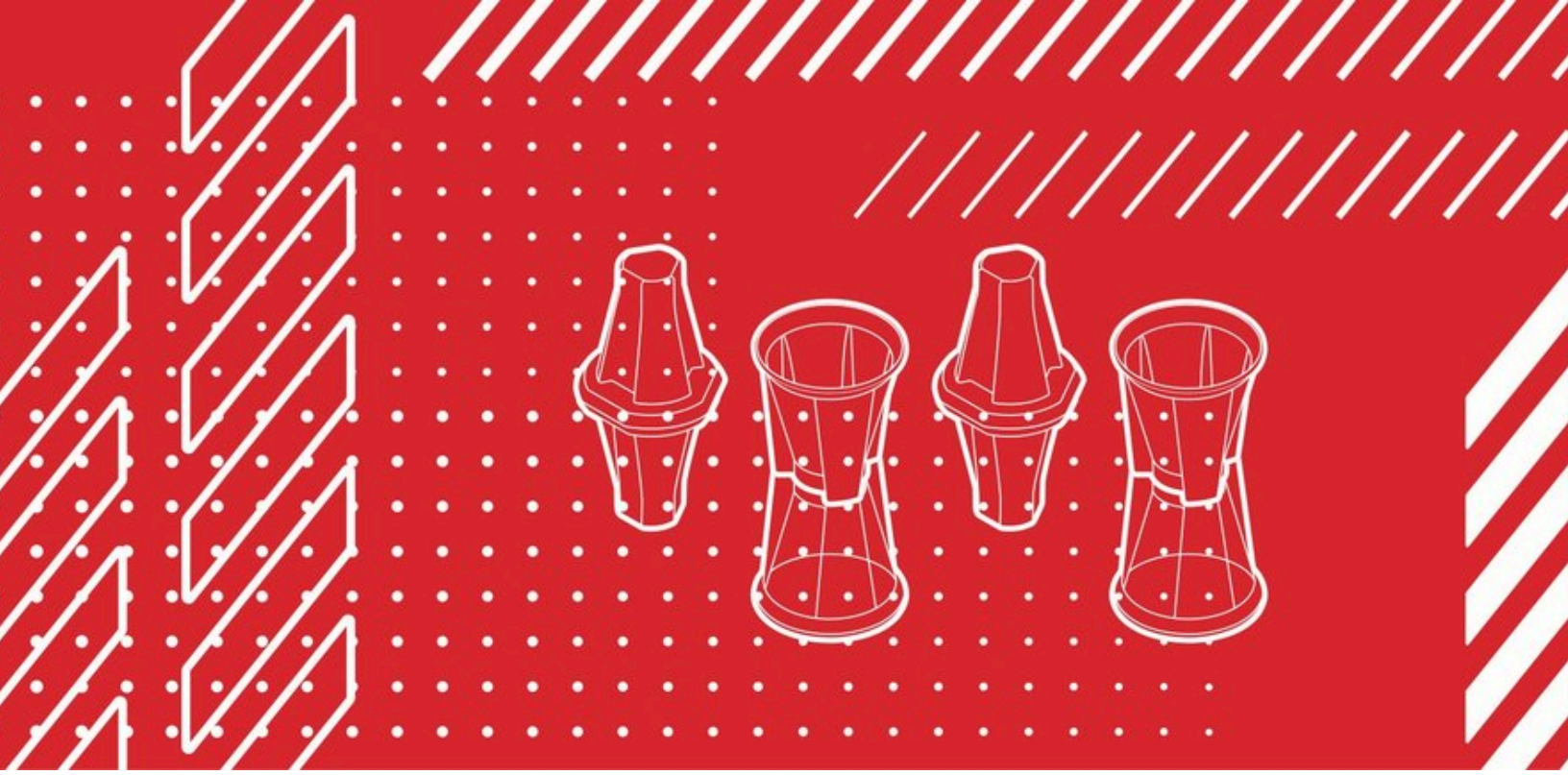


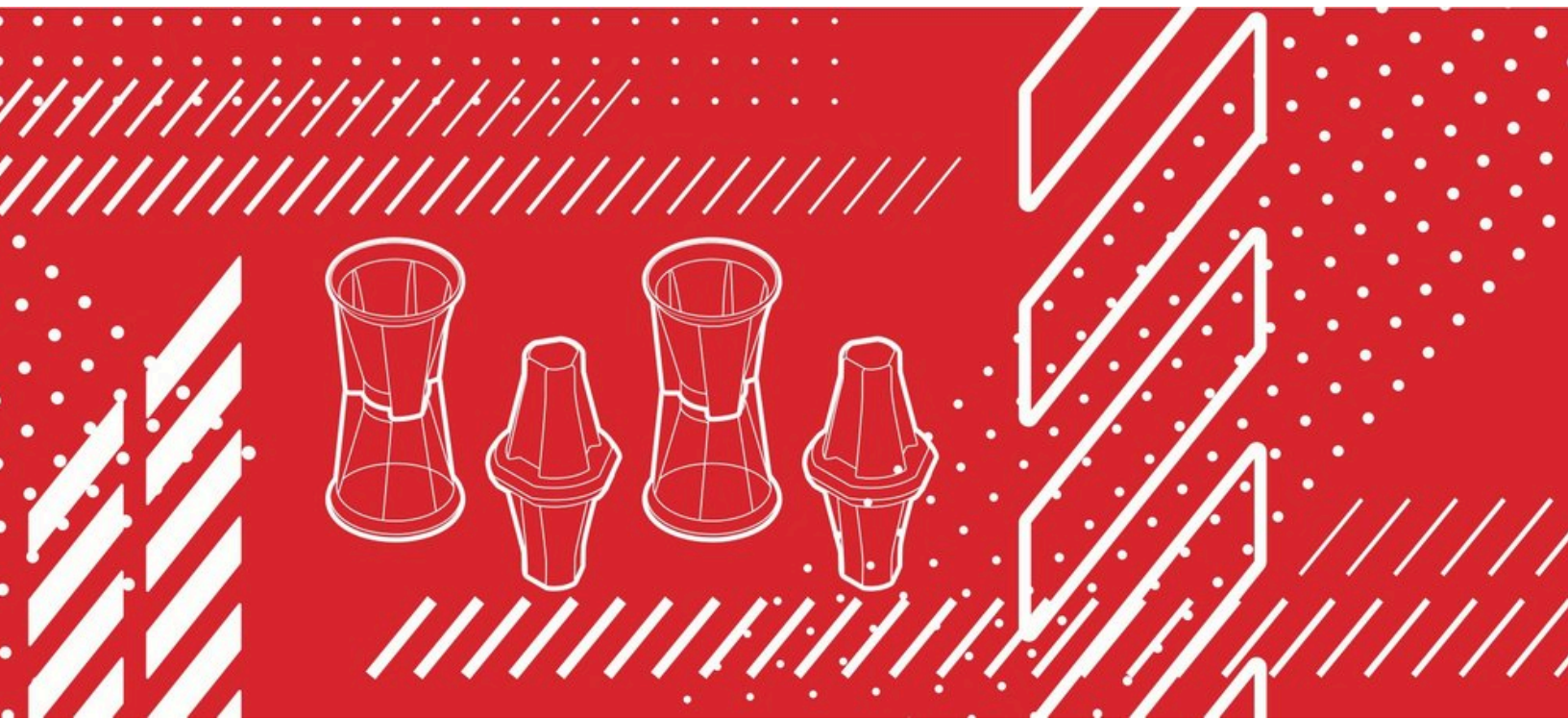
VEX V5 ROBOTICS COMPETITION

OVERRIDE

2026–2027

Game Manual

Version 2.1



V5 Full Manual v2.1

Prefix

Changelog

Version 2.1 - October 8, 2026

- Added Section 7, VEX AI Robotics Competition.
- Add Pin Half as new defined term
- Updated rules throughout the manual for clarity, revolving around the new Pin Half definition. This includes SC2, SC3, SC5, SC8, RSC3, VUG5, and VUG6
- Updated *Violation* Note 2 of SG9 for clarity
- Revised the *Violation* Note of SG10 for clarity
- Revised SG11 and VUG4 to clarify use of *Loaders*
- Updated the definition of Possession for clarity
- Revised the definitions of Owned, Pin and Toggle to use Pin Half term.
- Added Significant Q&A links to SG9 and SG10
- Other minor typo / formatting fixes

Version 2.0 - September 3, 2026

- Revised red-border box of SC2 to clarify intent
- Updated SC3 to provide clarity
- Updated SC6 to clarify intent
- Updated SC8 to revise the *Autonomous Win Point* criteria for standard and Worlds-qualifying events
- Revised the *Violation* Notes of SG10 with new Match Affecting calculations
- Revised SG11 to remove custom *Violation* notes and to allow *Match Loads* to have momentary simultaneous contact with *Robots* and *Drive Team Members*
- Updated SG12 to remove height restriction and replace with restriction on Placing *Scoring Objects* on the *Midfield Goal*
- Added a new bullet to SG13 to clarify intent
- Updated GG4 to provide clarity

- Removed <RSC3aiv>
- Revised VUG4 and **<VUG6>** for clarity
- Removed rule <VUG7> (again)
- Updated the definition of *Match Load* for simplicity
- Deleted the definition of Plowing
- Revised the definition of *Possession* so that moving objects with a concave face of the *Robot* does not count as *Possession*
- Other minor typo / formatting fixes

Version 1.1 - August 6, 2026

- Revised SC6 to provide clarity
- Updated SC7 to clarify that ending the *Autonomous Period* in the *Midfield* is not included in scoring calculations
- Updated SG7 and Figure SG-7 to fix a typo and provide clarity
- Revised the list of example interactions in SG9 to provide clarity
- Added a list of example interactions to SG10 to provide clarity
- Updated SG12 to clarify that *Robots* at least partially within the *Midfield* during the *Endgame* must make an effort to limit vertical expansion
- Revised the wording of rules G1, G2 and G4 for simplicity
- Removed rule <G5>. (Pre-existing rule <G6> is now <G5>)
- Updated GG16 for clarity
- Updated RSC2 to clarify that *Match Load Scoring Objects* can be introduced at any time, but only through red *Alliance Loaders*
- Updated <RSC3b> for clarity
- Added a bullet to R28 to clarify intent
- Revised VUG5 to clarify intent
- Removed rule <VUT6>. (Pre-existing rule <VUT7> is now <VUT6>)
- Updated the definition of *Midfield* to clarify intent, and correct “outer edges” to “inner edges”
- Updated figure Q-1 to make *Tournament* Manager scorekeeping consistent
- Updated the definition of *Student* for simplicity
- Revised SG9 and <SG10> *Violation* Notes to clarify intent
- Moved *Violation* Notes from Appendix C to their corresponding rules

- Other minor typo / formatting fixes

Version 1.0 - July 2, 2026

- Revised SC4 to provide clarity
- Updated SG2a and its red box to clarify that the rule only applies during the *Match*
- Updated SG3 to clarify *Endgame* expansion limits
- Updated SG4 to penalize only intentional remove of *Scoring Objects*, and to consider *Scoring Objects* resting on top of the *Field Perimeter* as being out of the *Field*
- Revised the wording of SG9 to provide better interaction examples
- Updated SG10 to clarify intent
- Rewrote SG12 to change the hard limit on vertical expansion during the *Endgame*, to a soft limit with verbal warnings
- Added rule SG13 to introduce *Load Zone* protections
- Revised R24f to add structurally non-homogeneous plastics to list of prohibited materials
- Added bullet points to T6 regarding custom solutions for mounting *Toggles* on metal *Field Perimeters* and *Alliance Station* dimensions / positioning as permissable *Field* modifications
- Removed existing rule <VUG7> and rewrote it for VEX U *Load Zone* protections
- Added a new definition for *Load Zone*
- Updated Figure T-1 to properly display the parts considered to be part of the *Toggle*
- Updated *Violation* Notes for rules SG4, SG9, SG10, SG12 and SG13
- Other minor typo / formatting fixes

Version 0.2 - June 4, 2026

- Updated a typo in the Game Design Philosophy to clarify that the *Endgame* is 10 seconds long
- Revised SC2, SC3, SC4, **<SC5>**, SC8, SG9, SG10, RSC3, **<VUG6>** and their corresponding figures for clarity, in regards to *Pins* that are *Placed* / *Scored*
- Updated R11 to clarify intent
- Updated R23a to allow anodizing, painting, dyeing, or otherwise changing the color of any legal VEX parts (other than for official events held in mainland China)
- Updated T6 to add white tape in place of blue/red tape for *Load Zones* as a permissible *Field* modification
- Revised tiebreakers in T22
- Added figures to Section 6 to show the starting configuration of a VEX U *Head-to-Head Match*

- Updated VUG4 to clarify that both *Cups* and *Pins* may be introduced into the *Loaders* in VEX U *Matches*
- Added a note to R11 and VUR11 to clarify that the 55W drivetrain motor restriction does not apply to VEX U
- Added new drawings to Appendix A for *Toggle* starting orientation, and AprilTag numbering locations
- Added new definitions for Plowing, *Possession* and *Scored* to Appendix B
- Other minor typo / formatting fixes

Version 0.1 - April 27, 2026

- Initial release

Quick Reference Guide

Scoring Rules	
SC1	All scoring statuses are evaluated after the *Match* ends
SC2	*Placed Scoring Object* criteria
SC3	*Scored Pin Half* criteria
SC4	A *Toggle* is considered set to a color when it meets all of the following criteria
SC5	Ownership of Yellow *Pin Halves*
SC6	*Robot Midfield* criteria
SC7	*Autonomous Bonus* criteria
SC8	*Autonomous Win Point* criteria

Specific Game Rules	
SG1	Starting a *Match*
SG2	Horizontal expansion is limited
SG3	Vertical expansion is limited

Specific Game Rules

SG4	Keep *Scoring Objects* in the *Field*
SG5	Each *Robot* gets one *Pin* as a *Preload*
SG6	*Possession* is limited to a maximum of one *Pin* and one *Cup*
SG7	Don't cross the *Autonomous Line*, and don't interfere with your opponents' actions
SG8	Engage with the *Midfield* and *Autonomous Line* during the *Autonomous Period* at your own risk
SG9	*Alliance Goals* are protected
SG10	*Scoring Objects* may not be neutral *Goals*
SG11	*Match Loads* may be introduced during the *Match* under certain conditions
SG12	Some rules change during the *Endgame* period
SG13	*Load Zones* are protected during the *Driver Controlled Period* of the *Match*.

Safety Rules

S1	Be safe out there
S2	*Students* must be accompanied by an *Adult*
S3	Each *Student Team* member must have a completed participant release form on file
S4	Stay inside the *Field*
S5	Wear safety glasses

General Rules

G1	Participants must follow the Code of Conduct
G2	Participants must follow the *Student* Centered Policy
G3	Use common sense

General Rules

G4	*Students* must meet the *Student* Eligibility Policy requirements
G5	There is a difference between accidentally and willfully violating a *Robot* rule

General Game Rules

GG1	Only *Drive Team Members*, and only in the *Alliance Station*
GG2	A *Team's Robot* should attend every *Match*
GG3	*Robots* on the *Field* must be ready to play
GG4	Hands out of the *Field*
GG5	*Match* replays are allowed, but rare
GG6	*Disqualifications*
GG7	*Time-outs*
GG8	Keep your *Robots* together
GG9	Don't hook your *Robot* to the *Field*, and don't get Entangled
GG10	The red *Alliance* may choose to place last
GG11	Controllers must stay connected to the *Field*
GG12	Autonomous means "no humans"
GG13	All rules still apply in the *Autonomous Period*
GG14	Don't destroy other *Robots*. But, be prepared to encounter defense
GG15	*Offensive Robots* get the "benefit of the doubt" when judgment calls are required
GG16	You can't force an opponent into a penalty
GG17	No *Holding* for more than a 3-count
GG18	Use *Scoring Objects* to play the game

Robot Skills Challenge Rules

RSC1	Standard rules apply in most cases
RSC2	*Match* play is different in *Robot Skills Matches*
RSC3	Scoring *Robot Skills Matches*
RSC4	*Field* setup for *Robot Skills Matches*
RSC5	*Skills Stop Time*

Robot Rules

R1	One *Robot* per *Team*
R2	*Robots* must pass inspection
R3	*Robots* must fit within an 18″ x 18″ x 18″ volume
R4	Officially registered *Team* numbers must be displayed on *Robot* License Plates
R5	Let go of *Scoring Objects* after the *Match*
R6	*Robots* have one Brain
R7	Keep the power button or battery connection accessible
R8	Firmware up to date
R9	Use a “Competition Template” for programming
R10	Motors are limited
R11	Subsystems 1 & 2 have a combined motor limit
R12	Electrical power comes from VEX batteries only
R13	*Robots* use VEXnet
R14	Give the radio some space
R15	One or two Controllers per *Robot*

Robot Rules

R16	*Robots* are built from the VEX V5 system
R17	New VEX parts are legal
R18	Prohibited Items
R19	Certain non-VEX components are allowed
R20	Custom V5 Smart Cables are allowed
R21	A limited amount of tape is allowed
R22	Certain non-VEX fasteners are allowed
R23	Visual decorations are allowed
R24	A limited amount of custom plastic is allowed
R25	Pneumatics are limited
R26	The VEX Pressure Gauge is a required part if a *Robot* includes pneumatics
R27	Most modifications to non-electrical components are allowed
R28	No modifications to electronic or pneumatic components are allowed

Tournament Rules

T1	*Head Referees* have ultimate and final authority on all gameplay and *Robot* ruling decisions
T2	*Head Referees* must be qualified
T3	*Drive Team Members* are permitted to immediately appeal a *Head Referee's* ruling
T4	The *Event Partner* has ultimate authority regarding all non-gameplay decisions
T5	Be prepared for minor *Field* variance
T6	*Fields* may be repaired at the *Event Partner's* discretion
T7	*Fields* at an event must be consistent with each other

Tournament Rules	
T8	There are three types of *Field* control that may be used
T9	There are two types of *Field Perimeter* that may be used
T10	*Qualification Matches* follow the *Match Schedule*
T11	Each *Team* will have at least six *Qualification Matches*
T12	*Qualification Matches* contribute to a *Team's* ranking for *Alliance Selection*
T13	*Qualification Matches* tiebreakers
T14	Small *Tournaments* have fewer *Alliances*
T15	Send a *Student* representative to *Alliance Selection*
T16	Each *Team* may only be invited once to join one *Alliance*
T17	*Elimination Matches* follow the *Elimination Bracket*
T18	*Elimination Matches* are a blend of "Best of 1" and "Best of 3"
T19	Ties in *Elimination Matches* lead to limited rematches
T20	Skills *Match Schedule*
T21	Skills Challenge *Fields* do not require the same modifications as the Head-to-Head *Fields*
T22	Skills Rankings at events
T23	Skills Rankings globally
T24	*Robot* Skills at League Events

VEX U Game Rules	
VUG1	Different *Robot* starting sizes
VUG2	Different *Robot* placement than rule GG10
VUG3	Some electronic devices may be in motion or moving at the beginning of the *Match*

VEX U Game Rules

VUG4	Different availability of *Loaders*
VUG5	Different scoring during the *Autonomous Period*
VUG6	Different *Autonomous Win Point* criteria

VEX U *Robot* Skills Challenge Rules

VURS1	VEX U *Robot Skills Matches* are set up differently than VEX V5 *Robot Skills Matches*
VURS2	*Teams* are permitted to use both *Robots* in their VEX U *Robot Skills Matches*
VURS3	Both *Robots* must start the *Robot Skills Match* in legal starting positions for the red *Alliance*

VEX U *Tournament* Rules

VUT1	VURC *Head-to-Head Matches* will be played 1-*Team* vs. 1-*Team*
VUT2	*Qualification Matches* will be conducted in the same manner as in a VEX V5 *Tournament*
VUT3	*Elimination Matches* will be conducted in the same manner, but without an *Alliance Selection*
VUT4	The *Autonomous Period* at the beginning of each *Head-to-Head Match* will be 30 seconds
VUT5	The *Driver Controlled Period* is shortened to 90 seconds
VUT6	VURC *Tournaments* have fewer *Teams* in *Elimination Matches*

VEX U *Robot* Rules

VUR1	*Teams* may use two (2) *Robots* in each *Match*
VUR2	*Teams* may use any official VEX Robotics products, other than the exceptions listed below
VUR3	*Fabricated Parts* may be made by applying the following processes to *Raw Stock*
VUR4	*Fabricated Parts* must be made from legal *Raw Stock*
VUR5	The following material types are not considered *Raw Stock*

VEX U *Robot* Rules	
VUR6	*Fabricated Parts* cannot be made from *Raw Stock* which poses a safety or damage risk
VUR7	*Fabricated Parts* must be made by *Team* members
VUR8	*Teams* may use commercially-available springs on their *Robots*
VUR9	*Teams* may use commercially available fastener hardware on their *Robot*
VUR10	Each *Robot* must utilize exactly one (1) V5 *Robot* Brain and at least one (1) V5 *Robot* Radio
VUR11	There is no restriction on the number of V5 Smart Motors
VUR12	There is no restriction on Sensors, *External Processors*, or *Additional Electronics*
VUR13	Commercially available Electromechanical Assemblies are not legal
VUR14	*Teams* may utilize an unlimited amount of the following pneumatic components
VUR15	*Teams* may use commercially available bearings on their *Robot*

VEX AI Robotics Competition Scoring Rules	
VAISC1	Isolation Bonus criteria
VAISC2	Different Isolation Win Point criteria

VEX AI Robotics Competition Game Rules	
VAIG1	Standard game rules apply
VAIG2	Autonomous means “no humans” for the entire *Match*
VAIG3	Use common sense, and give grace
VAIG4	*Robot* starting sizes, positions, and expansion
VAIG5	*Loaders* and *Match Loads*

VEX AI Robotics Competition *Robot* Skills Challenge Rules	
VAIRS1	Standard rules from VEX V5 and VEX U apply
VAIRS2	VEX AI *Teams* compete only in *Autonomous Coding Skills Matches*
VAIRS3	VEX AI *Robot Skills Matches* use the same *Field* layout as VEX AI *Head-to-Head Matches*
VAIRS4	Scoring VEX AI *Robot Skills Matches*

VEX AI Robotics Competition *Tournament* Rules	
VAIT1	VEX AI *Head-to-Head Matches* will be played 1-*Team* vs. 1-*Team*
VAIT2	*Qualification Matches* will be conducted in the same manner as in a VEX U *Tournament*
VAIT3	*Elimination Matches* will be conducted in the same manner, but without an *Alliance Selection*
VAIT4	The Isolation Period at the beginning of each *Head-to-Head Match* will be fifteen (15) seconds
VAIT5	The Interaction Period will be one minute and forty-five seconds (1:45)

VEX AI Robotics Competition *Robot* Rules	
VAIRM1	VEX U *Robot* rules apply as written, except *Robot* sizes
VAIRM2	Different *Robot* sizes
VAIRM3	Components used for AI vision processing are Additional Electronics

Section 1 - Introduction

About the Game Manual

The VEX V5 Robotics Competition Game Manual is the most authoritative source of information for the VEX V5 Robotics Competition. Contained within this document are all of the rules, boundaries, constraints, and other relevant information you will need to properly understand and play this year's game.

This manual is:

- A technical reference document for gameplay, *Robot* construction, and event operation
- A binding set of rules for *Teams*, coaches, referees, *Event Partners*, and all other volunteers and participants to adhere to
- The primary source of truth for all things related to the VEX V5 Robotics Competition

This manual is not:

- A strategy guide to score the most points
- An instruction set to build the best *Robot*
- A replacement for referee training, *Event Partner* training, or other event procedure

How to Read the 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:

Definitions in Appendix B establish the meaning of a term with regards to this document. Sometimes, these definitions may not perfectly match a more commonly accepted dictionary definition. In that case, the VEX definition takes precedence. If there is no VEX definition for a term, it can be reasonably assumed that a dictionary definition can be used.

General Rules establish the baseline rules for competition that *Teams* must adhere to at *all times*. These include, but are not limited to, conduct at an event, roster eligibility, competition integrity, and authority and enforcement.

General Game Rules begin to outline the rules that *Teams* must follow in every VEX game, not just the rules specific to this season's game. Many of these rules do not change from year to year, 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.

Tournament Rules describe how competitions are run, and how *Teams* are ranked at events.

Some rules also reference **Violation Notes** that are located in Appendix C. These notes provide additional guidance on enforcement, escalation, or special circumstances. If a rule doesn't include a cross-reference to *Violation* Notes, standard *Violation* definitions apply. See Appendix C for information about rule *Violations* and penalties.

> ⚠ **Caution**
>
> There are also red 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 Design Committee* has deemed may benefit from things being said a different way, or presented slightly differently. Red Boxes are meant to be supplements to, not replace, rules or definitions.

Game Manual Updates

This manual will have a series of "major" and "minor" updates over the course of the season. Each version is official and must be used in official VEX V5 events until the release of the next version, upon which the previous version becomes void.

The latest version of the Game Manual can always be found at https://link.vex.com/docs/26-27/v5rc/game-manual.

Known major release dates are as follows:

Release Date	Effective Date	Version #	Details
April 27, 2026	**April 27, 2026**	**Version 0.1**	Initial game release
May 14, 2026	May 14, 2026	N/A	Official Q&A system opens
June 4, 2026	June 11, 2026	Version 0.2	Minor typographical errors or formatting issues found in the initial release, with very few rule changes expected
July 2, 2026	**July 9, 2026**	**Version 1.0**	May include gameplay or rule changes inspired by input from the official Q&A system and the VEX community
August 6, 2026	August 13, 2026	Version 1.1	Clarification / minor update
September 3, 2026	**September 10, 2026**	**Version 2.0**	May include gameplay or rule changes inspired by early-season events
October 8, 2026	October 15, 2026	Version 2.1	Clarification / minor update
December 3, 2026	December 10, 2026	Version 2.2	Clarification / minor update
January 28, 2027	**February 4, 2027**	**Version 3.0**	May include gameplay or rule changes inspired by mid-season events
March 25, 2027	**April 1, 2027**	**Version 4.0**	May include gameplay or rule changes pertaining specifically to the VEX Robotics World Championship

In addition to these known major updates, there may also be unscheduled updates released throughout the season if deemed critical by the *Game Design Committee*.

Any scheduled or unscheduled updates will always be released on a Thursday, no later than 5:00 PM CST (11:00 PM GMT). These updates will be announced via the VEX Forum, automatically pushed to the VEX V5 Hub app, and shared via VEX Robotics social media & email marketing channels. Once announced, the new version of the Game Manual will be immediately available at the link above.

Generally, Game Manual updates, scheduled or unscheduled, will include a **grace period** before the updated rules go into effect for competitions. See the release table above for specific dates. This grace period does not apply to the **Version 0.1 Release**, which serves as the initial rule set for the season.

Any events that begin **before** the 7-day grace period has ended must **continue using the rules from the previous Game Manual Release**. This policy ensures fairness and consistency, allowing *Teams* to adapt their strategies and gameplay accordingly before the changes are enforced in official competitions.

The *Game Design Committee* reserves the right to enforce critical updates to the Game Manual as effective immediately upon release, if we feel that the changes are critical for competitive integrity, safety, and/or other extenuating circumstances.

Multi-week league events (or similar) that cross over a grace period should use the version of the Game Manual that is in effect at the beginning of each league session. Leagues should update to new versions of the Game Manual between sessions as appropriate.

The Q&A System

When first reviewing a new robotics game, it is natural to have questions about situations which may not be immediately clear. Navigating the Game Manual and seeking out answers to these questions is an important part of learning a new game. In many cases, the answer may just be in a different place than you first thought - or, if there is no rule explicitly prohibiting a gameplay strategy, then that usually means it is legal!

However, if a *Team* is still unable to find an answer to their question after closely reviewing the relevant rules, then every *Team* has the opportunity to ask for official rules interpretations and clarifications in the VEX Robotics Question & Answer System. These questions may be posted by a *Team's Adult* representative via the events.vex.com account that is associated with that *Team*.

All responses in this Q&A system should be treated as official rulings from the VEX Robotics *Game Design Committee*, and they represent the correct and official interpretation of the VEX V5 Robotics Competition rules. The Q&A system is the only source besides the Game Manual for official rulings and

clarifications, and is functionally an extension of the Game Manual. Unlike Game Manual updates, Q&A rulings are effective immediately upon release.

Before posting on the Q&A system, be sure to review the Q&A Usage Guidelines:

1. The Q&A system is for rules clarifications only.
2. Only registered *Teams*, certified *Event Partners*, and certified VEX V5 *Head Referees* can post questions.
3. Read and search this Game Manual before posting.
4. Read and search existing Q&As before posting.
5. Quote the applicable rule from the latest version of this Game Manual in your question.
6. Make a separate post for each question.
7. Use specific and appropriate question titles.
8. Questions will (mostly) be answered in the order they were received.
9. This system is the only source for official rules clarifications.
10. The *Game Design Committee* cannot and will not overrule a *Head Referee's* decision.

If there are any conflicts between the English-language PDF of the Game Manual and other supplemental or translated materials (e.g., referee training materials, the VEX V5 Hub app, the game reveal video, a translated game manual, etc.), the most current version of the English-language PDF of the Game Manual takes precedence.

Similarly, it can never be assumed that definitions, rules, or other materials from previous seasons apply to the current game. Q&A responses from previous seasons are not considered official rulings for the current game. Any relevant clarifications that are needed should always be re-asked in the current season's Q&A.

Hierarchy of Information

This Game Manual is the authoritative source for all gameplay, *Robot*, and event rules. For these matters, official information ranks as follows:

1. The current version of this Game Manual, including all published updates
2. The official Q&A system
3. Other VEX Robotics or Global Robotics and Science Foundation supplementary documents and training materials

Q&A answers are official rulings, effective when posted. An answer that conflicts with this Manual takes precedence until a Manual update addresses it. Answers not addressed by an update remain in effect.

The following companion documents are authoritative within their own scopes and take precedence over any summary or restatement of their content in this Manual:

- Code of Conduct
- Student-Centered Policy

No other source of information is official.

Section 2 - The Game

VEX V5 Robotics Competition Override: A Primer

VEX V5 Robotics Competition Override is played on a 12′ x 12′ square *Field*, set up as illustrated in the figures throughout this manual.

In *Head-to-Head Matches*, two (2) *Alliances* — one (1) "red" and one (1) "blue" — composed of two (2) *Teams* each, compete in *Matches* consisting of a fifteen (0:15) second *Autonomous Period* followed by a one minute and forty-five second (1:45) *Driver Controlled Period*.

The object of the game is to attain a higher score than the opposing *Alliance* by stacking *Pins* and *Cups* on *Goals*, setting *Toggles* to your *Alliance* color, and ending the *Match* with your *Robot* in the contested *Midfield*.

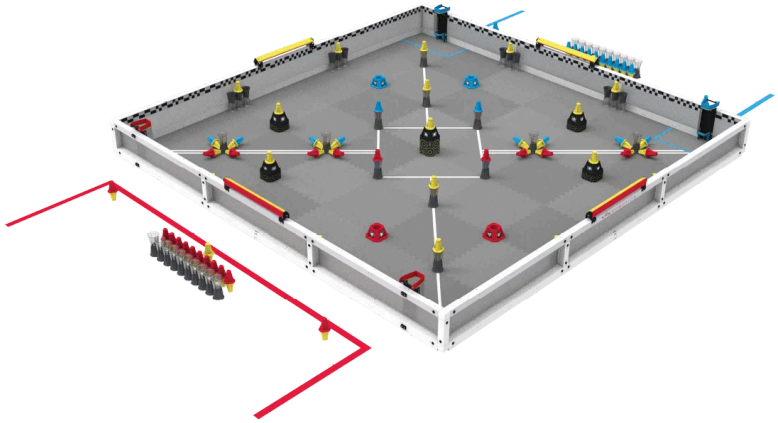
An *Autonomous Win Point* is awarded to any *Alliance* that completes a set of assigned tasks by the end of the *Autonomous Period*.

An *Autonomous Bonus* is awarded to the *Alliance* that has the most points at the end of the *Autonomous Period*.

Teams may also compete in *Robot Skills Matches*, where one (1) *Robot* tries to score as many points as possible. See Section 3 for more information.

At the VEX U Collegiate level, *Teams* play in a modified *Tournament* with a 30-second *Autonomous Period* and additional *Robot* build challenges. See Section 6.

In the VEX AI Robotics Competition, *Teams* play with two fully autonomous *Robots* and no *Driver Controlled Period*. See Section 7.



Field Overview

The VEX V5 Override *Field* consists of the following:

- 56 *Cups*
  - 20 *Match Loads*
    - 10 for red *Alliance*
    - 10 for blue *Alliance*
  - 24 that start the *Match* in predetermined locations on the *Field* (gray side up)
  - 12 that start the *Match* in predetermined locations on the *Field* (clear side up)
- 63 *Pins*
  - 4 red/blue that start the *Match* in predetermined locations
  - 20 red/yellow
    - 2 *Preloads*
    - 10 *Match Loads*
    - 8 that start the *Match* in predetermined locations
  - 20 blue/yellow
    - 2 *Preloads*
    - 10 *Match Loads*
    - 8 that start the *Match* in predetermined locations
  - 19 yellow/yellow
    - 2 *Match Loads*
    - 17 that start the *Match* in predetermined locations
- 9 *Goals*

    - 4 *Alliance* colored
        - 2 red
        - 2 blue
    - 5 neutral colored
        - 4 short
        - 1 tall
- 4 *Toggles*
- 4 *Loaders*, two adjacent to each *Alliance Station*

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 *Field Elements* and *Scoring Objects* to emphasize or clarify intent.

Teams should refer to official *Field* specifications, found in Appendix A, for exact *Field* dimensions, a full *Field* bill of materials, and exact details of *Field* construction.

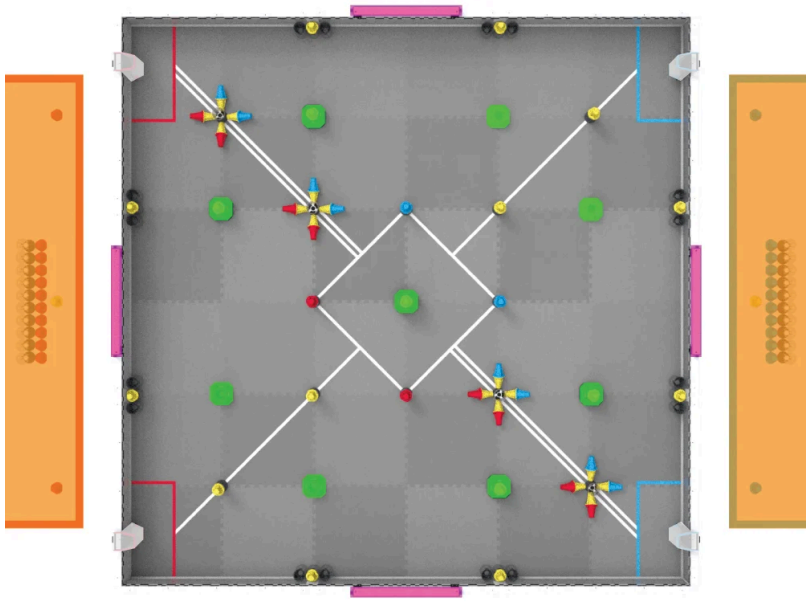


Figure FO-1: An overhead view of the VEX V5 Override *Field*, with *Alliance Stations* (orange), *Loaders* (white), *Toggles* (pink), and *Goals* (green) highlighted.

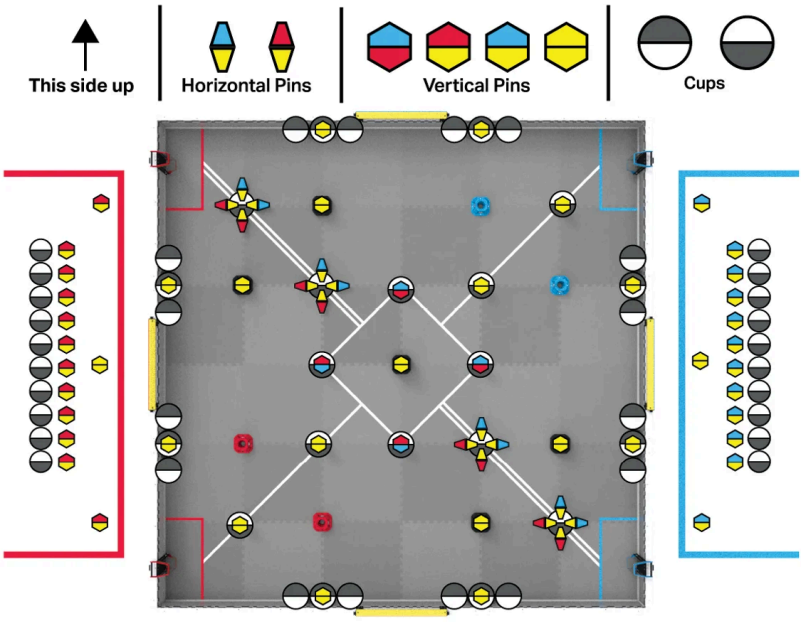


Figure FO-2: An overhead view of the VEX V5 Override *Field* in its starting configuration, with icons representing orientation of *Scoring Objects*.

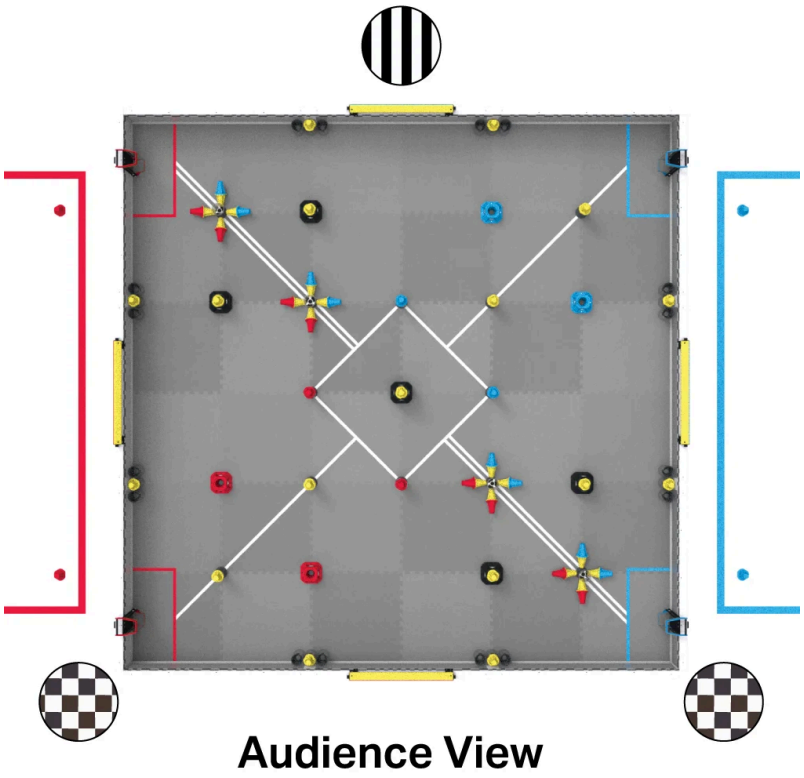


Figure FO-3: The recommended locations of the *Head Referee* (black & white stripes), and *Scorekeeper Referees* (black & white checkerboard).

