>](#).
- All Scoring statuses are evaluated per [<SC1>](#).
- Final scores are calculated, including the Autonomous Bonus from the Autonomous period.
- Between the Autonomous Period and Driver Controlled Period, there is an Intermission Period of unspecified duration where the Scorekeeper and Head Referees determine the scoring for the Autonomous Period and record the Autonomous Bonus. This time is not included in the three-minute playtime of the Match, but Teams must remain at the Pool during this time, because the Driver Controlled Period will begin after a 3-second count after the Head Referee announces the Autonomous Bonus score.
 - The Intermission Period is not considered a Match Period. It is simply a duration between the Autonomous and Driver Controlled Period.
 - The Score for the Autonomous Period is calculated 5 seconds after the Autonomous Period ends, as described in rule [<SC1>](#). This 5 second wait time occurs during the Intermission Period.

MARLIN Robotics Competitions consist of Qualifications Matches followed by Eliminations Matches.

- Qualifications Matches are played in a 2-v-2 format, where two (2) Alliances – one (1) “red” and one (1) “blue” – composed of two (2) Teams each compete to score as many points as possible.
- Eliminations Matches, are played in a 1-v-1 format, where two Alliances – one (1) “red” and one (1) “blue” – composed of one (1) Team each compete to score as many points as possible.

Match Score – Points scored by an Alliance during a Match, defined as the sum of all scored points by the Teams of an Alliance during the Match.

Offensive – a category of strategies, Robot actions, and/or Robot statuses that can be employed by a Team during a Match; see rules [<G12>](#) and [<G13>](#) for more information. A Robot is Offensive while it is engaged in actions that could directly increase its Team’s score for the current Match. Examples include, but are not limited to:

- Manipulating a Scoring Element into a valid Scored status to score points
- Moving while holding a Scoring Element with the apparent intention of placing the Scoring Element into a valid Scored status and earn points for their Team
- Changing the status of a Pool Element or Scoring Element that acts as a multiplier or scoring bonus for their Team
- Achieving (or attempting to achieve) any Robot status that adds points to their Team’s score



- Obtaining (or attempting to obtain) Scoring Elements.

Pool – The entire playing area, comprising the water in the Pool, Pool Perimeter, and all Pool Elements within. The horizontal dimensions of the Pool are approximately three (3) meters by two (2) meters and has a filled depth of 500mm.

Pool Element – Any non-Scoring Element component of the Pool, such as the Anchorage, Alliance Bollards, boundary lines, and the Pool Perimeter.

Pool Laptop – A single laptop dedicated to each Pool at a competition that coordinates the Match for that Pool. Every Team Laptop competing on a Pool connects to that Pool's Pool Laptop, which manages Match timing and the transitions between the Autonomous Period and the Driver Controlled Period. The Pool Laptop is provided at the competition, one per Pool, and is not part of any Robot.

Pool Management Software – A software which runs on the Pool Laptop, used by referees to control the start and end of Match Periods, and calculate Autonomous Bonus Scores and Match Scores.

Pool Perimeter – The outer four walls of the Pool and the Pool Floor. The Pool Walls are 1m tall.

Possession – A Robot / Scoring Element status. A Scoring Element is considered Possessed by a Robot if a Robot's change in direction would result in controlled movement of the Scoring Element. This typically requires at least one of the following: the Scoring Element is fully supported by the Robot, the Robot is moving the Scoring Element in a preferred direction with a concave face, or the Robot is holding the Element against the Pool Perimeter or a Pool Element.

Robot – A machine that has passed inspection, designed by Student Team members to execute one or more tasks autonomously and/or by remote control from a Drive Team Member.

Scorekeeper Referee – An impartial volunteer responsible for tallying scores at the end of a Match. Scorekeeper Referees do not make ruling interpretations and should redirect any Team questions regarding rules or scores to a Head Referee.

Schedule Difficulty Points – The Match Score of the losing Alliance of the Match. Used as a measure of how "difficult" the Match was.



Student – Any person enrolled in an accredited educational institution who is registered as a member of a MARLIN Robotics Competition Team.

Team – A registered group of Students (and their Adult supervisors) who design, build, and compete with Robots. Each Team fields one (1) Robot per Match. Each Team must build their own Robot and create their own code. Adults may teach the Students how to use concepts or tools associated with Robot construction, programming and design but should never work on the Robot or on the code that goes on the Robot or the design of the Robot.

Team Laptop – A laptop, provided by a Team, that runs that Team’s software during a Match. Team Laptops are not official MARLIN Robotics hardware; they are ordinary laptops supplied by the Team’s Students, onto which the official MARLIN VSCode Extension has been installed. A Team Laptop performs all the computation and student logic for the Team’s Robot: it runs the Team’s Python code (via the MARLIN VSCode Extension), connects to the Team’s Robot Controller by a USB cable, and connects to the Pool Laptop. There are either two (2) or four (4) Team Laptops at each Match, one per competing Team. The Team Laptop is not part of the Robot and is not subject to the Robot electronics rules in Section 3.

Alliance Station – The designated region poolside where the Drive Team Members must remain for the duration of the Match. Each Alliance has one Alliance Station on their side of the Pool.

Violation – The act of breaking a rule in the Game Manual.

- **Minor Violation** – a Violation which does not result in a Disqualification.
 - Accidental, momentary or otherwise non Match Affecting Violations are usually Minor Violations.
 - Minor Violations usually result in a verbal notification from the Head Referee during the Match, which should serve to inform the Team that a rule is being Violated before it escalates to a Major Violation.
- **Major Violation** – a Violation which results in a Disqualification.
 - Unless otherwise noted in a rule, all Match Affecting Violations are Major Violations.
 - If noted in the rule, egregious or strategic Violations or intentional actions that result in Violations may also be Major Violations.
 - Multiple Minor Violations within a Match or competition may escalate to a Major Violation at the Head Referee's discretion or as specified in a rule.



- **Match Affecting** – A Violation which changes the winning and losing Alliance in the Match.
 - Multiple Violations within a Match can cumulatively become Match Affecting.
 - When evaluating if a Violation was Match Affecting, Head Referees will focus primarily on any Robot actions that were directly related to the Violation.
 - Determining whether a Violation was Match Affecting can only be done once the Match is complete and the scores have been calculated.

To determine whether a Violation may have been Match Affecting, check whether the Alliance which contains the Team who committed the Violation won or lost the Match. If they did not win the Match, then the Violation could not have been Match Affecting, and it was very likely a Minor Violation. The Head Referee has final discretion on gameplay rulings, including judging whether a Violation was Match Affecting.



Game-Specific Definitions

Anchorage Post – One of six (6) fixed posts of the Anchorage. Anchorage Posts are part of the Anchorage, which is a Pool Element and may not be damaged.

Anchorage – The rectangular area in the center of the Pool, defined by a white base with six Anchorage Posts extending upwards. The outer edge of the white base, as seen from directly above, forms the boundary of the Anchorage and is used for all Berthing judgments.



Figure GSD-1: A depiction of an Anchorage (Pool Element).

Beacon – A yellow floating Scoring Element consisting of a yellow body made of two halves. The Beacon contains a radio with a battery which will broadcast a signal to all MARLIN Radio Receiver Modules. Robots can use an official MARLIN Radio Receiver Module to receive the Beacon signal and navigate to the Beacon by moving in the direction where the Beacon strength increases.

The Beacon by default does not have anything tied to the loop on the bottom of the Beacon but Event Partners may choose to have a small weight tied to the bottom of the Beacon via a legal rope tether, to prevent the Beacon from drifting in the water. A legal rope tether is less than 1 meter long, with a rope diameter of less than 8mm, and has a weight tied to the end of the rope with unspecified size and with a maximum weight of 300 grams. The weight is allowed to touch the Pool Floor, but the Beacon body must remain partially above the water.



Figure GSD-2: A depiction of a Beacon body (floating Scoring Element). Tether and weight are not shown.

Berthed (Anchorage) – see rule [<SC5>](#) and [<SG5>](#).

Centerline – The black line running across the center of the Pool. It is centered on the approximate 1.5m midpoint of the approximately 3m length of the Pool Perimeter and has a width of 15mm.

Chained – A Hex Link status. A Hex Link is considered Chained if it is magnetically connected to another Hex Link of the same upwards-facing color as described in rule [<SC3>](#), that is itself directly attached to or Chained on an Alliance Bollard. Chained Hex Links score identically to directly attached Hex Links (1 point each).

Hex Link – A floating hexagonal Scoring Element. There are fifty-six (56) Hex Links in each Match. Hex Links are scored by magnetically attaching them (directly or Chained) to an Alliance Bollard. Each Hex Link has a Red and a Blue piece of foam in its center. For Hex Links to magnetically connect to other Hex Links, their upwards-facing color (i.e., the color of the foam center as visible from above) must be the same, otherwise the geometry of the magnets embedded inside the Hex Links will not produce an attractive magnetic force. Robots may flip Hex Links to a different color during a Match.

Note: The Hex Links are shown to be arranged in a specific pattern in depictions of the Pool in Figure PO-1, PO-2 and PO-3. However, this arrangement is purely stylistic and not critical to gameplay. The Hex Links can start in any physical arrangement without affecting the Match and will not be considered out of tolerance as described in rule [<C4>](#), and hence the Hex Links not matching the depicted arrangement in Figure PO-1, PO-2 and PO-3 will not trigger a Match Replay as detailed in rule [<C12>](#).



Figure GSD-3: A depiction of a Hex Link (floating hexagonal Scoring Elements).

Moorings – A submerged and negatively buoyant Scoring Element located along the Centerline of the Pool. There are three (3) Moorings in each Match. Moorings are scored by placing them in contact with the Pool bottom within the boundary of an Alliance’s Starting Area.

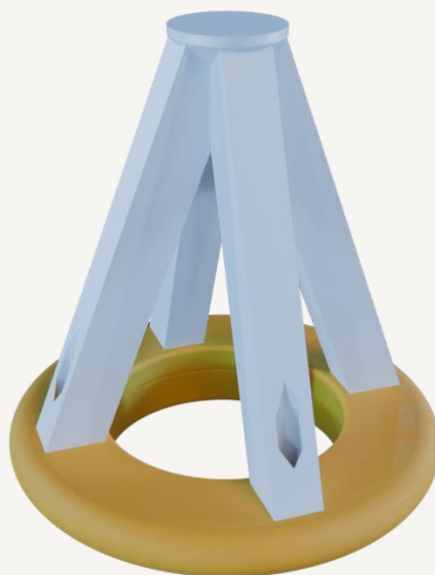


Figure GSD-4: A depiction of a Mooring (submerged Scoring Element).

Scoring Element – A Beacon, Hex Link or a Mooring.



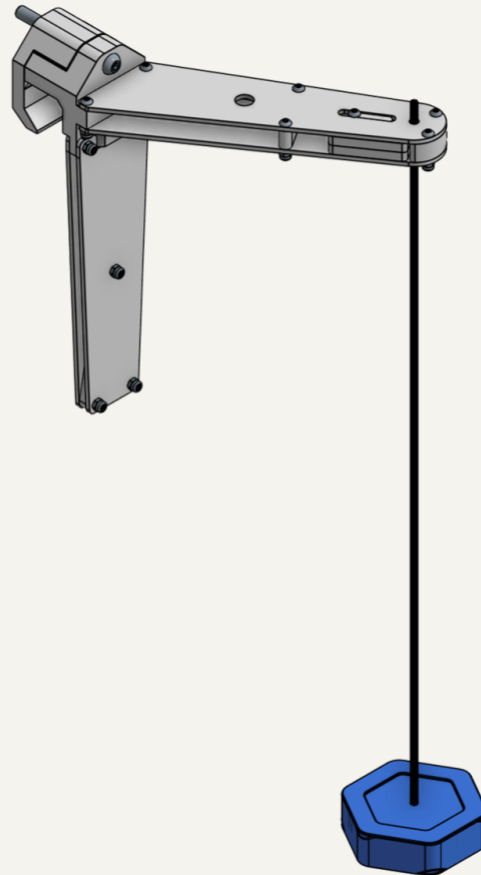
Scored (Hex Link) – see rule [<SC3>](#).

Scored (Mooring) – see rule [<SC4>](#).

Scored (Beacon) – see rule [<SC6>](#).

Starting Area – A 2m × 0.4m rectangular zone along each of the two opposing sides of the Pool nearest to where the two Alliance Stations are located. The 0.4m is measured from the interior Pool Perimeter wall face. The boundary marking is a 15mm wide black line on the Pool Floor. The width of the boundary marking is included in the 0.4m measurement. Robots must start within their Alliance’s Starting Area, defined as not exceeding the outer edge of the Starting Area boundary line on the Pool Floor.

Alliance Bollard – There are four (4) Alliance Bollards located in the corners of the Pool, two (2) per Alliance. Each Alliance Bollard consists of a diving-board shaped structure with a red or blue Hex Link tethered to the top by a thick rope. The red or blue Hex Link is called a Bollard Hex Link, and its color matches the color of the Alliance that the Alliance Bollard belongs to. Hex Links are scored by being directly attached or Chained to the Bollard Hex Link as described in rule [<SC3>](#). The Bollard Hex Link is considered part of the Alliance Bollard and is hence part of a Pool Element and is not a Scoring Element. The Bollard Hex Link is hence not included in the number of Hex Links on the Pool and does not count towards an Alliance’s score and cannot be removed from the Alliance Bollard.



*Figure GSD-5: A depiction of an Alliance Bollard (Pool Element) with a Blue Bollard Hex Link attached by a rope.
This Alliance Bollard belongs to the Blue Alliance.*



Scoring Rules

Scoring Action	Points
Beacon Scored in Starting Area (at the end of the Autonomous Period) – This score only counts towards the Autonomous Bonus as per rule <SC2>.	10 Points
Each Hex Link Scored on an Alliance Bollard (directly or chained)	1 Point
Each Mooring Scored (touching pool bottom in Starting Area)	10 Points
Each Robot Berthed in The Anchorage (at the end of the Autonomous Period) – This score only counts towards the Autonomous Bonus as per rule <SC2>.	3 Points
Each Robot Berthed in The Anchorage (at the end of the Driver Controlled Period)	5 Points

<SC1> All Scoring statuses are evaluated after the Match Period ends. Scores are calculated five (5) seconds after the Match Period ends, or once all Scoring Elements, Pool Elements, and Robots in the pool come to rest, whichever comes first.

- a. This 5-second delay is intended to be the only permitted “benefit of the doubt” for last-second scoring actions. If an element or Robot is still in motion and “too close to call” between two states at the 5-second mark, the less advantageous of the two states should be awarded to the Robot(s) in question.
- b. At the end of the Match Period, the on-screen timer displayed by the Pool Management Software will hold the current Match Period information and “0:00” for 5 seconds before moving to queue the next Match Period. This should be the primary 5-second visual cue used by Teams and Head Referees.
 - a. At the end of the Autonomous Period, the next Match Period will be the Driver Controlled Period of the same Match
 - b. At the end of the Driver Controlled Period, the next Match Period will be the Autonomous Period of the next Match
- c. This 5-second delay is only intended to be a grace period, not an extra 5 seconds of Match time. Robots which are designed to strategically exploit this grace period will receive a Minor Violation, and any post-Match movement will not be included in score calculation.

<SC2> Scoring of the Autonomous Bonus Score is evaluated after the Autonomous Period ends.



- a. Berthing bonuses (3 points per Robot) are added to the Autonomous Bonus Score.
- b. Hex Links scores (1 point per Hex Link scored as per <SC3>) are added to the Autonomous Bonus Score.
- c. Mooring scores (10 Points per Mooring scored as per <SC4>) are added to the Autonomous Bonus Score.
- d. If an Alliance has scored the Beacon in their Starting Area at the end of the Autonomous Period in accordance with <SC6>, that Alliance receives ten (10) points added to their Autonomous Bonus Score.
- e. The Alliance with a higher Autonomous Bonus Score at the end of the Autonomous Period will have the Autonomous Bonus Score added to their final Match Score – unless the Alliance contains a Team which was Disqualified during the Autonomous Period, in accordance with <G11>.
- f. If both Alliances have the same Autonomous Bonus Score at the end of the Autonomous Period (including zero-to-zero ties), both Alliances receive their Autonomous Bonus Scores added to their final Match Score.
- g. All points scored during the Autonomous Period, other than an awarded Autonomous Bonus Score, are voided after the Autonomous Period concludes. However, all Scoring Elements that were Scored remain in their positions entering the Driver Controlled Period.
- h. The rule <SC1> applies here to define the ending of the Autonomous Period.

<SC3> A Hex Link is considered Scored on an Alliance Bollard if it meets the following criteria:

- a. The Hex Link can be Scored by connecting directly to the Alliance Bollard's Bollard Hex Link: it must have the same upward-facing color as the Bollard Hex Link and have one flat face directly magnetically attached to one flat face of the Bollard Hex Link.
- b. The Hex Link is also considered Scored if it is Chained to another Hex Link which is already Scored: it must have the same upward-facing color as the Scored Hex Link and have one flat face directly magnetically attached to one flat face of the Scored Hex Link.
- c. The Hex Link is not in Possession of any Robot.
- d. Each Hex Link can only be counted for points once, even if it is simultaneously scored onto multiple Alliance Bollards, such as if a Chain of Hex Links stretches from one Alliance Bollard to the same Alliance's other Alliance Bollard.

Note: It is not possible to have a Chain which stretches from a Red Alliance Bollard to a Blue Alliance Bollard. Since each Hex Link has either a red or blue upward-facing color, it is not possible for any Hex Link to be Chained to both a Red and a Blue Alliance Bollard.



<SC4> A Mooring is considered Scored if it meets the following criteria:

- The Mooring is resting on the Floor (i.e., not suspended by a Robot, floating, or otherwise elevated above the Pool Floor).
- Any part of the Mooring is in contact with the vertical projection of the outer edge of an Alliance's Starting Area boundary, or the entire Mooring is within the Starting Area.
- The Mooring is not in Possession of any Robot.

Note: *The intent of this rule is to reward Teams that successfully retrieve submerged Moorings and transport them to their Starting Area without requiring millimeter-precise placement. A Mooring that has been dropped near the Starting Area and slid partially outside still counts, so long as it maintains contact with the boundary and is resting on the pool bottom.*

<SC5> Berthing criteria. A Robot is considered Berthed if it meets the following criteria at the time of evaluation:

- All parts of the Robot which are above water level are within the vertical projection of the outer edge of the Anchorage's white base.
- In Qualifications Matches, the Anchorage has a maximum capacity of three (3) Robots. In Eliminations Matches, the Anchorage has a maximum capacity of one (1) Robot. See rule [<SG5>](#).
- Berthing is evaluated at the end of each Match Period after the 5-second delay detailed in [<SC1>](#): three (3) points per Robot at the end of the Autonomous Period, which count only towards the Autonomous Bonus Score in accordance with [<SC2>](#), and five (5) points per Robot at the end of the Driver Controlled Period, which count towards the Match Score.

The "vertical projection" means that a Robot floating on the surface must be entirely within the vertical projection of the outer edge of the Anchorage's white base as viewed from directly above. Submerged portions of the Robot that extend slightly beyond the boundary due to hull shape are acceptable, provided the part of the Robot above the waterline is fully contained.

<SC6> A Beacon is considered Scored in a Starting Area if the Beacon body is partially or fully within the volume of the Starting Area, produced by the vertical projection of the shaded region of the Starting Area demarcated on the Pool Perimeter floor, including the 15mm wide black boundary of the Starting Area. For the purposes of this rule, the Beacon only includes the body of the Beacon and does not include the tether or the weight that is tethered to the Beacon body. The Beacon contributes ten (10) points to the Autonomous Bonus Score of the Alliance which successfully scores



the Beacon in their Starting Area. The Beacon contributes zero (0) points to the score of the Driver Controlled Period.

Safety Rules

<S1> Play things safe. If at any time the Robot operation or Team actions are deemed unsafe or have damaged another Robot, Pool Element, Scoring Element, or the Pool Perimeter, the offending Team may receive a Disablement and/or Disqualification at the discretion of the Head Referee. The Robot will require re-inspection as described in rule **<R3>** before it may enter the Pool again.

Violation Notes: Major **<S1>** Violations should be reported to and/or discussed with the Event Partner during the event.

<S2> Participants must be accompanied by a responsible Adult. No Student may attend a MARLIN Robotics Competition event without a responsible Adult supervising them. The Adult must obey all rules and be present for the full duration of the event in case of an emergency. Violations of this rule may result in removal from the event.

<S3> Water safety equipment must be accessible. Appropriate water safety equipment (e.g., reaching poles, life rings) must always be available and accessible during competition. Event Partners are responsible for ensuring compliance with local pool safety regulations. Drive Team Member footwear requirements are specified in **<G7>**.



General Game Rules

<G1> Treat everyone with respect. All Teams are expected to conduct themselves in a respectful and professional manner while competing in MARLIN Robotics Competition events. If a Team or any of its members (Students or any Adults associated with the Team) are disrespectful or uncivil to event staff, volunteers, or fellow competitors, they may receive a Disqualification from a current or upcoming Match. Team conduct pertaining to **<G1>** may also impact a Team's eligibility for judged awards. Repeated or extreme violations of **<G1>** could result in a Team being Disqualified from an entire event, depending on the severity of the situation.

Violation Notes: Any Violation of **<G1>** may be considered Major Violations and should be addressed on a case-by-case basis. Teams at risk of a Major **<G1>** Violation due to multiple disrespectful or uncivil behaviors will usually receive a "final warning," although the Head Referee is not required to provide one.