Game Design Philosophy - A Letter from the GDC

We want to take the opportunity to explain how this game was designed and what kind of gameplay we expect to see during the season. This section also points out parts of the game that we will watch closely in case updates are needed.

This is not a rules section. It does not add any new rules. Instead, it helps you understand the purpose of the game and what we as designers had in mind.

What This Game is About & Scoring

Override is a game that focuses on stacking and teamwork. We intend for *Teams* to work together with their *Alliance* partners to assemble stacks, gain points using *Scoring Objects*, and control *Toggles* to outscore their opponents.

Because of this, success in the game is not just about building a good *Robot*. It also depends on how well you:

- Communicate with your partner
- Plan your strategy
- Time your actions during a *Match*

Teams that coordinate well and make smart decisions will have an advantage.

The game is designed so that most points come from constructive actions, such as:

- Building stacks
- Flipping *Toggles*
- Positioning your *Robot* effectively

Interaction with the opposing *Alliance* is still an important part of the game. However, *Matches* cannot be dominated by tearing down what the other *Alliance* has built. Some defense and disruption is expected, but the main focus should stay on building and scoring.

If strategies that focus mostly on preventing stacks become too common, the *Game Design Committee* may consider making changes to ensure the game remains interesting with many strategy choices. We will look at how often these strategies are used and how they affect gameplay compared to our intentions.

Large Point Swings with Toggles and Yellow Pins

The scoring values in Override are designed to encourage dynamic strategy and decision making. Because of this, it is possible for actions like controlling *Toggles* or scoring yellow *Pins* to create large point swings during a *Match*.

These moments can be exciting, but they should not become the only way to win. *Teams* should still have multiple viable strategies, including building stacks and competing in the *Endgame*.

We will monitor how these point swings impact *Matches* throughout the season. If they begin to outweigh other scoring opportunities or reduce strategic variety, the *Game Design Committee* may adjust point values to maintain a balanced and engaging game.

The Endgame: Final 10 Seconds

The last 10 seconds of the *Match* are designed to feel more intense and competitive. During this time, the game shifts to a “king of the hill” style challenge in the *Midfield*. This section of the *Match* will likely include increased *Robot* interaction. As such:

- Positioning and timing become critical
- *Robot* durability matters more

Teams should expect more crowded and contested conditions than earlier in the *Match*.

If the *Endgame* consistently leads to problems like *Robots* getting stuck, tipping too often, or not being able to recover, the *Game Design Committee* may adjust rules to keep *Matches* fair and playable.

Using Sensors in the Game

Override is a game where sensors can be very helpful. Tools like AI Vision Sensors and Optical Sensors can help your *Robot* :

- Identify objects
- Interact with *Toggles*
- Navigate the *Field*

The *Game Design Committee* will work to support sensor use through *Field* and game design. However, real-world conditions are not always perfect. Lighting and object placement may vary. Because of this, *Teams* should design and code their *Robots* so their sensors can handle small changes and still work reliably during a *Match*.

In addition, *Robot* rules will continue to be reviewed to make sure the game stays fair throughout the season. One important focus is preventing *Teams* from building *Robots* that could interfere with sensors in unfair ways like intentionally trying to confuse sensors or adding parts that look like *Field Elements*.

Making sure all *Teams* can rely on their sensors to work as expected is an important part of fair competition.

Have a great season!

- The VEX V5 Robotics Competition *Game Design Committee*

Scoring

Autonomous Bonus	12 Points
Each *Scored Alliance*-colored *Pin Half*	5 Points
Each *Scored* yellow *Pin Half*	10 Points
Each *Robot* ending in the *Midfield*	8 Points

<SC1> All scoring statuses are evaluated after the Match ends. Scores are calculated five seconds after the *Match* ends, or once all *Scoring Objects*, *Field Elements*, and *Robots* on the *Field* 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 object or *Robot* is still in motion and “too close to call” between two states at the 5-second mark, then the less advantageous of the two states should be awarded to the *Robot* (s) in question. A *Robot* which is breaking the plane of the *Midfield* but slowly droops down and away from the *Midfield* at five (5) seconds would not be considered in the *Midfield*.

b. At the end of the *Match*, the on-screen timer displayed by *Tournament* Manager will hold the current *Match* information and “0:00” for five (5) seconds before moving to queue the next *Match*. This should be the primary 5-second visual cue used by *Teams* and *Head Referees*.

c. This 5-second delay is only intended to be a “benefit of the doubt” grace period, not an extra five 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 (i.e., the *Match* will be scored as it was at 0:00).

d. Referees should avoid contacting or moving *Robots* and/or *Scoring Objects* as much as possible while evaluating scoring statuses. If an object must be moved to evaluate the status of another object, its status must be agreed upon by all *Teams* and the *Head Referee*, and noted or recorded, before it is moved.

e. Referees must record counts based on verified scoring statuses evaluated after the *Match*, using final positions of *Scoring Objects*, *Field Elements*, and *Robots*. Point considerations used to determine whether a *Violation* is *Match Affecting* (e.g., specified in *Violation* Notes) should NOT be added to or deducted from the actual score, and points scored during a *Violation* should not be deducted from a score.

<SC2> Placed Scoring Object criteria.

a. A *Pin* is considered *Placed* if it meets all of the following criteria:
   i. The *Pin* is partially or entirely nested with a *Goal*, or with a *Cup* that is partially or entirely nested with another *Placed Pin*.
   ii. Each *Goal* and/or each half of a *Cup* nested with that *Pin* contains a maximum of one *Pin Half*. (See Figure SC2-2.)

b. A *Cup* is considered *Placed* if it meets the following criteria:
   i. The *Cup* is partially or entirely nested with a *Placed Pin*.

> ⚠ **Caution**
>
> In the context of SC2, nested means that one half of a *Pin* is partially or completely contained within the inner volume of a *Cup* or *Goal*. In other words, the *Pin* is breaking an imaginary plane at the opening of a *Cup* or *Goal*, in any way. *Robot* contact does not matter for the purposes of SC2, and a *Robot* that is contacting or Possessing a *Pin* and/or *Cup* that still meets the criteria presented in SC2 does not negate the *Placed* status, provided no other rules are broken (particularly SG6.

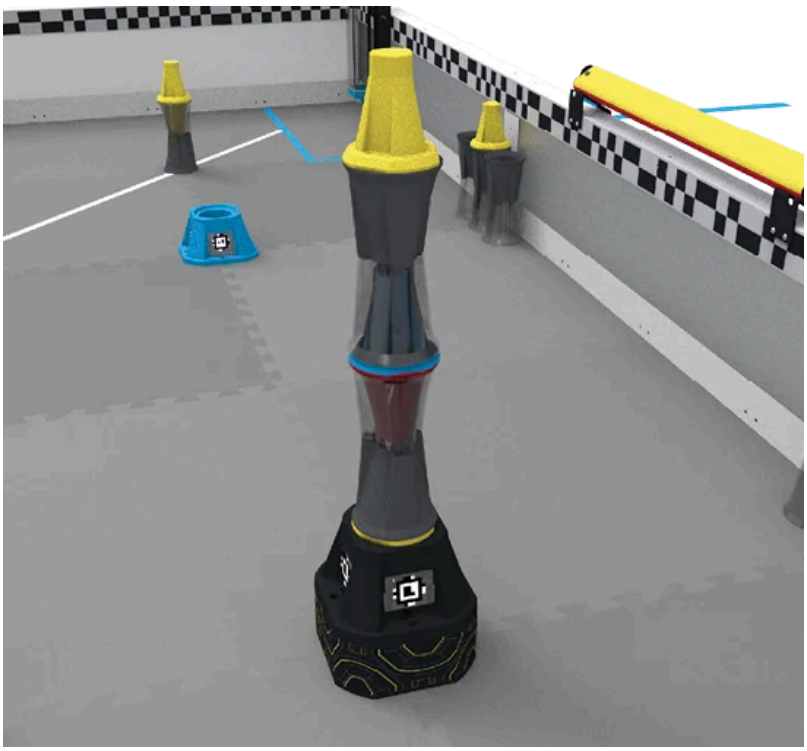


Figure SC2-1: The *Scoring Objects* stacked in the *Goal* all count as *Placed*, as they are all at least partially nested with the *Goal* and/or other *Placed Scoring Objects*.

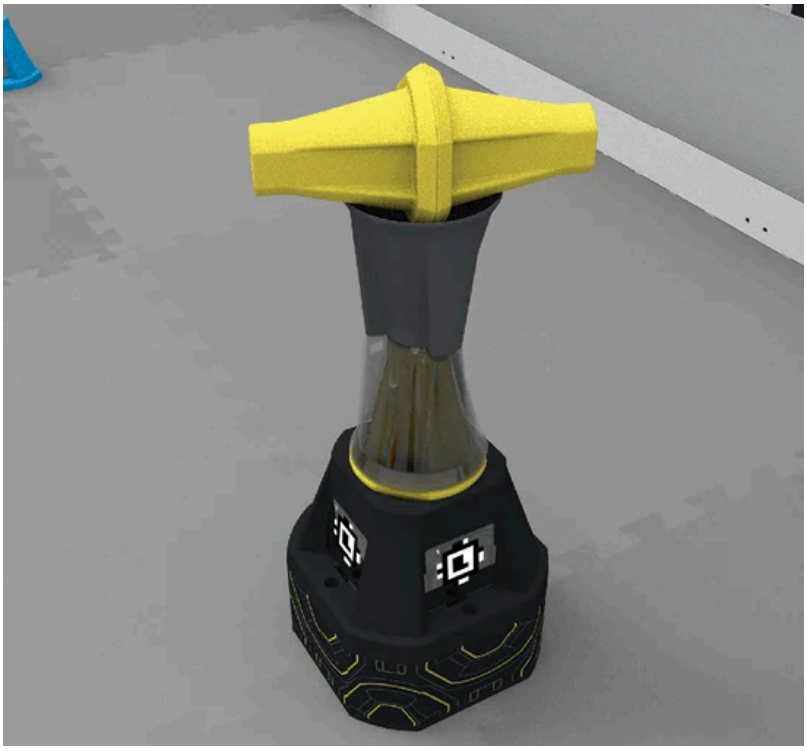


Figure SC2-2: The *Pin* resting on top is partially nested with the *Cup*, but the *Pin* is not considered *Placed* since that half of the *Cup* contains more than one *Pin Half*.

<SC3> Each *Pin* consists of two *Pin Halves*. **Each visible half of a Placed Pin is Scored** and earns points according to its color:

a. *Scored* red *Pin Halves* earn points for the red *Alliance*.
b. *Scored* blue *Pin Halves* earn points for the blue *Alliance*.
c. *Scored* yellow *Pin Halves* earn points for the *Alliance* that Owns them. (Yellow *Pin Halves* must be *Owned* to be considered *Scored*. See SC5.)

A *Pin Half* is considered visible unless it is partially or fully nested inside a *Goal* or the opaque half of a *Cup*.

<SC4> A Toggle is considered set to a color when it meets all of the following criteria:

a. The *Toggle* must be fully seated, such that there is a face of the *Toggle* in contact and parallel with its mounts on the *Field Perimeter* at rest. (see Figure SC5-1)
b. The *Toggle* is not in contact with a *Robot* from either *Alliance*.

If a *Toggle* is not considered set to a color, it is considered a neutral (yellow) *Toggle* by default, and neither *Alliance* receives Ownership of the yellow *Pin Halves* in that *Quadrant*. While the *Toggle* has

infinite potential orientations, only three discrete orientations are considered “set” states.

<SC5> Ownership of Yellow Pin Halves. Each yellow half of a *Placed Pin* can be *Owned* by an *Alliance* under the following conditions:

a. For *Pins Placed* in a *Quadrant Goal*, the yellow *Pin Halves* are *Owned* by an *Alliance* if the *Toggle* in that *Quadrant* is set to the *Alliance’s* color. If the *Toggle* in that *Quadrant* is set to yellow, the yellow *Pin Halves* are not *Owned* and do not score points. (See SC3.)

b. For *Pins Placed* in the *Midfield Goal*, the yellow *Pin Halves* are *Owned* by the *Alliance* that ends the *Match* with a greater number of *Robots* in the *Midfield*. (See SC6).

    i. If both *Alliances* end the *Match* with an equal number of *Robots* in the *Midfield*, the yellow *Pin Halves* are not *Owned* and do not score points.

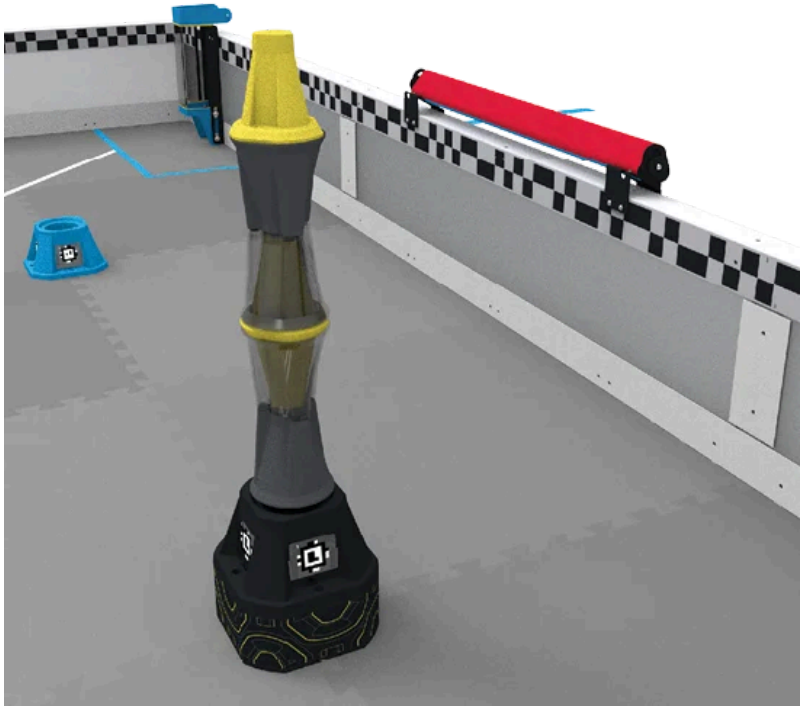


Figure SC5-1: This *Quadrant’s Toggle* is set to red, so these yellow *Pin Halves* are *Owned* by the red *Alliance*.

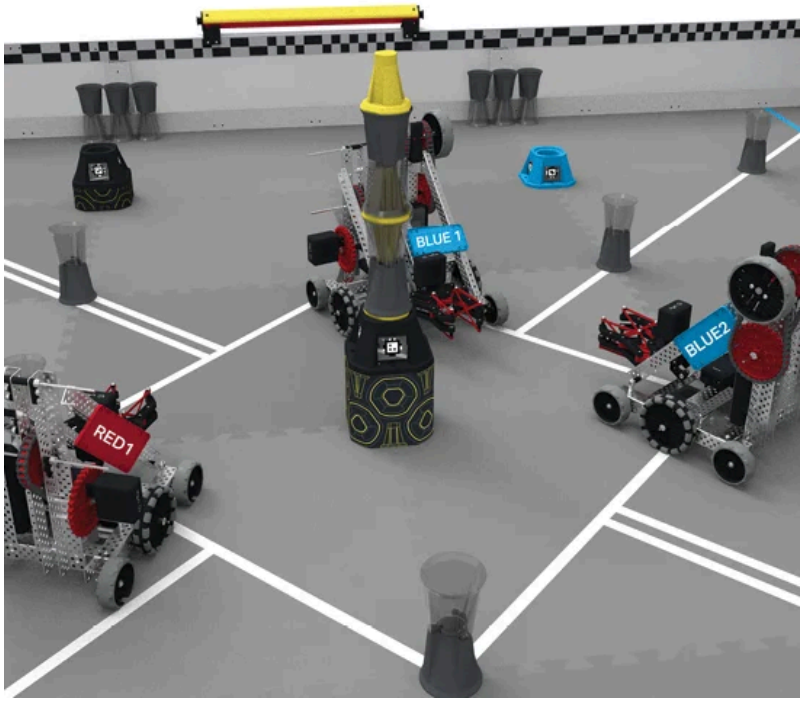
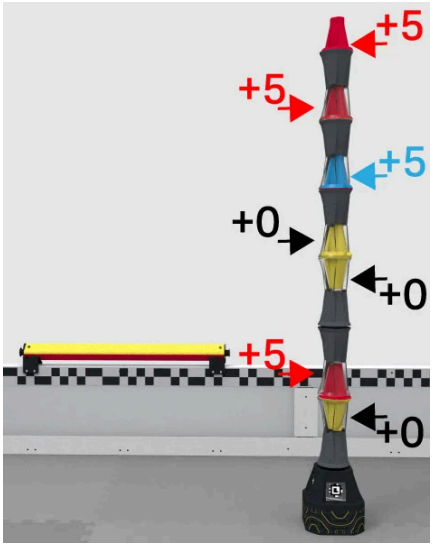
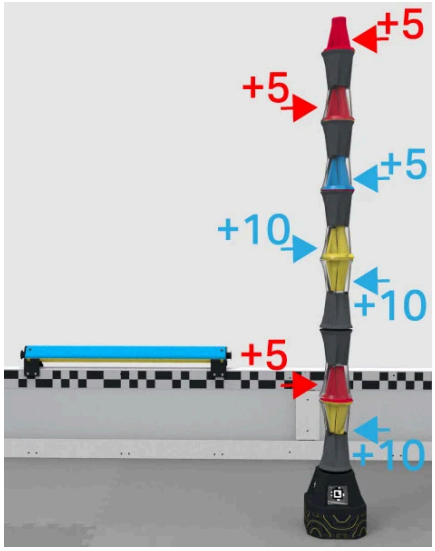
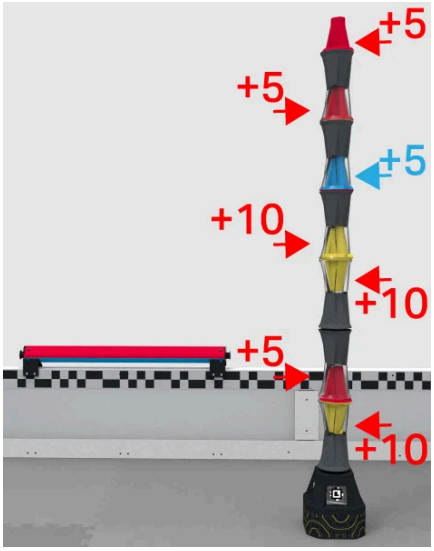


Figure SC5-2: The blue *Alliance* has more *Robots* in the *Midfield* at the end of the *Match*, so these yellow *Pin Halves* are *Owned* by the blue *Alliance*.

		
Toggle: Yellow	*Toggle*: Blue	*Toggle*: Red
Red *Pin Halves*: 15 points	Red *Pin Halves*: 15 Points	Red *Pin Halves*: 15 Points
Blue *Pin Halves*: 5 Points	Blue *Pin Halves*: 5 Points	Blue *Pin Halves*: 5 Points

Yellow *Pin Halves*: 0 Points	Yellow *Pin Halves*: 30 Points (*Scored* for Blue)	Yellow *Pin Halves*: 30 Points (*Scored* for Red)
Total Red : 15 Points / Blue : 5 Points	Total Red : 15 Points / Blue : 35 Points	Total Red : 45 Points / Blue : 5 Points

<SC6> A *Robot* counts as **ending in the Midfield** if the *Robot* is at least partially within the *Midfield* at the end of the *Match* (i.e., any part of the *Robot* extends into the defined volume of the *Midfield*).

<SC7> Scoring of the *Autonomous Bonus* is evaluated immediately after the *Autonomous Period* ends.

a. Scoring methods that rely on *Robots'* end-of-*Match* positioning in the *Midfield* (e.g., *Robots* ending in the *Midfield* and Ownership of yellow *Pins* in the *Midfield*) are not included in *Autonomous Period* scoring calculations.
b. If the *Autonomous Period* ends in a tie, including a zero-to-zero tie, each *Alliance* will receive an *Autonomous Bonus* of six (6) points.
c. Any *Violations*, Major or Minor, committed during the *Autonomous Period* will result in the *Autonomous Bonus* being automatically awarded to the opposing *Alliance*. See GG13.
d. Per rule GG13, if both *Alliances* commit *Violations* during the *Autonomous Period*, then no *Autonomous Bonus* will be awarded.

This rule is applied differently for VEX U. See Rule VUG5.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAISC1.

<SC8> An **Autonomous Win Point** is awarded to any *Alliance* that ends the *Autonomous Period* with all of the following tasks completed, and that has committed no *Violations* during the *Autonomous Period* :

1. At least six (6) *Pin Halves Scored* for your *Alliance*. (Does not include *Pin Halves Scored* in *Quadrants* on the opposing side of the *Autonomous Line*)
2. At least two (2) *Goals* each contain at least two (2) *Pin Halves Scored* for your *Alliance*. (Does not include *Goals* in *Quadrants* on the opposing side of the *Autonomous Line*.)
3. Neither *Robot* is contacting the *Field Perimeter*.

For events which qualify directly to the VEX Robotics World Championship (such as Event Region Championships and Signature Events), the following tasks must be completed for an *Alliance* to receive an *Autonomous Win Point*. The standard criteria above still apply to all other events.

1. At least seven (7) *Pin Halves Scored* for your *Alliance*. (Does not include *Pin Halves Scored* in *Quadrants* on the opposing side of the *Autonomous Line*)
2. At least three (3) *Goals* each contain at least two (2) *Pin Halves Scored* for your *Alliance*. (Does not include *Goals* in *Quadrants* on the opposing side of the *Autonomous Line*)
3. Neither *Robot* is contacting the *Field Perimeter*.

> ⚠ **Caution**
>
> *Autonomous Win Point* criteria may be further modified for the World Championship if needed, with details to be released in a future Game Manual update. *Autonomous Win Point* criteria for World Championship-qualifying events will be used as a baseline to determine criteria for the World Championship. Any potential modifications would be minor.

This rule is applied differently for VEX U. See Rule VUG6.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAISC2.

Specific Game Rules

<SG1> Starting a Match. Prior to the start of each *Match*, each *Robot* must be placed such that it meets all of the following criteria:

a. No larger than 18″ (457.2 mm) long by 18″ (457.2 mm) wide by 18″ (457.2 mm) tall.
b. Not contacting any *Scoring Objects* other than a maximum of one (1) *Preload*. See rule SG5.
c. Not contacting *Goals*, *Loaders*, *Load Zones*, or *Toggles*.
d. Not contacting any other *Robots*, and not sharing a *Quadrant* with another *Robot*.
e. Completely stationary (i.e., no motors or other mechanisms in motion).
f. Contacting the *Field* tiles and *Field Perimeter* on their *Alliance's* side of the *Autonomous Line*.

Note: Using external influences, such as *Preloads* or the *Field Perimeter*, to maintain a *Robot's* starting size is only acceptable if the *Robot* would still satisfy the constraints of R3 and pass inspection without these influences.

Violation Notes:

1. The *Match* will not begin with any conditions in this rule unmet. If a *Robot* cannot meet these conditions in a timely manner, the *Robot* will be removed from the *Field* and rules <R2d> and GG2

will apply until the situation is corrected. They will not receive a *Disqualification*, but should receive a *Minor Violation* and will not be permitted to play in the *Match*.

Clause A of this rule is applied differently for VEX U. See Rule VUG1 and VUG3.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIG4.

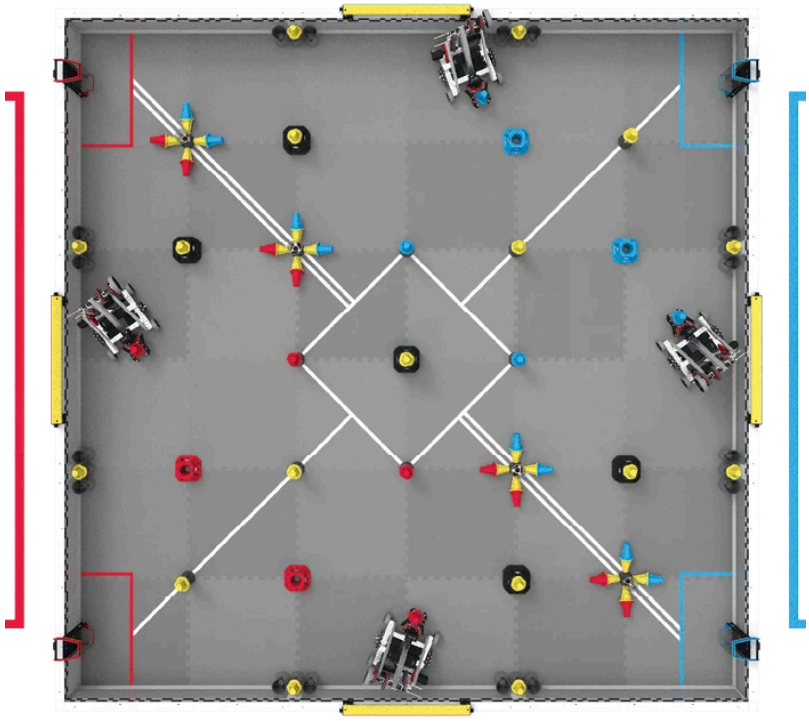


Figure SG-1: An overhead view of the *Field*, with four *Robots* in legal starting positions.

<SG2> Horizontal expansion is limited. Once the *Match* begins, *Robots* may expand horizontally beyond the starting size limit within the following criteria:

a. The *Robot* can never be larger than 24″ wide or 24″ long at any point during the *Match* (must fit within a 24″x24″ square horizontal footprint).

> ⚠ **Caution**
>
> *Teams* should be aware that *Robots* may incidentally expand horizontally while extending vertically (e.g., mechanisms that arc, swing, or deploy upward). *Teams* must be prepared to demonstrate that their *Robot* does not exceed the maximum size constraint of 24″ x 24″ at any point during a *Match* due to either physical or programmed limitations, including while any vertical expansion mechanisms are in use.

Violation Notes:

1. Incidental/insignificant infractions that occur during a *Match* are only considered *Minor Violations*. Repeated *Minor Violations* should only escalate to a *Major Violation* in extreme circumstances. Examples of *Minor Violations* include, but are not limited to:
    - Loose wires
    - Broken zip ties / rubber bands
    - Bent or broken mechanical components that are not used for strategic gain



Figure SG-2: A demonstration of how the size of the *Robot* may change horizontally through the course of a vertical expansion.

<SG3> Vertical expansion is limited. Once the *Match* begins, *Robots* may expand vertically beyond the starting size limit, but no part of the *Robot* may exceed an overall height of 50″ at any point during the *Match* (must always be able to fit within a hypothetical 50″ vertical sizing box).

<SG4> Keep Scoring Objects in the Field. *Teams* may not intentionally remove *Scoring Objects* from the *Field*. A *Scoring Object* that leaves the *Field* during *Match* play will be returned to the *Field* in a location near where it left, in contact with the *Field* tiles and the *Field Perimeter* but no other *Field Elements* or *Scoring Objects* and no *Robots*. Volunteers should return *Scoring Objects* to the *Field* as quickly as possible, and any delay in returning a *Scoring Object* should not be considered *Match Affecting* or cause for a replay.

a. A *Scoring Object* that comes to rest on top of the *Field Perimeter* is considered to have left the *Field*.

Violation Notes:

1. Due to the difficulty of determining *Match Affecting* implications of this rule, most *Violations* should be considered Minor. However, blatantly intentional and/or *Match Affecting Violations* may still immediately escalate to a *Major Violation* at the *Head Referee's* discretion.

<SG5> Each Robot gets one Pin as a Preload. Red *Alliance Preloads* are red/yellow *Pins* ; blue *Alliance Preloads* are blue/yellow *Pins*. Prior to the start of each *Match*, each *Preload* must be placed such that it meets all of the following criteria:

a. Contacting one *Robot* of the same *Alliance* color as the *Preload*.
b. Not contacting the same *Preload* as another *Robot*.
c. Not contacting other *Scoring Objects*.
d. Not contacting any other *Goals*, *Loaders*, *Load Zones*, or *Toggles*.

Note: If a *Robot* is not present for their *Match*, then that *Robot's Preload* may be used as a *Match Load* in accordance with SG11.

Violation Notes:

1. See SG1.

<SG6> Possession is limited to a maximum of one Pin and one Cup. *Robots* may not have *Possession* of more than (1) *Pin* at once. *Robots* may not have *Possession* of more than (1) *Cup* at once. *Robots* in *Violation* of this rule must immediately stop all actions except for attempting to remove the excess *Scoring Objects*.

If they are unable to remove the excess *Scoring Objects*, then they must return to a legal starting position (as described by SG1). They will not be eligible to receive points for ending the *Match* in the *Midfield*, and cannot interact with *Toggles*, *Goals*, or other *Scoring Objects* while in *Possession* of excess *Scoring Objects*.

<SG7> Don't cross the Autonomous Line, and don't interfere with your opponents' actions. During the *Autonomous Period*, *Robots* may not contact foam tiles, *Scoring Objects*, or *Field Elements* which are on the opposing *Alliance's* side of the *Autonomous Line*.

a. The *Autonomous Period* should be primarily *Offensive*, with *Teams* focusing on scoring and executing strategic maneuvers rather than *Defensive* disruption. *Teams* should avoid actions that are primarily *Defensive* in nature, including but not limited to:

i. Intentionally disrupting *Scoring Objects* or *Field Elements* on the opponent's side of the *Autonomous Line*.

ii. Deliberately contacting an opponent's *Robot* to interfere with their autonomous path.

b. *Scoring Objects* that begin the *Match* on the *Autonomous Line* are not considered to be on either side, and may be utilized by either *Alliance* during the *Autonomous Period*.

Note: All 28 *Scoring Objects* that begin the *Match* above or in contact with the *Autonomous Line* are considered to be on the *Autonomous Line*. See Figure SG-7.

c. While incidental contact or unintentional interactions may occur with *Robots* on the other side of the *Autonomous Line*, *Teams* that employ deliberate *Defensive* autonomous strategies that impact their opponents' autonomous routines may be subject to Minor or *Major Violations* at the discretion of the *Head Referee*.

d. *Teams* cannot intentionally move *Scoring Objects* to the opposing *Alliance's* side of the *Autonomous Line*.

e. Contact with either of the following during the *Autonomous Period* will result in the *Autonomous Bonus* and an *Autonomous Win Point* being awarded to the opposing *Alliance*, unless the opposing *Alliance* also breaks rules in the *Autonomous Period* :

i. An opposing *Robot* that isn't interacting with (1) the *Autonomous Line*, (2) objects that begin the *Match* on the *Autonomous Line*, or (3) the *Midfield*. (See SG8.)

ii. *Scoring Objects* on the other side of the *Autonomous Line*.

Violation Notes:

1. All *Violations* of this rule (Major or Minor) will result in the *Autonomous Bonus* being awarded to the opposing *Alliance*. See <SG8b> for a potential exception caused by *Autonomous Line* interactions.
2. Intentional, strategic, or egregious *Violations*, such as intentional contact with an opposing *Robot* while contacting the foam tiles on the opposing side of the *Autonomous Line*, or the interactions described in <SG7e> will be considered *Major Violations* and should result in a *Disqualification* for the *Match*.
3. Deliberate *Defensive* Autonomous strategies, as described in <SG7a>, may also be recorded as G1 *Violations* at the *Head Referee's* discretion.

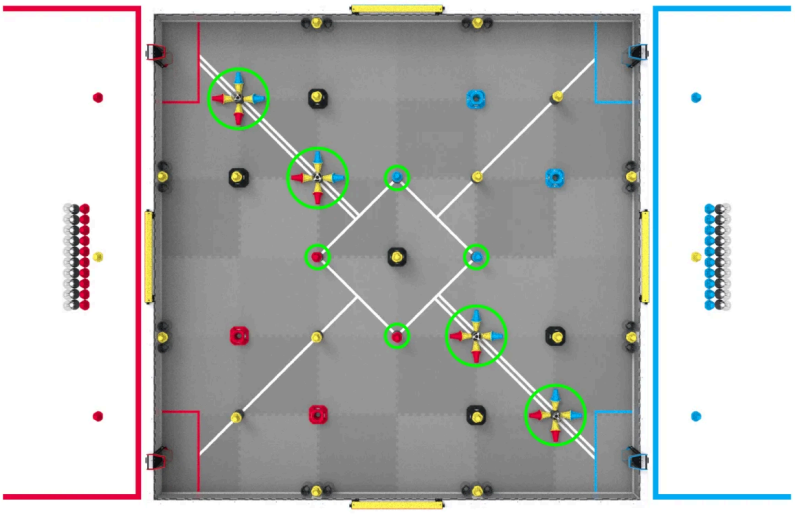


Figure SG-7: These *Scoring Objects* (circled in green) would be considered to be on the *Autonomous Line*.

<SG8> Engage with the Midfield and/or Autonomous Line during the Autonomous Period at your own risk. Any *Robot* that engages with the *Midfield* and/or *Scoring Objects* that begin the *Match* on the *Autonomous Line* should be aware that opponent *Robots* may also choose to do the same. Per GG12 and GG13, *Teams* are responsible for the actions of their *Robots* at all times.

a. For the purposes of this rule, "engages with" means any combination of:
    i. Contacting foam tiles within the *Midfield*
    ii. Contacting the *Goal* in the *Midfield*
    iii. Contacting *Scoring Objects* that begin the *Match* on the *Autonomous Line*
b. If opposing *Robots* contact one another while both engaging with the *Midfield* or *Autonomous Line*, and an incidental *Violation* of SG4 occurs, no penalty will be assessed on either *Alliance*.
c. Intentional, strategic, repeated, or egregious offenses, such as negatively impacting *Robots* that are not engaging with the *Midfield* or the *Autonomous Line*, may still be deemed a *Violation* of GG13, GG14, GG15, SG7, G1, and/or S1 at the *Head Referee's* discretion.

> **⚠ Caution**
>
> The *Midfield* and the *Scoring Objects* that begin on the *Autonomous Line* are intended to be utilized by both *Alliances* during the *Autonomous Period*. This will inevitably result in *Robot* -on-*Robot* interactions, both incidental and intentional. The overarching intent of SG8 is for the vast majority of these interactions to result in no rule *Violations* and / or penalties for either *Alliance*, just as no rules *Violations* occur in 99% of Driver Controlled interactions.
>
> *Teams* are responsible for the actions of their *Robots* at all times. A *Robot* with a small wheel base, which tips over every time they enter the *Midfield* and contacts an opponent, should not attempt to claim a GG14 *Violation* on their opponent.
>
> With that being said, the *Midfield* is a neutral zone, not a "free-for-all" zone. The intent of clause D is to provide *Head Referees* with the leeway to still make a judgment call, if needed, when a *Team* has chosen to exploit this rule beyond its intent. Reckless or unsafe strategies aimed solely at the destruction, damage, tipping over, *Entanglement*, *Trapping*, or forcing of an opponent into a penalty are still prohibited in the VEX Robotics Competition.

<SG9> Alliance Goals are protected. *Robots* may not directly or indirectly interact with opposing *Alliance*-colored *Goals*. Examples of interactions include, but are not limited to:

- Making contact with the *Goal* or with *Scoring Objects* stacked on the *Goal*. (Direct)
- Adding or removing *Placed Scoring Objects*. (Direct)
- Strategically covering the *Goal* in a manner that prevents additional *Scoring Objects* from being *Placed*. (Indirect)
- Pushing an opposing *Robot* into *Scoring Objects* stacked in their own *Alliance*-colored *Goal*, knocking some or all of them out of the *Goal*. (Indirect)

Violation Notes:

1. Incidental interactions, such as unintentional/inconsequential contact with the *Goal* and/or *Scoring Objects* stacked on the *Goal*, should typically be considered *Minor Violations*.
2. Intentional, strategic, or egregious interactions, as well as any interactions involving the addition or removal of *Placed Scoring Objects* on the *Goal*, will be considered *Major Violations*.
3. Repeated *Minor Violations* can escalate to a *Major Violation* at the *Head Referee's* discretion, especially in cases where *Violations* occur after multiple prior warnings.

<SG10> Placed Scoring Objects may not be removed from neutral Goals via direct or indirect interactions. Examples of interactions include, but are not limited to:

- Grabbing and lifting a *Scoring Object* out of the *Goal*. (Direct)
- Contacting *Scoring Objects* stacked in the *Goal*, knocking some or all of them out of the *Goal*. (Direct)
- Pushing an opposing *Robot* into *Scoring Objects* stacked in the *Goal*, knocking some or all of them out of the *Goal*. (Indirect)

Violation Notes:

1. For the purposes of *Match Affecting* calculations, the removal of *Placed Scoring Objects* from neutral *Goals* should be evaluated as follows:

    a. For an interaction resulting in the removal of 1, 2, or 3 *Pins*, each *Pin* removed as part of this interaction should be considered worth a value of 10 points.
    b. For an interaction resulting in the removal of 4+ *Pins*, the *Pins* removed as part of this interaction should be considered worth a combined value of 50 points. The value of removed *Pins* is determined for each independent interaction/*Violation*. When multiple *Violations* occur, the point values attributed to each *Violation* may stack and can cumulatively become *Match Affecting*.

    If subtracting these point values from the offending *Alliance's* final score would change the outcome of the *Match*, then the *Violation*(s) should be considered *Match Affecting*. (These point values are not actually subtracted from the final scores of either *Alliance*; this is merely a check made by the *Head Referee*.) These calculations should be taken into account simultaneously for both *Alliances*, prior to determining whether any *Violation* affected the outcome of the *Match* in favor of one *Alliance* or the other.