<G2> MARLIN Robotics is a student-centered program. Adults should not make decisions about the Robot's build, design, or gameplay, and should not provide an unfair advantage by providing 'help' that is beyond the Students' independent abilities. Students must be prepared to demonstrate an active understanding of their Robot's design, construction, and programming to judges or event staff.

Some amount of Adult mentorship, teaching, and/or guidance is an expected and encouraged facet of MARLIN Robotics competitions. No one is born an expert in maritime robotics! However, obstacles should always be viewed as teaching opportunities, not problems for an Adult to solve for the Team.

Violation Notes: Potential Violations of this rule will be reviewed on a case-by-case basis. By definition, all Violations of this rule become Match Affecting as soon as a Robot which was built or coded by an Adult wins a Match.

<G3> Use common sense. When reading and applying the various rules in this document, please remember that common sense always applies in the MARLIN Robotics Competition.

For example: if there is an obvious typographical error, this does not mean the error should be taken literally. Understand the realities of the MARLIN Robotics construction system. In general, Teams will be given the "benefit of the doubt" in the case of accidental or edge-case rules infractions. However, there is a limit to this allowance, and repeated or strategic infractions will still be penalized. This rule also applies to Robot rules. If a component's legality cannot be



easily/intuitively discerned by the Robot rules as written, then Teams should expect additional scrutiny during inspection.

<G4> The Robot must represent the skill level of the Team. Each Team must include Drive Team Members, Coder(s), Designer(s), and Builder(s). No Student may fulfill any of these roles for more than one MARLIN Robotics Competition Team in each competition season. Students may have more than one role on the Team.

<G5> Keep your Robot together. Robots may not intentionally detach parts during the Match or leave mechanisms in the pool.

Note: *Parts which become detached unintentionally are a Minor Violation, are no longer considered “part of a Robot,” and should be ignored for the purposes of any rules which involve Robot contact or location (e.g., Scoring) or Robot size.*

Violation Notes: *Major Violations of this rule should be rare, as Robots should never be designed to intentionally violate it. Minor Violations are usually due to Robots being damaged during gameplay, such as a mechanism breaking loose from wake or contact.*

<G6> Don’t clamp your Robot to the Pool. Robots may not intentionally grasp, grapple, or attach to any Pool Elements, including the Pool Perimeter, Anchorage Posts, and Alliance Bollards. Strategies with mechanisms that react against multiple sides of a Pool Element in an effort to latch or clamp onto said Pool Element are prohibited. The intent of this rule is to prevent Teams from both unintentionally damaging the Pool and/or from anchoring themselves to the Pool with methods other than via passive floating or powered propulsion.

<G7> Only Drive Team Members, and only in the Alliance Station. During a Match, each Team may have up to two (2) Drive Team Members in their Alliance Station, and all Drive Team Members must remain in their Alliance Station for the duration of the Match.

- a. Drive Team Members are prohibited from bringing/using any sort of communication devices into the Alliance Station. Non-headphone devices with communication features turned off (e.g., a phone in airplane mode) are allowed. Pool Laptops and Team Laptops are not considered communication devices for the purposes of this rule.
- b. Standing on any sort of object during a Match, regardless of whether the Pool is on the floor or elevated, is prohibited.



- c. Bringing/using additional materials to simplify the game challenge during a Match is prohibited.
- d. To ensure that Drive Team Members are aware of verbal calls or warnings during a Match, powered headphones, earbuds, and passive earpieces connected to electronic devices cannot be worn/used in the Alliance Station except as required by an officially approved accommodation request.
- e. Drive Team Members must wear closed-toe, non-slip footwear while in the Alliance Station for the duration of the Match. Bare feet, sandals, flip-flops, and any open-toe or open-heel footwear are not permitted. A Drive Team Member who is not wearing compliant footwear will be asked to leave the Alliance Station, and the Match will not be delayed to accommodate them.

<G8> Hands out of the pool. Drive Team Members are prohibited from making intentional contact with any Scoring Elements, Pool Elements, or Robots during a Match, apart from the contact specified in the sub-rule (a) described below.

- a. During the Autonomous or Driver Controlled Period, Drive Team Members may not touch their own Robot, except when directed to do so by the Head Referee.
- b. Drive Team Members are not permitted to break the vertical plane of the Pool Perimeter at any time during the Match, apart from the contact permitted in sub-rule (a).

Note: No exceptions are granted for Drive Team Members to request permission to contact or touch their Robot during a Match, including but not limited to: allowing Teams to turn a robot on if they forgot to turn it on, mount an actuator that they forgot to mount, upload code that they forgot to upload, or plug in a battery, motor or sensor that they forgot to plug in.

Teams are expected to have their Robot ready before placing the Robot into the Pool and the Match starting, including but not limited to ensuring that the Robot has the correct code uploaded to it, has a functioning and charged battery plugged into the Robot Brain, the Robot Brain is sealed correctly to prevent water ingress, all motors and sensors are plugged into the Robot Brain, and the Robot is ready to play the game.

<G9> Controllers must stay connected to the Pool. Prior to the beginning of each Match, Drive Team Members must connect their controllers to their Team Laptop, which must in turn remain connected to the Pool Laptop. The controller's USB cable must remain plugged in for the duration of the Match and may not be removed until the "all-clear" has been given for Drive Team Members to retrieve their Robots.



<G10> Autonomous means “no humans”. During the Autonomous Period, Drive Team Members are not permitted to interact with the Robots in any way, directly or indirectly, except where allowed for by rule [<G8>](#). This could include, but is not limited to:

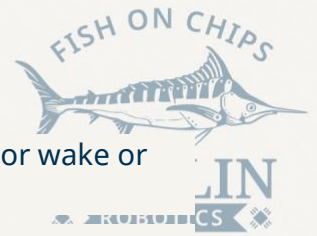
- Activating any controls on their Controllers
- Unplugging or otherwise manually interfering with the Pool connection in any way
- Manually triggering sensors in any way, even without touching them

<G11> All rules still apply in the Autonomous Period. Teams are responsible for the actions of their Robot at all times, including during the Autonomous Period. Any Disqualifications during the Autonomous period will result in the Autonomous Bonus being awarded to the other Alliance. If both Alliances are disqualified (mutual DQ) during the Autonomous Period, no Autonomous Bonus will be awarded.

Violation Notes: *In general, Minor Violations of rules that occur during the Autonomous Period should only affect the outcome of the Autonomous Period (i.e., the Alliance can't win the Autonomous Bonus) and should not be considered when determining whether a Violation has been repeated during the event. If a Head Referee determines that a Violation during the Autonomous Period was intentional/strategic rather than accidental/situational, they should be recorded as Minor or Major Violations and considered when determining whether a Violation has been repeated during the event.*

<G12> Don't destroy other Robots. But, be prepared to encounter defense. Strategies aimed solely at the destruction, damage, capsizing, or Entanglement of opposing Robots are not part of the ethos of the MARLIN Robotics Competition and are not allowed.

- a. MARLIN Robotics is intended to be an offensive game. Teams that partake in solely defensive or destructive strategies will not have the protections implied by [<G12>](#) (see [<G13>](#)). However, defensive play which does not involve destructive or illegal strategies is still within the spirit of this rule.
- b. MARLIN Robotics is also intended to be an interactive game. Some incidental contact, wake disruption, and water disturbance may occur as a part of normal gameplay without Violation. It will be up to the Head Referee's discretion whether the interaction was incidental or intentional.
- c. A Team is responsible for the actions of its Robot at all times, including the Autonomous Period. This applies both to Teams that are driving recklessly and potentially causing damage, and to Teams that have an unstable hull design. A Team should design its Robot such that it is not easily capsized or damaged by



external forces from other Robots, including but not limited to minor wake or contact.

Violation Notes: Major Violations of this rule are not required to be Match Affecting. Intentional and/or egregious capsizing, Entanglement, or damage may be considered a Major Violation at the Head Referee's discretion. Repeated Violations within a Match or competition could be considered a Violation of <G1> and/or <S1> at the Head Referee's discretion.

<G13> Offensive Robots get the “benefit of the doubt.” In a case where Head Referees are forced to make a judgment call regarding a destructive interaction between a defensive and offensive Robot, or an interaction which results in a questionable Violation, referees will decide in favor of the offensive Robot.

<G14> You can't force an opponent into a penalty. Intentional strategies that cause an opponent to break a rule are not permitted and will not result in a Violation for the opposing Team.

Violation Notes: In most cases, if a Team causes their opponent to break a rule, the Head Referee will simply not enforce the penalty on that opponent, and it will be considered a Minor Violation for the guilty Team. However, if the forced situation becomes Match Affecting in favor of the guilty Team, it will be considered a Major Violation.

<G15> No Holding for more than a 5-second count. A Robot may not Hold an opposing Robot for more than a 5-second count.

For the purposes of this rule, a “count” is defined as an interval of time that is approximately one second in duration, and “counted-out” by Head Referees verbally. A Holding Count should begin immediately once the Head Referee observes a suspected Holding interaction. A Robot is considered to be Holding if it meets any of the following criteria during a Match:

- a. **Trapping:** Limiting the movement of an opponent Robot to a small or confined area of the Pool, approximately 60cm by 60cm or less, without an avenue for escape. Note that if a Robot is not attempting to escape, it is not considered Trapped.
- b. **Pinning:** Preventing the movement of an opponent Robot through contact with the Pool Perimeter, a Pool Element, Scoring Elements or another Robot.
- c. **Lifting:** Controlling an opponent's movements by raising the opponent's Robot upwards such that the opponent Robot's thrusters no longer contact water.



A Holding count should end when at least one of the following conditions is met:

- The two Robots are separated by at least 60cm
- Either Robot has moved at least 60cm from where the Holding began. In the case of Lifting, this location is measured from where the Lifted Robot is released, not from where the Lifting began.
- The Holding Robot becomes Held by a different Robot.
- In the case of Trapping, if an avenue of escape becomes available due to changing circumstances in the Match.

After a Holding count ends, a Robot may not resume Holding the same Robot again for another 5-count. If a Team resumes Holding the same Robot within that 5-count, the original count will resume from where it ended.

<G16> Use Scoring Elements to play the game. Scoring Elements may not be used to accomplish actions that would be otherwise illegal if they were attempted by Robot mechanisms. Examples include but are not limited to: using a Scoring Element to push and capsize an opponent Robot (violation of rules [<G12>](#) and [<G17>](#)) or using Scoring Elements to react against multiple sides of a Pool Element to anchor the Robot in place (violation of rule [<G6>](#)).

The intent of this rule is to prohibit Teams from using the Beacon, Hex Links and Moorings as “gloves” to loophole any rule that states “a Robot may not [do some action].” This rule is not intended to be taken in its most extreme literal interpretation. If a rule is Violated using a Scoring Element instead of a Robot mechanism, it should be evaluated as though the rule in question had been Violated by a Robot mechanism.

<G17> Capsizing. Robots must be designed to be difficult to capsize and should be able to right themselves if they are tipped over. Accidentally capsizing an opponent Robot while legitimately attempting to score is a Minor Violation. Purposefully capsizing an opponent Robot is a Defensive action and may escalate to a Major Violation and Disqualification. See [<G12>](#), [<G13>](#) and [<G15>](#).

Robots may not be manually recovered from a capsized state. Team members may not reach into the Pool to flip, right, or otherwise reposition a capsized Robot (see [<G8>](#)). A Robot that capsizes and cannot right itself will remain capsized for the remainder of the Match.

Violation Notes: *Accidental capsizing of an opponent Robot during a legitimate scoring attempt is usually a Minor Violation. Intentional or repeated capsizing of an opponent Robot is a Defensive action and will be ruled a Major Violation, resulting in Disqualification, at the Head Referee’s discretion.*



Specific Game Rules

<SG1> Starting a Match. Prior to the start of each Match, each Robot must be smaller than the starting horizontal footprint and starting height specified in rule **<R4>**. Additionally,

- a. Robots must not be contacting any Scoring Elements at the start of the Match.
- b. Robots must not be contacting any other Robots at the start of the Match.
- c. Robots must be completely stationary (i.e., no motors, thrusters, or other mechanisms in motion).
- d. Robots must be floating and self-supporting in the water (not resting on the pool floor or held in place by a Team member).
- e. Floating within their Alliance's Starting Area (2m × 0.4m zone along their edge of the pool).

Violation Notes: Any Violation of this rule will result in the Robot being removed from the pool prior to the start of the Match, and in accordance with rule **<R3>**, the Robot will not be able to participate in a Match until the situation is corrected.

<SG2> Height above water is limited. Robots may not exceed 500mm in height above the waterline at any time during the Match. This vertical limit is measured from the water surface to the highest point of the Robot. There is no restriction on horizontal expansion of any kind: once the Match begins, a Robot may expand to any horizontal footprint. However, no part of a Robot may extend beyond the Pool at any time, defined as the volume enclosed by the vertical projection of the Pool Perimeter walls.

The intent of this rule is twofold: (1) to prevent Robots from gaining an unfair mechanical advantage through excessive vertical reach, and (2) to promote safe hull design by discouraging high centers of gravity that increase capsizing risk. Teams should design low-profile, stable hulls that prioritize a center of gravity well below the metacentric height for safe operation on the water surface.

<SG3> Keep Scoring Elements and Pool Elements in the Pool. Teams may not remove Scoring Elements or Pool Elements from within the Pool Perimeter. Any Scoring Element or Pool Element that leaves the Pool Perimeter during Match play will be returned to the Pool by a referee as soon as possible, to the same place on the Pool that it occupied before it was removed.

Violation Notes: Removing a Scoring Element or Pool Element from the Pool is a Minor Violation. The referee will return the escaped element to the same place on the



Pool that it occupied before it was removed. Repeated or strategic removal may escalate to a Major Violation at the Head Referee's discretion.

<SG4> De-scoring is allowed. Teams may remove opponent Hex Links from opponent Alliance Bollards and may retrieve Moorings from the opponent's Starting Area. Teams may also remove the Beacon from the opponent's Starting Area (However, the Beacon only contributes to Autonomous Bonus Scores and does not contribute to final Match Scores in the Driver Controlled Period, so there is no gameplay incentive for Teams to de-score the Beacon in the Driver Controlled Period).

The intent of this rule is to create a dynamic, interactive game where scored positions are not permanent. Teams should design defensive and recovery strategies accordingly.

<SG5> Anchorage capacity is limited. In Qualifications Matches, the Anchorage has a maximum capacity of three (3) Berthed Robots. If more than three (3) Robots satisfy the conditions for Berthed status at the time of evaluation, no Berthing bonus will be awarded to any Robot. In Eliminations Matches, the Anchorage has a maximum capacity of one (1) Robot. If more than one (1) Robot satisfies the conditions for Berthed status at the time of evaluation, no Berthing bonus will be awarded to any Robot.

This rule is intended to create an interesting endgame dynamic: with more Robots in the Pool than there are Berthing slots, at least one Robot must be excluded. Teams may choose to contest the Anchorage defensively, attempt to push opponents out, or focus on last-second scoring instead.

<SG6> Robots may never be fully submerged. At all times during a Match, at least some portion of the Robot must remain above the water surface; a Robot may never be entirely underwater. There is no minimum portion, area, or fraction of the Robot that must remain above the surface — it is sufficient that any part of the Robot breaks the surface. Robots may not be designed to submerge completely, and no part of a Robot may rest on or be supported by the Pool Floor. Mechanisms that dip below the waterline (e.g., for retrieving Moorings) are permitted.

The intent of this rule is to ensure that MARLIN Robotics is a surface vehicle competition. Robots that are designed to operate as submarines or fully submerged vehicles are not within the spirit of the competition.



SECTION 3

THE ROBOT

Overview

This section provides rules and requirements for the design and construction of your Robot. A MARLIN Robotics Robot is a remotely operated and/or autonomous unmanned surface vehicle (USV) designed and built by a registered MARLIN Robotics Competition Team to perform specific tasks on the water surface.

There are specific rules and limitations that apply to the design and construction of your Robot. Please ensure that you are familiar with these Robot rules before beginning your Robot design. These “inspection rules” are verified prior to the beginning of each event, in a formal Robot inspection.

Inspection rules are “pass/fail”; there are no Major or Minor Violations, only Violations. The penalty for all Violations is the same, as outlined in [<R3>](#).

Inspection Rules

<R1> One Robot per Team. Each Team will field one (1) Robot in each Match. The Robot must be designed, built, and programmed by members of the Team.

- a. Teams may not switch between more than one (1) Robot designs during a competition. If a Robot requires repair, the existing Robot must be repaired rather than replaced with a second design.
- b. Multiple Teams may not use the same Robot. Once a Robot has competed under a given Team number at an event, no other Teams may compete with it.

<R2> Robots must represent the Team’s skill level. The Robot must be designed, built, and programmed by members of the Team. Adults are expected to mentor and teach design, building, and programming skills to the Students on the Team, but may not design, build, or program that Team’s Robot.

<R3> Robots must pass inspection. Every Robot will be required to pass a full inspection before being cleared to compete. This inspection will ensure that all Robot rules and regulations are met. Noncompliance with any Robot design or construction rule will result in removal from Matches or Disqualification of the Robot at an event until the Robot is brought back into compliance.



- a. If a Robot does not pass initial inspection, the Team will be given time to make corrections and re-inspect.
- b. A Robot that passes inspection but is later found to be in Violation of a construction rule during a Match may be required to re-inspect before competing again.
- c. Robots must pass a waterproofing inspection: all electronic components must be sealed against water intrusion, and battery compartments must be verified as watertight.
- d. Inspectors and the Head Referee have final authority on all inspection decisions and on the legality of any Robot, component, Fabricated Part, or material. If the legality of any aspect of a Robot cannot be clearly determined from these rules, the inspector's or Head Referee's decision is final.
- e. The burden of proof for demonstrating that a Robot and all of its components are legal rests with the Team, not with the inspectors or the Head Referee. Any part whose legality cannot be demonstrated to the satisfaction of the inspector may be ruled illegal.
- f. Passing inspection does not guarantee that a Robot will be considered legal for the remainder of the event. A Robot may be re-inspected at any time, and may be found in Violation of a rule even after passing an earlier inspection.

<R4> Robots must fit within a 300mm × 500mm footprint and not exceed a height of 250mm above the waterline at the start of the Match. At the beginning of a Match, each Robot must fit within a 300mm × 500mm rectangular horizontal footprint. The Robot's starting height must be less than or equal to 250mm high, measured from the waterline to the highest point of the Robot when the Robot is floating in the Pool.

<R5> Robots may not exceed 500mm in height above the waterline. At all times during a Match, no part of the Robot may extend more than 500mm above the water surface. See [<SG2>](#).

This rule exists both for gameplay balance and safety. A high center of gravity in a floating vessel significantly increases capsizing risk. Teams are encouraged to design low-profile hulls with most of their mass at or below the waterline. Refer to basic naval architecture principles: a Robot's center of gravity should be below its metacentric height for stable operation.

<R6> All electronics must be from MARLIN Robotics. All electronic components on the Robot must be official and unmodified MARLIN Robotics parts unless otherwise specifically noted within these rules. Teams are responsible for providing documentation regarding a part's legality in the event of a question. Examples of documentation include receipts, part numbers, or other printed evidence. The definition of electronic components includes, but is not limited to: Robot brains,



microcontrollers, microprocessors, motors, thrusters, servos, sensors, radio receivers, and any other electronically powered or signal-carrying components. No non-MARLIN Robotics electronic components are permitted.

- a. A Robot may use at most one (1) Robot Brain and one (1) Robot Battery. No additional processors, microcontrollers, or power sources of any kind are permitted.
- b. This rule applies to all electronic components regardless of function (actuation, sensing, power distribution, communication, decoration etc.).
- c. Passive electronic components (e.g., resistors, capacitors) that are integrated into a MARLIN Robotics-approved circuit are considered part of that MARLIN Robotics component and are permitted.
- d. Custom cable harnesses using standard connectors are permitted, provided they only connect MARLIN Robotics components to other MARLIN Robotics components. A cable harness must be electrically inert: it may only carry existing power and signals between MARLIN Robotics components, and may not enhance, add to, or otherwise alter electrical function in any way — this includes adding power, splitting one harness into multiple harnesses, and breaking out additional ports. No unofficial electronics other than such cable harnesses are permitted.
- e. Custom cable harnesses are used entirely at the Team's own risk. MARLIN Robotics is not responsible for damage to any Robot electronics resulting from the use of custom cable harnesses.

Violation Notes: Any Robot found to be using modified MARLIN Robotics electronic components or non-MARLIN Robotics electronic components will fail inspection and will not be permitted to compete until the offending components are removed.