    Note: *Head Referees* cannot be expected to track the number of *Pins Placed* in each *Goal* throughout a *Match*, and when *Pins* get removed from *Goals*, they cannot be expected to have a 100% accurate count of the *Pins* that were previously *Placed* in that *Goal*. For each interaction involving removed *Pins*, *Head Referees* can only be asked to make their best educated guess as to how many *Pins* were removed, and *Teams* must accept *Head Referee* counts, even if not perfectly accurate. (Accurately counting 1, 2, or 3 *Pins* is difficult. Counting beyond 3 becomes even less reliable, which is why a fixed point value applies to interactions resulting in the removal of 4+ *Pins*.)

2. Intentional, strategic, or egregious *Violations* will be considered *Major Violations*.

3. Repeated *Minor Violations* can escalate to a *Major Violation* at the *Head Referee's* discretion, especially in cases where *Violations* occur after multiple prior warnings.

<SG11> Drive Team Members may only introduce Match Loads to the Field through Loaders, under the following conditions:

a. *Drive Team Members* may introduce *Match Loads* through their *Alliance*-colored *Loaders*, and may operate (raise/lower) those *Loaders*, only during the *Driver Controlled Period* of the *Match*.
b. *Match Loads* may only be introduced by placing or dropping them through the top or back of a *Loader*, either separately or nested together.
c. *Match Loads* may have momentary, simultaneous contact with both a *Drive Team Member* and a *Robot* as the *Match Load* is introduced, prior to being released by the *Drive Team Member*. Once a *Match Load* has been released, it may no longer be contacted by a *Drive Team Member*.
d. *Match Loads* may only be removed through the bottom opening of the *Loader*, and only by *Robots*.

When introducing *Match Loads* to the *Field* through *Loaders*, *Drive Team Members* should never extend any part of their body beyond the bottom edge of the *Loader* plastic. *Drive Team Members* must also be careful not to lift and pull on the *Field Perimeter* while lifting the *Loader*. Excessive, unnecessary, or unsafe actions while introducing a *Match Load* may be considered a *Violation* of S1 and/or G1 at the *Head Referee's* discretion.

This rule is applied differently for VEX U. See Rule VUG4.



Figure SG11-1: *Scoring Objects* can be introduced through the top opening of the *Loader*.

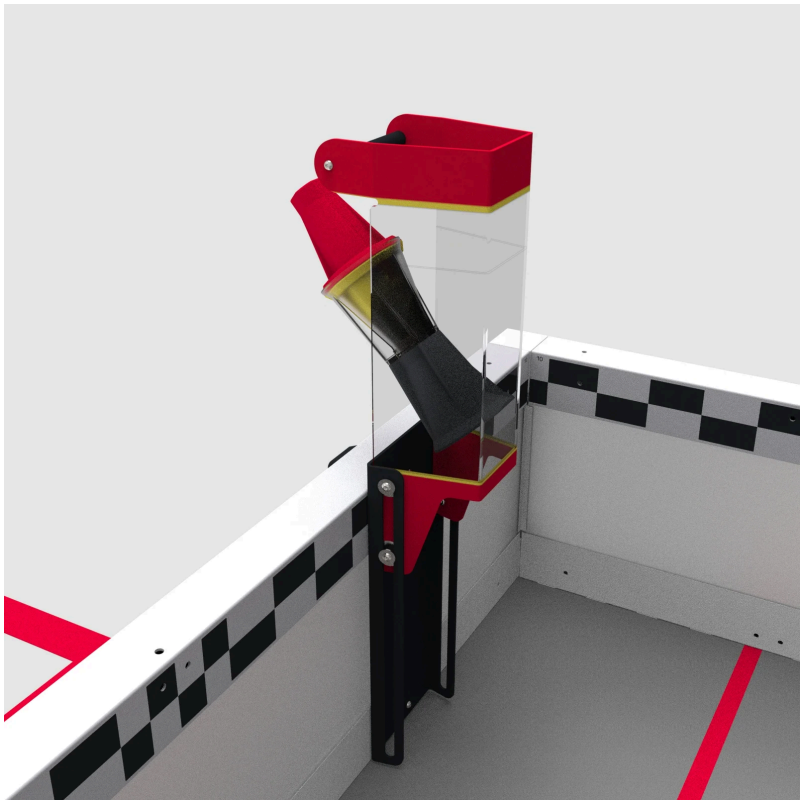


Figure SG11-2: *Scoring Objects* may also be introduced through the back of the *Loader* while it is raised.

<SG12> Some rules change during the Endgame period.

1. *Robots* may not Place *Scoring Objects* on the *Midfield Goal* during the *Endgame* period.
2. *Robots* that attempt to end the *Match* in the *Midfield* should expect vigorous interactions from opposing *Robots*, and must accept increased risk of becoming Entangled or being tipped, especially when vertically expanded. When a *Robot* is contacting or engaging with the *Midfield*, or is in proximity to the *Midfield*, incidental damage that is caused by opposing *Robots* pushing, tipping, or becoming Entangled with them would not be considered a *Violation* of GG14. Intentional damage or dangerous mechanisms may still be considered a *Violation* of S1 or G1 at the *Head Referee's* discretion.

Violation Notes:

1. Most *Violations* of this rule should be considered *Minor Violations*. However, repeated *Minor Violations* can escalate to a *Major Violation* at the *Head Referee's* discretion, especially in cases where *Violations* occur after multiple prior warnings.

2. *Violations* involving *Scoring Objects Placed* on the *Midfield Goal* that change the outcome of the *Match* in favor of the offending *Robot's Alliance* will be considered *Match Affecting Violations*.

<SG13> Load Zones are protected during the Driver Controlled Period of the Match.

a. A *Robot* is protected while it is at least partially within one of its *Alliance Load Zones*. *Robots* may not directly or indirectly contact a protected opposing *Alliance Robot*.
b. *Robots* may only enter an opposing *Alliance Load Zone* momentarily (e.g., while passing through or to retrieve a *Scoring Object*); *Robots* may not remain within an opposing *Alliance Load Zone*.
c. *Robots* may not cause *Scoring Objects* to accumulate within an opposing *Alliance Load Zone*.
d. *Robots* may not add *Scoring Objects* to, or remove them from, opposing *Alliance*-colored *Loaders*.

The intent of this rule is to protect *Load Zones* from intentional interference by the opposing *Alliance* (i.e., obstructing the *Load Zone* in an effort to inhibit *Loader* access).

This rule does not apply during the *Autonomous Period*.

Violation Notes:

1. Egregious *Violations* will be considered *Major Violations*.
2. Repeated *Minor Violations* can escalate to a *Major Violation* at the *Head Referee's* discretion, especially in cases where *Violations* occur after multiple prior warnings.

Safety Rules

<S1> Be safe out there. If at any time the *Robot* operation or *Team* actions are deemed unsafe or have damaged a *Field Element*, *Scoring Object*, or the *Field*, 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 R2 before it may take the *Field* again.

<S2> Students must be accompanied by an Adult. Every *Student* at a VEX Robotics Competition event must be supervised by a responsible *Adult*. The *Adult* must obey all rules and be careful to not violate *Student*-centered policies, but must be present for the full duration of the event in the case of an emergency. *Violations* of this rule may result in removal from the event and additional penalties.

<S3> Each Student Team member must have a completed participant release form on file for the event and season. A *Student Team* member cannot participate in an event without a completed release form on file.

<S4> Stay inside the Field. If a *Robot* is completely outside of the *Field* during a *Match*, it will receive a *Disablement* for the remainder of the *Match*.

Note: The intent of this rule is not to penalize *Robots* for having mechanisms that inadvertently cross the *Field Perimeter* during normal game play.

<S5> Wear safety glasses. *Drive Team Members* must wear eye protection. All *Drive Team Members* must wear some form of eye protection while at the *Field* for *Matches*. Safety glasses or other eye wear with side shields and non-shattering lenses are recommended. While in the pit and queuing areas, it is highly recommended that all *Team* members wear eye protection.

General Rules

<G1> Participants must follow the Code of Conduct. All event attendees must abide by the guidelines set forth in the Code of Conduct.

Violation Notes:

1. Any *Violation* of G1 may be considered a *Major Violation* and should be addressed on a case-by-case basis. *Teams* at risk of a G1 *Major 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> Participants must follow the Student Centered Policy. All event attendees must abide by the guidelines set forth in the Student Centered Policy.

Violation Notes:

1. 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 programmed by an *Adult* scores points in 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 VEX V5 Robotics Competition.

> ⚠ **Caution**
>
> Some examples include:
>
> - If there is an obvious typographical error (such as “per T5” instead of “per GG5”), this does not mean that the error should be taken literally until corrected in a future update.
> - Understand the realities of the VEX V5 *Robot* construction system. For example, if a *Robot* could hover above the *Field* for a whole *Match*, that would create loopholes in many of the rules. But… they can’t. So… don’t worry about it.
> - When in doubt, if there is no rule prohibiting an action, it is generally legal. However, if you have to ask whether a given action would violate S1, G1, or T1 then that’s probably a good indication that it is outside the spirit of the competition. On the other hand, if there’s not a rule that makes a *Robot* part legal, it’s not allowed.
> - 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. This especially applies to those rules which govern non-VEX components (e.g. R18, R19, R22, etc). There is a difference between “creativity” and “lawyering.” Basically, if there’s not a rule that makes a *Robot* part legal, it’s not allowed.

<G4> Students must meet the Student Eligibility Policy requirements. All *Student* participants must fall within the eligibility requirements set forth in the Student Eligibility Policy for their respective program.

Violation Notes:

1. *Teams* believed to be in *Violation* of this rule should be reported to the Judge Advisor, *Head Referee*, or *Event Partner* for further investigation in coordination with VEX Robotics. Based on the investigation the *Team* may be removed from further *Matches*, have their *Robot Skills Match* scores removed, and/or be removed from consideration from judged awards.
2. *Violations* of this rule will be evaluated on a case-by-case basis, in tandem with VEX Robotics as noted in G1 and G2.

<G5> There is a difference between accidentally and willfully violating a Robot rule. Any *Violation* of *Robot* rules, accidental or intentional, will result in a *Team* being unable to play until they pass inspection (per <R2d>).

However, *Teams* who intentionally and/or knowingly circumvent or violate rules to gain an advantage over their fellow competitors are in *Violation* of the spirit and ethos of the competition.

Violation Notes:

1. A *Team* that circumvents a *Robot* rule for a competitive advantage should receive an immediate *Disqualification* for the current *Match*.

General Game Rules

<GG1> Only Drive Team Members, and only in the Alliance Station. During a *Match*, *Robots* may be operated only by that *Team's Drive Team Members* and/or by software running on the *Robot's* control system in accordance with R9 and GG11. A *Team* may send up to (3) *Drive Team Members* to their *Alliance Station* for each *Robot*, and those *Drive Team Members* must remain in their *Alliance Station* for the duration of the *Match*.

Drive Team Members are the only *Team* members that are allowed to be in the *Alliance Station* during a *Match*. *Adults* (other than event staff) are not permitted to be in the *Alliance Station* during a *Match*.

a. *Drive Team Members* are prohibited from any of the following actions during a **Match** :
    i. Using any sort of communication device in the *Alliance Station*. Non-headphone devices with communication features turned off (e.g., a phone in airplane mode, a walkie talkie turned off, smart glasses with communication features disabled) are allowed. Communication features can be enabled for translation apps during post-*Match* discussions.
    ii. Standing or sitting on any sort of object during a *Match*, regardless of whether the *Field* is on the floor or elevated, except as required by an officially approved accommodation request.
    iii. Bringing/using additional materials to simplify the game challenge during a *Match* (e.g., device to align or add *Scoring Objects* to a *Loader*.
    iv. To ensure that *Drive Team Members* are aware of verbal calls during a *Match* (as an application of rules T1, G1, S1, and G3), powered headphones, earbuds, passive earpieces connected to electronic devices, or other personal accessories/devices that transmit audio cannot be worn/used in the *Alliance Station* except as required by an officially approved accommodation request.
b. Individuals who are not *Drive Team Members* for a *Match* cannot provide directions, commands, or advice to the *Drive Team Members* during that *Match*. They're welcome to provide cheerful, positive encouragement, but should not affect *Match* play or strategy.

> ⚠ **Caution**
>
> Point iii is intended to refer to non-*Robot*-related items that directly influence gameplay, such as a speaker that plays a buzzer sound to distract your opponent. Provided no other rules are violated, and the items do not pose any safety or *Field* damage risks, the following examples are not considered *Violations* of GG1:
>
> - Materials used before or after a *Match*, such as a pre-*Match* alignment aid
> - Strategic aids, such as a whiteboard or clipboard
> - Earplugs, gloves, or other personal accessories

Violation Notes:

1. *Major Violations* of this rule are not required to be *Match Affecting*, and could invoke *Violations* of other rules, such as G1, G2, or G4.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIG2.

<GG2> A Team's Robot should attend every Match. The *Team's Robot* must be in the *Alliance Station* or on the *Field* for the *Team's* assigned *Match*, even if the *Robot* is not functional. If the *Robot* is not at the *Field* for the entire duration of the *Match*, the *Team* will be considered a "no-show" and receive zero (0) *Win Points*, *Autonomous Win Points*, *Autonomous Points*, and *Strength of Schedule Points*.

a. *Teams* are expected to participate in all scheduled *Qualification Matches*, *Alliance Selection*, and *Elimination Matches* (if they're an *Alliance Captain* or were selected to join an *Alliance* for *Elimination Matches*). Failure to attend scheduled *Matches* or *Alliance Selection* may be considered a *Violation* of G1. *Teams* that participate in zero *Qualification Matches* cannot be considered for judged awards.

<GG3> Robots on the Field must be ready to play. When a *Team* puts their *Robot* on the *Field*, it must be prepared to play (e.g., battery charged, sized within the starting size constraint, includes only the correct *Alliance* -color license plates, etc.).

a. *Robots* must be placed on the *Field* promptly. Repeated failure to do so could result in a *Violation* of G1 and/or removal of the *Robot* from the current *Match* at the *Head Referee's* discretion.
b. If a *Robot* is delaying the scheduled start of a *Match*, it may be removed from the *Field* at the discretion of the *Head Referee* and *Event Partner*. The *Robot* may remain at the *Field* so that the *Team* does not get assessed a "no-show" (per GG2).

c. If a *Robot* is not placed on the *Field* prior to the start of a *Match*, it cannot be placed on the *Field* during that *Match*.

d. *Teams* who use VEX pneumatics must have their systems charged before they place the *Robot* on the *Field*.

e. If an event is using Smart *Field* Control and a *Robot* is unable to successfully connect to Smart *Field* Control prior to the scheduled start of a *Match*, the *Head Referee* may ask the *Team* to remove their *Robot* from the *Field* in accordance with clause B.

   i. A *Robot* that connects to Smart *Field* Control but displays a 'Legacy *Field* Control' error on the field monitor is NOT considered successfully connected to Smart *Field* Control, and may be removed from the *Field* if it is delaying the scheduled start of a *Match*.

> ⚠ **Caution**
>
> The definition of the word "promptly" as used in clause A is at the discretion of the *Event Partner* and *Head Referee*, who will consider event schedule, previous *Violations* or delays, etc. As a general guideline, five seconds to check *Robot* alignment would be acceptable, but five minutes to assemble multiple parts together would not.

<GG4> Hands out of the Field. During a *Match*, *Drive Team Members* are prohibited from reaching into the 3-dimensional volume of the *Field Perimeter* and from making intentional contact with any *Field Element*, *Robot*, or *Scoring Object* that has been introduced to the *Field*, unless otherwise noted below.

a. *Drive Team Members* are allowed to reach into the *Field* during the *Match* while introducing *Match Loads* as described in rule SG11. Rule S1 applies.

b. Any concerns regarding *Field Element* or *Scoring Object* starting positions should be raised with the *Head Referee* prior to the *Match*. *Team* members may never adjust *Scoring Objects* or *Field Elements* themselves.

c. Transitive contact, such as contact with the *Field Perimeter* that causes the *Field Perimeter* to contact *Field Elements* or objects inside of the *Field*, could be considered a *Violation* of this rule.

d. During the *Driver Controlled Period*, *Drive Team Members* may reach into the *Field* and touch their own *Robot* only if the *Robot* has not moved at all during the *Match*. Movement caused by an external force, such as another *Robot*, should not prevent a *Drive Team Member* from interacting with their *Robot* under this rule. Touching the *Robot* in this case is permitted only for the following reasons:

   i. Turning the *Robot* on or off.

   ii. Plugging in a battery.

iii. Plugging in a V5 *Robot* Radio.

iv. Touching the V5 *Robot* Brain screen, such as to start a program.

> ⚠ **Caution**
>
> If a *Drive Team Member's* hands extend over the *Field* and/or *Field Perimeter* in a way that is safe and doesn't contact anything in the *Field*, it's unlikely to be a *Violation*. However, *Head Referees* may still ask *Drive Team Members* to step back and remain completely outside the *Field* when necessary (e.g., for safety reasons or to reduce the chances of gameplay interference).

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIG2.

<GG5> Match replays are allowed, but rare. *Match* replays (i.e., playing a *Match* over again from its start) must be agreed upon by both the *Event Partner* and *Head Referee*, and will only be issued in the most extreme circumstances. Some example situations that may warrant a *Match* replay are as follows (note that this is not an exhaustive list):

a. *Match Affecting* "*Field* fault" issues.
   i. One or more *Field Elements* and/or *Scoring Objects* starting in incorrect positions, and out of the allowed tolerances (see T5).
   ii. Tape lines lifting.
   iii. *Field Elements* detaching or moving beyond normal tolerances (not as a result of *Robot* interactions).
   iv. The *Autonomous Period* or *Driver Controlled Period* ending early.
   v. *Field* control disconnecting or Disabling multiple *Robots*. Note, this is sometimes confused with a *Robot* whose motors have overheated, or bent pins on a controller's competition port causing intermittent drop-outs. In general, any true *Field* fault will impact both *Alliances* simultaneously, not one *Robot* at a time.

b. *Match Affecting* game rule issues.
   i. *Head Referee* Disables a *Robot* for a misinterpretation of a rule *Violation*.
   ii. *Head Referee* starts the *Driver Controlled Period* of the *Match* without determining the outcome of the *Autonomous Period* winner.

c. The *Field* is reset before a score is determined.

d. A *Match* is run before its scheduled time without a *Team*.

> **⚠ Caution**
>
> Communication or control issues affecting a single *Robot* are not considered eligible grounds for a replay.

<GG6> Disqualifications. When a *Team* receives a *Disqualification* in a *Qualification Match*, they receive a score of zero (0) for the *Match*, as well as zero (0) *Win Points*, *Autonomous Win Points*, *Autonomous Points*, and *Strength of Schedule Points*.

a. If the *Team* receiving the *Disqualification* is on the winning *Alliance*, then *Teams* on the opposing *Alliance* who are not also Disqualified will receive the win for the *Match* and two (2) *Win Points*.
    i. The *Team's* non-Disqualified *Alliance* Partner is unaffected, i.e., they will also receive the win for the *Match* and two (2) *Win Points*.

b. If the *Match* was a tie, then each *Team* on the opposing *Alliance* (the *Alliance* that did not receive the *Disqualification*) will receive the win for the *Match* and two (2) *Win Points*. If both *Alliances* have a *Team* receiving a *Disqualification*, then all non-Disqualified *Teams* will receive a tie for the *Match* and one (1) **Win Point**.

c. *Autonomous Win Points* are not given to *Teams* that receive a *Disqualification*, and are not automatically awarded to the opposing *Alliance*.

When a *Team* is Disqualified in an *Elimination Match*, the entire *Alliance* is Disqualified ; they receive a loss for the *Match*, and the opposing *Alliance* is awarded the win. If both *Alliances* receive a *Disqualification* in an *Elimination Match*, both *Alliances* receive a loss and will play another *Match* to determine a winner.

Note: If a *Team* is Disqualified in a *Robot Skills Match*, a score of zero (0) will be recorded for that *Match*.

<GG7> Time-outs. Each Elimination *Alliance* gets one three-minute *Time-out*, which they may request during the *Elimination Bracket*. The *Time-out* will be served at the time of the *Alliance's* next upcoming *Match*. *Alliances* must request their *Time-out* between *Elimination Matches* ; they may not use their *Time-out* during a *Match*, for another *Alliance's Match*, or after they have been eliminated. There are no *Time-outs* **during the Qualification Match schedule.**

a. A *Time-out* can be ended early, but only if agreed to by both *Alliances* and the *Head Referee*.

b. An *Alliance's Time-out* request should never be denied if the *Alliance* legitimately needs extra time.

<GG8> Keep your Robots together. *Robots* may not intentionally detach parts during the *Match* or leave mechanisms on the *Field*.

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

Violation Notes:

1. *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 wheel falling off.

<GG9> Don't hook your Robot to the Field, and don't get Entangled. *Robots* may not intentionally grasp, grapple, hook, attach to or otherwise Entangled with any *Field Elements*. Strategies with mechanisms that react against multiple sides of a *Field Element* in an effort to latch or hook onto said *Field Element* are prohibited. The intent of this rule is to prevent *Teams* from unintentionally damaging the *Field* and/or from anchoring to or otherwise Entangling themselves with the *Field*.

Whenever possible, *Head Referees* should alert *Teams* to potential *Violations* before they happen to prevent actual *Violations*. If a *Robot* takes immediate action to avoid or resolve the issue, and if the *Head Referee* determines that the issue had no effect on the *Match*, no *Violation* should be recorded.

<GG10> The red Alliance may choose to place last. The red *Alliance* has the right to place its *Robots* on the *Field* last in *Qualification Matches* and *Elimination Matches*. Once a *Team* has placed its *Robot* on the *Field*, in order to avoid schedule delays its position should not be adjusted prior to the *Match*. GG3 applies. If a *Team* chooses to reposition their *Robot* after it has already been placed, the opposing *Alliance* will also be given the opportunity to reposition their *Robots* promptly.

This rule is applied differently for VEX U. See Rule VUG2.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIG1.

<GG11> Controllers must stay connected to the Field. Prior to the beginning of each *Match*, *Drive Team Members* must plug their V5 Controller into the *Field's* control system. This 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*. See T8 for more information regarding *Field* control system options.

Violation Notes:

1. The intent of this rule is to ensure that *Robots* abide by commands sent by the tournament software. Temporarily removing the cable to assist with mid-*Match* troubleshooting, with an *Event Partner* or other event technical staff present and assisting, would not be considered a *Violation*.

<GG12> 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. This could include, but is not limited to:

- Activating any controls on their V5 Controllers
- Unplugging or otherwise manually interfering with the *Field* connection in any way
- Manually triggering sensors (including the Vision Sensor) in any way, even without touching them

Note: In extreme cases, with permission from the *Head Referee*, *Teams* may Disable their *Robot* during the *Autonomous Period* by holding the power button on their V5 Controller. This exception is only intended for egregious safety- or damage-related circumstances; Disabling an autonomous routine for strategic purposes would still be considered a *Violation* of GG12.

Violation Notes:

1. See GG13.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIG2.

<GG13> All rules still apply in the Autonomous Period. *Teams* are responsible for the actions of their *Robots* at all times, including during the *Autonomous Period*. Any *Violations*, Major or Minor, committed during the *Autonomous Period* will result in the *Autonomous Bonus* being automatically awarded to the opposing *Alliance* and make the violating *Team's Alliance* ineligible for the *Autonomous Win Point*.

If both *Alliances* commit *Violations* during the *Autonomous Period*, then no *Autonomous Bonus* will be awarded.

Violation Notes:

1. In general, *Minor Violations* of SG 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* or earn an *Autonomous Win Point*) and should not be considered when determining whether a *Violation* has been repeated during the event.
2. If a *Head Referee* determines that a *Violation* of an SG or GG rule during the *Autonomous Period* was intentional/strategic rather than accidental/situational, it should be recorded as a *Minor Violation* or *Major Violation* and considered when determining whether a *Violation* has been repeated during the event.

<GG14> Don't destroy other Robots. But, be prepared to encounter defense. Strategies aimed solely at the destruction, damage, tipping over, or *Entanglement* of opposing *Robots* are not part of the ethos of

the VEX V5 Robotics Competition and are not allowed.

a. VEX V5 Override is intended to be an *Offensive* game. *Teams* that partake in solely *Defensive* or destructive strategies will not have the protections implied by this rule (see GG15). However, *Defensive* play which does not involve destructive or illegal strategies is still within the spirit of this rule.
b. VEX V5 Override is also intended to be an interactive game. Some incidental tipping, *Entanglement*, and damage 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 or potentially causing damage, and to *Teams* whose *Robots* have small and/or unstable wheel bases. A *Team* should design its *Robot* such that it is not easily tipped over or damaged by minor contact.
d. GG14 may be applied differently in the *Midfield* during the *Endgame*. See SG12.

Violation Notes:

1. *Major Violations* of this rule are not required to be *Match Affecting*. Intentional and/or egregious tipping, *Entanglement*, or damage may be considered a *Major Violation* at the *Head Referee's* discretion.
2. Repeated *Violations* within a *Match* or *Tournament* could be considered a *Violation* of G1 and/or S1 at the *Head Referee's* discretion.

<GG15> Offensive Robots get the "benefit of the doubt" when judgment calls are required. In a case where a *Head Referee* is 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*. This also applies during the *Autonomous Period* (see <SG7a>).

> **⚠ Caution**
>
> This rule is intended to be a "logical tiebreaker" for use only when referees cannot make a clear and definitive ruling without it. It should not be used or applied in every situation. Most *Violations* should be resolved without considering this rule.
>
> *Head Referees* must apply judgment when determining whether each *Robot* in a GG15 interaction was *Defensive* or *Offensive*, and in some cases may need to consider which *Robot* was more *Defensive* or *Offensive* than another within the larger context of the *Match*. In these cases, the *Head Referee* should decide in favor of the less *Defensive* and/or more *Offensive Robot* based on the definitions and guidance in this game manual.

<GG16> You can't force an opponent into a penalty. Actions that cause an opposing *Robot* to break a rule are not permitted, and will not result in a *Violation* for the opposing *Robot*.

Violation Notes:

1. 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 *Team* that forced a *Violation*. However, if the forced situation becomes *Match Affecting* in favor of the *Team* that forced the *Violation*, it will be considered a *Major Violation* for the *Team* that forced the *Violation*.

<GG17> No Holding for more than a 3-count. A *Robot* may not Hold an opposing *Robot* for more than a 3-count during the *Driver Controlled Period*.

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.

The *Holding* count should pause when at least one of the following conditions is met:

a. The two *Robots* are separated by at least two (2) feet (approximately one foam tile).
b. Either *Robot* has moved at least two (2) feet away (approximately one tile) from the location where the *Trapping* or *Pinning* count began.
    i. In the case of *Lifting*, this location is measured from where the Lifted *Robot* is released, not from where the *Lifting* began.
c. The *Holding Robot* becomes Trapped or Pinned by a different *Robot*.

i. In this case, the original count would end, and a new count would begin for the newly Trapped or Pinned *Robot*.

d. 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 a 5-count. If a *Team* resumes *Holding* the same *Robot* within that 5-count, the original *Holding* count will resume from where it ended. A *Head Referee* should use fingers to display the 5-count that occurs after the end of a *Holding* count, and "wave it off" after the *Holding* interaction has been cleared.

If two *Robots* are working together to Trap an opponent simultaneously, the *Holding* count can be applied to both *Robots* ; it's possible for them to legally take turns *Trapping*, but it's risky.

> ⚠ **Caution**
>
> If the *Head Referee* determines that a *Robot* is not attempting to escape, then it is not considered Pinned or Trapped. This commonly occurs when the *Robot* has malfunctioned and lost the ability to move, or when the *Robot* is defending a *Field Element*.
>
> This criteria is not required for *Lifting*; the *Holding* status begins as soon as the opponent becomes Lifted.
>
> *Holding* is a standard and legal part of Head-to-Head game play, and only becomes a *Violation* if it exceeds the guidelines in this rule. By beginning a *Holding* count immediately after noticing a *Holding* interaction, and providing a visual signal when a *Holding* interaction has been cleared, *Head Referees* can help *Teams* avoid penalties.
>
> Starting a *Holding* count is not, in and of itself, a declaration that *Holding* is occurring. Ending a *Holding* count early and waving it off is also not, in and of itself, an indication that *Holding* has occurred. There is no harm in a *Head Referee* reacting quickly with a *Holding* count, realizing that no *Holding* is occurring, and then ending and waving off the count.
>
> During a *Holding* count, the *Head Referee* should continually verify that the interaction meets the definition of *Holding*. If it becomes clear that the interaction doesn't meet the definition of *Holding*, the *Head Referee* should end the count early and wave off the *Holding* count. *Holding* only becomes a *Violation* if a referee exceeds a three-count before the *Robots* separate as described in rule GG17.

Violation Notes:

1. When determining whether a *Holding Violation* was *Match Affecting*, they should consider the full context of the *Match* and both *Robots'* actions, including the following. Because the first three seconds of a Hold are legal game play and not a *Violation*, only the extended portion of a Hold should be considered. *Holding* is an inherently *Defensive* action, so rule GG15 may also be considered if a judgment call is required.
    - How much extra time was included in the *Holding* interaction
    - How long the *Robots* were separated if the *Holding Robot* backs away and returns too early
    - What both *Robots* were doing within the larger context of the *Match*

<GG18> Use Scoring Objects to play the game. *Scoring Objects* may not be used to accomplish actions that would be otherwise illegal if they were attempted by *Robot* mechanisms. If a rule is Violated through the use of a *Scoring Objects* instead of a *Robot* mechanism, it should be evaluated as though the rule in question had been Violated by a *Robot* mechanism. Examples include, but are not limited to:

- Interfering with an opponent's Autonomous routine per SG7
- Using a *Scoring Objects* to intentionally tip or Entangle an opponent *Robot*

The intent of this rule is to prohibit *Teams* from using *Scoring Objects* 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, where any interaction between a *Scoring Object* and a *Robot* needs to be scrutinized with the same intensity as if it were a *Robot*.

Section 3 - Robot Skills

Overview

In *Robot Skills Matches*, *Teams* have one minute to score as many points as possible. There are two types of **Robot Skills Matches** : *Driving Skills Matches*, which are entirely Driver controlled, and *Autonomous Coding Skills Matches*, which are autonomous with limited human interaction. *Teams* are ranked based on their combined score in the two types of *Robot Skills Matches*.

Robot Skills Matches are optional for all *Teams*. *Teams* who do not compete in *Robot Skills Matches* will not be penalized in Teamwork *Matches*. However, participation in *Robot Skills Matches* may impact eligibility for judged awards at the event.

At events that include Teamwork *Matches*, *Teams* may only participate in *Robot Skills Matches* if they also participate in the *Qualification Matches*. See rule <T20>.

Robot Skills Challenge Rules

<RSC1> Standard rules apply in most cases. All rules from previous sections apply to *Robot Skills Matches*, unless otherwise specified in this section.

a. Removing *Scoring Objects* from the *Field* in a *Robot Skills Match* is not a *Violation*. *Scoring Objects* that leave the *Field* cannot be returned.
b. In the *Robot* Skills Challenge, the standard definition of *Match Affecting* does not apply, because there is no winner or loser. When evaluating whether a rule *Violation* should be classified as a *Major Violation* or *Minor Violation* in the context of this criteria, the term “score affecting” can be substituted for “*Match Affecting*.” A *Violation* is considered “score affecting” if it results in a net increase of that *Team’s* score at the end of the *Match*.
c. *Violations* of <GG>, <SG>, and <RSC> rules that occur during a *Robot Skills Match* should only affect the outcome of that *Match* and should not be considered when determining whether a *Violation* has been repeated during the event.

<RSC2> Match play is different in Robot Skills Matches.

a. The *Robot* must start the *Robot Skills Match* in a legal starting position in the *Quadrant* adjacent to the red *Alliance Station*.

b. All *Drive Team Members* must remain in the red *Alliance Station* for the duration of the *Match*.
c. One red/yellow *Pin* must be used as a *Preload* in accordance with SG5.
d. *Teams* may only introduce *Match Load Scoring Objects* through red *Alliance Loaders*.
e. *Teams* may introduce *Match Load Scoring Objects* at any time during a *Robot Skills Match*, but only through red *Alliance Loaders*.
f. *Robots* may move freely about the *Field* after the start of the *Match*.

This rule is applied differently for VEX U. See Rule VURS3.

<RSC3> Scoring Robot Skills Matches. For each *Robot Skills Match*, *Teams* are awarded a score based on the following rules and scoring table:

a. The *Team* will earn points for *Scored Pin Halves* of any color. To be considered *Scored*, each visible half of a *Placed Pin* must also meet the following conditions:
    i. Red *Pin Halves* can only be *Scored* if the *Pin* is *Placed* in a red *Quadrant* or in the *Midfield*.
    ii. Blue *Pin Halves* can only be *Scored* if the *Pin* is *Placed* in a blue *Quadrant* or in the *Midfield*.
    iii. Yellow *Pin Halves* can only be *Scored* if they are *Owned*. Ownership is determined as follows:
        1. For *Pins Placed* in a *Quadrant Goal*, the yellow *Pin Halves* are *Owned* if the *Toggle* in that *Quadrant* matches the color of its *Quadrant* (i.e., yellow *Pin Halves* in a red *Quadrant* with a *Toggle* that is set to blue are not *Owned* and will not earn any points).
        2. For *Pins Placed* in the *Midfield Goal*, the yellow *Pin Halves* are *Owned* if a *Robot* ends the *Match* in the *Midfield*. (See SC6.)
b. The *Team* will earn points for a *Robot* ending in the *Midfield*. (See SC6.)

Each *Scored* red or blue *Pin Half*	**5 points**
Each *Scored* yellow *Pin Half*	10 points
Each *Robot* ending in the *Midfield*	8 points

<RSC4> Field setup for Skills Matches. The *Field* is set up differently than a *Head-to-Head Match*, with the following modifications:

a. In *Autonomous Coding Skills Matches*, the VEX GPS code strip must be installed on the *Field*.
b. Revised *Match Loads*. Three (3) red/yellow *Pins*, four (4) blue/yellow *Pins*, and seven (7) *Cups* begin off the *Field* as *Match Loads*.
c. All *Goals* start the *Match* empty with no *Placed Pins*.

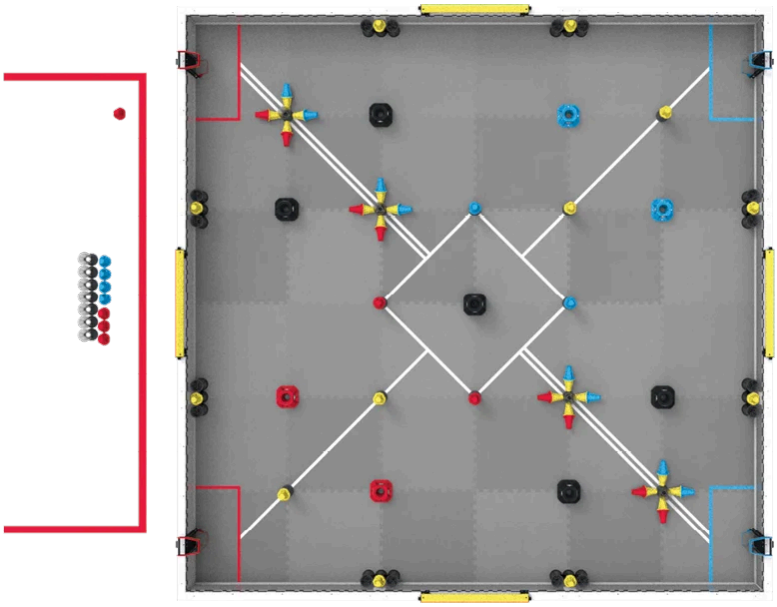


Figure RSC4-1: An overhead view of a VEX V5 Override *Robot Skills Match*.

This rule is applied differently for VEX U. See Rule VURS1.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIRS3.

<RSC5> Skills Stop Time. If a *Team* wishes to end their *Robot Skills Match* early, they may elect to record a *Skills Stop Time*. This is used as a tiebreaker for *Robot* Skills Challenge rankings. A *Skills Stop Time* does not affect a *Team's* score for a given *Robot Skills Match*. *Drive Team Members* and field staff must agree prior to the *Match* on the signal that will be used to end the *Match* early.

a. *Teams* who intend to attempt a *Skills Stop Time* must "opt-in" by verbally confirming with the *Scorekeeper Referee* prior to the *Robot Skills Match*. If no notification is given prior to the start of the *Match*, then the *Team* forfeits their option to record a *Skills Stop Time* for that *Match* and they will receive a default *Skills Stop Time* of 0.
    i. This conversation should include informing the *Scorekeeper Referee* which *Drive Team Member* will signal the stop. The *Match* may only be ended early by a *Drive Team Member* for that *Match*.
    ii. If a *Team* runs multiple *Robot Skills Matches* in a row, they must reconfirm their *Skills Stop Time* choice with the *Scorekeeper Referee* prior to each *Match*.
    iii. Any questions regarding a *Skills Stop Time* should be reviewed and settled immediately following the *Match*. T1 and T3 apply to *Robot Skills Matches*.
b. If the event is utilizing a V5 *Robot* Brain or the TM Mobile app for *Robot* Skills Challenge field control, a *Drive Team Member* may elect to start and stop their own *Robot Skills Matches*.

i. This V5 *Robot* Brain or other device running the TM Mobile app will be used to start the *Robot Skills Matches* (i.e., "enable" the *Robot*), end the *Robot Skills Match* (i.e., "Disable " the *Robot*), and display the official *Skills Stop Time* to be recorded.

ii. This V5 *Robot* Brain must be running the official field control user program.

iii. For more information regarding the use of a V5 *Robot* Brain for *Robot* Skills Challenge field control, and to download the official field control user program, visit this VEX Knowledge Base article.

iv. For more information regarding the use of TM Mobile for field control, see the *Tournament* Manager documentation.

c. At events which do not have a V5 *Robot* Brain or the TM Mobile App available for *Robot* Skills Challenge field control, *Drive Team Members* and field staff must agree prior to the *Match* on the signal that will be used to end the *Match* early. A manual timer must be used in conjunction with a VEXnet Competition Switch.

i. The moment when the *Match* ends early is defined as the moment when the *Robot* is "Disabled " by the field control system. The time shown on the timer should be rounded up to the nearest second. For example, if the *Robot* is Disabled and the timer shows 25.2 seconds, then the *Skills Stop Time* should be recorded as 26.

ii. The agreed-upon signal must be both verbal and visual, such as *Drive Team Members* crossing their arms in an "X" or placing their V5 Controller(s) on the ground.

iii. The signal must be given by a *Drive Team Member* who is standing in the *Alliance Station*.

iv. It is recommended that *Drive Team Members* also provide verbal notice that they are approaching their *Skills Stop Time*, such as by counting out "3-2-1-stop."

d. It is at the *Event Partner's* discretion which method will be used to record *Skills Stop Times* at a given event. The chosen method must be communicated prior to the start of *Matches* (such as during an event meeting), and made equally available to all *Teams*.

i. If an event intends to use a manual timekeeping method, a *Team* cannot bring their own V5 *Robot* Brain just for use during their own *Robot Skills Match*.

ii. If an event intends to utilize a V5 *Robot* Brain, all *Teams* must use the same V5 *Robot* Brain for all *Robot Skills Matches* on a given *Field*.

iii. If an event is using multiple *Fields* for *Robot Skills Matches*, the same method must be used at all *Fields*, as described in rule T21. Multiple V5 *Robot* Brains may be used as needed (e.g., a "*Field* 1 Brain" and a "*Field* 2 Brain").

iv. The default timed "Drive" program accessed from a V5 Controller is intended for practice only, and cannot be used for an official *Robot Skills Match*.

e. If a *Team* chooses to utilize/record a *Skills Stop Time*, the 5-second grace period described in rule SC1 does not apply.

Section 4 - The Robot

Overview

All *Robots* must pass inspection before competing in the VEX V5 Robotics Competition to ensure compliance with all *Robot* rules. Inspections typically occur during *Team* check-in or practice time. *Teams* should use the rules below to pre-inspect their *Robot* and confirm it meets all requirements.

Most rules are hard limits (e.g., motor quantity), while others are subject to inspector discretion (e.g., safety concerns). At many events, the lead inspector and *Head Referee* are the same person; if not, inspectors should consult the *Head Referee* for judgment calls. Per <R2d> and <R2e>, the *Head Referee* has final authority on all *Robot* rules and whether a *Robot* may compete.

Robot Rules

<R1> One Robot per Team. Each *Team* can only bring one *Robot* to a given event in the VEX V5 Robotics Competition. Though it is expected that *Teams* will make changes to their *Robot* at the competition, a *Team* is limited to only one *Robot* at a given event, and a given *Robot* may only be used by one *Team*. A VEX *Robot*, for the purposes of the VEX V5 Robotics Competition, has the following subsystems:

- Subsystem 1: Mobile robotic base including wheels, tracks, legs, or any other mechanism that allows the *Robot* to navigate the majority of the flat playing *Field* surface. For a stationary *Robot*, the robotic base without wheels would be considered Subsystem 1.
- Subsystem 2: Power and control system that includes a legal VEX battery, a legal VEX control system, and associated motors for the mobile robotic base.
- Subsystem 3: Additional mechanisms (and associated motors) that allow manipulation of *Scoring Objects* and interactions with *Field Elements* and other *Robots*.

Given the above definitions, a minimum *Robot* for use in any VEX V5 Robotics Competition event (including *Robot Skills Matches*) must consist of subsystems 1 and 2 above. Thus, if you swap out an entire subsystem 1 or 2, you have created a second *Robot* and are in *Violation* this rule.

a. *Teams* may not compete with one *Robot* while a second is being modified or assembled at a competition.
b. *Teams* may not have an assembled second *Robot* on hand at a competition that is used to repair or swap parts with the first *Robot*.

c. *Teams* may not switch back and forth between multiple *Robots* during a competition. This includes using different *Robots* for *Robot Skills Matches*, *Qualification Matches*, and/or *Elimination Matches*.

d. Multiple *Teams* may not use the same *Robot*. Once a *Robot* has competed under a given *Team* number at an event, it is "their" *Robot* ; no other *Team* may EVER compete with it.

> ⚠ **Caution**
>
> The intent of <R1a>, <R1b>, and <R1c> is to ensure an unambiguous level playing field for all *Teams*. *Teams* are welcome (and encouraged) to improve or modify their *Robots* between events, or to collaborate with other *Teams* to develop the best possible game solution.
>
> However, a *Team* who brings and/or competes with two separate *Robots* at the same *Tournament* has diminished the efforts of a *Team* who spent extra design time making sure that their one *Robot* can accomplish all of the game's tasks. A multi-*Team* organisation that shares a single *Robot* has diminished the efforts of a multi-*Team* organisation who puts in the time, effort, and resources to undergo separate individual design processes and develop their own *Robots*.
>
> To help determine if a *Robot* is a "separate *Robot*" or not, use the subsystem definitions found in R1. Above that, use common sense as referenced in G3. If you can place two *Robots* on a table next to each other, and they look like two separate legal/complete *Robots* (i.e., each has the 3 subsystems defined by R1), then they are two *Robots*. Trying to decide if changing a screw, a wheel, or a microcontroller constitutes a separate *Robot* is missing the intent and spirit of this rule. Rules G4 and R2 still apply to both *Robots*.

This rule is applied differently for VEX U. See Rule VUR1.

<R2> 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, as described in the following subclauses.

a. Significant changes to a *Robot*, such as a partial or full swap of Subsystem 3, must be re-inspected before the *Robot* may compete again.

b. All possible functional *Robot* configurations must be inspected before being used in competition. This especially pertains to modular or swappable mechanisms (per R1) and *Match* starting configurations/sizes (per R3).

c. *Teams* may be requested to submit to spot inspections by *Head Referees*. Refusal to submit will result in *Disqualification*.
    i. If a *Robot* is determined to be in *Violation* of a *Robot* rule before a *Match* begins, the *Robot* will be removed from the *Field*. The *Robot* may remain at the *Field* so that the *Team* does not get assessed a “no-show” (per GG2).
d. *Robots* which have not passed inspection (i.e., that are in *Violation* of one or more *Robot* rules) will not be permitted to play in any *Matches* until they have passed inspection. GG2 will apply to any *Matches* that occur until the *Robot* has passed inspection.
e. If a *Robot* has passed inspection, but is later confirmed to be in *Violation* of a *Robot* rule during or immediately following a *Match* by a *Head Referee*, they will be Disqualified from that *Match*. This is the only *Match* that will be affected; any prior *Matches* that have already been completed will not be revisited. <R3d> will apply until the *Violation* is remedied and the *Team* is re-inspected.
f. All robot rules are to be enforced within the discretion of the *Head Referee* within a given event. *Robot* legality at one event does not automatically imply legality at future events. *Robots* which rely on “edge-case” interpretations of subjective rules, such as whether a decoration is “non-functional” or not, should expect additional scrutiny during inspection.
g. Events may wish to use “inspection markers” (e.g., zip tie or sticker) to identify *Robots* that have passed inspection at that event. Inspection markers are functional components and are subject to all *Robot* rules, including legal materials and *Robot* size/expansion limits.

Event staff and volunteers are allowed to contact and/or photograph *Robots* during inspection and/or at other times as needed.

<R3> Robots must fit within an 18” x 18” x 18” volume.

a. Compliance with this rule may be checked using the official VEX Robotics On-*Field Robot* Expansion Sizing Tool.
b. *Event Partners* may construct and/or provide any sizing tool that measures the correct dimensions.
c. Any restraints used to maintain starting size (i.e., zip ties, rubber bands, etc.) must remain attached to the *Robot* for the duration of the *Match*, per GG8.
d. For the purposes of this rule, it can be assumed that *Robots* will be inspected and begin each *Match* on a flat standard foam field tile.

> **⚠ Caution**
>
> The official sizing tool is intentionally manufactured with a slightly oversized tolerance. Therefore, any contact with the sizing tool (i.e., a “paper test”) while being measured should be considered a clear indication that a *Robot* is outside of the permitted size. This tolerance also provides a slight “leeway” for minor protrusions, such as screw heads or zip ties.

This rule is applied differently for VEX U. See Rule VUR1.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIRM2.

<R4> Officially registered Team numbers must be displayed on Robot license plates. To participate in an official VEX V5 Robotics Competition event, a *Team* must first register on events.vex.com and receive a VEX V5 *Team* number. This *Team* number must be displayed on the *Robot* using license plates. *Teams* may choose to use the official VEX V5 License Plate Kit, or may create their own using legal materials.

a. License plates must be placed in fixed locations on exactly two (2) horizontally opposing sides of the *Robot* and must remain visible, legible, and attached for the entirety of the *Match*. The top of a *Robot* is not considered a “side” for these two license plates.
    i. License plates should be mounted in locations that remain stationary on the *Robot* during a *Match* (e.g., not on a rotating intake or flipping manipulator). The function of license plates is to identify *Robots* for referees, spectators, and other *Teams*. Identification is harder when a license plate on a *Robot* moves during a *Match*.
b. License plates must be securely attached to the *Robot* using materials that are legal for *Robot* construction. VEX IQ pins are not legal for mounting license plates on *Robots*.
c. *Robots* may only include license plates that match their *Alliance* color for the current *Match* (i.e., red *Alliance Robots* must have only red plates installed for the *Match*).
d. License plates are considered functional components, and must meet the requirements of all *Robot* rules.
e. Additional license plates cannot be used on the *Robot* for any purpose.
f. *Team* numbers must be in white font, and clearly legible. Number/letter stickers are legal for use on license plates instead of or in addition to those in the VEX V5 License Plate Kit.
g. Custom license plates used to meet the requirements of <R4a> and <R4f> must be within the following size limits:
    i. Height: between 2.0 (50.8mm) and 2.5 inches (63.5mm)
    ii. Width: between 4.0 (101.6mm) and 4.5 inches (114.3mm)

iii. Thickness: up to 0.25″ (6.35mm)

> ⚠ **Caution**
>
> Imagine the *Robot* as a cube that's sitting flat on a flat surface. License plates should be placed onto two (2) opposing faces of that cube (excluding the top and bottom).
>
> When a license plate is mounted to the *Robot*, only human influence should be able to remove the plate. The mounting should be secure enough to withstand any and all interactions between the *Robot* and other things on the *Field*. Using rubber bands or other flexible mounting methods to mount license plates should not be considered secure, and should not pass inspection. Using screws and nuts/standoffs to mount plates is the best way to meet the requirements for securely mounted license plates.
>
> The intent of this rule is to make it immediately apparent to *Head Referees* and other event personnel which *Alliance* and which *Team* each *Robot* belongs to, at all times. It will be at the full discretion of the *Head Referee* and inspector at a given event to determine whether a given license plate satisfies the criteria listed in R4.
>
> *Teams* who use custom plates should be especially prepared for the possibility of this judgment, and ensure that they are prepared to replace any custom parts with official VEX license plates if requested. Not bringing official replacement plates to an event will not be an acceptable reason for overlooking a *Violation* of one or more points in R4. *Teams* are encouraged to use an easily-read, sans-serif font (e.g., Arial).
>
> If a *Robot* must be removed from the *Field* based on this rule, <R2ci> applies and the *Team* should not be issued a "no-show."



Figure R4-1: An example of a license plate made from the VEX V5 License Plate Kit.

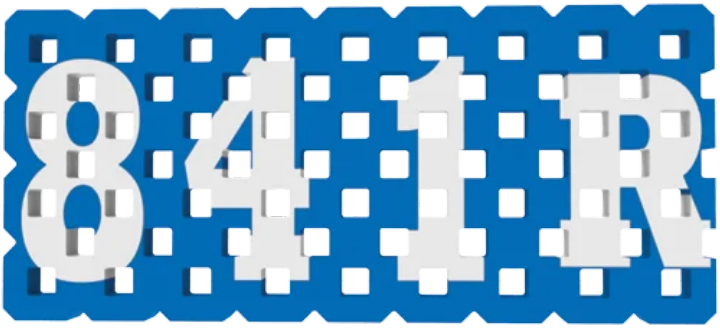


Figure R4-2: An example of a legal custom license plate

<R5> Let go of Scoring Objects after the Match. *Robots* must be designed to permit easy removal of *Scoring Objects* from any mechanism without requiring the *Robot* to have power after a *Match*.

<R6> Robots have one Brain. *Robots* must ONLY use one (1) VEX V5 *Robot* Brain (276-4810). Any other microcontrollers or processing devices are not allowed, even as non-functional decorations.

a. This includes microcontrollers that are part of other VEX product lines, such as VEX Cortex, VEX EXP, VEXpro, VEX CTE, VEX RCR, VEX IQ, VEX GO, VEX AIR, or VEX Robotics by HEXBUG. This also includes devices that are unrelated to VEX, such as Raspberry Pi or Arduino devices.
b. V5 *Robot* Brain accessories (short flanges, long flanges, and the magnetic screen protector) are part of the V5 *Robot* Brain and are only legal for use on *Robots* as part of the V5 *Robot* Brain.
c. At events using a V5 Smart *Field* Control System, the "*Team* Number" field in the *Robot* Brain must be set as the *Team's* registered number and letter (with no spaces).

This rule is applied differently for VEX U. See Rules VUR10 and VUR12.

<R7> Keep the power button or battery connection accessible. The on/off button on the V5 *Robot* Brain and/or the Battery Cable connection on either the V5 *Robot* Brain or V5 *Robot* Battery must be accessible without moving or lifting the *Robot*. The V5 Brain screen should be easily visible during *Robot* inspection. Keeping the V5 Brain screen visible throughout a *Match* is recommended but not required.

> ⚠ **Caution**
>
> This rule is in place to ensure the safety of both competitors and field staff. In the event that a *Robot* needs to be quickly powered off—whether due to a malfunction, *Entanglement*, or other safety concern—it is crucial that the power button and/or *Robot* Battery remains easily accessible. This allows competitors and/or field personnel to safely Disable the *Robot* without putting their hands near moving parts or other hazards inside the *Robot*.
>
> Additionally, keeping screens and indicator lights visible helps officials diagnose issues efficiently, minimizing downtime and ensuring a smooth competition experience. If the V5 Brain is accessible, *Field* volunteers can help *Teams* troubleshoot time-sensitive issues prior to a *Match*, including switching between Bluetooth and VEXnet radio modes as needed, selecting programs on the V5 Brain in instances that prevent selection via the V5 Controller, etc. *Teams* will also have easier access during any needed <GG4a> interactions.

<R8> Firmware. *Teams* must use VEXos version 1.1.5 or newer, found at https://link.vex.com/firmware. Custom firmware modifications are not permitted.

a. The minimum version requirement is subject to change over the course of the season.
b. When the minimum version is updated, *Teams* have a one week (7 calendar day) grace period from the time the minimum version is changed to update their firmware to the latest minimum version.
c. VEX reserves the right to deem any firmware update critical, and remove the allowable grace period.
d. Beta firmware, which includes any firmware version that ends with the letter ‘b’, is not legal for use in competition.

<R9> Use a “Competition Template” for programming. The *Robot* must be programmed to follow control directions provided by the VEXnet *Field* Controllers or Smart *Field* Control system.

During the *Autonomous Period*, *Drive Team Members* will not be allowed to use their V5 Controllers. As such, *Teams* are responsible for programming their *Robot* with custom software if they want to perform in

the *Autonomous Period*.

This may be tested in inspection, where *Robots* may be required to pass a functional "enable/disable" test. For more information on this, *Teams* should consult the help guides produced by the developers of their chosen programming software.

<R10> Motors are limited. *Robots* may use any combination of V5 Smart Motors, 11W (276-4840) and/or 5.5W (276-4842), within the following criteria:

a. The combined power of all motors (11W & 5.5W) must not exceed 88W. This limit applies to all motors on the *Robot*, even those which are not plugged in.
b. V5 Smart Motors connected to Smart Ports are the only motors that may be used with a V5 *Robot* Brain. The 3-wire ports may not be used to control motors of any kind.

Example	A	B	C	D	E
Qty of 11W motors	8	7	6	5	0
Qty of 5.5W motors	0	2	4	6	16

This rule is applied differently for VEX U. See Rule VUR11.

<R11> Motors are limited for Subsystem 2 (see <R1>) *Robots* may use any combination of V5 Smart Motors, 11W (276-4840) and/or 5.5W (276-4842), in Subsystem 2 within the following criteria:

a. The combined power of all motors in Subsystem 2 must not exceed 55W.
b. Motors used in Subsystem 2 cannot provide power to any mechanism that is not a part of Subsystem 1.
    i. Motors in Subsystem 2 cannot be toggled, engaged, or configured such that they are capable of providing power to any part of the *Robot* that is not a part of Subsystem 1
c. *Teams* may be required to demonstrate what each motor is capable of powering on their *Robot* during inspection in order to satisfy this requirement.

This rule does not apply to VEX U. See VUR11

<R12> Electrical power comes from VEX batteries only. *Robots* may use one (1) V5 *Robot* Battery (276-4811) to power the V5 *Robot* Brain.

a. No other sources of electrical power are permitted, unless used as part of a non-functional decoration per <R23e>.

b. There are no legal power expanders for the V5 *Robot* Battery.

c. V5 *Robot* Batteries may only be charged by a V5 *Robot* Battery Charger (276-4812 or 276-4841).

d. V5 Controllers (276-4820) may only be powered by their internal rechargeable battery.

   i. *Teams* are permitted to have an external power source (such as a rechargeable battery pack) plugged into their V5 Controller during a *Match*, provided that this power source is connected safely and does not violate any other rules, such as R28.

   ii. Some events may choose to provide *Field* power for V5 Controllers. If this is provided for all *Teams* at the event, then this is a legal power source for the V5 Controllers.

This rule is applied differently for VEX U. See Rule VUR12.

<R13> Robots use VEXnet. *Robots* must ONLY utilize VEXnet for all wireless *Robot* communication.

a. Electronics from the Cortex, VEX EXP, VEX CTE. VEXpro, VEX RCR, VEXplorer, VEX IQ, VEX GO, or VEX Robotics by HEXBUG product line are prohibited unless otherwise noted in R16.

b. *Teams* are permitted to use the Bluetooth® capabilities of the V5 *Robot* Brain and/or V5 Controller in *Team* pits, practice *Fields*, and *Robot Skills Matches*. However, VEXnet must be used for wireless communication during *Head-to-Head Matches*.

c. *Teams* are permitted to use the Wi-Fi capabilities of the Vision Sensor in *Team* pits or outside of *Matches*. However, the Vision Sensor must have its wireless transmitting functionality disabled during *Matches*.

This rule is applied differently for VEX U. See Rules VUR2, VUR10 and VUR12.

<R14> Give the radio some space. The V5 Radio should be mounted such that no metal surrounds the radio symbol on the V5 Radio. While failure to do so will affect *Robot* performance, it will not prevent the *Robot* from passing inspection.

> ⚠ **Caution**
>
> It is fine to loosely encapsulate the V5 Radio within *Robot* structure. The intent of this rule is to minimize radio connection issues by minimizing obstructions between VEXnet devices. Burying a radio deep within a *Robot* may result in *Robot* communication issues. It is also recommended that the LEDs on the radio be visible to aid in troubleshooting.

<R15> One or two Controllers per Robot. No more than two (2) VEX V5 Controllers may control a single *Robot*.

a. No physical or electrical modification of these Controllers is allowed under any circumstances.
    i. Attachments which assist the *Drive Team Member* in holding or manipulating buttons/joysticks on the V5 Controller are permitted, provided that they do not involve direct physical or electrical modification of the Controller itself.
b. No other methods of controlling the *Robot* (light, sound, etc.) are permissible.
    i. Using sensor feedback to augment driver control (such as motor encoders or the Vision Sensor) is permitted.

<R16> Robots are built from the VEX V5 system. *Robots* may be built ONLY using official VEX

V5 components, unless otherwise specifically noted within these rules.

a. All legal parts for the V5 system are listed in the V5 Competition Legal Parts List.
b. Any questions or concerns about legal parts should be directed to the official Q&A System on events.vex.com.

This rule is applied differently for VEX U. See Rule VUR2.

<R17> New VEX parts are legal. Additional VEX components released during the competition season on www.vexrobotics.com are considered legal for use unless otherwise noted.

Some “new” components may have certain restrictions placed on them upon their release. These restrictions will be documented in the official Q&A, in a Game Manual update, or in the VEX V5 Legal Parts List.

<R18> Prohibited Items. The following types of mechanisms and components are NOT allowed.

a. Those that could potentially damage *Field Elements* or *Scoring Objects*.
b. Those that could potentially damage other competing *Robots*.
c. Those that pose an unnecessary risk of *Entanglement* with other *Robots* or *Field Elements*.
d. Those that could pose a potential safety hazard to *Drive Team Members*, event staff, or other humans.
e. Products from the VEXpro, VEX EXP, VEX IQ, VEX GO, VEX 123, VEX CTE, VEX AIM, VEX AIR, VEX Robotics by HEXBUG∗, or any other VEX product lines, unless specifically allowed by a clause of R16 or listed in the VEX V5 Legal Parts List (See R16).
f. Components obtained from the V5 beta program. All V5 beta hardware can be identified by its lighter gray pre-production color. *Robot* Brains, *Robot* Batteries, Controllers, and Vision Sensors

from the V5 beta have a “BETA TEST” stamp on them. Smart Motors and Radios do not have this stamp, but can still be identified by color.

g. Standalone VEX Smart *Field* Controller Brains (SKU 276-7577).

h. VEX apparel, competition support materials, packaging, or other non-*Robot* products.

i. *Field Elements* or components of *Field Elements* that are not otherwise explicitly legal materials (e.g., screws, standoffs, nuts, or non-shattering plastic within the limitations of R24).

j. 3D printed *Robot* parts for any purpose, including non-functional decorations and license plates.

k. Speakers and other audio devices that create sound.

> ⚠ **Caution**
>
> 3D printed Controller attachments, 3D printed *Robot* alignment tools, and/or other custom 3D printed tools that do not go onto the *Robot* or into the *Field* during a *Match* are not considered *Robot* parts, and may be legal for use if they meet the requirements of other pertinent rules.

This rule is applied differently for VEX U. See Rules VUR2, VUR5, VUR6, & VUR13.

* The HEXBUG brand is a registered trademark belonging to Spin Master Corp

<R19> Certain non-VEX components are allowed. *Robots* are allowed the following additional components from sources other than VEX Robotics:

a. Any non-aerosol-based grease or lubricating compound, when used in extreme moderation on surfaces and locations that do NOT contact the playing *Field* walls, foam *Field* tiles, *Scoring Objects*, or other *Robots*. Grease or lubricant applied directly to V5 Smart Motors or Smart Motor cartridges is prohibited.

b. Anti-static compound, when used in extreme moderation (i.e., such that it does not leave residue on *Field Elements*, *Scoring Objects*, or other *Robots*).

c. Hot glue when used to secure cable connections.

d. An unlimited amount of non-elastic rope/string, no thicker than 1/4” (6.35mm).

e. Commercially available items used solely for bundling or wrapping of 2-wire, 3-wire, 4-wire, or V5 Smart Cables, and/or pneumatic tubing are allowed. These items must solely be used for the purposes of cable/tubing protection, organisation, or management. This includes but is not limited to electrical tape, cable carrier, cable track, etc. It is up to inspectors to determine whether a component is serving a function beyond protecting and managing cables and tubing.

f. Rubber bands no larger than 7.5” long and 0.25” wide.

g. Anti-slip drawer liner with similar nominal dimensions to VEX Anti-Slip Mat (275-0120 or 275-0121). The pattern of the matting should be similar to VEX Anti-Slip Mat, and there should be no additional performance gained by using non-VEX anti-slip drawer liner (i.e., no additional elasticity, adhesive backing, etc.). No piece of anti-slip drawer liner can be larger than 12″ x 15″ and all anti-slip drawer liner must be black in color.
h. Plastic zip ties no larger than 12″ long and 0.25″ wide.
i. A Micro SD card installed in the V5 *Robot* Brain.
j. Aerosol-based cooling/freeze spray may be used to assist in cooling motors. *Teams* using freeze spray or similar products in ways that may reasonably be deemed unsafe could be subject to S1 *Violations*.
k. Cleaners, disinfectants, and/or sanitizers may be used to assist in cleaning *Robots*, parts, components, etc.
l. See rules R21 through R25 for additional legal non-VEX components.

This rule is applied differently for VEX U. See Rules VUR3, VUR4, VUR7, VUR8, VUR9, VUR12, VUR14& VUR15.

<R20> Custom V5 Smart Cables are allowed. *Teams* who create custom cables acknowledge that incorrect wiring may have undesired results.

a. Official V5 Smart Cable Stock must be used.
b. Use of non-VEX 4P4C connectors and 4P4C crimping tools is permissible.
c. V5 Smart Cables may only be used for connecting legal electronic devices to the V5 *Robot* Brain.

<R21> A limited amount of tape is allowed. *Robots* may use a small amount of tape for the following purposes:

a. To secure any connection between the ends of two (2) VEX cables.
b. To label wires, motors, *Robot* Brains, and/or controllers.
c. To prevent leaks on the threaded portions of pneumatic fittings. This is the only acceptable use of Teflon tape.
d. In any other application that would be considered a “decoration” per R23.
e. As an aglet at the end of rope/string to prevent fraying.

<R22> Certain non-VEX fasteners are allowed. *Robots* may use the following commercially available hardware:

a. #4, #6, #8, M3, M3.5, or M4 screws up to 2.5″ (63.5 mm) long, and M2.5 x 8mm screws.
b. Shoulder screws with a shoulder length no longer than 0.20″ and a diameter no larger than 0.176″.
c. Any commercially available nut, washer, threaded standoff up to 6″ (152.4mm) long, and/or non-threaded spacer up to 2.5″ (63.5mm) long which fits these screws.

> ⚠ **Caution**
>
> The intent of the rule is to allow *Teams* to purchase their own commodity hardware without introducing additional functionality not found in standard VEX equipment. It is up to inspectors to determine whether the non-VEX hardware has introduced additional functionality or not.
>
> For the purposes of this rule, weight savings is not considered additional functionality.
>
> If a key component of a *Robot's* design relies upon convincing an inspector that a specialized component is "technically a screw," it is probably outside of the spirit and intent of this rule.
>
> All specific dimensions listed in this rule are intended to be 'nominal' references to hardware sizes found within the VEX V5 product line and/or their metric equivalents.

This rule is applied differently for VEX U. See Rule VUR9.

<R23> Visual decorations are allowed. *Teams* may add non-functional decorations, provided that they do not affect *Robot* performance in any significant way or affect the outcome of the *Match*. These decorations must be in the spirit of the competition. Inspectors and *Head Referees* will have final say in what is considered "non-functional." Unless otherwise specified below, non-functional decorations are governed by all standard *Robot* rules.

To be considered "non-functional," decorations must be backed by legal materials that provide the same functionality. For example, if a *Robot* has a giant decal that prevents *Scoring Objects* from falling out of the *Robot*, the decal must be backed by VEX material that would also prevent the *Scoring Objects* from falling out. A simple way to check this is to determine if removing the decoration would impact the performance of the *Robot* in any way.

a. Anodizing, painting, dyeing, or otherwise changing the color of any legal VEX part is considered a legal nonfunctional decoration.

   Note: For official events held in mainland China, anodizing, painting, dyeing, or otherwise changing the color of any legal VEX part is prohibited.

b. Small cameras are permitted as non-functional decorations, provided that any transmitting functions or wireless communications are disabled. Unusually large cameras used as ballast are not permitted.

c. VEX electronics may not be used as non-functional decorations.

d. Decorations that visually mimic *Field Elements* or *Scoring Objects* are not permitted. The inspector and *Head Referee* will make the final decision on whether a given decoration or mechanism violates this rule.

    i. Decorations cannot be designed to intentionally interfere with opponent Vision or Color Sensors. *Teams* will be asked to remove these decorations if the inspector or *Head Referee* determines that it interferes with opponent systems.

e. Decorations which provide feedback to a *Robot* (e.g., by influencing legal sensors) would be considered "functional," and are not permitted.

f. Decorations that cover or obscure identifying features of electronics and/or pneumatics parts are not legal.

    i. *Teams* will be asked to either replace the electronics and/or pneumatics part entirely, or remove the decoration if possible.

    ii. Identifying features include, but are not limited to, VEX logos, part numbers, and other distinctive colors or features of the part that allow an inspector to easily confirm it is a legal part.

<R24> A limited amount of custom plastic is allowed. *Robots* may use custom-made pieces cut from certain types of non-shattering plastic, up to 0.070" (1.78mm) thick.

a. Each *Robot* is limited to a maximum of 12 individual pieces cut from non-shattering plastic. This includes non-shattering plastic used in non-functional decorations.

b. Each individual piece of non-shattering plastic cannot be larger than 4" x 8" x 0.070".

c. *Teams* must present and display ALL non-shattering plastic parts during inspection.

    i. Inspectors will verify the total number of plastic pieces. They may use dry-erase markers or other forms of temporary marking to aid in counting.

    ii. Inspectors will verify that no non-shattering piece exceeds the size limitation.

d. Plastic may be mechanically altered by cutting, drilling, bending, etc. It cannot be chemically treated, melted, cast, or bonded to another part. Heating non-shattering plastic to aid in bending is

acceptable.

e. Legal plastic types are polycarbonate (Lexan), acetal monopolymer (Delrin), acetal copolymer (Acetron GP), POM (acetal), ABS, PEEK, PET, HDPE, LDPE, nylon (all grades), polypropylene, PTFE, and FEP.

f. Shattering plastics, such as PMMA (also called plexiglass, acrylic, or perspex), and structurally non-homogeneous plastics, such as woven (e.g., SRPP) and/or fiber-reinforced sheets, are prohibited.

g. Plastic sheets sold by VEX (such as the 276-8340 PET Sheets) are considered custom plastic in the context of this rule, and are subject to the same limitations as other plastic parts.

h. This rule does not apply to 3D printed plastic parts. 3D printed *Robot* parts are not permitted in the VEX V5 Robotics Competition for any purpose, including non-functional decorations.

Note: *Teams* are strongly encouraged to provide inspectors with 1:1 scale drawings, identical spares, or 1:1 scale tracings of their non-shattering plastic pieces to aid in inspection. Drawings and tracings should accurately reflect ALL shapes and dimensions of each piece. Complex bent/cut parts, and parts that are cut diagonally across a 4″x8″ sheet to gain length may require more evidence.

This rule is applied differently for VEX U. See Rules VUR3 & VUR4.

Violation Notes:

1. *Teams* must replace broken plastic pieces that result in temporary, unintentional R24 *Violations*.

<R25> Pneumatics are limited. A *Robot's* pneumatic subsystem must satisfy all of the following criteria:

a. *Teams* may use a maximum of two (2) VEX Air Tanks (276-8749) on a *Robot*.

b. Pneumatic devices may be charged to a maximum of 100 psi.

c. The compressed air contained inside a pneumatic subsystem can only be used to actuate legal pneumatic devices (e.g., cylinders).

> ⚠ **Caution**
>
> The intent of <R25a> and <R25b> is to limit *Robots* to the air pressure stored in two reservoir tanks, as well as the normal working air pressure contained in their pneumatic cylinders and tubing on the *Robot*. *Teams* may not use other elements for the purposes of storing or generating air pressure.
>
> Using cylinders or additional pneumatic tubing solely for additional storage is a *Violation* of the spirit of this rule. Similarly, using pneumatic cylinders and/or tubing without any air reservoirs is also a *Violation* of the spirit of this rule.
>
> The intent of <R25c> is to ensure that pneumatics are being used safely. Pressurized systems, such as a *Robot's* pneumatic subsystem, have the potential to be dangerous if used incorrectly. This rule ensures the safety of participants, and prevents potentially unsafe uses in the future.
>
> Another way of thinking of <R25c> is that "pneumatics should only be used with pneumatics." *Teams* should not use compressed air as a means of actuating non-pneumatic devices such as screws, nuts, etc. For example, pulling a pin with a pneumatic cylinder is okay, but using air to actuate the pin itself is not.

This rule is applied differently for VEX U. See Rule VUR14.

<R26> The VEX Pressure Gauge (276-8748) is a required part if a Robot includes pneumatics.

a. The gauge must be plumbed to the high pressure side of the system if the *Team* is using a regulator.
b. The pressure gauge must be visible and readable by referees and inspectors without moving or removing other *Robot* components or mechanisms.
c. The pressure gauge will be used to verify that the pneumatics system is charged to no more than 100psi, per R25.
    i. The VEX Pressure Gauge on the *Robot* will take precedence over any off-board measurement.

<R27> Most modifications to non-electrical components are allowed. Physical modifications, such as bending or cutting, of legal metal structure or plastic components are permitted.

a. Modifying the arm of limit switches (by bending or trimming) or removing the rubber cap of bumper switches is permitted.
b. Metallurgical modifications that change fundamental material properties, such as heat treating or melting, are not permitted.
c. Pneumatic tubing may be cut to desired lengths.

d. Fusing/melting the end of legal nylon rope/string (see <R19d>) to prevent fraying is permitted.
e. Welding, soldering, brazing, gluing, or attaching parts to each other in any way that is not provided within the VEX platform is not permitted. Rule <R19c> is an exception to this rule.
f. Mechanical fasteners may be secured using Loctite or a similar thread-locking product. This may ONLY be used for securing hardware, such as screws and nuts.

This rule is applied differently for VEX U. See Rules VUR3, VUR12& VUR13.

<R28> No modifications to electronic or pneumatic components are allowed. Motors (including the V5 Smart Motor firmware), microcontrollers (including V5 *Robot* Brain firmware), cables, sensors, controllers, battery packs, reservoirs, solenoids, pneumatic cylinders, and any other electrical or pneumatics component of the VEX platform may NOT be altered from their original state in ANY way.

a. *Teams* may make the following modifications to the V5 Smart Motor (11W)'s user-serviceable features. This list is all-inclusive; no other modifications are permitted. Where applicable, the components listed below (in the specific applications listed below) are permissible exceptions to R19.
    i. Replacing the gear cartridge with other official cartridges.
    ii. Removing or replacing the screws from the V5 Smart Motor Cap (276-6780).
    iii. Removing or replacing the threaded mounting inserts (276-6781).
    iv. Aesthetic/non-functional labeling (e.g., markers, stickers, paint, etc.).
b. V5 Smart Motors (11W) must use an official VEX V5 gear cartridge. For the purposes of this rule, the gear cartridges found within the V5 Smart Motor are considered "part of the motor." Therefore, any physical or functional modifications to official gear cartridges is not permitted. V5 Smart Motors (11W) may only use official VEX motor cartridges
c. For the purposes of this rule, the V5 Smart Motor Cap is not considered "part of the motor." Therefore, R27 applies.
d. External wires on VEX 2-wire or 3-wire electrical components may be repaired by soldering or using twist/crimp connectors, electrical tape, or shrink tubing such that the original functionality and length are not modified in any way.
    i. Wire used in repairs must be identical to VEX wire.
    ii. *Teams* make these repairs at their own risk; incorrect wiring may have undesired results.
e. V5 *Robot* Brain accessories (short flanges, long flanges, and the magnetic screen protector) are considered "part of the V5 *Robot* Brain" and cannot be modified.

f. The modifications listed in clause A also apply to equivalent parts for the 276-4842 V5 Smart Motor (5.5W), with the exception of gear cartridges which only apply to the V5 Smart Motor (11W). For the purposes of this rule, the motor cap for the V5 Smart Motor (5.5W) is not considered “part of the motor,” and therefore R27 applies.

Section 5 - The Tournament

Overview

The VEX V5 Robotics Competition consists of *Head-to-Head Matches*, *Robot Skills Matches*, and optional judging. This section describes how *Head-to-Head Matches* and *Robot Skills Matches* are to be played at a given event.

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

Tournament Rules

<T1> Head Referees have ultimate and final authority on all gameplay and Robot ruling decisions during the competition.

a. *Scorekeeper Referees* score the *Match*, and may serve as observers or advisers for *Head Referees*, but may not determine any *Violations* directly.
b. When issuing a *Major Violation* or *Minor Violation* to a *Team*, *Head Referees* must provide the rule number of the specific rule that has been Violated, and must record the *Violation* on the *Match* Anomaly Log.
c. *Event Partners* may not overrule a *Head Referee's* gameplay or *Robot* decisions.
d. Every *Qualification Match* and *Elimination Match* must be watched by a certified *Head Referee*. A *Head Referee* may only watch one *Match* at a time; if multiple *Matches* are happening simultaneously on separate *Fields*, each *Field* must have its own *Head Referee*. *Head Referees* must follow the rules in this game manual and the Q&A, and must make rulings consistent with the intent of the game manual and Q&A.
e. At a minimum, every *Robot Skills Match* must be watched by a trained *Scorekeeper Referee*, who may only watch one *Match* at a time. If multiple *Robot Skills Matches* are happening simultaneously on separate *Fields*, each *Field* must have its own *Scorekeeper Referee*. A certified *Head Referee* must be available at the event to explain a rule, *Disqualification*, *Violation*, or other penalty to *Teams* in *Robot Skills Matches* as needed in support of the *Scorekeeper Referees* at skills *Fields*.

> ⚠ **Caution**
>
> Note from the VEX *GDC*: 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 judgment 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 their official support materials (the Game Manual and the Q&A), and most crucially, the context of the *Match* in question.
>
> The VEX V5 Robotics Competition does not have video replay, our *Fields* do not have absolute sensors to count scores, and most events do not have the resources for an extensive review conference between each *Match*.
>
> When an ambiguous rule results in a controversial call, there is a natural instinct to wonder what the "right" ruling "should have been," or what the *Game Design Committee* "would have ruled." This is ultimately an irrelevant question; our answer is that when a rule specifies "*Head Referee's* discretion" (or similar), then the "right" call is the one made by a *Head Referee* in the moment. The VEX *GDC* designs games, and writes rules, with this expectation (constraint) in mind.

<T2> Head Referees must be qualified. VEX V5 *Head Referees* must have all of the following qualifications:

a. Be at least 20 years of age.
b. Be approved by the *Event Partner*.
c. Be a certified VEX V5 *Head Referee* for the current season.
d. Cannot be the *Event Partner* or a Judge Advisor for the event.

Note: *Scorekeeper Referees* must be at least 15 years of age, and must be approved by the *Event Partner*.

> ⚠ **Caution**
>
> *Head Referees* should demonstrate the following attributes:
>
> - Thorough knowledge of the current game and rules of play
> - Effective decision-making skills
> - Attention to detail
> - Ability to work effectively as a member of a team
> - Ability to be confident and assertive when necessary
> - Strong communication and diplomacy skills

<T3> 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 T1); failure to accept this final decision may be considered a G1 *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 are not permitted to review any photo or video *Match* recordings when determining a score or ruling. Some events may also prohibit *Drive Team Members* from reviewing photo or video *Match* recordings while in the *Alliance Station* ; this should be announced to all *Teams* before *Matches* start.
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 field 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 VEX V5 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.