Component	Description	Intended Usage
1. Robot Battery	7.4V nominal, 3000mAh 50C 2s Lithium-Polymer Battery, with XT60 Power Connector and JST-XH 2.54P Balance Charging Connector.	Powers the Brain.
2. Robot Brain	Eight (8) Motor Ports, allowing up to eight (8) Thruster Modules or Servomotor Modules to be connected to the Brain. Six (6) Sensor Ports, allowing up to six (6) Inertial Sensor Modules or Radio Receiver Modules to be connected to the Brain. Connects to the Robot Controller with Bluetooth.	Communicates and connects with all other MARLIN electronics and executes the low-level commands it receives from the Team Laptop via the Robot Controller. All Team software and computation runs on the Team Laptop, not on the Robot Brain. Distributes battery power to all connected MARLIN electronics.
3. Thruster Module	Comes in Clockwise or Counter-Clockwise variants. Connects to a Motor Port on the Robot Brain.	Used to propel the Robot around the Pool.
4. Servomotor Module	180-degree absolute position angle-controlled servomotor. Absolute position means that the position of the servomotor persists regardless of whether there is power to the servomotor. Connects to a Motor Port on the Robot Brain.	Used to control mechanisms on the Robot which Teams may design to play the game.
5. Robot Controller	Connects to the Robot Brain with Bluetooth. Connects to the Team Laptop with USB.	Relays commands from the Team Laptop to the Robot Brain, and sends Drive Team Member inputs back to the Team Laptop. Used to control the Robot during the Driver Controlled Period.
6. Inertial Sensor Module	9-axis inertial measurement unit (IMU) module. Connects to the Robot Brain using one of the Robot Brain's Sensor Ports.	Used for navigation of the Robot. It contains a magnetometer, accelerometer and gyroscope, allowing for



		determination of linear and angular motion.
7. Radio Receiver Module	Radio Receiver Module, capable of receiving data from official MARLIN radio products. In Link Lockdown, the only MARLIN radio product capable of communicating to the Radio Receiver Module is the Beacon.	Can receive radio signals. Can be used to navigate towards the Beacon, since the Beacon emits radio signals.
8. Team Laptop	Not official MARLIN Robotics hardware, and not part of any Robot. An ordinary laptop, provided by the Team, running the official MARLIN VSCode Extension. Connects to the Team's Robot Controller by USB and connects via Wifi to the Pool Laptop.	Runs the Team's Python code and performs all computation and logic for the Robot. The Robot is a thin client that only executes commands sent from the Team Laptop.
9. Pool Laptop	Not official MARLIN Robotics hardware, and not part of any Robot. An ordinary laptop dedicated to each Pool at the competition; Each Team participating in a Match must connect their Team Laptops to the Pool Laptop of the Pool that the Match is played in.	Coordinates the Match for its Pool, including Match timing and the Autonomous and Driver Controlled Periods.

More information on each component can be found in Appendix A.



Control architecture. MARLIN Robotics uses a thin-client control architecture. All of a Team's software, computation, and decision-making runs on the Team Laptop (via the MARLIN VSCode Extension), never on the Robot itself. During a Match, the Robot Controller sends its inputs to the Team Laptop over its USB cable; the Team Laptop runs the Team's code to decide what the Robot should do, and sends the resulting commands back through the Robot Controller, which relays them to the Robot Brain over Bluetooth. The Robot is therefore a thin client: it only executes the commands it receives and performs no student logic or computation of its own. Each Team Laptop also connects to the Pool Laptop, a single laptop dedicated to each Pool that coordinates Match timing and the Autonomous and Driver Controlled Periods. Team Laptops and the Pool Laptop are not official MARLIN Robotics hardware and are not part of the Robot; they are not subject to the Robot electronics rules in this section.

<R7> MARLIN Robotics batteries only; no modifications permitted. All Robots must use official MARLIN Robotics batteries. Batteries are provided in factory-sealed jackets. No modifications to the batteries or their jackets are permitted. This includes but is not limited to: opening the battery jacket, adding or removing cells, modifying the charging circuit, or attaching external power sources.

- a. Teams are responsible for ensuring that the battery jacket seal is intact before each Match. A battery with a compromised seal is a safety risk and will fail inspection.
- b. Batteries must be charged only with MARLIN Robotics-approved chargers.
- c. Damaged or swollen batteries must be immediately removed from service and reported to event staff.

Violation Notes: Any modification to a MARLIN Robotics battery or its waterproof jacket will result in immediate failure of inspection. Competing with a modified battery is a serious safety concern and may result in the Team being barred from participating in the event at the Head Referee's discretion.

<R8> Structural and mechanical components may be official MARLIN parts, custom-fabricated parts made by the Team, or commercially available springs, fasteners, O-rings and bearings. Teams may only build their robots from the following materials:

- a. Official MARLIN structural parts
- b. Fabricated Parts made by the Team
- c. Commercially Available springs, fasteners, O-rings and bearings.

For the purposes of this rule:



- a. A “spring” is any device used for storing and releasing elastic potential energy, including but not limited to compression, tension, torsion, constant force or conical springs made from spring steel, springs made from elastic thread or rubber such as surgical tubing, bungee cords or stretchable braided tape, or unmodified closed-loop (pneumatic) gas shocks.
- b. A “fastener” is any device used to fasten multiple parts together, such as but not limited to screws, nuts, rivets, heat set inserts, hinges, pins, rod ends, threaded rods, hose clamps, ancillary fastener accessories such as washers or spaces, adhesives such as epoxy, glue or tape (only when used to join together two parts).
- c. A “bearing” is any part that supports external loads, reduces friction, and improves efficiency by facilitating smooth dynamic motion between components, including parts supporting rotational motion such as radial bearings, roller bearings, thrust bearings, needle bearings, one-way bearings, bushings etc, or parts supporting linear motion such as linear bearings, linear slides, drawer slides etc.
- d. An “O-ring” is any device made of a compliant or “squishy” material, which is compressed between two mating surfaces to form a watertight seal. Examples include but are not limited to: Silicone O-rings, rubber O-rings, rubber gaskets.

<R9> Robots must be waterproof and safe for pool use. All Robots must be designed such that no electronic components, batteries, or potentially hazardous materials can contact or be released into the pool water during normal operation or in the event of a collision.

- a. All electrical connections must be insulated and waterproofed.
- b. Robots must not have sharp edges, exposed metal points, or other features that could cause injury or damage to other Robots.
- c. Robots should not use lubricants, paints, or adhesives that could contaminate pool water.
- d. Robots should not use materials that corrode, dissolve or leach chemicals into Pool water.
- e. Robots must not release any debris, fluids, or particulate matter into the pool during normal operation.
- f. If a Robot begins leaking during a Match or is otherwise deemed unsafe, the Head Referee will issue a Disqualification to protect the Pool and other Robots.



Violation Notes: Robots that violate this rule will receive an immediate Disqualification. Unwanted contamination of the Pool is considered a hazard and if the Team cannot prevent the problem from occurring, the Team may be barred from participating in the event at the Head Referee's discretion.

It is up to the Referees to determine whether a material is legal.

<R10> Robots must have legal Identification Flags. All Robots in the Pool must have designated Identification Flags which display the Team Number.

- a. The Flag must either have a red or blue background, corresponding to the Team's color during the Match.
- b. The Flag must be at least 50mm tall and 100mm wide.
- c. There must always be at least two Flags on the Robot above water level. The Flags must be visually unobstructed by other parts of the Robot and must face in opposite directions. Flags should not be faced vertically.
- d. The Team Number must be written on the Flag with numbers and capitalized letters which are at least 40mm tall, with a line thickness of at least 2mm.

<R11> Robots must be a single Robot. Each Team fields one (1) Robot, which must be a single, unified object. Robots may not be designed to split, separate, or break apart into two or more independent objects, and must remain together for the entirety of the Match. See [<G5>](#).

<R12> Robots must not resemble Scoring Elements or Pool Elements. Robots may not be designed, shaped, colored, or decorated in a way that causes them to closely resemble a Hex Link, Mooring, Beacon, Anchorage, Alliance Bollard, or any other Scoring Element or Pool Element. The intent of this rule is to prevent Robots from confusing opponents, referees, or the scoring process by imitating a Scoring Element or Pool Element.



SECTION 4

THE COMPETITION

Overview

The MARLIN Robotics Competition consists of Qualifications Matches and Eliminations Matches. This section describes how Qualifications Matches and Eliminations Matches are to be played at a given event.

Awards may be given to top Teams, as applicable. Awards may also be given for overall performance in the criteria judged.

Competition Rules

<C1> Head Referees have ultimate and final authority on all gameplay and Robot ruling decisions during the competition. Some parts of the Game Manual may be up to interpretation or be misunderstood by Teams. During the Competition, the Head Referee has the final say on interpretation of game rules.

- a. Once the Head Referee has made their decision on game rule interpretation, the Head Referee's decision is final.
- b. Scorekeeper Referees score the Match and may serve as observers or advisers for Head Referees but may not determine any Violations directly.
- c. Every Qualification Match and Elimination Match must be watched by a Head Referee. A Head Referee may only watch one Match at a time; if multiple Matches are happening simultaneously on separate Pools, each Pool must have its own Head Referee. Head Referees must follow the rules in this game manual and must make rulings consistent with the intent of the game manual.
- d. A Head Referee must be available at the event to explain a rule, Disqualification, Violation, or other penalty to Teams in Matches as needed in support of the Scorekeeper Referees at Pools.

Note: The rules contained in this Game Manual are written to be enforced by human Head Referees. Many rules have "black-and-white" criteria that can be easily checked. However, some rulings will rely on a judgement call from this human Head Referee. In these cases, Head Referees will make their calls based on what they and the Scorekeeper Referees saw, what guidance is provided by the Game Manual, and the context of the match in question. The MARLIN Robotics Competition does not have video replay, the Pools do not have absolute sensors to count scores, and the events do not have the resources for an extensive review conference between each Match. When an ambiguous rule results in a controversial call, the Head Referee's discretion



is what the game designers consider the “right” call. The game is designed and the rules are written with this expectation in mind.

It is normal for Teams to wish to seek clarifications regarding game rule interpretations. At the Head Referee’s discretion, there may be a period of time at the start of the Competition before Matches begin, organized by the Head Referee, where Teams have the opportunity to clarify what the Head Referee considers to be legal, especially for game rules where Teams have identified unclear interpretations or “grey areas”.

<C2> Drive Team Members are permitted to immediately appeal a Head Referee’s ruling. If Drive Team Members wish to dispute a score or ruling, they must stay in the Alliance Station until the Head Referee from the Match talks with them. The Head Referee may then choose to meet with the Drive Team Members at another location and/or at a later time so that the Head Referee has time to reference materials or resources to help with the decision. Once the Head Referee announces that their decision has been made final, the issue is over and no more appeals may be made (See rule **<C1>**); failure to accept this final decision may be considered a Violation. There is no system or opportunity for an appeal of the Head Referee’s final decision, either at or after the event.

- a. Referees and Drive Team Members are not permitted to review any photo or video Match recordings when determining a score or ruling.
- b. Head Referees are the only individuals permitted to explain a rule, Disqualification, Violation, or other penalty to the Teams in a Head-to-Head Match. Teams should never consult other Pool personnel, including Scorekeeper Referees, regarding a ruling clarification.

Communication and conflict resolution skills are an important life skill for Students to practice and learn. In the MARLIN Robotics Competition, we expect Students to practice proper conflict resolution using the proper chain of command. Violations of this rule may be considered a Violation of **<G1>**.

<C3> The Event Partner has ultimate authority regarding all non-gameplay decisions during an event. The Game Manual is intended to provide a set of rules for successfully playing MARLIN Link Lockdown; it is not intended to be an exhaustive compilation of guidelines for running a MARLIN Robotics Competition event. Rules such as, but not limited to, the following examples are at the discretion of the Event Partner and should be treated with the same respect as the Game Manual.



- » Venue access
- » Pit spaces
- » Health and safety
- » Team registration and/or competition eligibility
- » Team conduct away from competition Pools

Note: This rule exists alongside [<G1>](#), [<S1>](#) and [<G3>](#).