> ⚠ **Caution**
>
> Some events may choose to utilize a "question box" or other designated location for discussions with *Head Referees*. Offering a "question box" is within the discretion of the *Event Partner* and/or *Head Referee*, and may act as an alternate option for asking *Drive Team Members* to remain in the *Alliance Station* (although all other aspects of this rule apply).
>
> However, by using this alternate location, *Drive Team Members* acknowledge that they are forfeiting the opportunity to use any contextual information involving the specific state of the *Field* at the end of the *Match*. For example, it is impossible to appeal whether a *Scoring Object* was *Scored* or not if the *Field* has already been reset. If this information is pertinent to the appeal, *Drive Team Members* should still remain in the *Alliance Station*, and only relocate to the "question box" once the *Head Referee* has been made aware of the concern and/or any relevant context.

<T4> 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 VEX V5 Override; it is not intended to be an exhaustive compilation of guidelines for running a VEX V5 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 *Fields*

> ⚠ **Caution**
>
> This rule exists alongside G1, S1, and G3. Even though there isn't a rule that says "do not steal from the concession stand," it would still be within an *Event Partner's* authority to remove a thief from the competition.

<T5> Be prepared for minor Field variance. *Field Element* tolerances and *Scoring Objects* 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 and tolerances.

a. *Field Element* tolerances may vary from nominal by up to ±1.0".

b. *Scoring Object* placement at the beginning of the *Match* may vary from nominal by up to ±1″ (25.4mm). If a *Scoring Object* is within tolerance, it should not be adjusted before the *Match*.
c. The rotation of *Scoring Objects* is not specified. If a *Scoring Object* is within tolerance, either on the *Field* or within a *Loader*, it should not be adjusted before the *Match*.

The *Field Perimeter* and *Field Elements* are designed to be assembled and disassembled multiple times each year. *Event Partners* store and transport *Fields* between events, and the individuals setting up the *Field* 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 *Field* may be slightly different than another, and prepare accordingly. Just because something works on one *Field* does not fully guarantee it will work on the next, and is not enough evidence alone to determine if a *Field* is out of tolerance.

<T6> Fields may be repaired at the Event Partner's discretion. All competition *Fields* 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, provided that they do not impact gameplay (see T4).

Examples of permissible modifications include, but are not limited to:

- Applying threadlocker to *Field Element* mounting hardware
- Using non-VEX electrical tape to add required lines to the *Field*
- Anchoring *Field Elements* directly to *Field* risers instead of the metal plates
- Anchoring the metal plates to the underlying surface with hardware or tape
- Utilizing a non-VEX Strap under the *Field* to tie walls together
- Parts added to the exterior of the Portable *Field Perimeter* to assist in assembly, transportation, and rigidity during *Matches*
- Custom solutions for mounting *Toggle* brackets to metal *Field Perimeters*. See Appendix A drawing titled "*Toggle* Mounting - Metal *Field Perimeter*" for examples.
- Adjust the size/position of the *Alliance Station* tape lines.

Note: Exact dimensions/positioning of the *Alliance Stations* are subject to *Event Partner* discretion. *Alliance Station* tape lines should always be placed such that *Drive Team Members* can reasonably view and interact with the *Field* from within the *Alliance Station* during a *Match* (e.g., *Drive Team Members* can easily reach *Loaders* from within the *Alliance Station*).

Modifications that may impact *Robot* functionality and/or how the game is played are generally not allowed. Examples of prohibited modifications include, but are not limited to:

- Unofficial *Field Perimeter* walls, additional structural elements inside of the *Field Perimeter*, or unofficial/replica *Field Elements*
- Additional VEX structural parts attached to a *Field Element*
- Replacing the opaque *Field* walls on the VEX Portable Competition *Field Perimeter* with transparent panels
- Assembling a VEX Portable Competition *Field Perimeter* without including the securing straps
- Affixing stickers to the foam *Field* Tiles or otherwise marking object placements for *Field* reset

Any specific repairs and/or modifications which pertain to the current season's game will be documented in this rule and Appendix A, as needed.

<T7> Fields at an event must be consistent with each other. There are many types of permissible aesthetic and/or logistical modifications that may be made to competition *Fields* at the *Event Partner's* discretion (see T6). If an event has multiple Head-to-Head competition *Fields*, they must all incorporate the same permissible/applicable modifications. If an event has multiple *Robot* Skills Challenge *Fields*, they must all incorporate the same permissible modifications. For example, if one Head-to-Head competition *Field* is elevated, then all Head-to-Head competition *Fields* must be elevated to the same height.

Examples of these modifications may include, but are not limited to:

- Elevating the playing *Field* off of the floor (common heights are 12″ to 24″ [30.5cm to 61cm])
- *Field* control systems (see T8)
- *Field* display monitors
- *Field Perimeter* decorations (e.g., LED lights, sponsor decals on polycarbonate panels)
- *Field Perimeter* type (see T9)
- Utilizing the VEX GPS *Field* Code Strips
- Utilizing non-VEX Straps to hold the *Field* walls together

Note: If an event has dedicated *Fields* for *Robot Skills Matches*, there is no requirement for them to have the same consistent modifications as the Head-to-Head *Fields*. See T21 for more details.

<T8> There are three types of Field control that may be used.

1. A VEXnet *Field* Controller controlled by *Tournament* Manager, which connects to a Controller's competition port via ethernet cable.

2. A V5 Event Brain controlled by *Tournament* Manager, which connects to a Controller via Smart Cable.
3. A VEXnet Competition Switch, which connects to a Controller's competition port via Cat-5 cable, may only be used in *Practice Matches*, *Robot Skills Matches*, and Leagues, and only under extreme circumstances.

If an event has multiple *Fields*, then all *Fields* of the same game type must use the same control system, in accordance with T7 and T21. For example, it would be permissible for Head-to-Head competition *Fields* to use V5 Event Brains, and for Skills Challenge *Fields* to use VEXnet *Field* Controllers. However, it would not be permissible for one Head-to-Head *Field* to use a V5 Event Brain while another Head-to-Head *Field* uses a VEXnet *Field* Controller.

Note: Official Qualifying Events may only use the official, unmodified version of *Tournament* Manager for field control, along with approved hardware and networking solutions. Add-ons that abide by the TM Public API guidelines are permitted. Once add-ons are enabled, the software is no longer supported by VEX Robotics, or DWAB Technologies; any necessary troubleshooting will be done at the user's own risk.

<T9> There are two types of Field Perimeter that may be used.

1. VEX Metal Competition *Field Perimeter* (SKU 278-1501).
2. VEX Portable Competition *Field Perimeter* (SKU 276-8242).

See Appendix A for more details.

If an event has multiple *Fields*, then all *Fields* of the same game type must use the same *Field Perimeter* type, in accordance with T7 and T21. For example, it would be permissible for Head-to-Head competition *Fields* to use metal *Field Perimeters*, and for Skills Challenge *Fields* to use Portable *Field Perimeters*.

However, it would not be permissible for one Head-to-Head *Field* to use a metal *Field Perimeter*, while other Head-to-Head *Fields* use Portable *Field Perimeters*.

<T10> 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, and *Alliance* colors for each *Match*. For *Tournaments* with multiple *Fields*, the schedule will indicate which *Field* each *Match* will take place on.

a. *Practice Matches* may be included in the *Match Schedule* at some events, but are not required. If *Practice Matches* are run, every effort will be made to equalize practice time for all *Teams*.

b. A *Qualification Match* can only start before its scheduled time if all *Teams*, *Robots*, and assigned volunteers are at the *Field* and ready to play.
c. Any multi-division event must be approved by VEX Robotics prior to the event, and divisions must be assigned in sequential order by *Team* number.
d. 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.
e. If it is determined by both the *Event Partner* and VEX Robotics that a *Team* should be removed from further *Matches* at the event based on the outcome of a serious *Violation*, the *Event Partner* can use the full-event *Disqualification* feature in TM to remove that *Team* from all further *Matches* at the event. Their spots in later *Qualification Matches* will be replaced automatically by *Teams* from the end of the *Match Schedule*, and *Matches* will be removed from the end of the schedule as appropriate. The *Event Partner* cannot do this without permission from VEX Robotics.

<T11> Each Team will have at least six Qualification Matches.

a. A *Tournament* must include a minimum of six *Qualification Matches* per *Team* at local qualifying events or eight *Qualification Matches* per *Team* at a Championship event. The recommended number of *Qualification Matches* per *Team* is eight for a standard *Tournament*, and up to ten for a championship event.
b. A league must include at least three league ranking sessions, with at least one week between sessions. Each session must include a minimum of two *Qualification Matches* per *Team* at that session. The suggested number of *Qualification Matches* per *Team* for a standard league ranking session is four. Leagues will have a championship session where elimination rounds will be played. *Event Partners* may also choose to have *Qualification Matches* as part of their championship session.

<T12> Qualification Matches contribute to a Team's ranking for Alliance Selection.

a. When in a *Tournament*, every *Team* will be ranked based on the same number of *Qualification Matches*.
b. For *Tournaments* that have more than one division, *Teams* will be ranked among all *Teams* in their specific division.
c. When in a league, every *Team* will be ranked based on the number of *Matches* played. *Teams* that participate in at least 60% of the total *Matches* available will be ranked above *Teams* that participate in less than 60% of the total *Matches* available; e.g., if the league offers 3 ranking sessions with 4 *Qualification Matches* per *Team*, *Teams* that participate in 8 or more *Matches* will

be ranked higher than *Teams* who participate in 7 or fewer *Matches*. Being a no-show to a *Match* that a *Team* is scheduled in still constitutes participation for these calculations.

d. In some cases, a *Team* will be asked to play an additional *Qualification Match*. The extra *Match* will be identified on the *Match Schedule* with an asterisk; *Win Points*, *Autonomous Points*, and *Strength of Schedule Points* for that *Qualification Match* will not impact a *Team's* ranking, and will not affect participation percentage for leagues.
    i. *Teams* are reminded that G1 is always in effect and *Teams* are expected to behave as if the additional *Qualification Match* counted.
    ii. In leagues, *Teams* may have a different number of *Qualification Matches*. Rankings are determined by the *Win Percentage*, which is the number of wins divided by the number of *Qualification Matches* that *Teams* have played.

<T13> Qualification Match tiebreakers. *Team* rankings are determined throughout *Qualification Matches* as follows:

1. Average *Win Points* (*Win Points* / number of *Matches* played)
2. Average *Autonomous Points* (*Autonomous Points* / number of *Matches* played)
3. Average *Strength of Schedule Points* (*Strength of Schedule Points* / number of *Matches* played)
4. Highest *Match* score
5. Second-highest *Match* score
6. Random electronic draw

<T14> Small Tournaments have fewer Alliances. The number of *Alliances* for a given event is determined as follows, except in extraordinary circumstances with the permission of VEX Robotics:

# of *Teams*	# of Elimination *Alliances*
32+	16
24-31	12
16-23	8
<16	# of *Teams* divided by 2, less any remainder

This rule is applied differently for VEX U. See rule **<VUT6>**.

<T15> Send a Student representative to Alliance Selection. Each *Team* must send one *Student* representative to the playing *Field* (or other designated area) to participate in *Alliance Selection*. If the *Team* representative fails to report in for *Alliance Selection*, their *Team* will be ineligible for participation in the *Alliance Selection* process.

Once the *Alliance Selection* begins, *Student* representatives cannot use electronic devices unless they have been demonstrated to be in airplane mode. No electronic communication by or with *Student* representatives is allowed during the *Alliance Selection* process.

Teams are advised to complete their scouting prior to the beginning of *Alliance Selection*, and to come to *Alliance Selection* prepared with a written list of potential *Alliance* Partners. Non-electronic methods of communication are allowed. Rule G2 and the **Student**-centered Policy still apply during *Alliance Selection*. Any communication about *Alliance Selection* and specific *Teams* should be limited to *Student Team* Members.

<T16> Each Team may only be invited once to join one Alliance. If a *Team* representative declines an *Alliance Captain's* invitation during *Alliance Selection*, that *Team* is no longer eligible to be selected by another *Alliance Captain*. However, they are still eligible to play *Elimination Matches* as an *Alliance Captain*. This video includes a full explanation of the *Alliance Selection* process.

For example:

- *Alliance Captain* 1 invites *Team* 000A to join their *Alliance*.
- *Team* 000A declines the invitation.
- No other *Alliance Captains* may invite *Team* 000A to join their *Alliance*.
- However, *Team* 000A may still form their own *Alliance* if *Team* 000A is ranked high enough after *Qualification Matches* to become an *Alliance Captain*.

Note: *Alliances* must have two *Teams*, and there are no "do-overs" during *Alliance Selection*. If enough *Teams* decline their invitations such that the full number of *Alliances* cannot be filled, the event will proceed with a reduced number of *Alliances*.

<T17> Elimination Matches follow the Elimination Bracket. A sixteen (16) *Alliance* bracket plays as shown in Figure T17-1, with *Matches* proceeding in numbered order through each round.

If an event is run with fewer than 16 *Alliances*, then they will use the bracket shown in Figure T17-1, with *Byes* awarded when there is no applicable *Alliance*. For example, in a *Tournament* with 12 *Alliances*, *Alliances* 1, 2, 3, & 4 would automatically advance to the Quarterfinals.

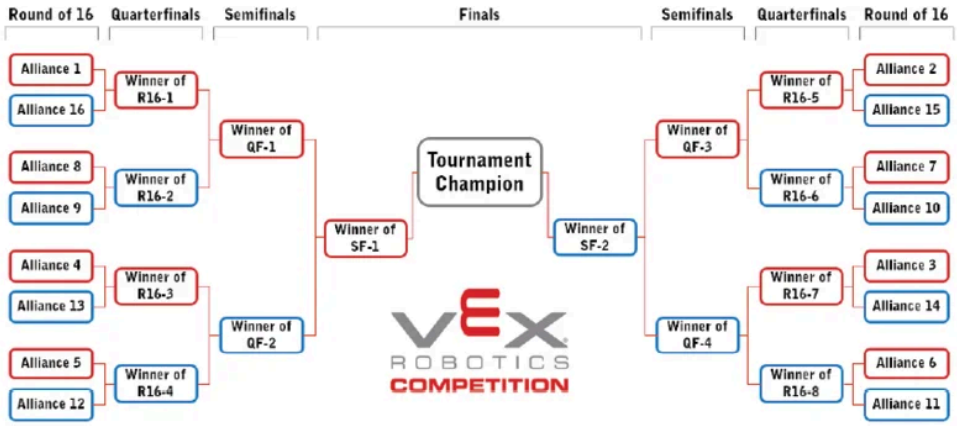


Figure T17-1: A 16-*Alliance* bracket

Thus, an eight (8) *Alliance* bracket would run as shown below:

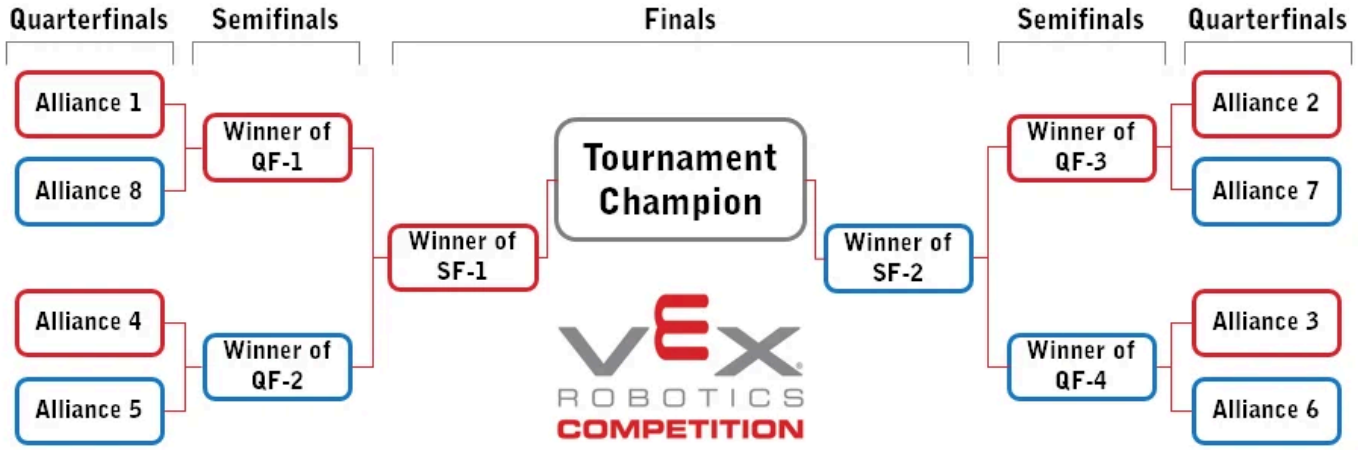


Figure T17-2: An 8-*Alliance* bracket

At events with multiple divisions, each division champion *Alliance* will advance to the overall event finals. *Alliance* color assignment for these *Matches* will be determined by the original *Alliance* seeding within their respective divisions. The higher seeded *Alliance* (e.g., 1 is higher than 2) will be designated as the red *Alliance*, and the lower-seeded *Alliance* will be designated as the blue *Alliance*.

If both *Alliances* hold the same seed number within their divisions, the *Event Partner* will conduct a coin flip to determine which *Alliance* is assigned to the red *Alliance*, with the remaining *Alliance* assigned to blue.

<T18> Elimination Matches are a blend of "Best of 1" and "Best of 3." "Best of 1" means that the winning *Alliance* in each *Match* advances to the next round of the *Elimination Bracket*. "Best of 3" means

that the first *Alliance* to reach two wins will advance.

See the flowchart below for more information.

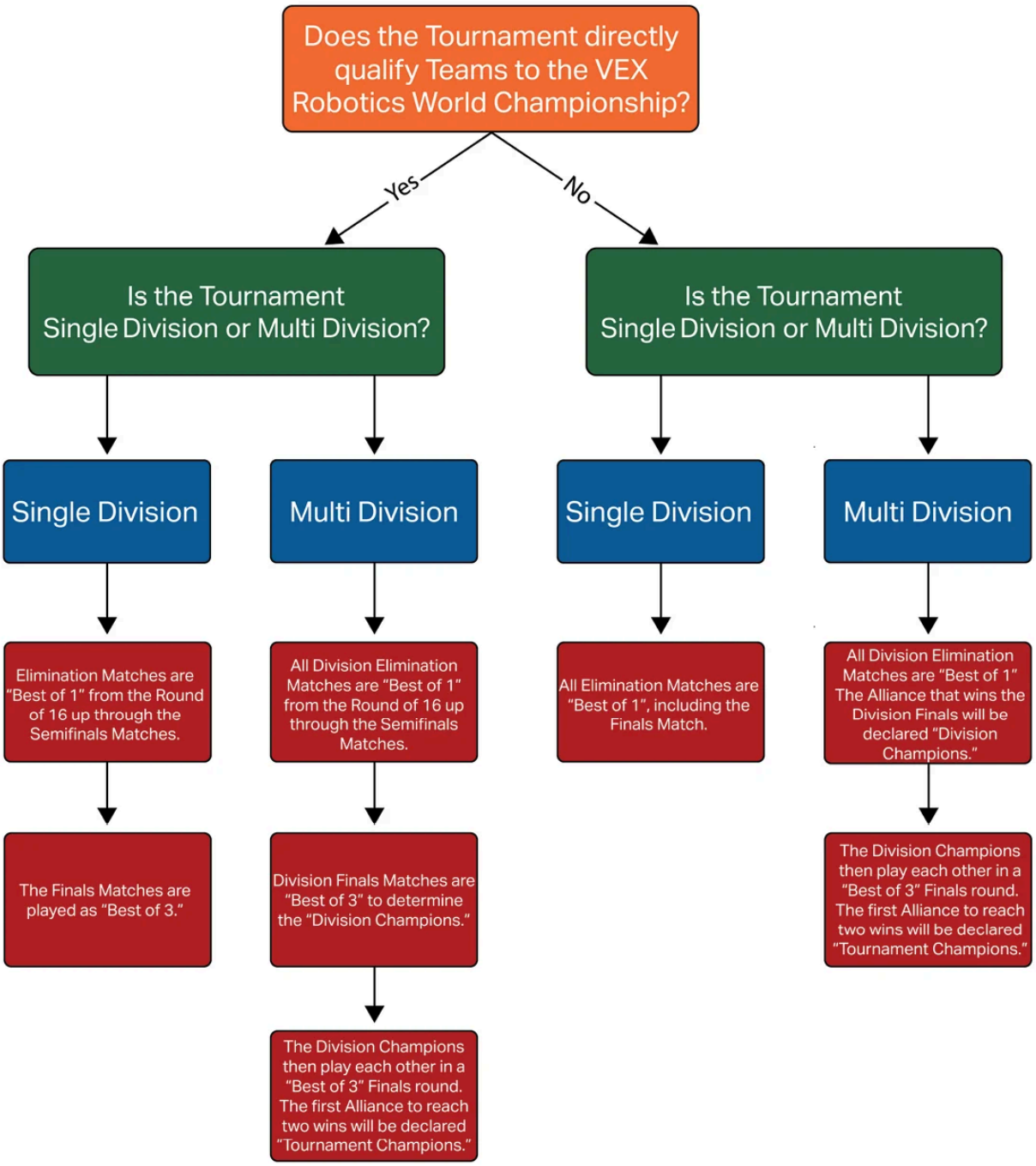


Figure T18-1: The process for determining how *Elimination Matches* should be played.

<T19> Ties in Elimination Matches lead to limited rematches. In the case of tied *Matches* during *Elimination Matches*, *Tournament* Manager will apply the following logic to determine which *Alliance* will progress to the next round.

a. In a “Best of 1” Elimination Round, the higher-seeded *Alliance* will advance and be declared the winner under the following guidelines.
    i. After two (2) ties in a non-finals *Match*.
    ii. After three (3) ties in a finals *Match*.
b. For single-division events or within a division: in a ”Best of 3” Elimination Round, the higher-seeded *Alliance* will advance and be declared the winner under the following guidelines.
    i. After three (3) ties in a round in which neither *Alliance* has yet won a *Match* (0-0).
    ii. After two (2) ties in a round in which each *Alliance* has won a single *Match* (1-1).
c. For single-division events or within a division: after two (2) ties in a “Best of 3” Elimination Round in which one *Alliance* has won a single *Match* (1-0), the *Alliance* with one (1) win will be declared the winner.
d. For a “Best of 3” overall Finals round at a multi-division event, *Teams* should continue to play tiebreaker *Matches* until one *Alliance* has won two (2) *Matches*.

<T20> Skills Match Schedule. *Teams* play *Robot Skills Matches* on a first-come, first-served basis. Each *Team* will get the opportunity to play exactly three (3) *Driving Skills Matches* and three (3) *Autonomous Coding Skills Matches* at each *Tournament* and/or League Session.

Teams should review the event agenda and their *Match Schedule* to determine when the best possible time is to complete their *Robot Skills Matches*. If the *Robot* Skills Challenge area closes before a *Team* has completed all six (6) *Robot Skills Matches*, but it is determined that there was adequate time given, then the *Team* will automatically forfeit those unused *Matches*.

<T21> There is no requirement that Skills Challenge Fields have the same consistent modifications as the Head-to-Head Fields. For example, there is no requirement that all Skills Challenge *Fields* are elevated to the same height as Head-to-Head *Fields*. However, all Skills Challenge *Fields* at a single event must use the same type of *Field* control and *Field Perimeter*, as described in rules T8 and T9.

It is strongly recommended/preferred that all Skills Challenge *Fields* are consistent with each other, but this may not be the case in extreme circumstances. In order to use non-conforming Head-to-Head *Fields* for Skills Challenge runs (e.g. during lunch), the following steps should be taken:

- *Teams* must be informed that the Head-to-Head *Fields* may have some differences from the Skills Challenge *Fields* (e.g., they might not have GPS strips).

- *Teams* must be given an opportunity to select which type of *Field* they want to use, i.e. they cannot be required to use a Head-to-Head *Field* for any Skills Challenge run.

<T22> Skills Rankings at events. *Teams* will be ranked at an event based on the following scores and tiebreakers:

1. Sum of highest *Autonomous Coding Skills Match* score and highest *Driving Skills Match* score.
2. Highest *Autonomous Coding Skills Match* score.
3. Second-highest *Autonomous Coding Skills Match* score.
4. Second-highest *Driving Skills Match* score.
5. Highest sum of *Skills Stop Times* (see rule RSC5) from a *Team's* highest *Autonomous Coding Skills Match* and highest *Driving Skills Match* (i.e., the *Matches* in point 1).
6. Highest *Skills Stop Time* from a *Team's* highest *Autonomous Coding Skills Match* (i.e., the *Match* in point 2).
7. Third-highest *Autonomous Coding Skills Match* score.
8. Third-highest *Driving Skills Match* score.
9. If a tie cannot be broken after all above criteria, then the following ordered criteria will be used to determine which *Team* had the "best" *Autonomous Coding Skills Match* :
    i. Quantity of *Scored Pins*
    ii. Number of *Toggles* set to a color other than yellow
10. If the tie still isn't broken, the same process in Step 9 will be applied to each *Team's* best *Driving Skills Match*.
11. If the tie still isn't broken, events may choose to allow *Teams* to have one more deciding *Driving Skills Match*, to be ranked according to the standard criteria above, or declare both *Teams* the *Robot* Skills Challenge Winner.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIRS2.

<T23> Skills Rankings Globally. *Teams* will be ranked globally based on their *Robot* Skills scores from *Tournaments* and Leagues that upload results to events.vex.com, according to the following tiebreakers:

1. Highest *Robot* Skills score (combined *Autonomous Coding Skills Match* and *Driving Skills Match* Score from a single event).
2. Highest *Autonomous Coding Skills Match* score (from any event).
3. Highest sum of *Skills Stop Times* (see rule RSC5) from the *Robot Skills Matches* used for point 1.
4. Highest *Skills Stop Time* from the *Autonomous Coding Skills Match* used for point 2.

5. Highest *Driving Skills Match* score (from any event).
6. Highest *Skills Stop Time* from the *Driving Skills Match* score used for point 5.
7. Earliest posting of the highest *Autonomous Coding Skills Match* score. The first *Team* to post a score ranks ahead of other *Teams* that post the same score at a later time, all else being equal.
8. Earliest posting of the highest *Driving Skills Match* score. The first *Team* to post a score ranks ahead of other *Teams* that post the same score at a later time, all else being equal.

This rule is applied differently for the VEX AI Robotics Competition. See Rule VAIRS2.

<T24> Robot Skills at League Events. At league events in which *Teams* may submit *Robot* Skills Challenge scores across multiple sessions, the *Robot* Skills scores (combined highest *Autonomous Coding Skills Match* and *Driving Skills Match* scores) used for rankings will be calculated from *Matches* within the same session.

For example, consider the following scores for a hypothetical *Team* across two league event sessions:

	Autonomous Coding Skills Match	***Driving Skills Match***	***Robot* Skills Score**
Session 1	50	60	110
Session 2	40	100	140

This *Team* would have a *Robot* Skills score of 140 for this event, and their scores from Session 2 would be used for the Event and Global tiebreakers listed in T22 and T23.

Section 6 - VEX U

Introduction

While many colleges and universities already use the VEX V5 system in their academic classes, many more have extensive manufacturing capabilities beyond the standard “VEX metal” library. Fabrication techniques like machining and 3D printing are more common than ever in collegiate engineering programs, and we can’t wait to see what VEX U Robotics Competition *Teams* from around the world are able to create under these more advanced rules.

As in past years, the season will include a culminating VEX U event at the VEX Robotics World Championship, along with regional *Tournaments* across the world. Participating schools will get the chance to prove their abilities in front of thousands of future engineers and show off what truly makes their school remarkable. The VEX U Robotics Competition is the perfect project-based supplement to many university level engineering programs, and gives *Students* the unique opportunity to demonstrate their real-world skills to potential employers, such as our event sponsors.

Game, Robot, and Tournament Rules

The VEX U Robotics Competition uses the VEX V5 Robotics Competition Override *Field* with some minor modifications. Anyone that has a VEX V5 Override *Field* can use it for a VEX U event or *Team*. Please consult earlier sections of this game manual for the basic set of competition rules and details. All of the standard rules apply, except for the modifications listed in this section. In the event of a conflict between rules, the rules listed in this Section of the game manual and any rulings on the official VEX U Q&A take precedence.

VURC Definitions

Additional Electronics - Any *Sensor*, processor, or other electronic component used in *Robot* construction, and connected to the V5 *Robot* Brain, that is not sold by VEX Robotics. Examples include commercially-available devices (e.g., Raspberry Pi) or custom devices designed and fabricated by the *Team*. See VUR12 and VUR13 for more details.

Alliance - A grouping of two (2) *Robots* from the same *Team* that have been chosen by the *Students* to play together during a given *Match*.

Electromechanical Assembly - A complex system composed of multiple off-the-shelf components, which may include *Sensors*, mechanical parts, and actuators.

External Processor - A computing device or microcontroller that independently processes *Sensor* data before sending it to the VEX V5 Brain.

Fabricated Part - Any component used in *Robot* construction that is fabricated by *Team* members. See VUR3 through VUR7 for more details.

Raw Stock - Stock materials purchased from third-party vendors that may be used to create *Fabricated Parts*. See VUR4 and VUR5.

Sensor - A device that detects and responds to changes in the environment, providing data to the *Robot's* control system.

Rule Modifications: Field Setup

The VURC playing *Field* is set up differently than a Head-to-Head VEX V5 Robotics Competition Override *Match*, with the following modifications:

- The VEX GPS code strip must be installed on the *Field*.
- Modified *Field* layout. Only the *Midfield Goal* should begin the *Match* with a yellow/yellow *Pin Placed* in it.
- Modified *Match Loads*. Each *Alliance* gains an additional two yellow/yellow *Pins* that begin off the *Field* as *Match Loads*.
    - Red *Alliance Match Loads* : 10 *Cups*, 10 red/yellow *Pins*, and 3 yellow/yellow *Pins*
    - Blue *Alliance Match Loads* : 10 *Cups*, 10 blue/yellow *Pins*, and 3 yellow/yellow *Pins*

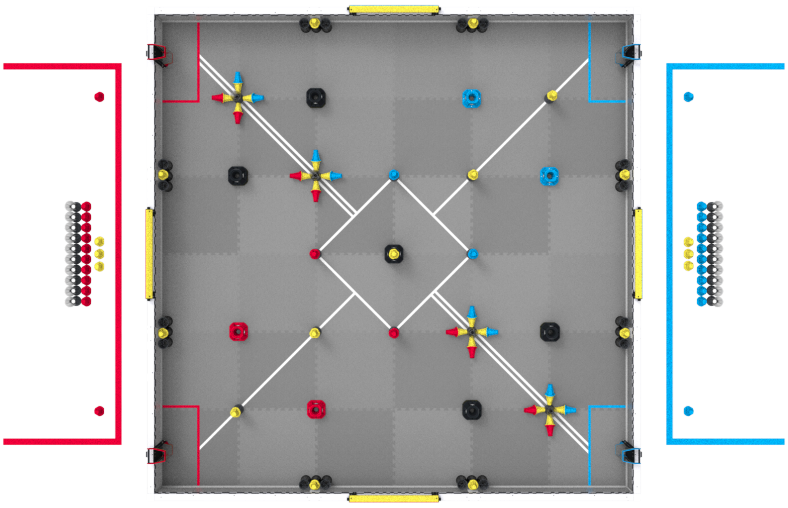


Figure VEXU-1: An overhead view of the *Field* setup for a VEX U *Match*.

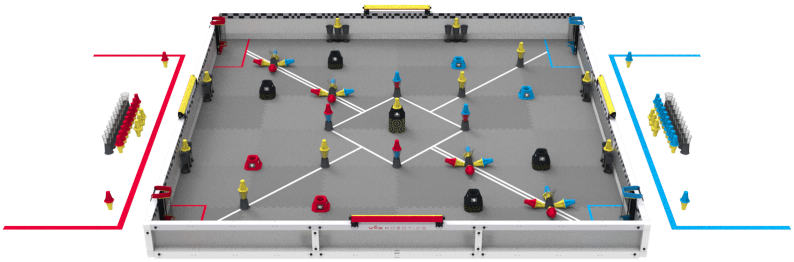


Figure VEXU-2: A side view of the *Field* setup for a VEX U *Match*.

Rule Modifications: Game

<VUG1> Different Robot starting sizes. See VUR1.

<VUG2> Different Robot placement than rule <GG10>. The red *Team* has the right to place one *Robot* on the *Field* first, followed by both blue *Robots*, and ending with the 2nd red *Robot*. This applies in *Qualification Matches* and *Elimination Matches*. If this right is used, once a *Team* has placed a *Robot* on the *Field*, its position cannot be readjusted prior to the *Match*.

<VUG3> Some electronic devices may be in motion or moving at the beginning of the Match. This includes active cooling fans, spinning LIDAR modules, and/or other similar sensors or *Additional Electronics*. These electronic devices should not initiate any form of motion for the entire *Robot* or any of its subsystems, and may not directly interact with *Scoring Objects* and/or other *Robots*.

<VUG4> Different availability of Loaders. *Drive Team Members* may introduce *Match Loads* through their *Alliance*-colored *Loaders*, and may operate those *Loaders*, during both the *Autonomous Period* and *Driver Controlled Period* of the *Match*.

<VUG5> Different scoring during the Autonomous Period. For the purpose of determining the *Autonomous Bonus* winner, the following are included in *Autonomous Period* scoring calculations:

a. Ownership and Scoring of yellow *Pin Halves* in the *Midfield*
   i. For *Pins Placed* in the *Midfield Goal*, the yellow *Pin Halves* are *Owned* by the *Alliance* that ends the *Autonomous Period* with a greater number of *Robots* in the *Midfield*.

b. Scoring of *Robots* ending in the *Midfield*
   i. A *Robot* counts as ending in the *Midfield* if the *Robot* is at least partially within the *Midfield* at the end of the *Autonomous Period*.

<VUG6> Different Autonomous Win Point criteria. For all VEX U events, an *Autonomous Win Point* is awarded to any *Alliance* that ends the *Autonomous Period* with all of the following tasks completed, and that has committed no *Violations* during the *Autonomous Period* :

1. At least twelve (12) *Pin Halves Scored* for your *Alliance*. (Does not include *Pin Halves Scored* in *Quadrants* on the opposing side of the *Autonomous Line*.)
2. At least four (4) *Goals* each contain at least two (2) *Pin Halves Scored* for your *Alliance*. (Does not include *Goals* in *Quadrants* on the opposing side of the *Autonomous Line*).
3. Neither *Robot* is contacting the *Field Perimeter*.
4. At least one (1) *Robot* is at least partially within the *Midfield*.

Rule Modifications: Robot Skills Challenge

All rules apply from VEX V5 Section 3: *Robot* Skills Challenge, with no modifications other than those noted below.

<VURS1> VEX U *Robot Skills Matches* are set up differently than VEX V5 Robotics Competition *Robot Skills Matches*, with the following modification:

a. Modified *Match Loads*. Four (4) red/yellow *Pins*, six (6) blue/yellow *Pins*, and ten (10) *Cups* begin off the *Field* as *Match Loads*. See figure VURS1.

<VURS2> *Teams* are permitted to use both *Robots* in their VEX U *Robot Skills Matches*, per VUT1 and VUR1.

<VURS3> Both *Robots* must start the *Robot Skills Match* in legal starting positions for the red *Alliance*. All other portions of rule SG1 apply. Each *Robot* must use one red/yellow *Pin* as a *Preload* in accordance with SG5.

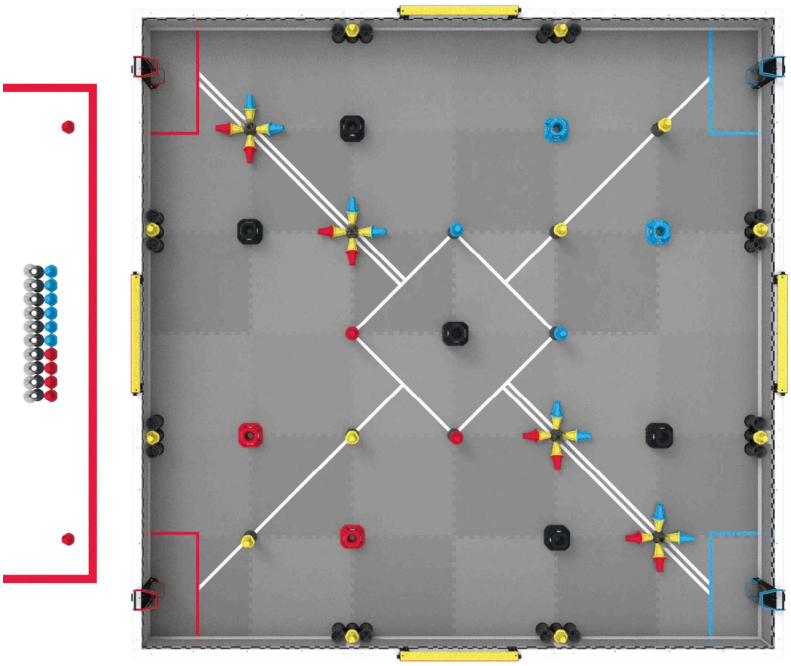


Figure VURS1: The *Field* setup for a VEX U *Robot Skills Match*.

Rule Modifications: Tournament

<VUT1> Instead of a 2-*Team Alliance* format, **VURC Head-to-Head Matches will be played 1-Team vs. 1-Team**. Each *Team* will use two (2) *Robots* in each *Match*.

a. *Teams* are allowed to build and bring as many *Robots* as they would like, but only two (2)—one of each size as described in VUR1 —may be brought from the pit to the playing *Field* for any *Match*.

b. All *Robots* must pass inspection before they are allowed to compete.

<VUT2> Qualification Matches will be conducted in the same manner as in a VEX V5 tournament, but in the revised 1v1 format described in VUT1.

<VUT3> Elimination Matches will be conducted in the same manner as in a VEX V5 tournament, but without an Alliance Selection. At the end of the competition, one *Team* will emerge as the *Tournament* champion.

<VUT4> The **Autonomous Period at the beginning of each Head-to-Head Match will be 30 seconds.**

a. Human interaction with *Robots* during the *Autonomous Period* is strictly prohibited.

b. If both *Teams* complete their routines before 30 seconds have elapsed, they have the option to signal that they wish to end the *Autonomous Period* early. Both *Teams* and the *Head Referee* must all agree on the "early stop." This is not a requirement, and the option must have been established for all *Teams* at the event, such as during the event meeting.

<VUT5> The **Driver Controlled Period is shortened to 90 seconds and immediately follows the Autonomous Period.**

<VUT6> VURC tournaments have fewer Teams in Eliminations. The number of *Teams* in *Elimination Matches* for a given event is determined as follows, except in extraordinary circumstances with the permission of VEX Robotics. A number of *Teams* below 16 will result in one or more *Byes* for highest-ranking *Teams*.

# of *Teams*	# of elimination *Teams*
16+	16
<16	# of *Teams*

Rule Modifications: Robot

<VUR1> *Teams* may use **two (2) Robots** in each *Match*.

a. Both *Robots* may only be built from the following materials:
   i. Official VEX Robotics products (see VUR2)
   ii. *Fabricated Parts* made by the *Team* (see VUR3 through VUR7)
   iii. Commercially-available springs, fasteners, and bearings (see VUR8, VUR9, and VUR15)
   iv. A legal electronics system (see VUR10 and VUR11)
   v. Any legal *Additional Electronics* (see VUR12)
   vi. A legal pneumatics system (see VUR14)
   vii. Unmodified legal *Raw Stock* (see VUR4 and VUR5)

b. One *Robot* must be no larger than 24″ (609.6 mm) x 24″ (609.6 mm) x 24″ (609.6 mm) at the start of the *Match*.

c. One *Robot* must be no larger than 15″ (381 mm) x 15″ (381 mm) x 15″ (381 mm) at the start of the *Match*.

<VUR2> *Teams* may use **any official VEX Robotics products**, other than the exceptions listed in the tables below, to construct their *Robot*. This includes those from the VEXpro, VEX EXP, VEX IQ, VEX GO, VEX 123, VEX CTE, and VEX Robotics by HEXBUG* product lines. Rule R28 applies, but most modifications to non-electrical components are allowed.

This rule takes precedence over all other rules regarding *Raw Stock* and/or *Fabricated Parts*, such as VUR5.

* The HEXBUG brand is a registered trademark belonging to Spin Master Corp

⚠ Caution

As of November 2025, all VEXpro parts are discontinued. To maintain a level playing field and ensure all VURC *Teams* have access to the same library of parts, functionally equivalent, drop-in part substitutes for VEXpro parts may be considered to meet the intent of VUR2.

In order to meet our intent, each functionally equivalent, drop-in part must:

a. *Match* the form, fit, and function of the VEXpro part it is replacing.
b. Not provide a discernible or perceivable advantage over the comparable VEXpro part.
c. Comply with all other applicable VURC *Robot* rules.

Teams should be prepared to demonstrate or defend their part substitutes in inspection as necessary, when possible.

The *Game Design Committee* understands that this may be difficult in the immediate future, as the VEXpro website no longer hosts documentation on VEXpro parts, including but not limited to part descriptions, drawings, pictures, etc. The *Game Design Committee* is working with VEX Robotics to explore and identify a better long-term solution to this problem. In the interim, we ask all *Teams*, referees, inspectors, and the entire VURC community to:

1. Work collaboratively, understanding that the intent of this clarification is to allow *Robots* to compete with minimal to no modification, not to prevent participation.
2. Apply G1 and G3when interpreting this guidance. We recognize this may temporarily result in a challenging inspection environment; good faith is essential.
3. Refrain from exploiting this allowance. We intentionally and meaningfully chose to attempt to maintain product legality and competitive fairness while products are discontinued. Deliberately pushing boundaries may force the *Game Design Committee* to entirely reassess the legality of all VEXpro components.

SKU	Description
217-8080	Talon SRX
217-9191	Victor SPX
217-9090	Victor *SP*

SKU	Description
217-4243	Pneumatic Control Module
217-4244	Power Distribution Panel
217-4245	Voltage Regulator Module
217-4347	775pro
217-2000	CIM Motor
217-3371	Mini CIM Motor
217-3351	BAG Motor
217-6515	Falcon 500

<VUR3> *Fabricated Parts* may be made by applying the following manufacturing processes to legal *Raw Stock* :

a. Additive manufacturing processes, such as 3D printing.

b. Subtractive manufacturing processes, such as cutting, drilling, routing, or machining.

c. Bending, such as sheet metal braking or thermoforming.

d. Attaching materials to one another, such as welding or chemically bonding (e.g., epoxy).

e. Molding of non-metals, such as injecting polyurethane into a 3D printed mold.

<VUR4> *Fabricated Parts* must be made from legal *Raw Stock*. To be considered *Raw Stock*, the material must be obtained in one of the following forms before undergoing the fabrication processes listed in VUR3 :

	Type	Shape / Profile	Examples
1	Sheet	Flat Plane	* Sheet metal * ⅛″ polycarbonate sheet * Plywood
2	Solid Billet	“Thick” rectangular beam / block	* 4″ x 4″ x 6″ solid aluminum billet * 2″ x 2″ x 2″ acetal block

	Type	Shape / Profile	Examples
3	Solid Bar	“Thin” rectangular beam	* 2x4 wood planks * ¼” x 3” aluminum bars
4	Hollow Bar	Hollow rectangular beam	* 1” x 1”, 1/32” wall aluminum box tube
5	Solid Rod	Cylinder, Hexagonal or Rounded Hexagonal Stock	* ¼” steel rod * ¼” acetal rod * VEXpro Hex Shaft
6	Hollow Rod / Tube	Hollow Cylinder, Drilled/Threaded Hexagonal or Rounded Hexagonal Stock	* Copper tubing * PVC pipe * VEXpro ThunderHex Stock
7	Angle	90° “L” shape	* 1” x 1”, 1/16” thickness aluminum angle
8	U- / C-Channel	“U” or “C”.	* 1/4” High x 1” Wide Aluminum U-Channel
9	Non-Metal 3D Printer Filament	Thin cylinder	* PLA or TPU filament * Composite nylon filament (e.g. Markforged OnyxTM)
10	Synthetic Polymer used for Molding	Liquid	* Polyurethane * Silicone
11	Solid Sphere	Solid (not hollow) uniformly rounded stock	* Steel ball bearing * Shaped wood finial

> **⚠ Caution**
>
> *Teams* are not required to exhaustively define the specific material type for each component of every *Fabricated Part* in their Engineering Notebook, as it should be obvious from the engineering drawings required by VUR7. However, unusual parts should be expected to receive increased scrutiny.
>
> If any materials do not easily fall into one of these categories, then that is probably an indication that it is not intended to be a legal type of *Raw Stock*. If a *Team* cannot demonstrate that the component was made from a legal type of *Raw Stock*, then they will be asked to remove it from their *Robot*.

<VUR5> The following material types are **not considered Raw Stock**, and are therefore not permitted:

	Type	Examples
1	Any otherwise-legal *Raw Stock* that has been post-processed by drilling, machining, or otherwise removing material	* Angle aluminum with regularly-spaced holes or slots * Perforated sheet metal
2	Extrusions that do not fall under one of the categories listed in VUR4	* Non-rectangular aluminum extrusions, such as 80/20, T-slot, or Octanorm * Gear stock
3	Assembled items (or pre-arranged kits of unassembled items) that form a single, more complex component	* Gearboxes * Claw mechanisms * Swerve drive modules
4	Commercial Off-the-Shelf items that are intended to be used with minimal modification	* Wheels * Gears * Timing belts and pulleys
5	Materials that are intended to be cast or sintered	* Resin / powdered-bed 3D printing * Molten aluminum used for sand casting

Note: VUR2 takes precedence over this rule. Materials purchased from VEX Robotics that fall under one of these categories (e.g., VersaFrame pre-drilled extrusion) are permitted.

> **⚠ Caution**
>
> In industry, terms like “raw stock,” “raw material,” and “material stock” are often used interchangeably and cover an extremely broad scope of physical goods. The lists in VUR4 and VUR5 are intended to explain what specific material types and profiles fall under the defined term “*Raw Stock*” in the context of the VEX U competition.

<VUR6> *Fabricated Parts* cannot be made from *Raw Stock* which poses a **safety or damage risk** to the event, other *Teams*, or *Field Elements*. Examples of prohibited materials include, but are not limited to:

a. Any material intended to produce flames or pyrotechnic effects.
b. Any material that is liquid at the time of the *Match*. Examples include hydraulic fluids, oils, greases, liquid mercury, and tire sealant.
    i. This does not include fabrication processes that involve the use of liquids, such as milling coolant or epoxy.
c. Any matter that shatters or otherwise presents an excessive *Field* /safety hazard upon failure. Examples include fiberglass, acrylic, and carbon fiber sheet/tube stock.
    i. This rule refers specifically to material legality itself. Any potentially unsafe mechanisms made from legal *Raw Stock* may still be addressed by S1 and R19.
    ii. 3D printer filaments that include carbon fiber (or similar) additives or carbon fiber (or similar) inlay are exempt from this exception, and are considered legal for use in *Fabricated Parts*.

<VUR7> Fabricated Parts must be made by Team members. Any *Fabricated Parts* must be accompanied by documentation that demonstrates the *Team’s* design and construction process for that *Fabricated Part*.

a. The minimum acceptable form of documentation is an engineering drawing with multiple views for the part in question. These drawings may be included in a *Team’s* Engineering Notebook or in a standalone appendix to the Engineering Notebook.
b. Any *Fabricated Part* must have been entirely designed and produced by *Team* members. For example, parts ordered by the *Team* and 3D printed by a third party would be prohibited.
c. *Teams* will be required to provide this documentation as requested by inspectors, *Head Referees*, or judges at any time at an event. Failure to provide acceptable documentation will result in the part being deemed illegal for use; therefore, R2, **<G5>**, and/or G1 will apply.

<VUR8> *Teams* may use **commercially-available springs** on their *Robots*. For the purposes of this rule, a “spring” is any device used for storing and releasing elastic potential energy. Examples include, but are

not limited to:

a. Compression, tension, torsion, constant force, or conical springs made from spring steel.
b. Springs made from elastic thread or rubber, such as surgical tubing, bungee cords, or stretchable braided rope.
c. Closed-loop (pneumatic) gas shocks.

Note: Gas shocks are not considered pneumatic devices in the context of VUR14. Gas shocks may not be modified in any way.>

<VUR9> *Teams* may use **commercially available fastener hardware** on their *Robot*. Examples include (but are not limited to):

- Screws, nuts, rivets, and heatset inserts
- Hinges, pins, rod ends, threaded rods, and hose clamps
- Ancillary fastener accessories, such as washers or spacers
- Adhesives such as epoxy, glue, or tape (only when used to join together two parts)

If the primary function of the part is not “fastening”, then VUR5, VUR6, and/or VUR7 take precedence over this rule. Illegal examples include (but are not limited to):

- A prefabricated non-VEX wheel, even though it may technically connect tread to a shaft
- 80/20 extrusion; other items get “fastened to it”, it is not the part doing the “fastening”
- Using grip tape to improve wheel traction

<VUR10> Each *Robot* must utilize exactly **one (1) V5 Robot Brain and at least one (1) V5 Robot Radio** connected to a V5 Controller.

a. *Teams* must abide by the power rules noted in R12 and <VUR12d>.
b. Wireless communication between *Robots* is permitted if using legal V5 *Robot* Brains and V5 *Robot* Radios. No other types of wireless communication protocols (e.g., radio, Bluetooth, Wi-Fi) are permitted.

<VUR11> There is **no restriction on the number of V5 Smart Motors, 11W (276-4840) and/or 5.5W (276-4842)** that *Robots* may use. No other motors, servos, or electronic actuators are permitted, including those sold by VEX (e.g., the 2-Wire 393 Motor).

Note 1: Rule R28 still applies in VEX U. *Teams* may not modify Smart Motors, and must use official/unmodified gear cartridges.

Note 2: Commercially available pneumatic actuators and pneumatic solenoids are permitted within the guidelines of VUR14.

Note 3: Legal *Additional Electronics* may include their own motor, servo, or actuator, per VUR12.

Note 4: The 55W drivetrain limit specified in R11 does not apply for VEX U.

<VUR12> There is **no restriction on commercially available Sensors, External Processors, or Additional Electronics** that *Robots* may use for sensing and processing, except as follows:

a. *Sensors* and *External Processors* MUST be connected to the V5 *Robot* Brain via any of the externally accessible ports (i.e., without any modification to the commercially available electronics). A *Sensor* may be connected to an *External Processor* which then connects to the V5 *Robot* Brain.
b. *Sensors*, *External Processors*, and *Additional Electronics* CANNOT directly electrically interface with VEX motors and/or solenoids.
c. *Sensors* and *Additional Electronics* may only receive power from any of the following:
    i. Directly from the V5 *Robot* Brain via any externally accessible port.
    ii. From an additional lithium ion, lithium iron, or nickel metal hydride battery pack (only one (1) additional battery can be used for *Sensor*/processing power). This additional battery pack must operate at a maximum of less than 13 volts.
    iii. Directly from an *External Processor*
d. Only the V5 Battery can power the V5 Brain.
e. *Sensors*, *External Processors*, and/or *Additional Electronics* which include a low-powered motor as an integral part of their primary sensing/processing function, such as an *External Processor's* cooling fan or a spinning *Sensor*, are permissible.
    i. Standalone motors which serve no additional sensing or processing functionality (e.g., using a commercially-available brushless motor in a drivetrain) are not considered legal *Additional Electronics*, and would be considered a *Violation* of VUR11.
f. Pneumatic solenoids are the only types of solenoids that are permitted as *Additional Electronics*. Solenoids used for any purpose other than opening and closing a pneumatic valve are considered an actuator and therefore prohibited, per VUR11.
g. R28 still applies in VEX U, *Teams* may not alter or modify electronic parts from the VEX product lines. It is legal to rotate the blocks of the V5 Optical *Sensor* and V5 Distance *Sensor* relative to their bases, and to manufacture custom back plates for these sensors.

<VUR13> Commercially available **Electromechanical Assemblies are not legal** for use on *Robots*.

a. For the purposes of this rule, any system that integrates *Sensors* with other mechanical parts that are fabricated by anyone other than *Team* members and which serve more use than the basic definition of a *Sensor* would be considered an *Electromechanical Assembly*, and is therefore not legal.

b. Examples may include but are not limited to: odometry pods.

c. Commercially available *Sensors* with simple plastic housings that do not have any use beyond protecting internal components and aiding in mounting of the *Sensor* are not considered *Electromechanical Assemblies*.

> ⚠ **Caution**
>
> The intent of this rule is to remind *Teams* to focus their efforts on integrating custom parts with the VEX Robotics ecosystem. The VEX U Competition operates within a semi-closed system, not an open-build system. *Teams* should make efforts to use VEX Robotics parts where possible. Parts like additional *Sensors* (LIDAR, encoders, etc.) should generally be considered okay, but assemblies/systems from other robotics suppliers that remove the challenge of systems integration should not be considered a legal part.

<VUR14> *Teams* may utilize an **unlimited amount of the following commercially available pneumatic components:** cylinders, actuators, valves, gauges, storage tanks, regulators, manifolds, tubing, and solenoids.

a. Pneumatic devices may only be charged to a maximum of 100 psi.

b. Compressors or any other forms of “on-*Robot* ” charging are not permitted.

c. All commercial components must be rated for 100 psi or higher. *Teams* should be prepared to provide documentation that verifies these ratings to inspectors if requested.

d. Components must not be modified from their original state, other than the following exceptions:
    i. Cutting pneumatic tubing or wiring to length; assembling components using pre-existing threads, brackets, or fittings; or minor cosmetic labels

e. If commercially available 12V solenoids are used, these are considered *Additional Electronics* and must therefore satisfy all conditions listed in VUR12. 12V solenoids may be either powered by an additional power source (per <VUR12d>), or by a 5V-12V step-up converter from the V5 *Robot* Brain. If an external power source (or other *Additional Electronics* device) is used to interface with the solenoid, *Teams* MUST be able to demonstrate that there is no way for the solenoid to receive power while the *Robot* is receiving a Disabled state from the field controller.

<VUR15> Teams may use commercially available bearings on their Robot. For the purpose of this rule, a 'bearing' is a part that supports external loads, reduces friction, and improves efficiency by facilitating smooth dynamic motion between components. Legal examples include (but are not limited to):

- Parts supporting rotational motion: radial bearings, roller bearings, thrust bearings, needle bearings, one-way bearings, bushings, etc.
- Parts supporting linear motion: linear bearings, linear slides, drawer slides, etc.

Team Composition

We want to see Universities face off in a global head-to-head competition. Schools are not limited to one *Team*, and a *Team* may consist of multiple colleges, but we hope that each *Team* identifies with and proudly represents one (1) post-secondary institution. (e.g., "Clarkson University" vs. "UC Santa Barbara"). Of course, university-level "club" *Teams* and mixed composition *Teams* are encouraged to join! However, as noted in the Student Eligibility Policy, *Students* who have not yet graduated secondary school are not eligible to participate in VEX U, even if they are "dual-enrolled" or taking post-secondary courses. A *Student* cannot be a member of a VEX V5 and a VURC *Team* simultaneously, regardless of eligibility.

Section 7 - VEX AI Robotics Competition

Game, Robot, and Tournament Rules

The VEX AI Robotics Competition is played on the same *Field* as VEX V5 Override, with the same *Scoring Objects* and *Field Elements*. Two (2) *Teams*, one (1) red and one (1) blue, with two (2) *Robots* each, compete in *Matches* that have no *Driver Controlled Period*. Each *Match* consists of a fifteen (0:15) second *Isolation Period* followed by a one minute and forty-five second (1:45) *Interaction Period*, and *Robots* operate autonomously for the entire *Match*.

All rules in Sections 1 through 5 apply to VEX AI *Teams* unless modified by the rules in this section. *Student* eligibility, *Team* makeup, and participation on more than one *Team* or in more than one program are governed by the Student Eligibility Policy; See rule G4.

Official rules clarifications for the VEX AI Robotics Competition come only from its own Q&A at events.vex.com, not the VEX V5 Q&A.

VEX AI Robotics Competition: Game Design Philosophy

An open letter to every *Team* entering the VEX AI Robotics Competition, and to every *Head Referee* who will call its *Matches*:

Override is a stacking game, and AI *Robots* can be unpredictable. We know those two things can work against each other. Stacks of *Pins* and *Cups* fall over in VRC *Matches* with a driver at the controls; they will fall over in VEX AI *Matches*, where no one is at the controls. Section 7 is written with that in mind, and so is this letter.

Teams: we want you to be as productive as you can be. Override gives an autonomous *Robot* more to do than any previous game: sort *Pins* by color, read the AprilTag on each *Goal* to know where it is, find a *Loader*, choose a *Goal*, and more. That is what this competition is for. Two *Teams* doing those things is a good *Match*, even if stacks are on the floor when it ends.

Toggles are a contest this game designed in. Setting one to your color changes who owns the yellow *Pins* in that *Quadrant*; it is a scoring action the game invites, and it leaves every stack standing. Knocking

stacks down is not a scoring action, and a *Robot* coded to do it is where the grace in this letter runs thin.

Head Referees: a driver can see a stack start to tip and back off, or see a *Match* going sideways and change the plan on the fly. Giving a *Robot* that same judgment is one of the hardest problems in this competition, and every *Team* is still learning the intricacies of driving autonomously around other *Robots*, moving *Scoring Objects*, and *Field Elements*. Contact with stacks will happen, and on its own it is rarely a *Violation*. A *Robot* that disturbs a stack while scoring, driving to a *Loader*, or working a *Toggle* is playing the game, and so is a *Robot* that was knocked off course by another. We are asking you to start from the understanding that a *Robot* which removes points from the *Field* most likely did not mean to, to use your best judgment, to extend grace wherever you can, and to treat *Disqualification* as a last resort. The clearest cases for a call are an especially egregious action, a *Team* that plays a purely defensive strategy, or a *Robot* that repeats the same destructive action *Match* after *Match*. See VAIG3.

To both of you: this is not a loosening of the standard. It is a handshake. *Teams* compete knowing that the other *Robots* are also unsupervised, that unintended things will happen, and that a strange *Match* is a normal *Match*. *Head Referees* call *Matches* knowing that the *Team* in front of them was, far more often than not, trying to score. Our hope is simple: more VEX AI *Matches* that end with points on the board for both *Teams*, earned by *Robots* that were trying to score, and fewer that end in a *Disqualification* nobody wanted.

Build your points up. Do not knock the other *Team's* down.

The *Game Design Committee*

VEX AI Definitions

Isolation Period - The first fifteen (0:15) seconds of a VEX AI *Head-to-Head Match*. Any rule that references the *Autonomous Period* applies to the Isolation Period.

Interaction Period - The one minute and forty-five second (1:45) period that follows the *Isolation Period* in a VEX AI *Head-to-Head Match*. Any rule that references the *Driver Controlled Period* applies to the Interaction Period. *Robots* remain autonomous during the Interaction Period; see VAIG2.

Isolation Bonus - The VEX AI equivalent of the *Autonomous Bonus*. Any rule that references the *Autonomous Bonus* applies to the Isolation Bonus. See VAISC1 for more information.

Isolation Win Point - The VEX AI equivalent of the *Autonomous Win Point*. Any rule that references the *Autonomous Win Point* applies to the Isolation Win Point. See VAISC2 for more information.

Isolation Points - The VEX AI equivalent of *Autonomous Points*, used for *Qualification Match* rankings. Any rule that references *Autonomous Points* applies to Isolation Points.

In the VEX AI Robotics Competition, an *Alliance* is one *Team* with two *Robots*. Rules VUT1 and VUR1 apply; see VAIT1 and VAIRM1. Any rule that references an *Alliance* partner, or the other *Team* on an *Alliance*, applies to the *Team's* second *Robot*.

> ⚠ **Caution**
>
> The VEX AI Definitions exist so that Sections 2 through 5 can be read once, not rewritten. Wherever a rule says *Autonomous Period*, read *Isolation Period*; wherever it says *Driver Controlled Period*, read *Interaction Period*. *Drive Team Members* are still *Drive Team Members*: they place *Robots*, stand in the *Alliance Station*, introduce *Match Loads*, and retrieve *Robots* after the *Match*. They do not operate the *Robots*. See VAIG2.

Rule Modifications: Field Setup

The VEX AI playing *Field* is set up differently than a Head-to-Head VEX V5 Robotics Competition Override *Match*, with the following modifications:

1. The VEX GPS code strip must be installed on the *Field*.
2. Modified *Field* layout. Four *Goals* are removed. In each *Quadrant*, the *Goal* on the left-hand side, as seen from outside the *Field Perimeter* looking into that *Quadrant*, is removed, leaving one *Goal* in each *Quadrant* and the *Midfield Goal*. No *Field Element* is relocated.
3. Modified AprilTag numbering. The *Midfield Goal* keeps AprilTag 0. The four *Quadrant Goals* are numbered counterclockwise from the red *Alliance*-colored *Goal*: the red *Alliance*-colored *Goal* in the Red 1 *Quadrant* is AprilTag 1, the neutral *Goal* in the Red 2 *Quadrant* is AprilTag 2, the blue *Alliance*-colored *Goal* in the Blue 1 *Quadrant* is AprilTag 3, and the neutral *Goal* in the Blue 2 *Quadrant* is AprilTag 4. See Figure VAI-1 and the VEX AI AprilTag drawing in Appendix A.
4. Modified *Match Loads*. There are no yellow/yellow *Match Loads*. Red *Alliance Match Loads* are 10 *Cups* and 10 red/yellow *Pins*; blue *Alliance Match Loads* are 10 *Cups* and 10 blue/yellow *Pins*.
5. Modified *Scoring Object* layout. *Scoring Objects* begin the *Match* as shown in Figures VAI-1 through VAI-3, in the quantities listed below. Each neutral *Goal* begins the *Match* with a yellow/yellow *Pin Placed* in it.

The VEX AI Head-to-Head *Field* consists of the following:

- 48 *Cups*
  - 20 *Match Loads*
    - 10 for red *Alliance*
    - 10 for blue *Alliance*
  - 8 that start the *Match* in predetermined locations on the *Field* (gray side up)
  - 20 that start the *Match* in predetermined locations on the *Field* (clear side up)
- 53 *Pins*
  - 4 red/blue that start the *Match* in predetermined locations
  - 19 red/yellow
    - 2 *Preloads*
    - 10 *Match Loads*
    - 7 that start the *Match* in predetermined locations
  - 19 blue/yellow
    - 2 *Preloads*
    - 10 *Match Loads*
    - 7 that start the *Match* in predetermined locations
  - 11 yellow/yellow
    - 11 that start the *Match* in predetermined locations, including one on each neutral *Goal*
    - No *Match Loads*
- 5 *Goals*
  - 2 *Alliance* colored
    - 1 red
    - 1 blue
  - 3 neutral colored
    - 2 short
    - 1 tall
- 4 *Toggles*
- 4 *Loaders*, two adjacent to each *Alliance Station*

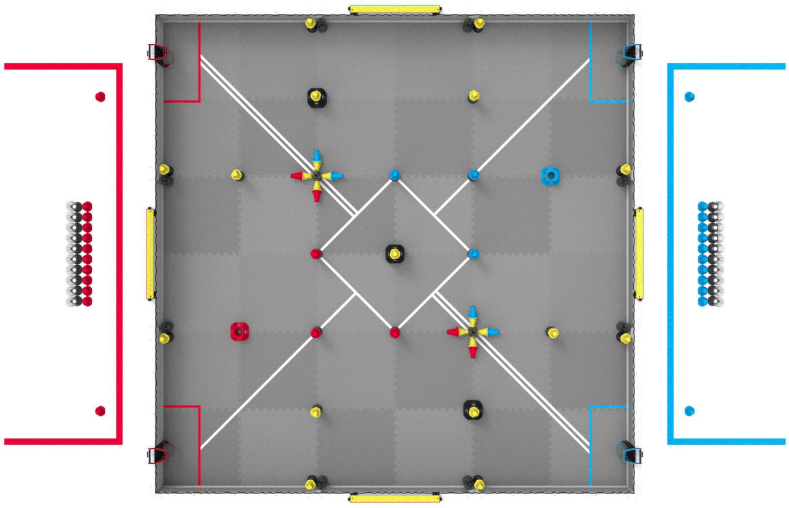


Figure VAI-1: An overhead view of the VEX AI Head-to-Head *Field* in its starting configuration.

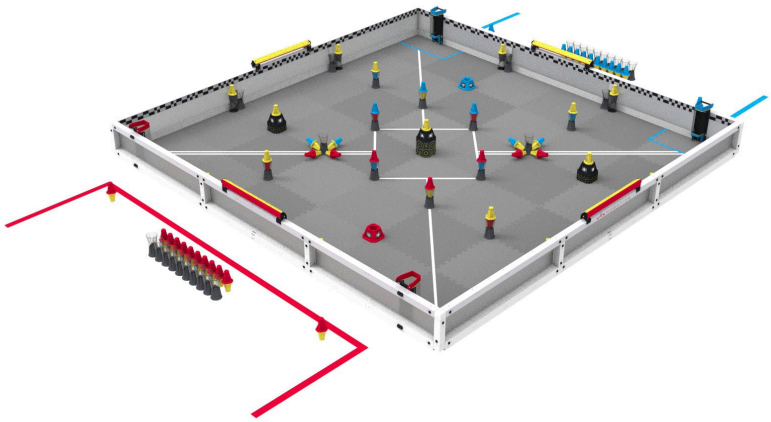


Figure VAI-2: An isometric view of the VEX AI Head-to-Head *Field* in its starting configuration.

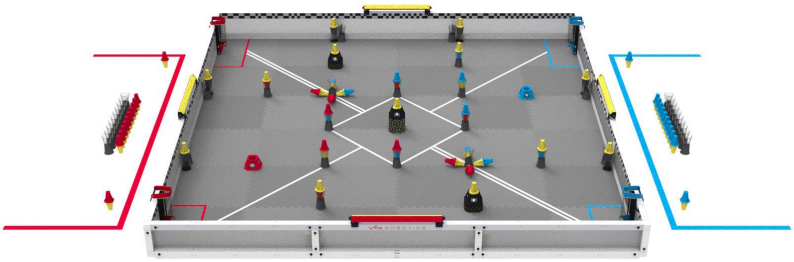


Figure VAI-3: A side view of the VEX AI Head-to-Head *Field* in its starting configuration, from the audience side.

> ⚠ **Caution**
>
> The VEX AI *Field* removes *Goals* rather than moving them, so the assembly instructions are unchanged: build a VEX V5 *Field* and leave four *Goals* out. One *Goal* per *Quadrant* spreads scoring across the *Field*, removes the wall-to-*Goal* choke points beside the *Toggles*, and lets each *Goal* carry a unique AprilTag for localization.

VEX AI *Robot Skills Matches* use the same *Field* layout, with the *Match Load* and *Preload* modifications in VAIRS3.

Rule Modifications: Scoring

<VAISC1> Isolation Bonus criteria. Rule SC7 applies as written to the *Isolation Period*. The *Isolation Bonus* is worth twelve (12) points, the value listed for the *Autonomous Bonus* in the Scoring table in Section 2. Rule VUG5 does not apply to VEX AI.

<VAISC2> Different Isolation Win Point criteria. Rule SC8 is applied differently for VEX AI. An *Isolation Win Point* is awarded to any *Alliance* that ends the *Isolation Period* with all of the following tasks completed, and that has committed no *Violations* during the *Isolation Period*:

1. At least five (5) *Pin Halves Scored* for your *Alliance*. (Does not include *Pin Halves Scored* in *Quadrants* on the opposing side of the *Autonomous Line*.)
2. At least two (2) *Goals* each contain at least two (2) *Pin Halves Scored* for your *Alliance*. (Does not include *Goals* in *Quadrants* on the opposing side of the *Autonomous Line*.)
3. At least one (1) *Robot* is at least partially within the *Midfield*.
4. Neither *Robot* is contacting the *Field Perimeter*.

These criteria apply at all VEX AI events. Rule VUG6 does not apply to VEX AI.

> ⚠ **Caution**
>
> A VEX AI *Team* is two *Robots* on one side of the *Autonomous Line*, which is the same shape as a VEX V5 *Alliance* during the *Autonomous Period*. The VEX AI bar sits below SC8 on purpose: five *Scored Pin Halves* instead of six, with one *Robot* finishing in the *Midfield*. Knowing where you are is the point of this competition, so the *Midfield* task rewards it. Both *Robots* must still leave the *Field Perimeter*.

Rule Modifications: Game

<VAIG1> Standard game rules apply. All Scoring, Specific Game, Safety, General, and General Game rules in Section 2 apply to VEX AI as written, using the VEX AI Definitions, except as modified in this section. The following VEX U Game rules also apply as written: VUG2 and VUG3. Rules VUG1, VUG4, VUG5, and VUG6 do not apply to VEX AI.

<VAIG2> Autonomous means “no humans” for the entire Match. Rule GG12 applies during both the *Isolation Period* and the *Interaction Period*. *Drive Team Members* may not interact with *Robots*, *Field Elements*, or *Scoring Objects* in any way, directly or indirectly, at any time during a *Match*, except as noted below.

a. *Drive Team Members* are allowed to reach into the *Field* during the *Interaction Period* while introducing *Match Loads* as described in rule SG11. See VAIG5. No other interaction with *Scoring Objects* is permitted.

b. Rule <GG4d> applies during both the *Isolation Period* and the *Interaction Period*. A *Drive Team Member* may reach into the *Field* and touch their own *Robot* only if the *Robot* has not moved at all during the *Match*, and only for the reasons listed in <GG4d>.

c. A *Robot* may be Disabled at any time during the *Match*, with permission from or at the request of the *Head Referee*, as described in GG12. *Drive Team Members* must Disable their *Robot* immediately when directed to do so by the *Head Referee*. A *Robot* that has been Disabled may not be re-enabled for the rest of the *Match*.

Violation Notes:

a. Any *Violation* of this rule during the *Isolation Period* is handled per GG13. Any *Violation* during the *Interaction Period* that affects a *Robot's* actions, a *Field Element*, or a *Scoring Object* is a *Major Violation*. Touching a *Robot* that has already moved, for any reason other than a *Head Referee's* direction to Disable it, is a *Major Violation*.

> ⚠ **Caution**
>
> *Drive Team Members* still attend the *Match* per GG1, place their *Robots* per GG3 and VUG2, and retrieve them after the all-clear. Their job during the *Match* is to watch, to introduce *Match Loads* per SG11, and to Disable a *Robot* if the *Head Referee* requires it. Nothing else.

<VAIG3> Use common sense, and give grace. Rule G3 applies to VEX AI with added weight. *Teams* do not control their *Robots* during a *Match*, and a *Robot* will sometimes do something its *Team* did not intend. Unintended actions are part of this competition, not *Violations*.

a. A *Violation* should be called in VEX AI only when the action meets at least one of the following conditions:
   i. It is *Match Affecting*, or its effect on the *Match* is significant and obvious.
   ii. The *Head Referee* interprets it to be intentional, including a programmed strategy that depends on the action.
   iii. The same *Team* repeats it across multiple *Matches* in a way that indicates strategy rather than malfunction.

b. An action that meets none of these conditions is not a *Violation*, even where the same action would be a *Violation* in a VEX V5 *Match*. The *Head Referee* may still warn the *Team* so that it can correct its *Robot* before its next *Match*. *Head Referees* should use their best judgment and let the *Teams* play wherever possible.

c. This rule does not lower the standard for the Safety rules (S1 through S5), for VAIG2, or for the Code of Conduct. An unsafe *Robot* is Disabled per S1 whether or not its behavior was intended, and a human who interacts with a *Match* is in *Violation* of VAIG2 regardless of intent.

d. *Teams* entering VEX AI accept that *Robots* act without human input, that unintended actions will occur, and that a *Match* may not unfold as either *Team* expected, including the risks described in SG8 and SG12. *Teams* are expected to compete graciously (G1) with that understanding. Entering a VEX AI *Match* is accepting this.

e. Rules SG9 and SG10 apply in VEX AI with their intent unchanged: *Teams* should pursue constructive strategies that add points for themselves, not strategies that remove opposing points from *Goals*. Interactions around *Goals* and *Toggles* that unintentionally disturb or knock down *Placed Scoring Objects* are the clearest case for grace under clause b. A *Robot* that is obviously coded to knock stacks down is the clearest case for a call under clause a, as an intentional action.

Violation Notes:

a. In VEX AI, a *Violation* that would be a *Major Violation* under the *Violation* Notes of the rule involved, including a *Match Affecting Violation*, is considered a *Minor Violation* unless the *Head Referee* determines that the action was especially egregious, that the *Team's* strategy is purely defensive, or that the *Team's Robot* has repeated the action across multiple *Matches*. In the context of this rule, an especially egregious action is one the *Head Referee* judges to be beyond what might be expected in normal gameplay such as *Holding* an opponent for fifteen (15) seconds or more, or knocking over the only points scored on the entire field.

> ⚠ **Caution**
>
> AI on a competition *Robot* is new, and no *Team* will implement it perfectly. The *GDC* wants *Teams* to try things and to ask more of their *Robots* than they are sure will work, without a *Head Referee* being pushed into calling a *Violation* the *Team* plainly did not intend. The trade is mutual: every *Team* competes knowing the other *Robots* are also unsupervised, and that a strange *Match* is a normal *Match*. When in doubt, no call, and a word with the *Team* between *Matches*. A *Robot* that drifts into a Hold and never releases is a no call unless it decided the *Match*; a *Robot* whose program plainly targets the opposing *Robots* every *Match* is a call. Around *Goals* and *Toggles*, expect contact. A *Robot* that clips a stack on its way to a *Loader* is a no call; a *Robot* that drives through the opposing *Alliance's Goal* every *Match* is a call under SG9. Let the *Teams* play.

<VAIG4> Robot starting sizes, positions, and expansion. Rule VUG1 does not apply to VEX AI. For the purposes of <SG1a>, each *Robot* must be within its starting size per VAIRM2. Rule SG1 otherwise applies

as written: *Robots* start in the same positions as in a VEX V5 *Head-to-Head Match*, contacting the *Field* tiles and *Field Perimeter* on their *Alliance's* side of the *Autonomous Line*, in separate *Quadrants*. See Figure SG-1. Rules SG2, SG3, and SG12 apply as written; there are no VEX AI modifications to expansion limits.

> ⚠ **Caution**
>
> The 18" limit for the smaller *Robot* is intentional. A VEX V5 *Robot* that satisfies R3 is a legal VEX AI *Robot* without modification, so VEX V5 *Teams* can enter VEX AI with the *Robot* they already have. A *Robot* built to the smaller VUG1 size also fits, so VEX U *Teams* lose nothing. The 24" *Robot* is subject to SG2 as written, and therefore cannot expand horizontally beyond its starting maximum footprint.

<VAIG5> Loaders and Match Loads. Rule SG11 applies as written, with the *Interaction Period* in place of the *Driver Controlled Period*.

a. *Drive Team Members* may introduce *Match Loads* through their *Alliance*-colored *Loaders*, and may operate (raise/lower) those *Loaders*, only during the *Interaction Period* of the *Match*.
b. Rule SG13 applies during the *Interaction Period* as written, and does not apply during the *Isolation Period*.
c. *Match Load* quantities are listed under Rule Modifications: Field Setup.

Scoring Objects that leave the *Field* are returned per SG4 by event volunteers, not by *Drive Team Members*.

Rule Modifications: Robot Skills Challenge

<VAIRS1> Standard rules from VEX V5 and VEX U apply. Rules RSC1 through RSC5 apply as written, with the modifications below. The following VEX U *Robot* Skills Challenge rules also apply as written: VURS2 and VURS3. Rule VAIG2 applies for the entire *Robot Skills Match*.

<VAIRS2> VEX AI Teams compete only in Autonomous Coding Skills Matches. There are no VEX AI *Driving Skills Matches*. Rules T22 and T23 apply as written, with each *Driving Skills Match* score treated as zero (0). If an event chooses to run a deciding *Match* under T22, it is an *Autonomous Coding Skills Match*.