<C4> Be prepared for minor Pool variance. Positions and rotations of Pool Elements and Scoring Elements may vary from specified locations/dimensions; Teams are encouraged to design their Robots accordingly. Please make sure to check Appendix A for more specific nominal dimensions of Pool Elements and Scoring Elements.

- a. Pool Element tolerances may vary from nominal by up to $\pm 25\text{mm}$, with exception of the Pool Perimeter, which may vary from nominal by up to $\pm 150\text{mm}$.
- b. Scoring Element position at the beginning of the Match may vary from nominal up to $\pm 50\text{mm}$. Note that Hex Links and Beacons have no position requirements and can be placed completely randomly.
- c. The rotation of Scoring Elements is not specified.
- d. The rotation of Pool Elements may vary from nominal by up to ± 45 degrees.
- e. Pools are to be filled to a depth of 500mm, and filled depth may vary from nominal up to $\pm 10\text{mm}$.
- f. If a Scoring Element or Pool Element is within tolerance, it should not be adjusted before the Match.

Event Partners store and transport Pools between events, and the individuals setting up the Pool at one event may differ from those at the next. While every effort will be made to ensure minimal variance, Teams should expect that any Pool may be slightly different than another and prepare accordingly. Just because something works on one Pool does not fully guarantee it will work on the next and is not enough evidence alone to determine if a Pool is out of tolerance.

<C5> Pools may be repaired at the Event Partner's discretion. All competition Pools at an event must be set up in accordance with the specifications in Appendix A and/or other applicable Sections. Minor aesthetic customizations or repairs are permitted, if they do not impact gameplay (see [<C4>](#)).

<C6> Qualification Matches follow the Match Schedule. A Qualification Match Schedule will be available on the day of competition. The Match Schedule will indicate Alliance partners, Match pairings, Alliance colors for each Match, and a scheduled time for each Match. For Competitions with multiple Pools, the schedule will indicate which



Pool each Match will take place on. For Competitions spanning multiple days, the schedule will indicate which day the Match will take place on.

- a. A Qualification Match can only start before its scheduled time if all Teams, Robots, and assigned volunteers are at the Pool and ready to play.
- b. The Match Schedule is subject to change at the Event Partner's discretion. Events should generally wait to generate the Match Schedule until all Teams have checked in and passed Robot Inspection, or when it has been confirmed that Teams will not be participating.
- c. If a Team does not punctually report to the Pool where their Match is scheduled to begin, the Match may begin without that Team at the Head Referee's discretion. In this scenario, the Team which failed to report to the Pool on time will receive a Disqualification.

<C7> Each Team will play at least six Qualification Matches. A Competition must have at least six (6) Qualification Matches per Team. The Match schedule will be arranged to guarantee this.

<C8> Matches may result in a Tie. In the event of both Alliances in a Match getting the same score at the end of the Match, the Match will end in a Tie if the following conditions are not met.

In order of priority, tiebreaker conditions are:

1. The Alliance which does not contain a Disqualified Team wins the Match.
2. If both or neither Alliance contains a Disqualified Team, then the Alliance which was awarded the Autonomous Bonus Score wins the Match.
3. If both or neither Alliance was awarded the Autonomous Bonus Score, then the Alliance which scored the Beacon wins the Match.
4. If neither Alliance scored the Beacon, then the Match is a Tie.

In the event of a Tie:

- If this Match is a Qualifications Match, both Alliances will have the Match recorded as a Win and receive the same points for final Match Scores and Schedule Difficulty Points.
- If this Match is an Eliminations Match, the Match will be considered a Tie and replays will be triggered in accordance with rule [<C11>](#).

<C9> Qualification Matches contribute to a Team's ranking for Eliminations Bracket seeding. Team rankings are determined throughout Qualification Matches as follows:

5. Win Rate (Number of Matches that this Team won/number of Matches played)



6. Average Score (Total points scored by this Team's Alliance across all the Matches played by this Team/number of Matches played)
7. Average Schedule Difficulty Points (Total points scored by the losing Alliance of each Match played by this Team/number of Matches played)
8. Highest Match Score
9. Second-highest Match Score
10. Random electronic draw

Note: The intent of Schedule Difficulty Points is to provide a metric for how difficult each Match was. The total points scored by both Teams on the losing Alliance of each Match determines the Schedule Difficulty Points for that Match, and all four Teams in that Match receive the same Schedule Difficulty Points regardless of which Alliance won.

<C10> Elimination Matches follow the Elimination Bracket. Eliminations Matches are played once all the Matches in the Qualifications Match Schedule have been played, and all rankings for all participating Teams have been finalized. The top 16 Teams in the Competition rankings will proceed to participate in Eliminations Matches to decide the Competition Champion.

The 16 Teams will be seeded into the Eliminations Bracket as shown in Figure T1-A:

- Teams are seeded 1 through 16 by rank
- The 1st seeded Team is matched against the 16th seeded Team
- The 2nd seeded Team is matched against the 15th seeded Team, and so on.

Eliminations Matches will be played as shown in Figure T1-A.

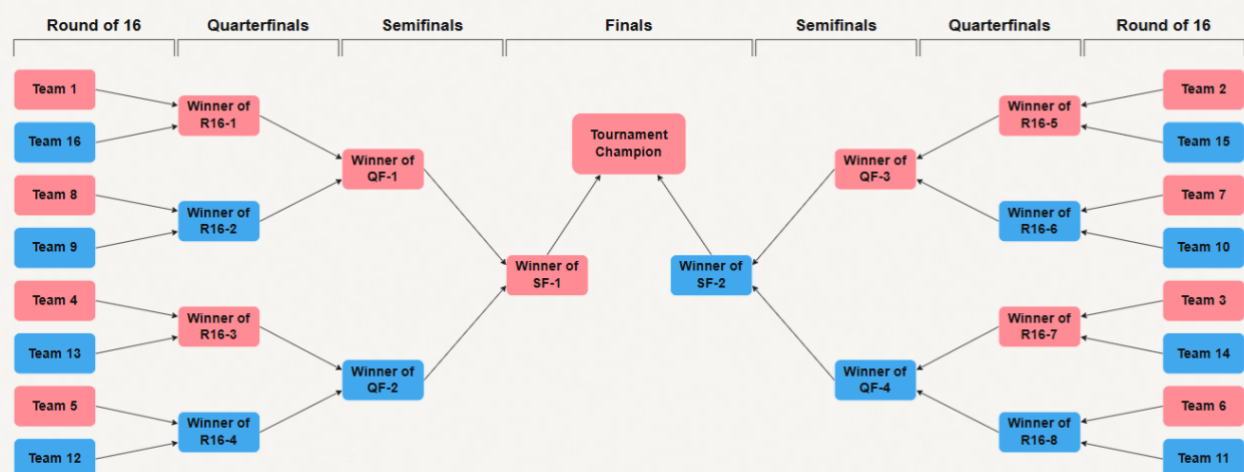


Figure T1-A - Round of 16 Eliminations Bracket



For each Eliminations Match, the winning Team proceeds to the next round. The losing Team does not move further in the Eliminations Bracket and will not have any more Matches for the remaining duration of the Competition.

If a Team is disqualified during an Eliminations Match, the opposing Team automatically becomes the winner of that round and proceeds to the next round.

<C11> Ties in Elimination Matches lead to limited replays. In the case of tied Matches during Elimination Matches, the Match is replayed and the winning Alliance of the replayed Match will progress to the next Match.

If the replayed Match is also a Tie, the higher-seeded Team will advance and be declared the winner under the following guidelines:

- a. After two (2) ties in a non-finals Match, including the original tied Match
- b. After three (3) ties in a finals Match, including the original tied Match

<C12> Match replays are allowed but only under specific conditions. Match replays (playing a Match over again from its start) are at the Head Referee's discretion and will only be issued in extreme circumstances, listed below:

- a. A Tied Eliminations Match
- b. One or more Pool Elements or Scoring Elements starting in incorrect positions, and out of the allowed tolerances specified in **<C4>**
- c. Pool Elements detaching or moving beyond normal tolerances (not as a result of Robot interactions)
- d. The Autonomous Period or Driver Controlled Period ending early
- e. Pool Laptop malfunction causing multiple Teams to be Disabled
- f. Both Teams in an Eliminations Match are Disqualified

Any other circumstance, including but not limited to technical faults, connection issues, game rule disputes and environmental factors are not grounds for Match replays.

<C13> Disqualifications. If a Team gets Disqualified during a Qualifications Match, the following consequences will be applied:

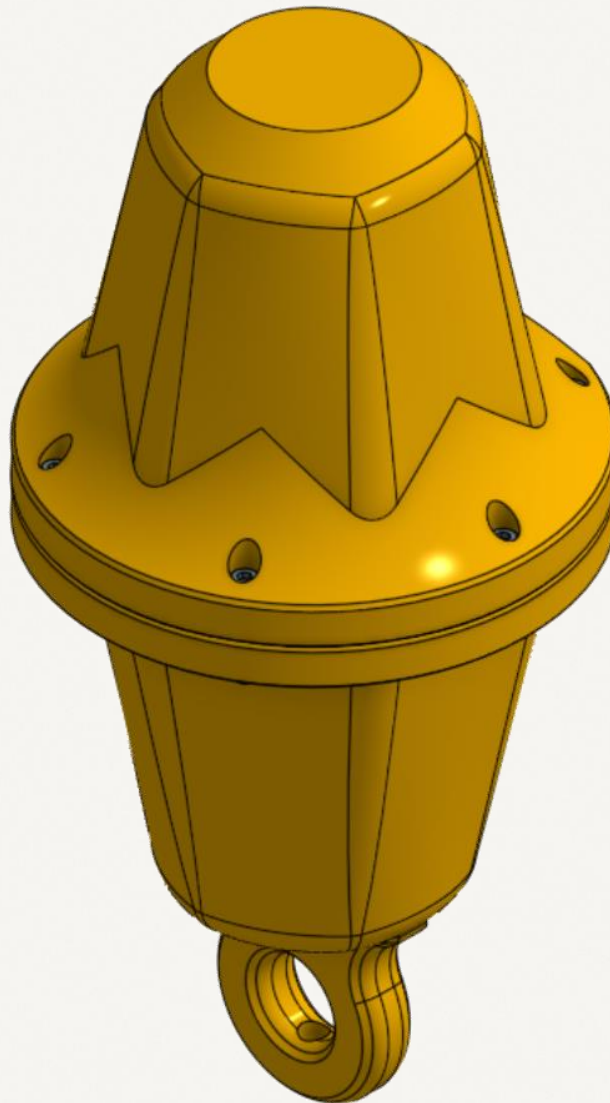
- a. This Match will not be counted in the total number of Matches won by this Team during this Competition but will still be counted in the total number of Matches played by this Team.
- b. The Team will receive a Match Score of zero for this Match
- c. The Team will receive zero Schedule Difficulty Points for this Match
- d. Disqualifications do not otherwise affect the outcome of the Match, except if one Alliance does not contain a Disqualified Team and the Match is a Tie – in which case, in accordance with **<C8>**, Disqualifications act as a tiebreaker.