<VAIRS3> VEX AI Robot Skills Matches use the same Field layout as VEX AI Head-to-Head Matches. The *Field* is set up as described under Rule Modifications: Field Setup, including the VEX GPS code strip (see rule RSC4) and a yellow/yellow *Pin Placed* on each neutral *Goal*, with the following modifications:

1. *Match Loads*: ten (10) *Cups*, four (4) red/yellow *Pins*, and six (6) blue/yellow *Pins*, introduced through the red *Alliance Loaders* per rule RSC2.
2. Each *Robot* begins the *Match* with one (1) red/yellow *Pin* as a *Preload*, per rule SG5.
3. Both *Robots* start in legal starting positions for the red *Alliance*, per rule VURS3.

<VAIRS4> Scoring VEX AI Robot Skills Matches. VEX AI *Robot Skills Matches* are scored as VEX U *Robot Skills Matches*: Rule RSC3 applies as written, both *Robots* count per VURS2, and each *Robot* ending the *Match* in the *Midfield* earns the points listed in the Scoring table. For the purposes of RSC3, each *Quadrant* has the color shown in Figure Q-1, whether or not its *Alliance*-colored *Goal* is on the *Field*.

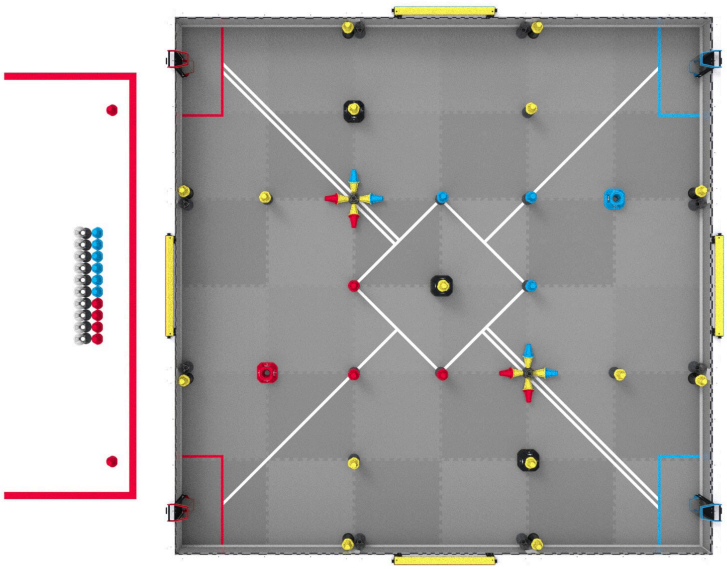


Figure VAIRS-1: An overhead view of the VEX AI Skills *Field* in its starting configuration.

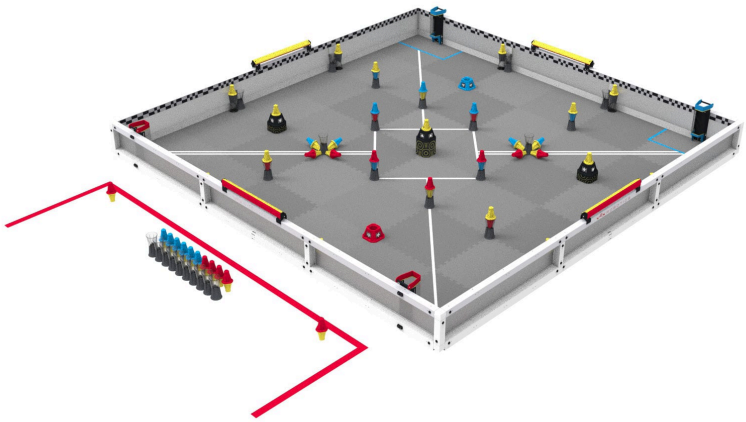


Figure VAIRS-2: An isometric view of the VEX AI Skills *Field* in its starting configuration.

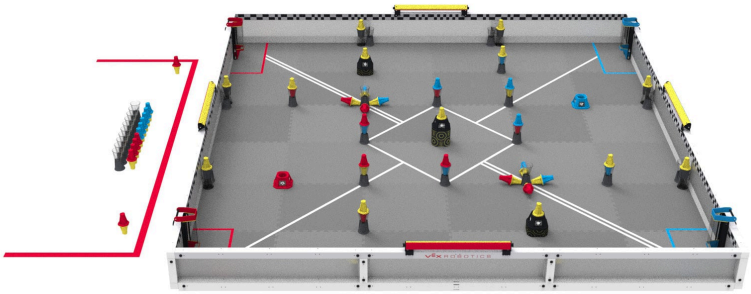


Figure VAIRS-3: A side view of the VEX AI Skills *Field* in its starting configuration.

Rule Modifications: Tournament

<VAIT1> VEX AI Head-to-Head Matches will be played 1-Team vs. 1-Team. Rules VUT1, VUT2, VUT3, and VUT6 apply as written. For every rule in Sections 2 through 5 that refers to an *Alliance*, the *Team* is the *Alliance*, and both of the *Team's Robots* play in each *Match*. Rules VUT4 and VUT5 do not apply; see VAIT4 and VAIT5. For <VUT1a>, the two (2) *Robots* brought to the *Field* must satisfy VAIRM2.

<VAIT2> Qualification Matches will be conducted in the same manner as in a VEX U Tournament. Rules T10 through T13 apply as written, with *Isolation Win Points* and *Isolation Points* in place of *Autonomous Win Points* and *Autonomous Points*. *Teams* are ranked by the following, in order:

1. Average *Win Points* (*Win Points* / number of *Matches* played).
2. Average *Isolation Points* (*Isolation Points* / number of *Matches* played), the *Team's* score at the end of the *Isolation Period* of each *Qualification Match*.
3. Average *Strength of Schedule Points* (*Strength of Schedule Points* / number of *Matches* played), per T12.
4. Remaining tiebreakers, per rule T13.

<VAIT3> Elimination Matches will be conducted in the same manner, but without an Alliance Selection. Rules T17, T18, and T19 apply as written; rules T14, T15, and T16 do not apply. *Teams* are seeded into the *Elimination Bracket* in order of their *Qualification Match* ranking. At the end of the competition, one *Team* will emerge as the *Tournament* champion.

1. The number of *Teams* in *Elimination Matches* for a given event is determined as follows, except in extraordinary circumstances with the permission of Global Robotics and Science Foundation: at events with sixteen (16) or more *Teams*, sixteen (16) *Teams* advance; at events with fewer than sixteen (16) *Teams*, every *Team* advances, and one or more *Byes* go to the highest-ranking *Teams*.
2. Each *Team* in the *Elimination Bracket* gets one three-minute *Time-out*, per rule GG7.
3. When a *Team* is Disqualified in an *Elimination Match*, both of its *Robots* are Disqualified per rule GG6, and the opposing *Team* is awarded the win.
4. Ties in *Elimination Matches* are handled per rule T19.

<VAIT4> The Isolation Period at the beginning of each Head-to-Head Match will be fifteen (15) seconds. Rule VUT4 does not apply to VEX AI. Any rule that references the *Autonomous Period* applies to the *Isolation Period*; see the VEX AI Definitions and VAISC1. The *Isolation Period* may be ended early if both *Teams* and the *Head Referee* agree. This option is available in all *Matches* by default and does not need to be established at the event meeting.

<VAIT5> The Interaction Period will be one minute and forty-five seconds (1:45). Rule VUT5 does not apply to VEX AI. Any rule that references the *Driver Controlled Period* applies to the *Interaction Period*, and *Robots* remain autonomous throughout; see VAIG2. *Teams* may signal that they wish to end the *Interaction Period* early. The *Interaction Period* ends early only if both *Teams* and the *Head Referee* agree; this option is available in all *Matches* by default and is never required.

Rule Modifications: Robot

<VAIRM1> VEX U Robot rules apply as written, except Robot sizes. Rules VUR1 through VUR15 apply to VEX AI *Robots* as written, except that *Robot* sizes are governed by VAIRM2. Where a VEX U *Robot* rule modifies a VEX V5 *Robot* rule, the VEX U rule controls.

<VAIRM2> Different Robot sizes. Rule R3 applies to VEX AI *Robots* with the following volumes in place of the VEX V5 volume. One of a *Team's* two *Robots* must fit within an 18″ (457.2 mm) x 18″ (457.2 mm) x 18″ (457.2 mm) volume, and the other must fit within a 24″ (609.6 mm) x 24″ (609.6 mm) x 24″ (609.6 mm) volume. A *Team* whose *Robots* both fit within the 18″ volume satisfies this rule. Rule VUG1 does not apply to VEX AI.

> **⚠ Caution**
>
> The 18″ volume is the VEX V5 inspection volume on purpose. A VEX V5 *Team* can bring two 18″ *Robots* from the regular season, add AI sensing and processing, and inspect as a VEX AI *Team* without rebuilding. The 24″ volume is a ceiling for one *Robot*, not a requirement, and it replaces the 15″ small-*Robot* volume used in VEX U. Every other VEX U *Robot* rule applies as written per VAIRM1.

<VAIRM3> Components used for AI vision processing are Additional Electronics. Cameras, processors, and other components used for image capture, machine vision, or AI processing are *Additional Electronics*, and are governed by VUR12.

Appendix A - Field Overview

Game Field Introduction

This document will provide Bill of Materials (BOM) information and detailed specifications for the Official Competition *Field*.

Please note: this *Field* can utilize both the VEX Portable Competition *Field Perimeter* (276-8242 and the VEX Competition *Field Perimeter* (278-1501) developed by VEX Robotics. Instructions and specifications for these *Field Perimeters* are available in separate documents and are important for the *Field* assembly.

This document is divided up into three sections:

1. *Field* Overview
2. *Field* BOM
3. *Field* Specifications

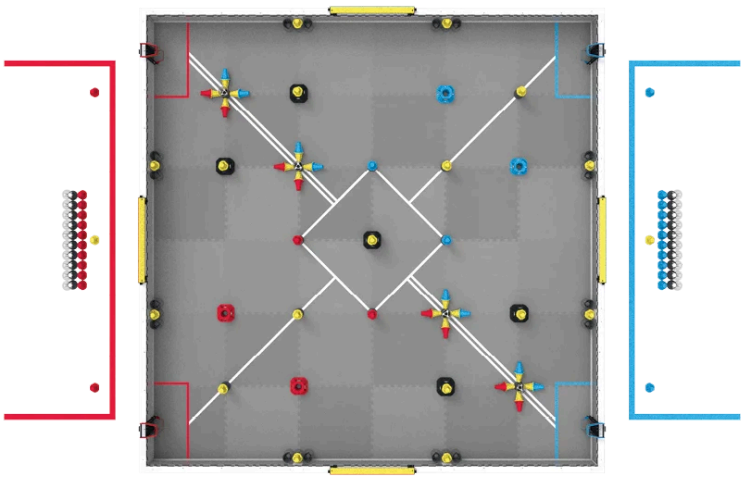
There is also an accompanying STEP file which can be imported into most 3D modeling programs (e.g., Inventor, Sketchup, Solidworks, etc.). This 3D model shows the “official” setup of a VEX V5 Robotics Competition Override competition *Field*, as well as detailed models of individual *Field Elements*. For additional game-play detail, please refer to the VEX V5 Robotics Competition Override Game Manual.

Field Overview

VEX V5 Override is played on a 12ft x 12ft foam mat, surrounded by a *Field Perimeter*, with nine (9) *Goals*, four (4) *Loaders*, and four (4) *Toggles* on the *Field*.

The VEX V5 Override *Field* consists of fifty-six (56) *Cups* and sixty-three (63) *Pins*.

For more details and specific gameplay rules, please refer to the VEX V5 Override Game Manual.



Game Objects & Field Bill of Materials

All of these items are available for purchase from www.vexrobotics.com

Generic *Field Elements* - Reusable Each Year

Part Number	Description
278-1501	*Field Perimeter* Frame & Hardware
276-8242	Portable Competition *Field Perimeter*
276-6905	Anti-Static *Field* Tiles (18-Pack)
276-7741	Smart *Field* Controller Kit

Official VEX V5 Robotics Competition Override Specific Elements

Part Number	Description	Quantity per Full *Field*
276-9250	VEX V5 2026-27 Full *Field* & Game Element Kit	
276-9251	VEX V5 2026-27 Game Element Kit	1
276-9252	VEX V5 2026-27 *Field Element* Kit 1	1
276-9091	VEX V5 *Field Element* Plates (4-Pack)*	2

*Optional. Only needed if *Field Element* Plates are not already owned.

Practice Elements

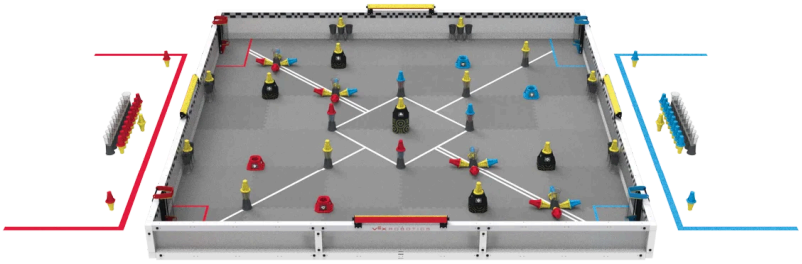
Part Number	Description
276-9255	VEX V5 2026-27 Scoring Element Kit

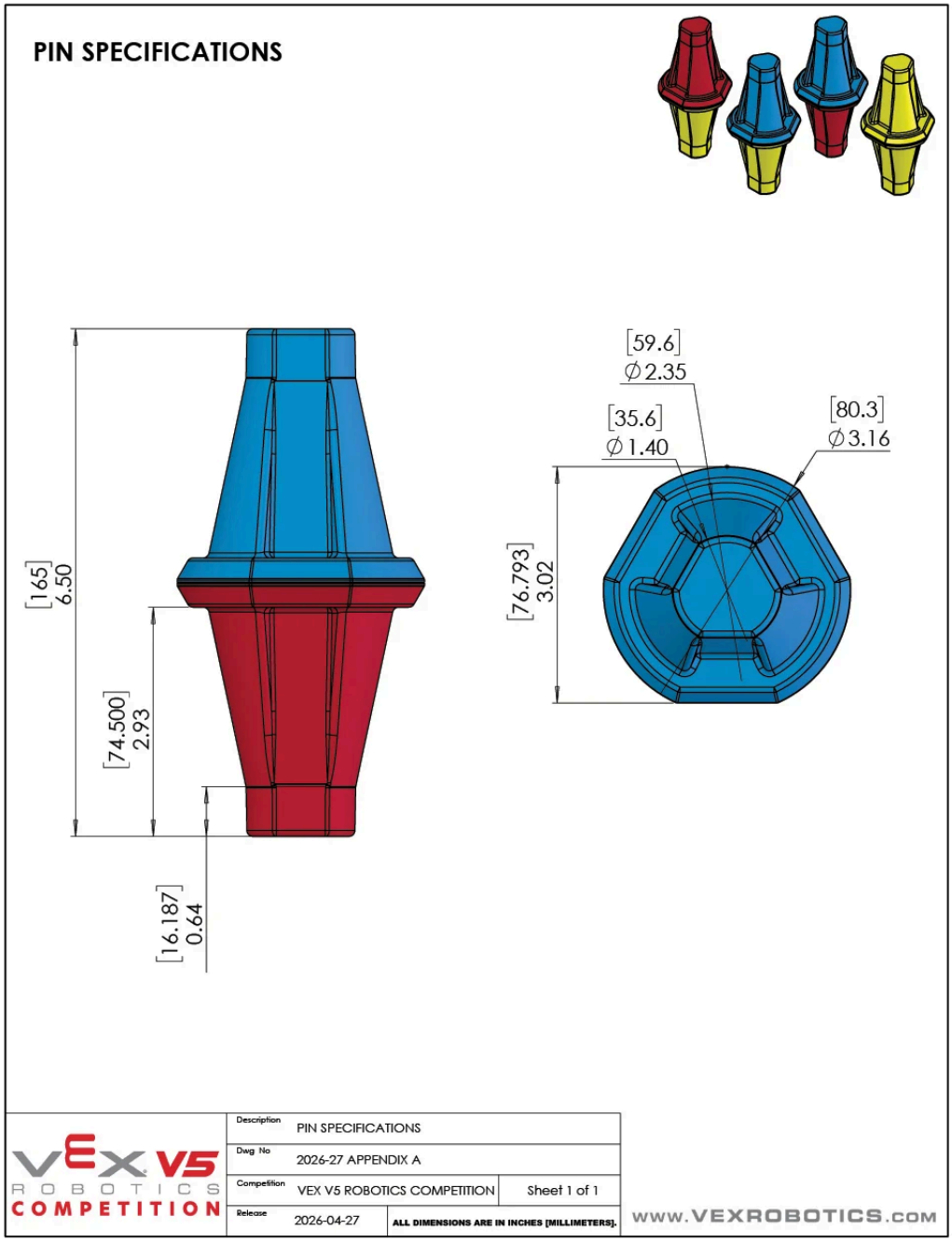
Field Specifications Introduction

This section will outline the specifications that are most important to *Teams* designing a *Robot* to compete in VEX V5 Robotics Competition Override. Though many of the critical dimensions are included in this section, it may be necessary to consult the separate assembly guide and 3D CAD models of the *Field* for an additional level of detail. If you can't find a dimension in the specifications, we include a full model of the *Field* to "virtually" measure whatever dimension is necessary.

Field components may vary slightly from event to event. This is to be expected; *Teams* will need to adapt accordingly. It is good design practice to create mechanisms capable of accommodating variances in the *Field* and *Scoring Objects*.

Note: Minor *Field* repairs are permissible, provided that the repairs do not affect gameplay. Examples of minor *Field* repairs include (but are not limited to) threadlocker applied to *Field Element* mounting hardware. Be sure to check the Official Q&A for specific examples or to get an official clarification.

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2026-27 APPENDIX A
Competition
VEX V5 ROBOTICS COMPETITION
Sheet 1 of 1
Release
2026-04-27
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
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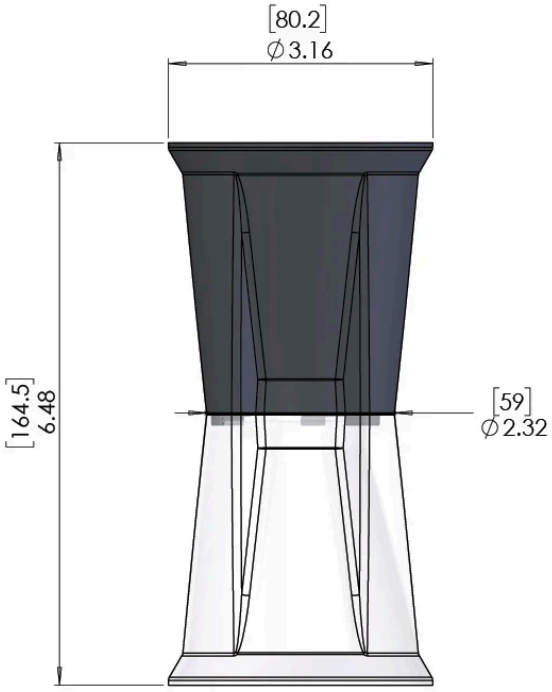
CUP SPECIFICATIONS





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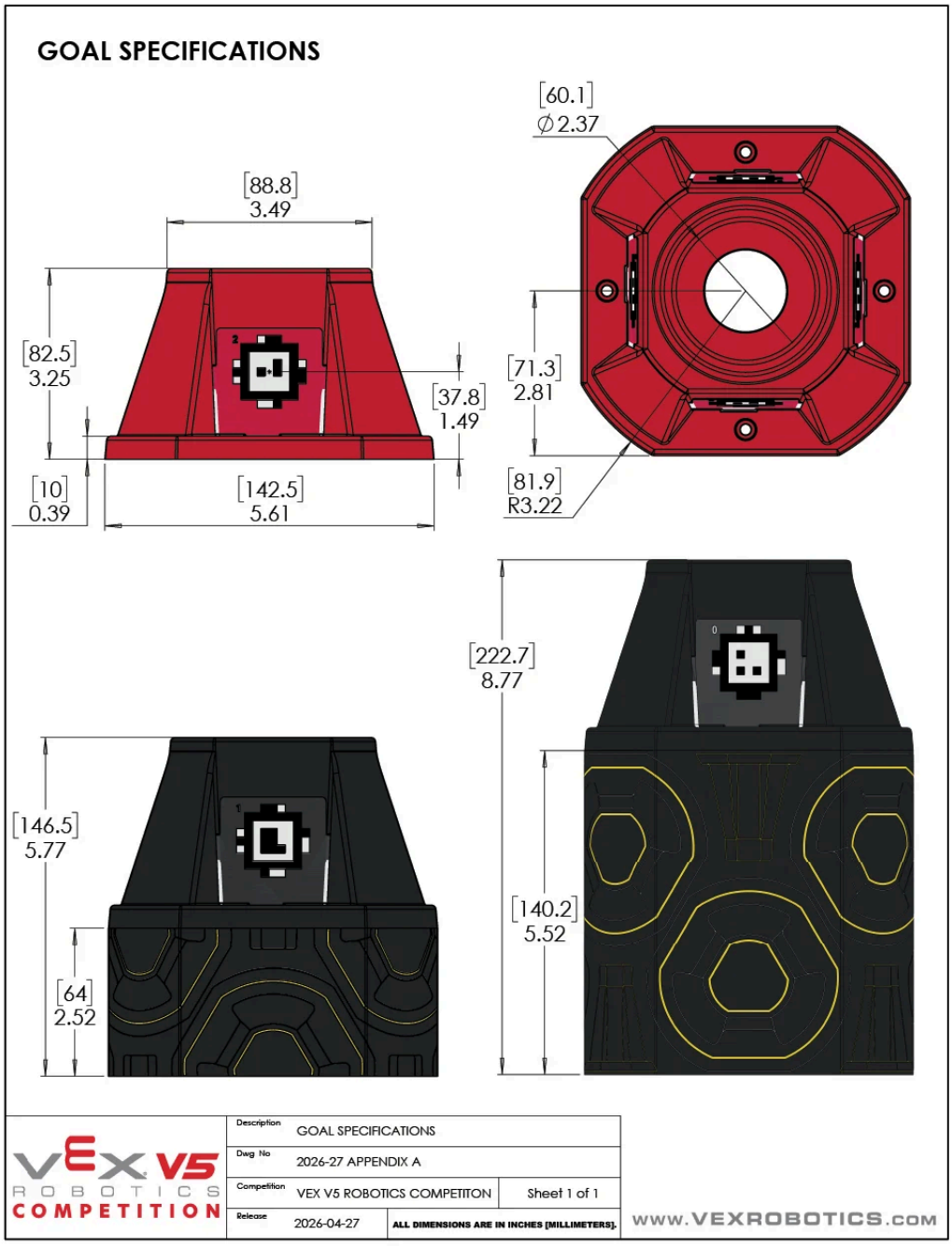
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Competition VEX V5 ROBOTICS COMPETITON
Sheet 1 of 1
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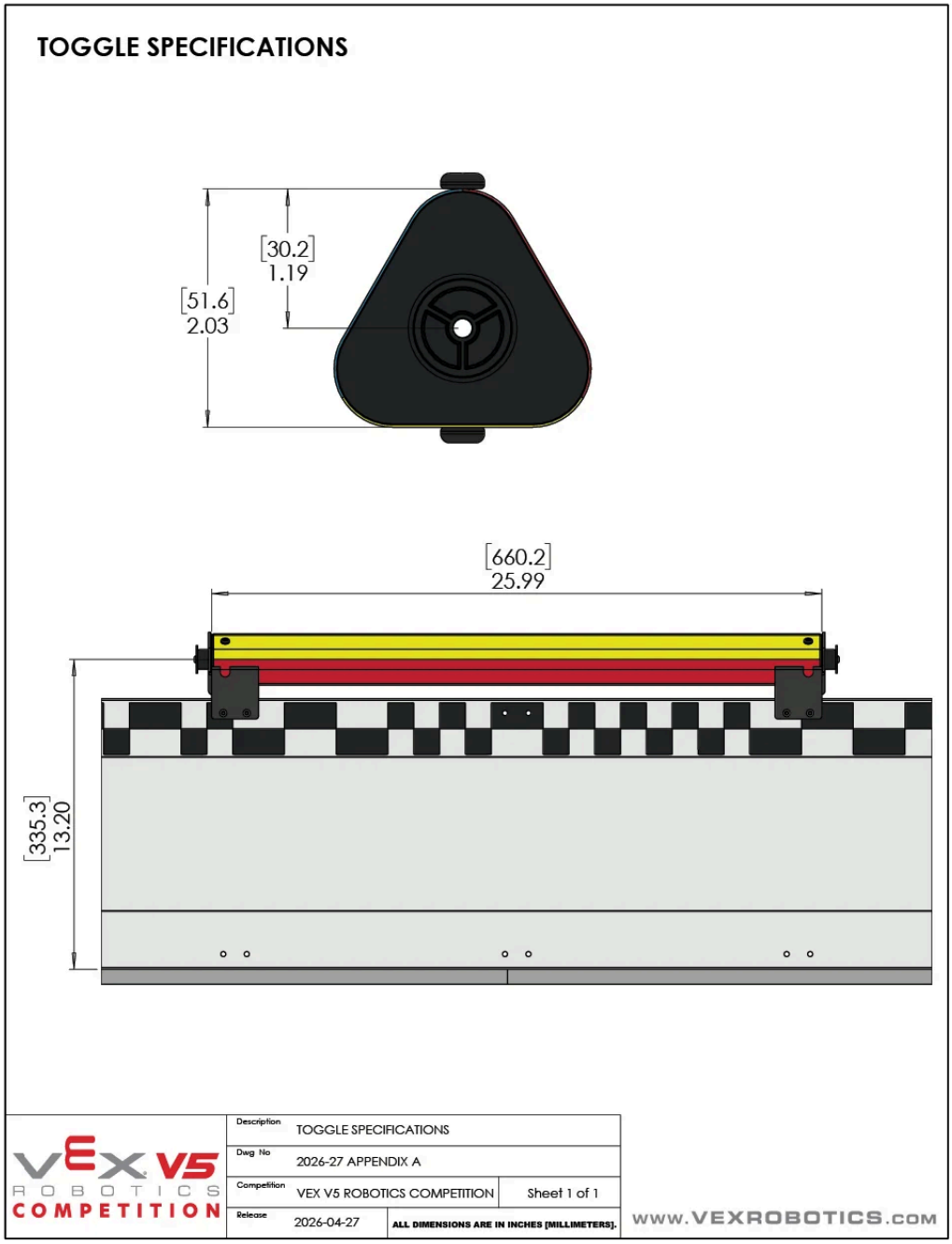
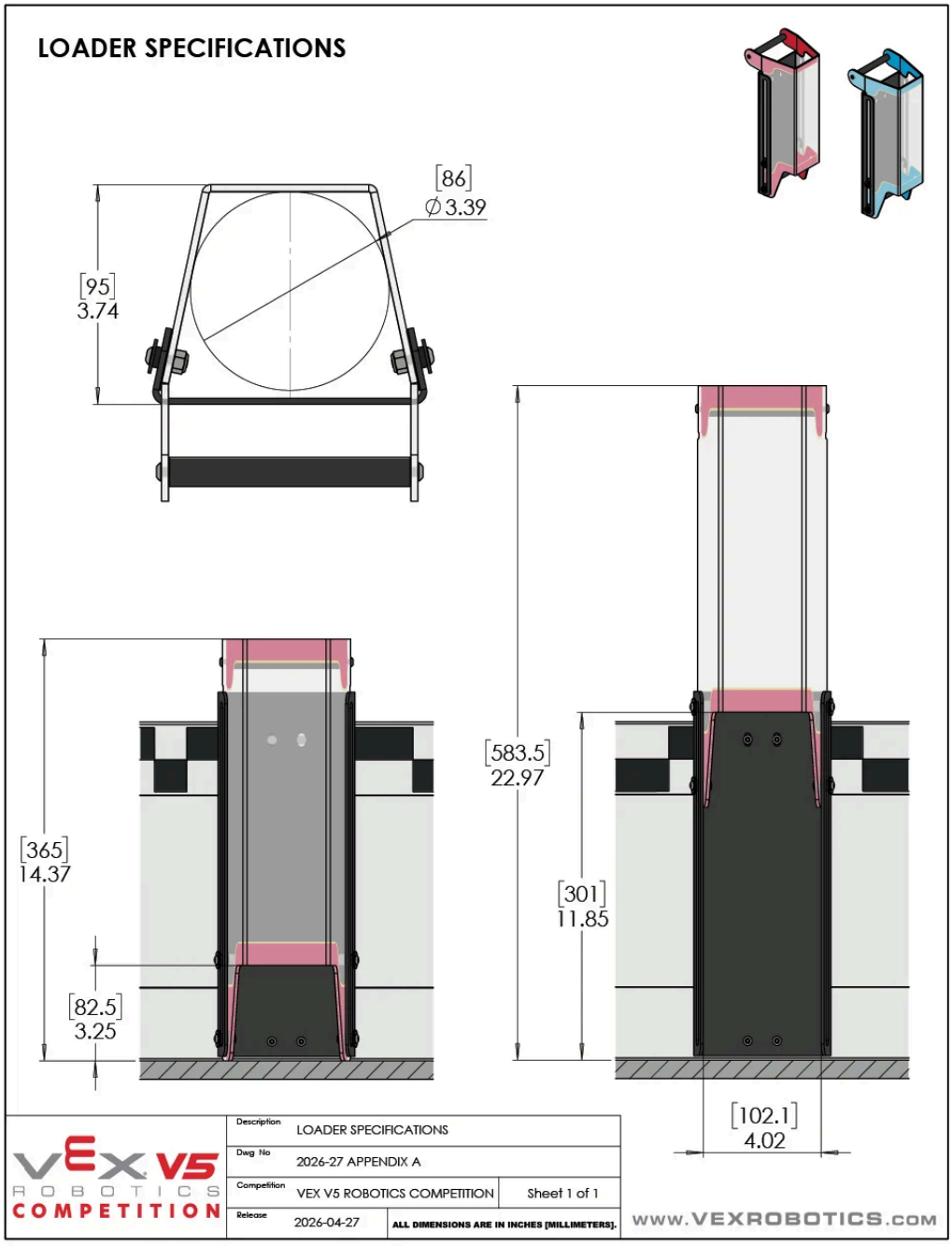
TOGGLE SPECIFICATIONS




LOADER SPECIFICATIONS
[86]
∅3.39
[95]
3.74
[583.5]
22.97
[365]
14.37
[301]
11.85
[82.5]
3.25
[102.1]
4.02
Description LOADER SPECIFICATIONS
Dwg No 2026-27 APPENDIX A
Competition VEX V5 ROBOTICS COMPETITION
Sheet 1 of 1
Release 2026-04-27
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
VEX V5 ROBOTICS COMPETITION
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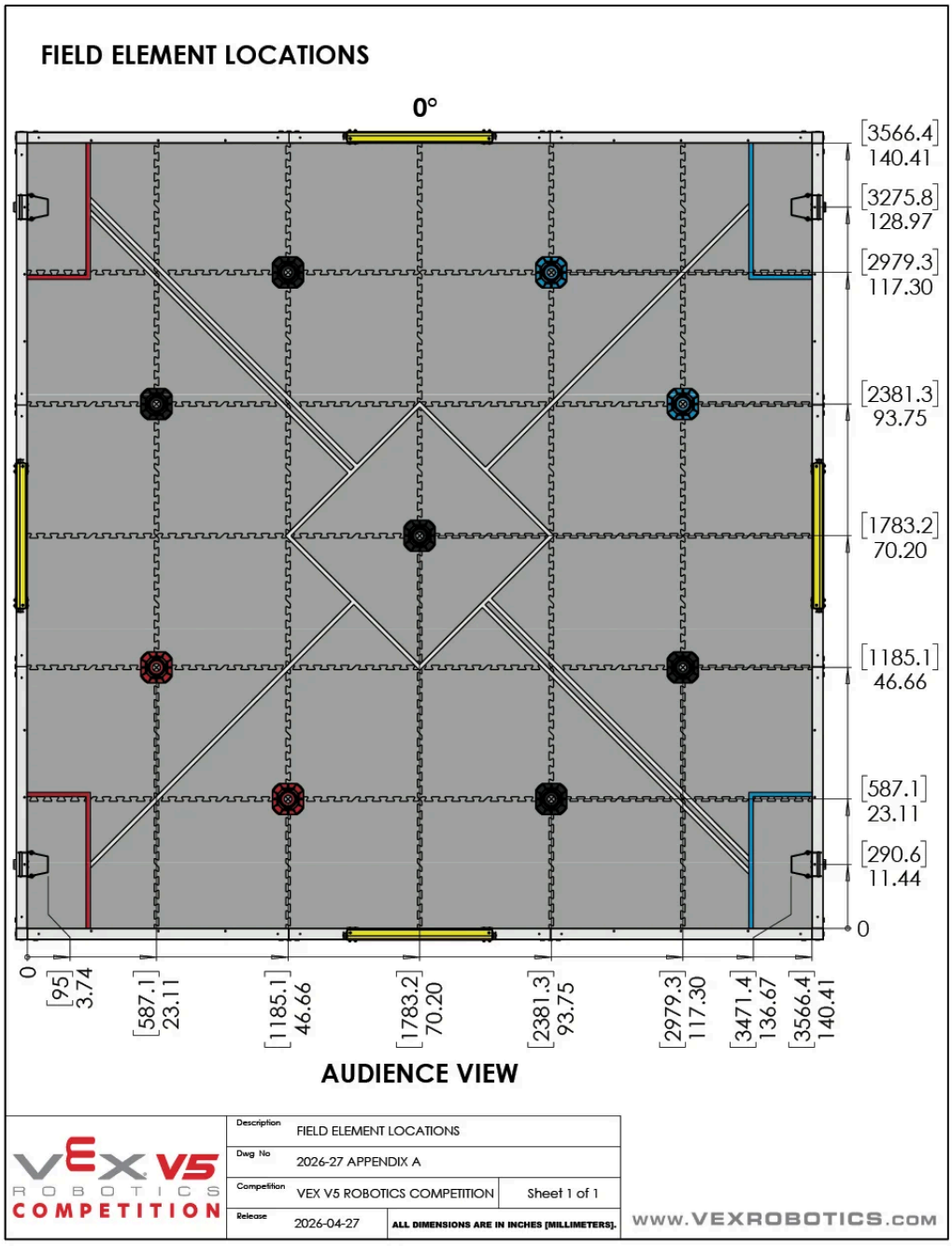
FIELD ELEMENT LOCATIONS
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AUDIENCE VIEW
Description FIELD ELEMENT LOCATIONS
Dwg No 2026-27 APPENDIX A
Competition VEX V5 ROBOTICS COMPETITION
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ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
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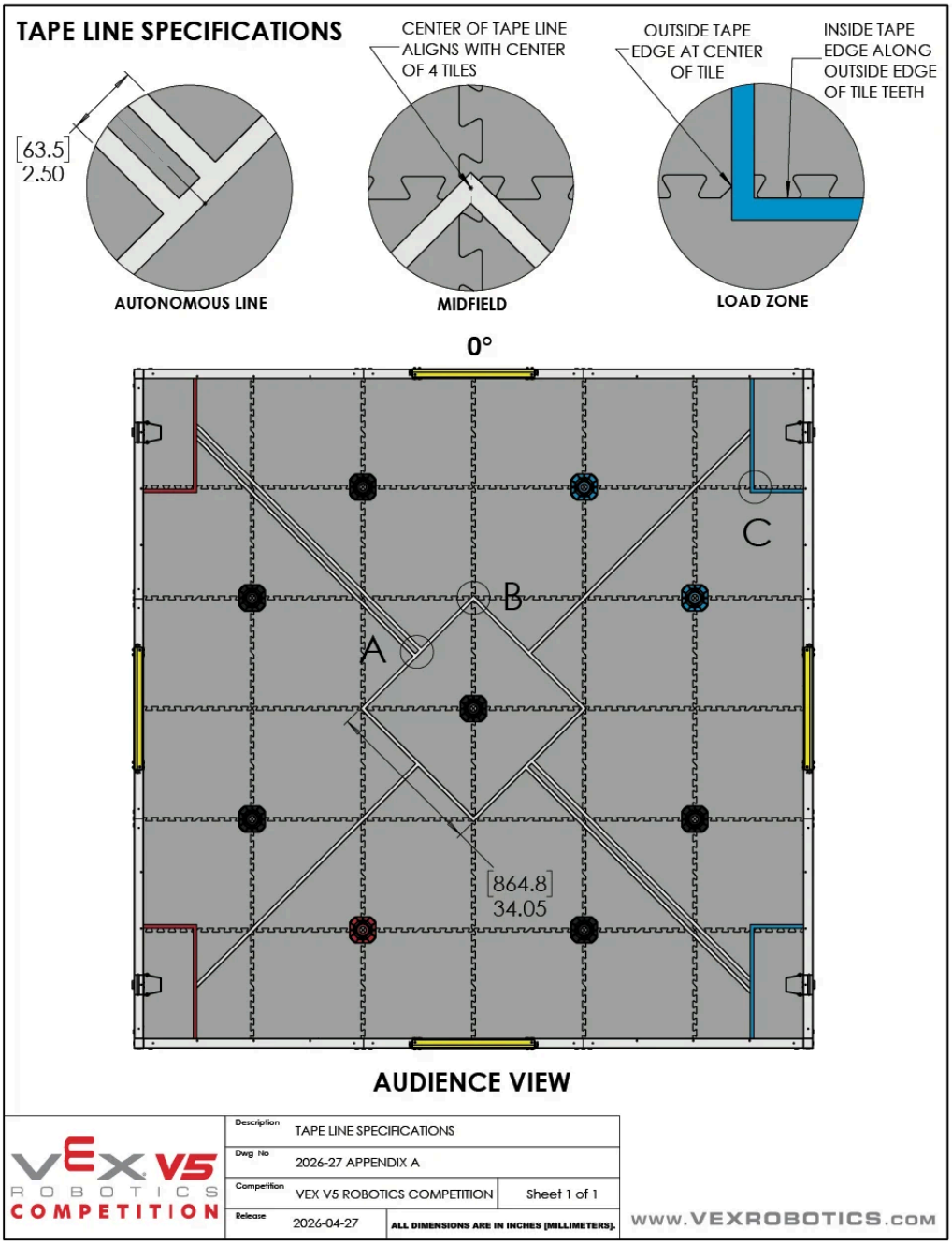
TAPE LINE SPECIFICATIONS
CENTER OF TAPE LINE ALIGNS WITH CENTER OF 4 TILES
OUTSIDE TAPE EDGE AT CENTER OF TILE
INSIDE TAPE EDGE ALONG OUTSIDE EDGE OF TILE TEETH
[63.5]
2.50
AUTONOMOUS LINE
MIDFIELD
LOAD ZONE
0°
A
B
C
[864.8]
34.05
AUDIENCE VIEW
Description TAPE LINE SPECIFICATIONS
Dwg No 2026-27 APPENDIX A
Competition VEX V5 ROBOTICS COMPETITION
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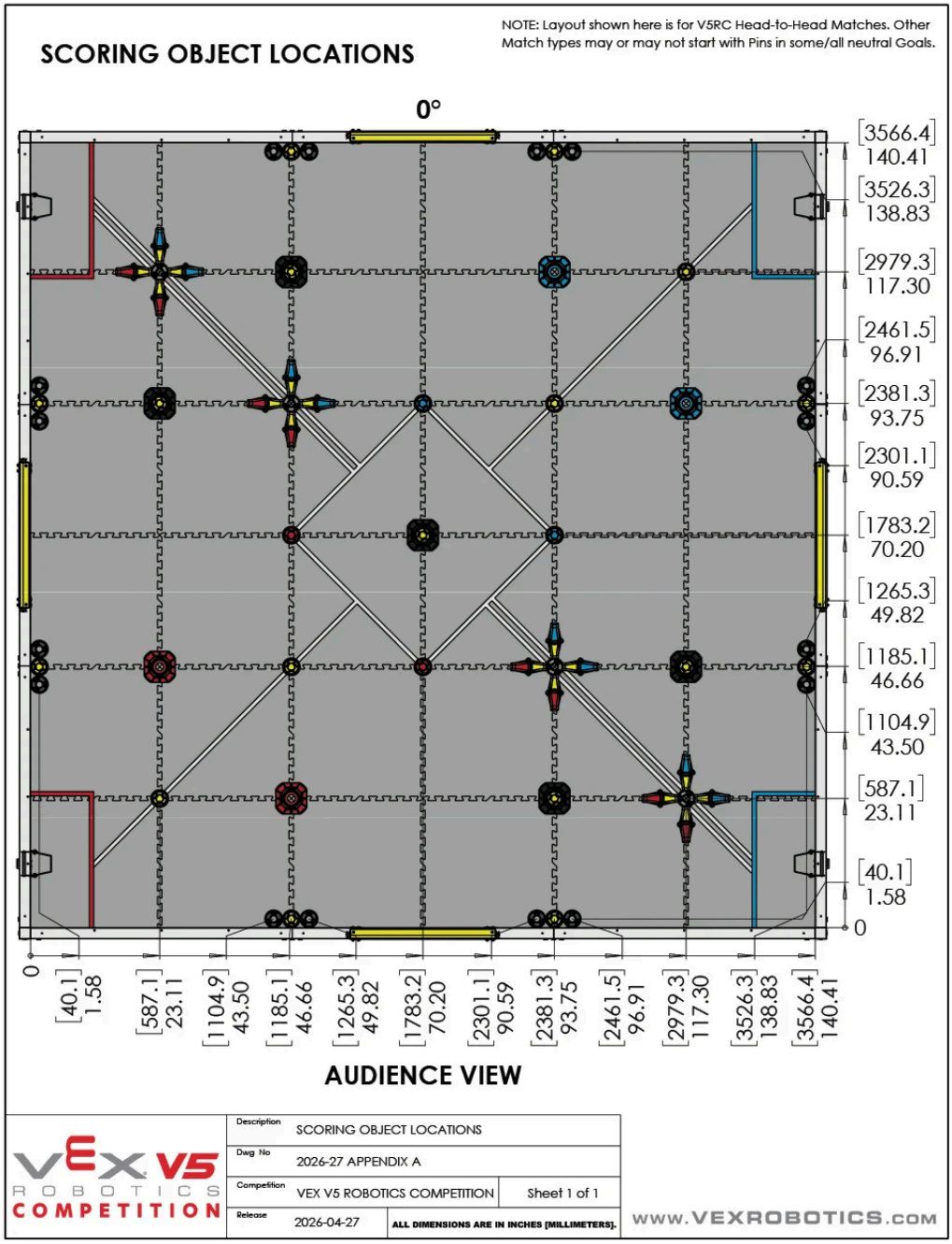
SCORING OBJECT LOCATIONS
NOTE: Layout shown here is for V5RC Head-to-Head Matches. Other Match types may or may not start with Pins in some/all neutral Goals.
0°
[3566.4] 140.41
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[2979.3] 117.30
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AUDIENCE VIEW
Description SCORING OBJECT LOCATIONS
Dwg No 2026-27 APPENDIX A
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ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
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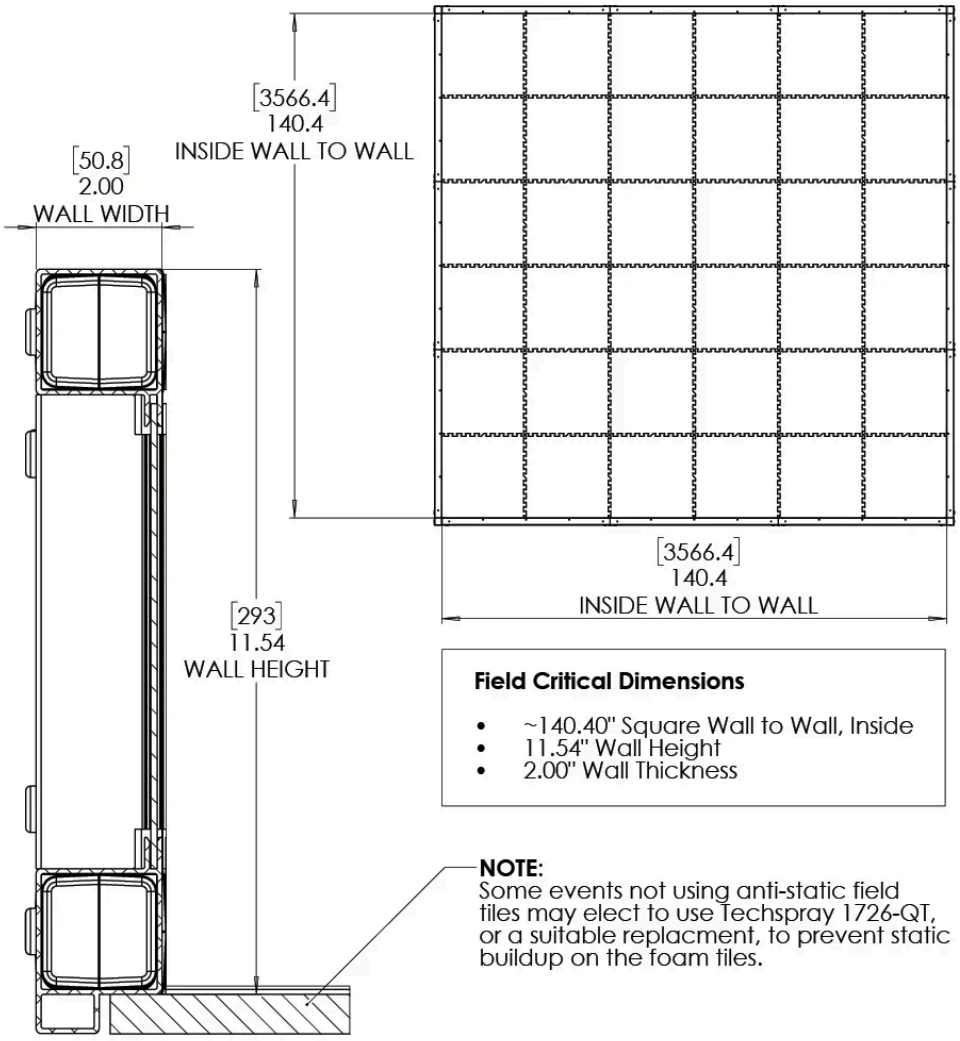
PORTABLE FIELD PERIMETER SPECIFICATIONS