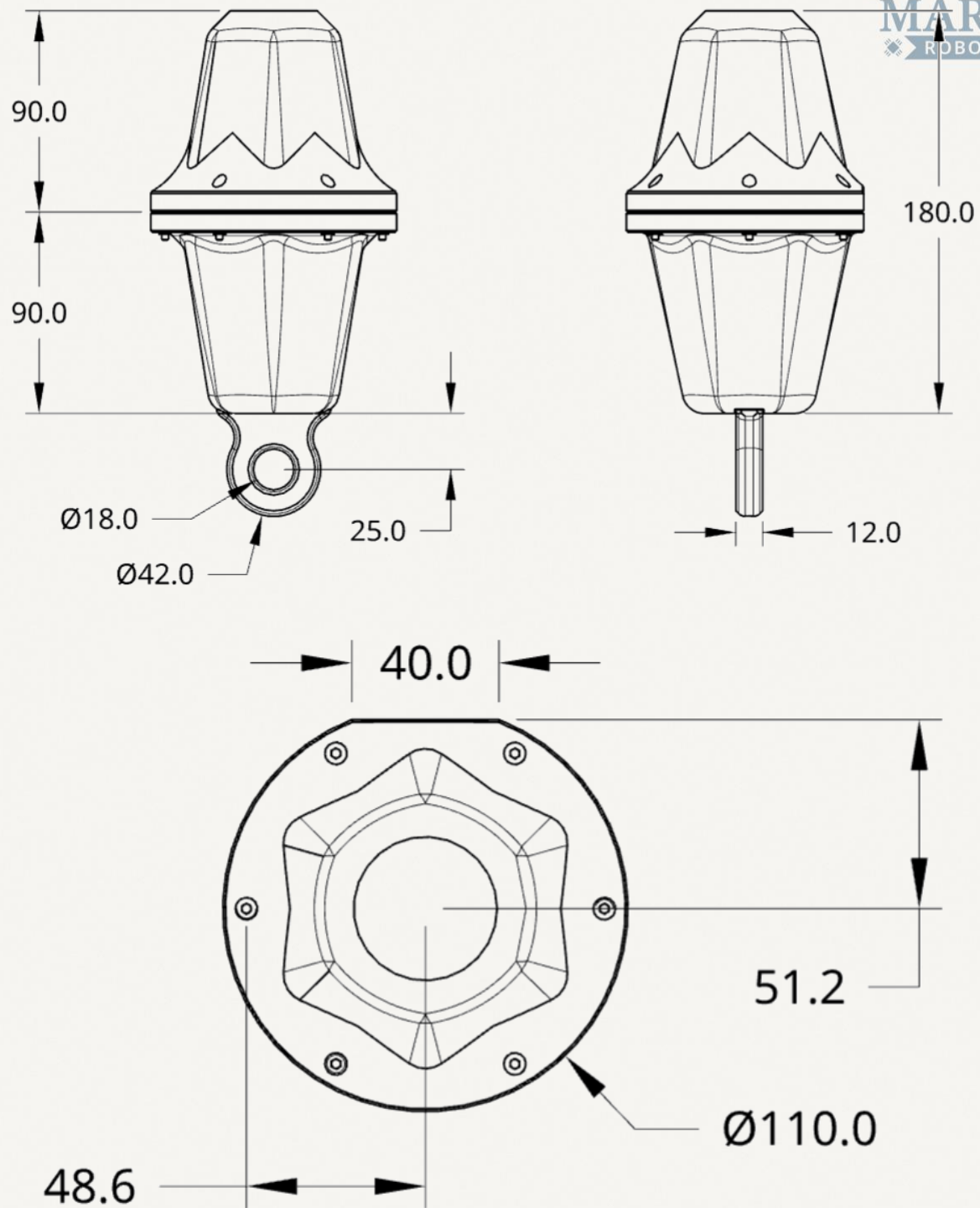
If a Team is Disqualified in an Eliminations Match, they receive a loss for the Match and the opposing Alliance is awarded the win. If both Teams in an Eliminations Match are Disqualified, a Match Replay is triggered as detailed in [<C12>](#).

Appendix A

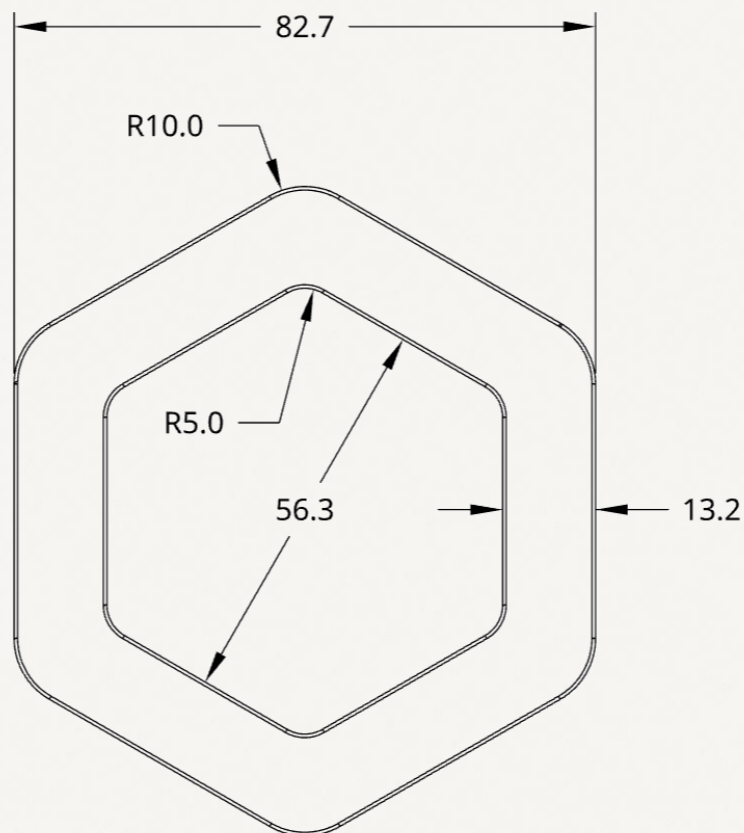
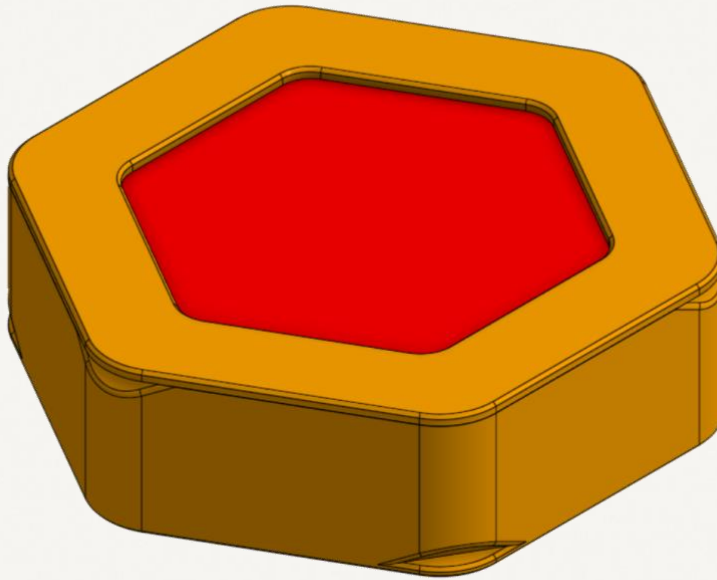
Scoring Element Specifications

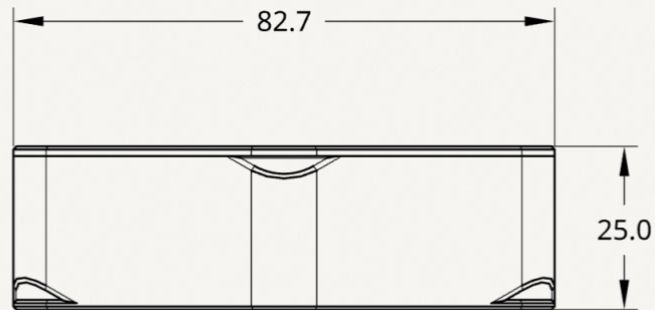
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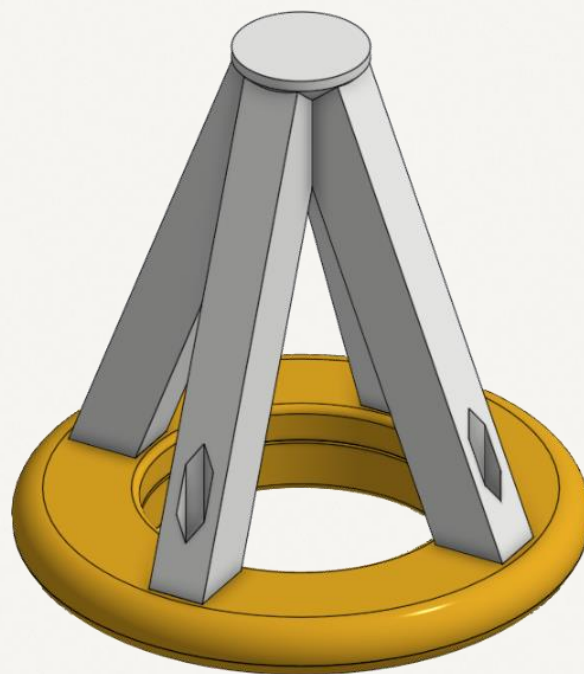


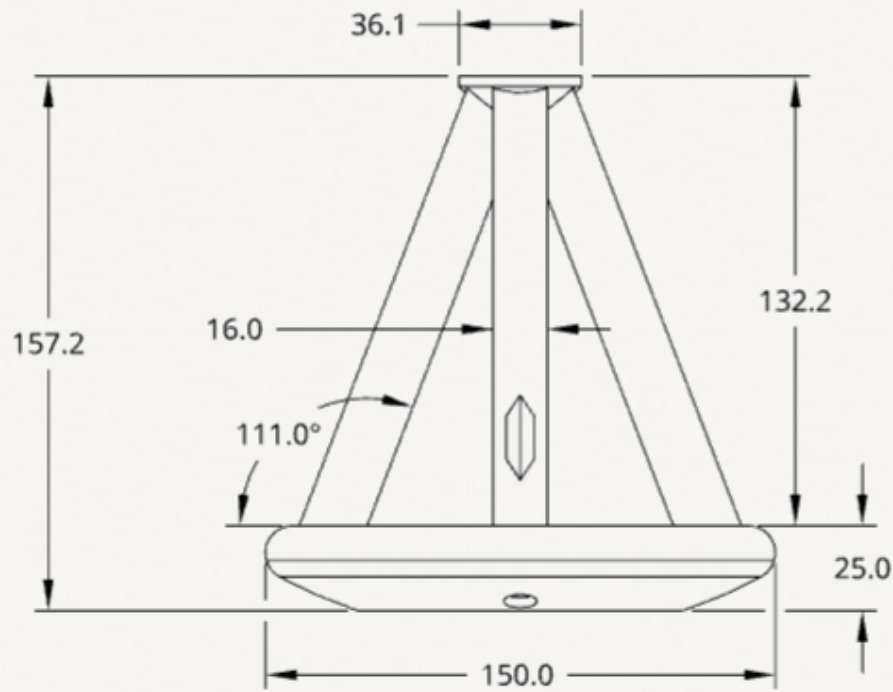
<A2> Hex Link Specifications





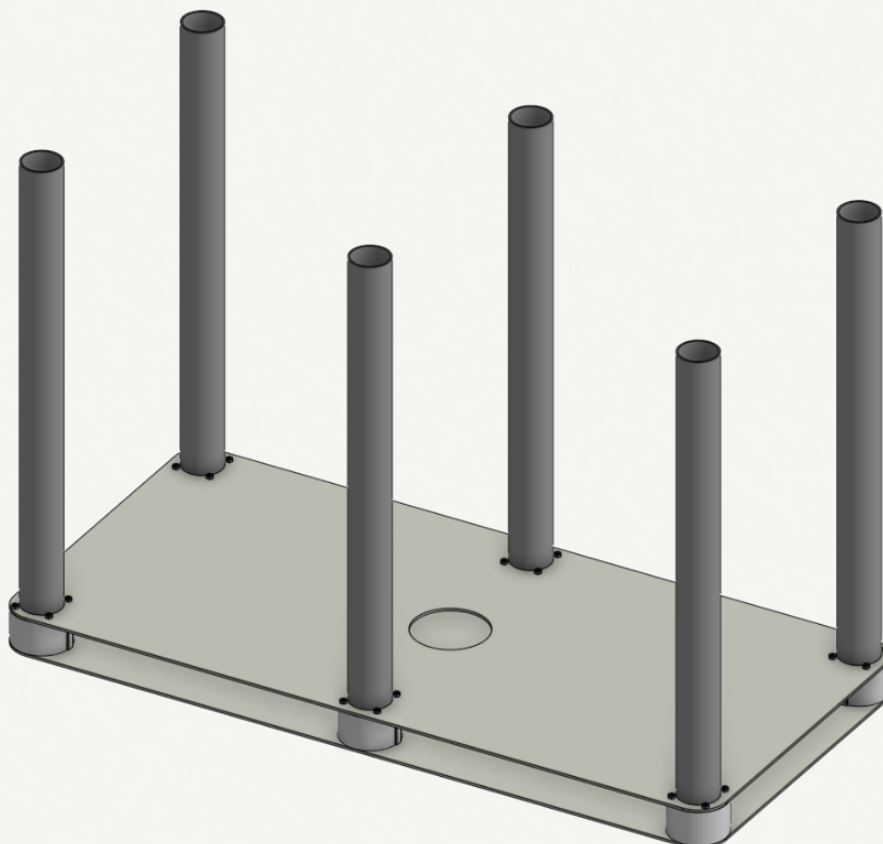
<A3> Mooring Specifications

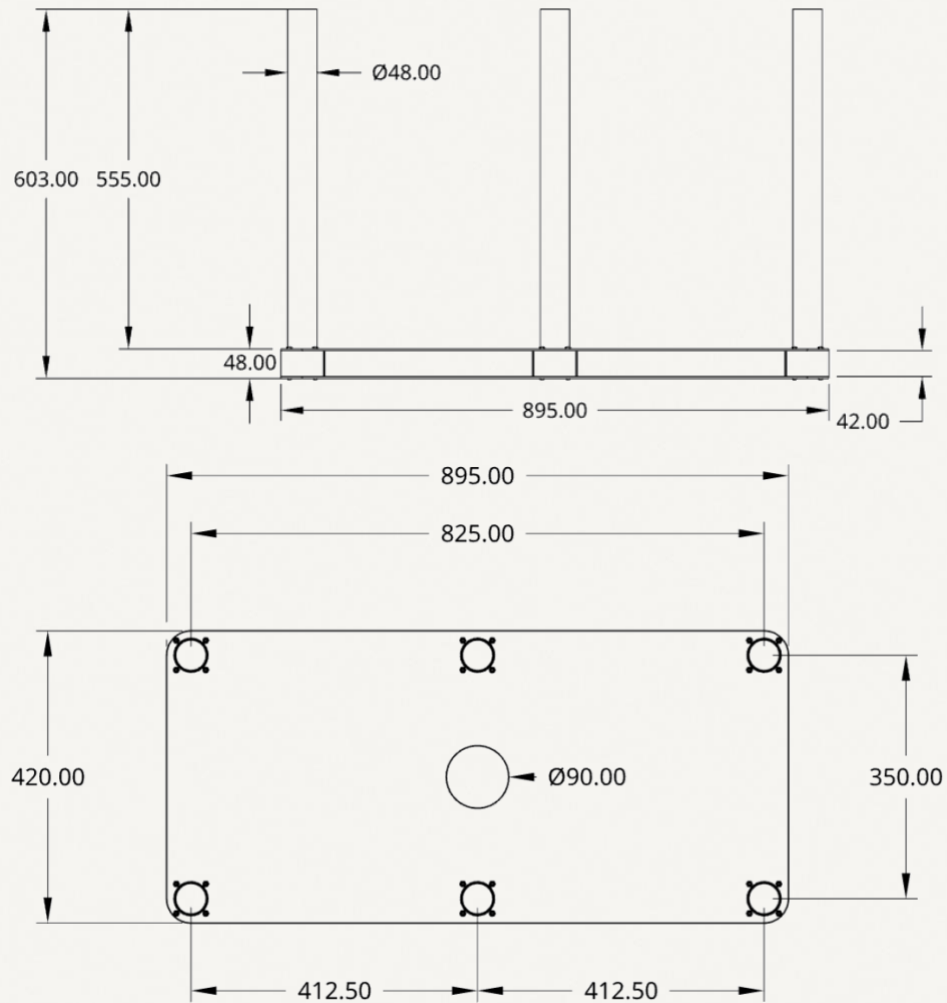




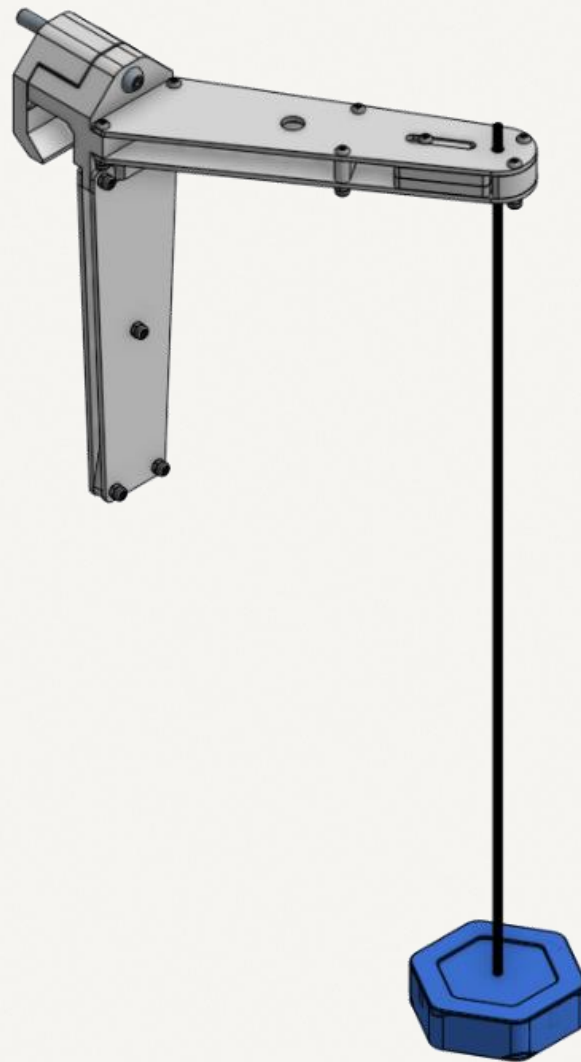
Pool Element Specifications

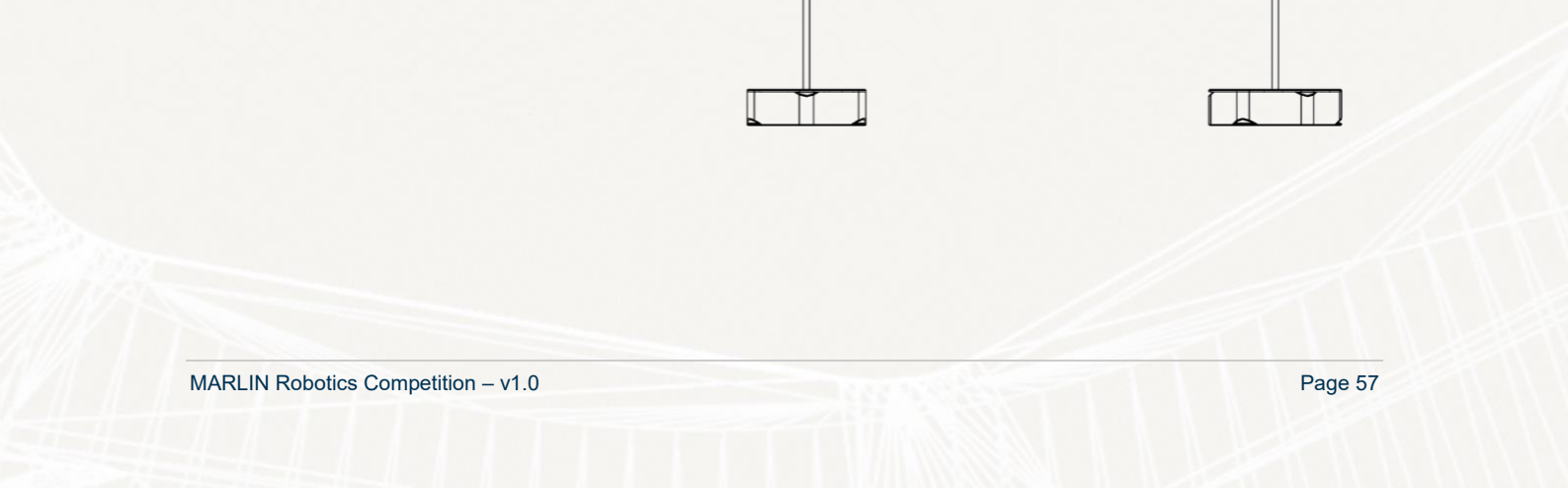
<A4> Anchorage Dimensions





<A5> Alliance Bollard Dimensions and Positions





Pool Specifications

<A6> Pool Dimensions and Layout