Field Critical Dimensions

- ~140.40" Square Wall to Wall, Inside
- 11.54" Wall Height
- 2.00" Wall Thickness

NOTE:
Some events not using anti-static field tiles may elect to use Techspray 1726-QT, or a suitable replacment, to prevent static buildup on the foam tiles.

SECTION A-A

Description	PORTABLE FIELD PERIMETER SPECIFICATIONS	
Dwg No	2026-27 APPENDIX A	
Competition	VEX V5 ROBOTICS COMPETITION	SHEET 1 OF 1
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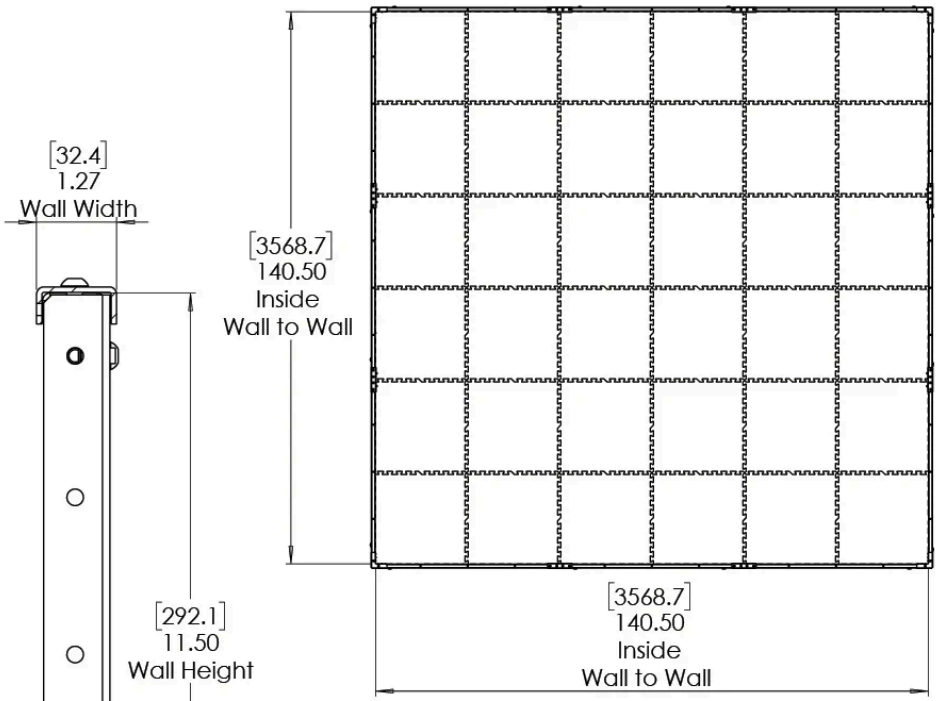
METAL FIELD PERIMETER SPECIFICATIONS



Field Critical Dimensions

- ~140.5" Square Wall to Wall, Inside
- 11.5" Wall Height
- 1.27" Wall Thickness

NOTE:
Some events not using anti-static field tiles may elect to use Techspray 1726-QT, or a suitable replacment, to prevent static buildup on the foam tiles.

Description	METAL FIELD PERIMETER SPECIFICATIONS		
Dwg No	2026-27 APPENDIX A		
Competition	VEX V5 ROBOTICS COMPETITION	Sheet 1 of 1	
Release	2026-04-27	ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].	

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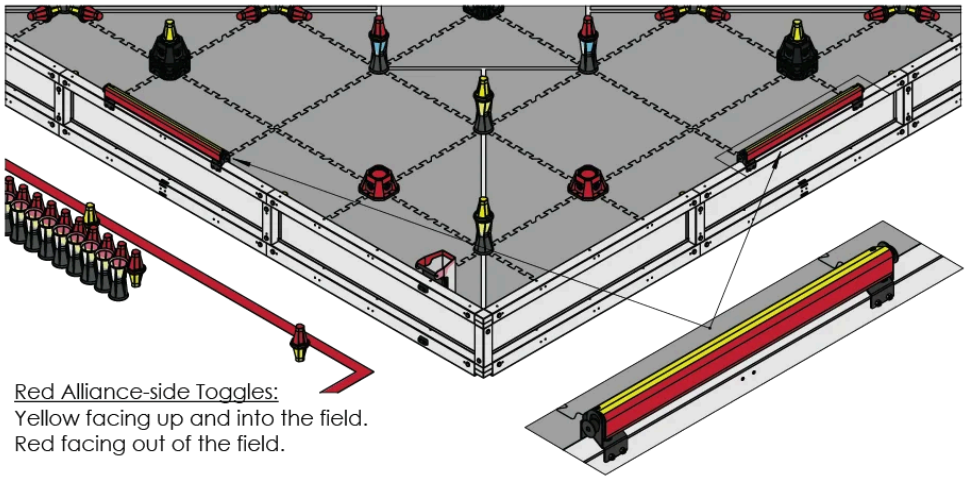
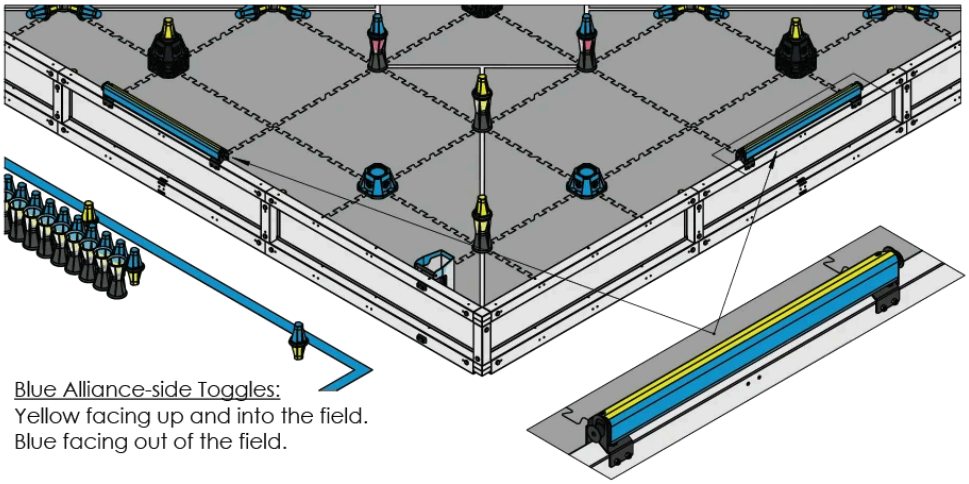
TOGGLE ASSEMBLY - STARTING ORIENTATION



Red Alliance-side Toggles:
Yellow facing up and into the field.
Red facing out of the field.



Blue Alliance-side Toggles:
Yellow facing up and into the field.
Blue facing out of the field.

Description	TOGGLE ASSEMBLY - STARTING ORIENTATION		
Dwg No	2026-27 APPENDIX A		
Competition	VEX V5 ROBOTICS COMPETITION	Sheet 1 of 1	
Release	2026-04-27	ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].	

VEX V5 ROBOTICS COMPETITION

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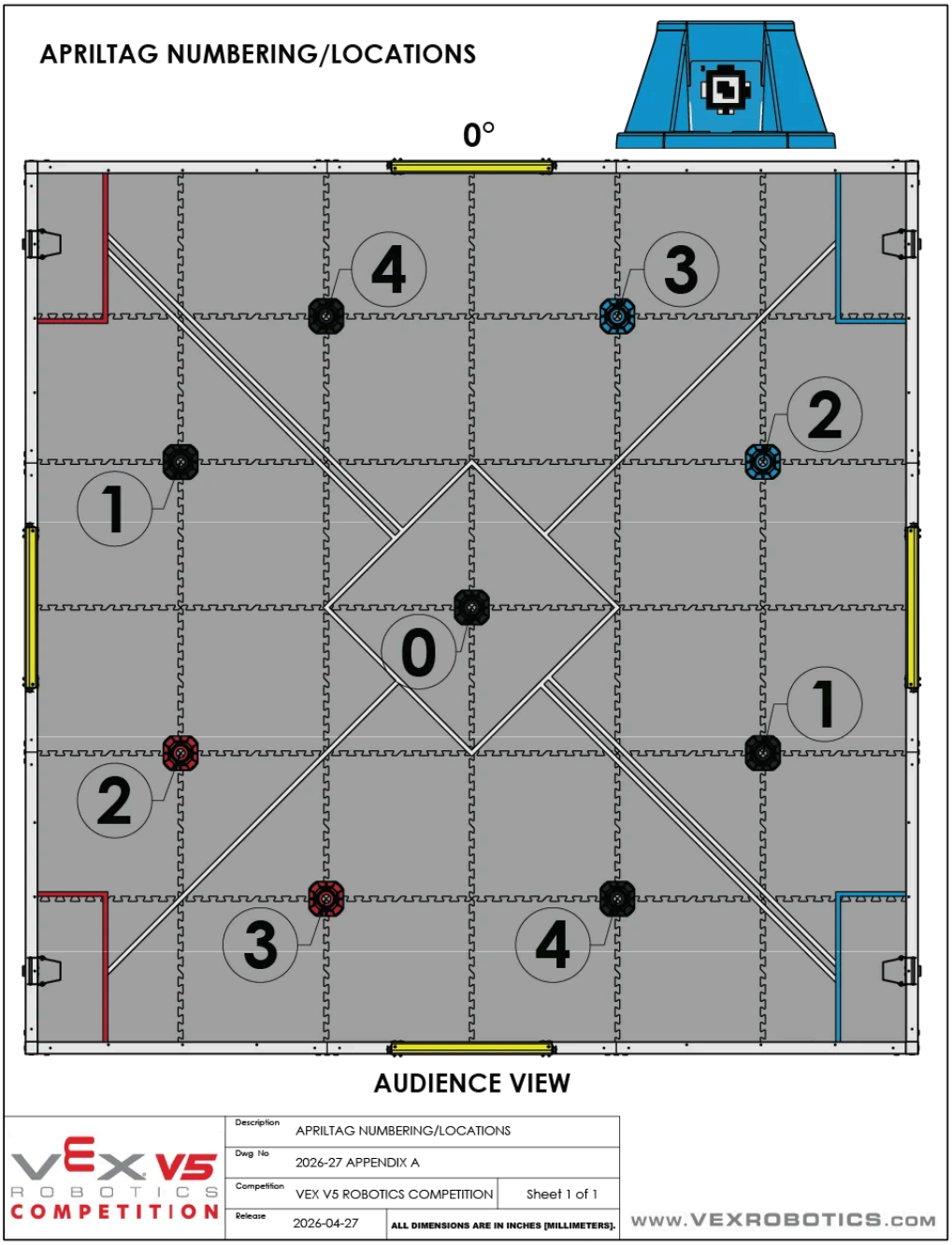
APRILTAG NUMBERING/LOCATIONS
0°
4
3
2
1
0
1
2
3
4
AUDIENCE VIEW
Description
APRILTAG NUMBERING/LOCATIONS
Dwg No
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ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
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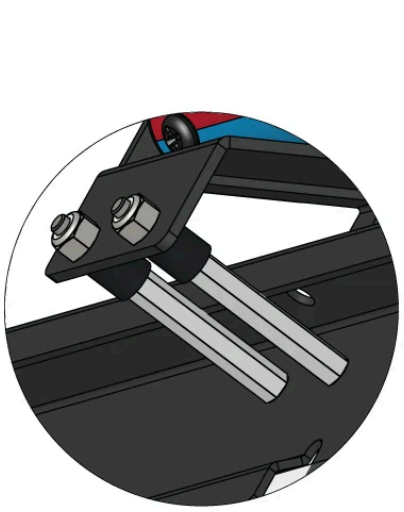
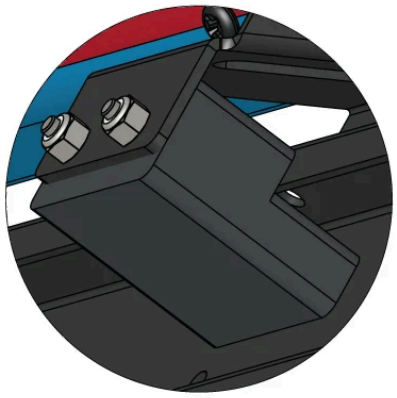
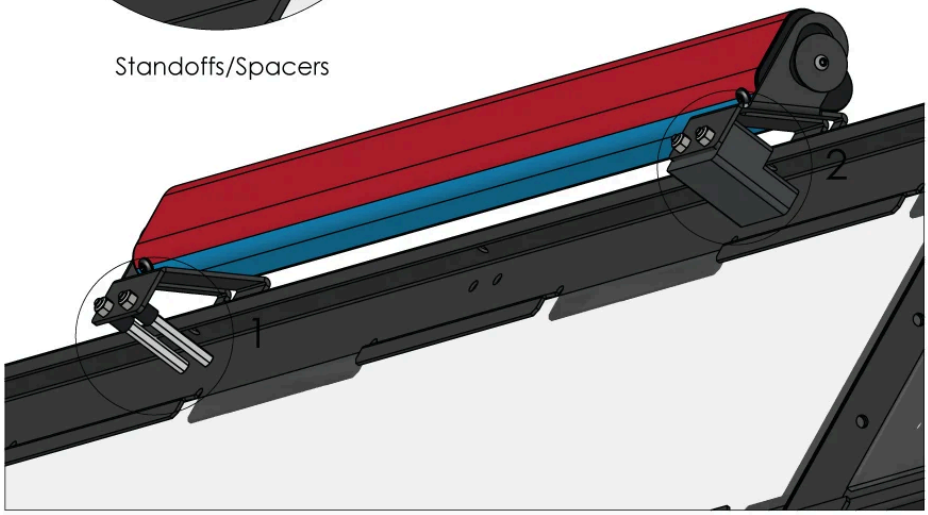
TOGGLE MOUNTING - METAL FIELD PERIMETER



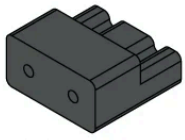
Standoffs/Spacers



Custom 3D Printed Part



Note: This is not intended to be an exhaustive list of allowed mounting methods. You may use one of the two different methods shown here, or you may use another custom mounting solution of your own.



ToggleMountingBlock.STEP

Description	TOGGLE MOUNTING - METAL FIELD PERIMETER	
Dwg No	2026-27 APPENDIX A	
Competition	VEX V5 ROBOTICS COMPETITION	Sheet 1 of 1
Release	2026-07-02	ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].

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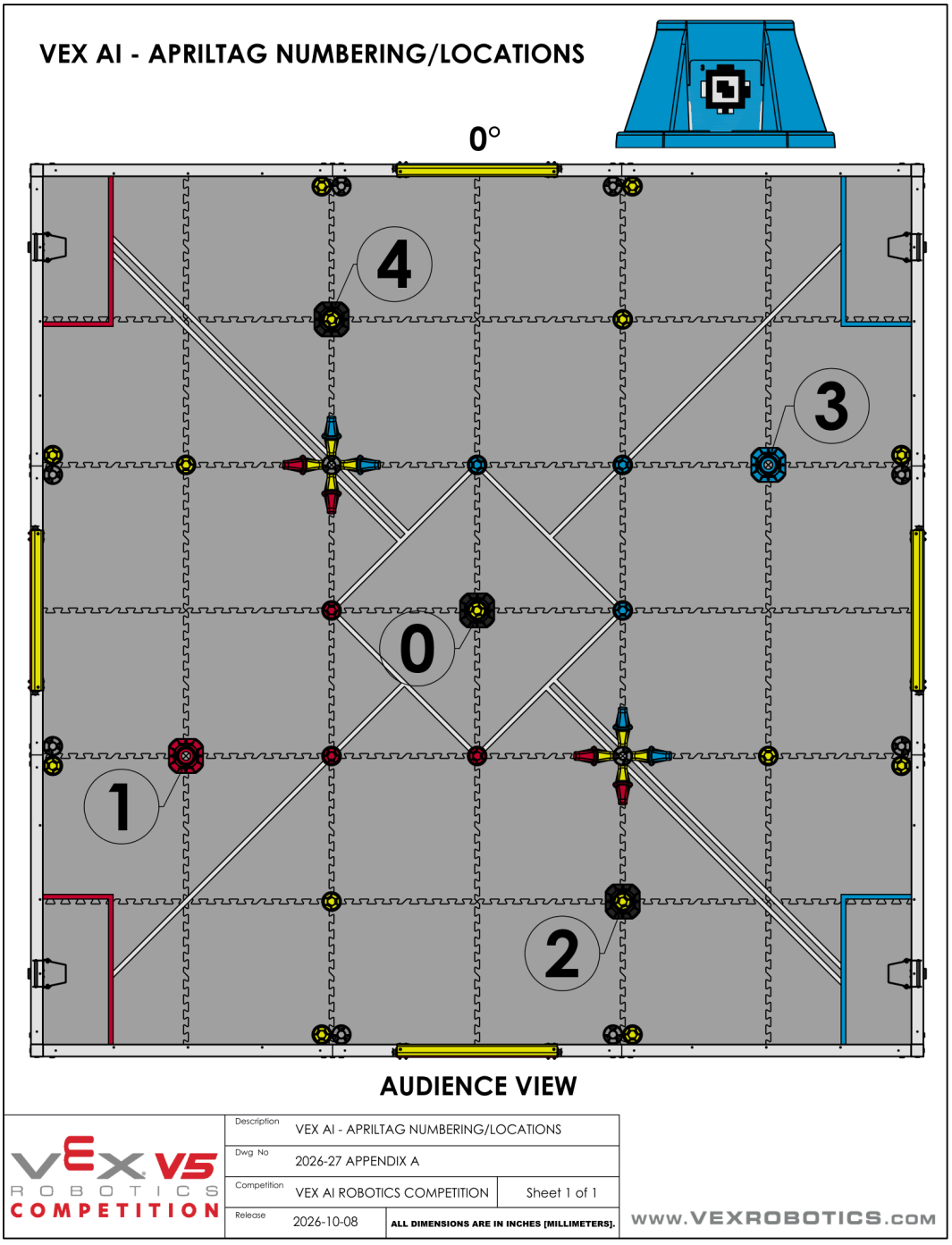
VEX AI - APRILTAG NUMBERING/LOCATIONS
0°
4
3
0
1
2
AUDIENCE VIEW
Description
VEX AI - APRILTAG NUMBERING/LOCATIONS
Dwg No
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Release
2026-10-08
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
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Appendix B - Glossary of Terms

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

Alliance - A pre-assigned grouping of two *Robots* that are paired together during a given *Head-to-Head Match*.

Alliance Captain - One of the *Teams* with the privilege of inviting another available *Team* to form an *Alliance* for *Elimination Matches*. See T16.

Alliance Selection - The process of choosing the permanent *Alliances* for *Elimination Matches*. The Alliance Selection proceeds as follows:

1. The highest-ranked *Team* at the end of *Qualification Matches* becomes the first *Alliance Captain*.
2. The *Alliance Captain* invites another *Team* to join their *Alliance*.
3. The invited *Team* representative either accepts or declines as outlined in T16.
4. The next-highest-ranked *Team* becomes the next *Alliance Captain*.
5. *Alliance Captains* continue to select their *Alliances* in this order until all *Alliances* are formed for *Elimination Matches*.

Alliance Station - The designated regions where the *Drive Team Members* must remain for the duration of the *Match*.

Autonomous Bonus - A point bonus awarded to the *Alliance* that has earned the most points at the end of the *Autonomous Period*. See SC7 for more information.

Autonomous Coding Skills Match - see *Match*.

Autonomous Line - The pair of white tape lines that run diagonally across the *Field* and around the *Midfield*, and the space between those lines. See SG7 for more information.

Autonomous Period - A time period during which *Robots* operate and react only to sensor inputs and pre-programmed commands.

Autonomous Points (AP) - The second basis of ranking *Teams*. An *Alliance* who wins the *Autonomous Bonus* during a *Qualification Match* earns ten (10) Autonomous Points. In the event of a tie, both *Alliances* will receive five (5) Autonomous Points.

Autonomous Win Point (AWP) - An additional **Win Point** awarded to any *Alliance* that has completed a defined set of tasks at the end of the *Autonomous Period* of a *Qualification Match*. Both *Alliances* can earn an Autonomous Win Point if both *Alliances* accomplish these tasks. See SC7 for more information.

Builder - Any *Student Team* member who helps build the *Robot*. *Adults* are permitted to teach Builders associated concepts, but should never work on the *Robot*.

Bye - A situation in which an *Alliance* automatically advances to the next round of *Tournament* play without competing.

Coder - Any *Student Team* member who contributes to the computer code that is downloaded onto the *Robot*. *Adults* are permitted to teach Coders associated concepts, but should never work on the code that goes on the *Robot*.

Cup - A *Scoring Object*, measuring approximately 3.15″ (80mm) in diameter and 6.5″ (164.5mm) tall. Each Cup consists of two halves: one transparent and one opaque.



Figure C-1: A *Cup*

Defensive - A category of strategies, *Robot* actions, and/or *Robot* statuses that can be employed by a *Team* during a *Match* ; see rules GG14 and GG15 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 Object* 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 doesn't increase points for the *Robot's* own *Alliance*
- Limiting access to a portion of the *Field* while not attempting to score
- *Holding*, blocking, impeding, or otherwise restricting or controlling an opponent's movements

> ⚠ **Caution**
>
> Remember, *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.

Designer - Any *Student Team* member who helps design the *Robot* to be built for competition. *Adults* are permitted to teach Designers associated concepts, but should never work on the design of the *Robot*.

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) on the ground or another safe location outside of the *Field*, as directed by the *Head Referee*.

Disqualification - A penalty applied to a *Team* for a *Major Violation* (see GG6 for more details). If a *Team* receives a Disqualification in a *Match*, the *Head Referee* will notify the *Team* of their *Violation* at the end of the *Match*. A *Team* that receives a Disqualification in a *Qualification Match* receives zero *Win Points*, zero *Autonomous Win Points*, zero *Autonomous Points*, and zero *Strength of Schedule Points*. When a *Team* receives a Disqualification in an *Elimination Match*, the entire *Alliance* is Disqualified and they receive a loss for the *Match*. At the *Head Referee's* discretion, repeated *Violations* and/or Disqualifications for a single *Team* may lead to its Disqualification for the entire *Tournament* (see GG6). A *Team* that receives a Disqualification in a *Driving Skills Match* or *Autonomous Coding Skills Match* receives a score of zero for that *Robot Skills Match*.

Drive Team Member - A *Student* who stands in the *Alliance Station* during a *Match*. *Adults* are not allowed to be Drive Team Members. See rule GG1.

Driver Controlled Period - A time period during which *Drive Team Members* operate their *Robot* using a VEX V5 controller.

Driving Skills Match - see *Match*.

Elimination Bracket - A schedule of *Elimination Matches* for eight (8) to sixteen (16) *Alliances*. See T17.

Elimination Match - see *Match*.

Endgame - A time period consisting of the last 10 seconds of a *Head-to-Head Match*, in which *Robots* attempt to end the *Match* in the *Midfield*. See rule SG12.

Entanglement - A *Robot* status. A *Robot* is Entangled if it has grabbed, hooked, or attached to an opposing *Robot* or a *Field Element*. See rule GG14.

Event Partner - The volunteer VEX V5 Robotics Competition *Tournament* coordinator who serves as an overall manager for the volunteers, venue, event materials, and all other event considerations.

Field - The entire playing Field, comprising the *Floor* and the *Field Perimeter*.

Field Element - The *Field*, white tape, *Loaders*, *Goals*, *Toggles*, and all supporting structures and accessories (such as field monitors, etc.).

Field Perimeter - The outer part of the *Field*, made up of 12 straight sections.

Floor - The interior flat part of the playing *Field*, made up of an array of six (6) gray foam field tiles wide by six (6) gray foam field tiles long (totaling 36 *Field* tiles) that are within the *Field Perimeter*.

Game Design Committee (GDC) - The creators of Override, and authors of this Game Manual. The Game Design Committee is the only official source for rules clarifications and Q&A responses; see Section 1.

Goal - One of the nine (9) designated locations around the *Field* in which *Robots* attempt to score *Pins* and *Cups*. Goals are octagonal, and each Goal is one of three colors: red, blue, or black. The center Goal is 8.7″ (222.7mm) tall, neutral Goals in *Quadrants* are 5.8″ (146.5mm) tall, and *Alliance* -specific Goals are 3.25″ (82.5mm) tall.



Figure G-1: The four types of *Goals* in a VEX V5 Override *Match*

Head Referee - A certified impartial volunteer 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. Large events (e.g., Signature Events, World Championships, etc.) might include multiple Head Referees at the *Event Partner's* discretion.

Head-to-Head Match - see *Match*.

Holding - A *Robot* status; see rule GG17 for more information. Holding is legal until it exceeds the limits in GG17. A *Robot* is considered to be Holding if it meets any of the following criteria during a **Match** :

- **Trapping** - Limiting the movement of an opponent *Robot* to a small or confined area of the *Field*, approximately the size of one foam field tile or less, without an avenue for escape. Note that if a *Robot* is not attempting to escape, it is not considered Trapped.
- **Pinning** - Preventing the movement of an opponent *Robot* through contact with the *Field Perimeter*, a *Field Element*, or another *Robot*.
- **Lifting** - Controlling an opponent's movements by raising or tilting the opponent's *Robot* off of the *Floor*. Preventing a *Robot* that is already off of the *Floor* from returning to the *Floor* may also be considered Lifting or *Trapping*.

Loader - One of the four designated locations (two per *Alliance*) around the *Field* where *Drive Team Members* can introduce *Match Load Pins* and *Cups*. See rule SG11.

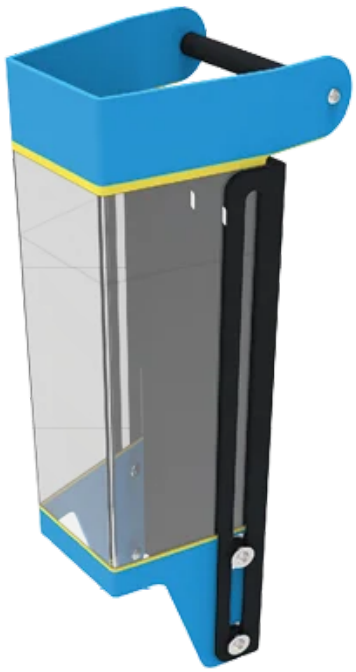

Figure L-1: A *Loader*

Load Zone - An infinitely tall three-dimensional volume bounded by the inner edges of the *Field Perimeter* and the outer edges of the red or blue tape lines surrounding each *Loader*.

Match - A set time period, consisting of an *Autonomous Period* and/or *Driver Controlled Periods*, during which *Teams* play a defined version of Override to earn points.

Match types:

- *Autonomous Coding Skills Match* - A *Robot Skills Match* in which a single *Robot* operates during a one minute *Autonomous Period*. There is no *Driver Controlled Period*. *Teams* can elect to end an *Autonomous Coding Skills Match* early if they wish to record a *Skills Stop Time*.
- *Driving Skills Match* - A *Robot Skills Match* in which one *Team* operates their *Robot* during a one minute *Driver Controlled Period*. There is no *Autonomous Period*. *Teams* can elect to end a *Driving Skills Match* early as described in rule RSC5 if they wish to record a *Skills Stop Time*.
- *Elimination Match* - A *Head-to-Head Match* used in the process of determining the champion *Alliance*. *Alliances* of two (2) *Teams* face off according to the *Elimination Bracket* ; the winning *Alliance* moves on to the next round.
- *Head-to-Head Match* - A *Match* that consists of two *Alliances* that work to outscore the other *Alliance* in a two-minute *Match*. *Qualification Matches*, Finals *Matches*, and optional *Practice Matches* are *Head-to-Head Matches*.
- *Practice Match* - A non-scored *Head-to-Head Match* used to provide time for *Teams* to get acquainted with the official playing *Field* and procedures. *Head Referees* should not record or track standard gameplay *Violations* that occur during *Practice Matches*. Egregious *Violations* may be recorded and tracked at the discretion of the *Head Referee*.
- *Qualification Match* - A *Head-to-Head Match* that is used to determine *Teams'* rankings for *Alliance Selection*. Each *Qualification Match* consists of two *Alliances* competing to earn *Win Points*, *Autonomous Points*, and *Strength of Schedule Points*.
- *Robot Skills Match* - A *Driving Skills Match* or *Autonomous Coding Skills Match*.

Match Type	Participants	Specific Rules	*Autonomous Period* (m:ss)*	*Driver Controlled Period* (m:ss)*
Head-to-Head Match	Two *Alliances* (red/blue) each composed of two *Teams*, with one *Robot* each	Scoring (“SC”), General Game (“GG”) and Specific Game (“SG”) sections	0:15	1:45
Driving Skills Match	One *Team*, with one *Robot*	Section 3	None	1:00
Autonomous Coding Skills Match	One *Team*, with one *Robot*	Section 3	1:00	None
VEX U Robotics Competition *Head-to-Head Match*	Two *Teams* (red/blue), with two *Robots* each	Section 6	0:30	1:30
VEX U Robotics Competition *Driving Skills Match*	One *Team*, with two *Robots*	Section 6	None	1:00
VEX U Robotics Competition *Autonomous Coding Skills Match*	One *Team*, with two *Robots*	Section 6	1:00	None
VEX AI Robotics Competition *Head-to-Head Match*	Two *Teams* (red and blue), with two *Robots* each	Section 7	0:15	1:45
VEX AI Robotics Competition *Autonomous Coding Skills Match*	One *Team*, with two *Robots*	Section 7	1:00	None

*Note: The time periods in VEX AI are referred to as the *Isolation Period* and the *Interaction Period*.

Match Load - *Scoring Objects* that begin the *Match* in an *Alliance Station*, which may be introduced to the *Field* by *Drive Team Members* during the *Match*. See rule SG11.

Match Schedule - A list of *Matches* that is generated at the start of an event. The Match Schedule includes the predetermined, randomly-paired *Alliances* that will be competing in each *Qualification Match*, and the expected start times for these *Matches*. The Match Schedule may be subject to change at the *Event Partner's* discretion.

Qualification Match List

Lions Middle School VEX V5 Robotics Competition

Match	Field	Time	Red 1	Red 2	Blue 1	Blue 2
Q1	Field 1	Sat 9:30 AM	1660B	8686R	29651B	29651C
Q2	Field 2	Sat 9:33 AM	33249H	33249C	29651F	33249B
Q3	Field 3	Sat 9:37 AM	13115D	32222A	77240K	1660C
Q4	Field 1	Sat 9:40 AM	13115C	8686D	33249E	40994D
Q5	Field 2	Sat 9:44 AM	40994E	40994C	13115A	13115B
Q6	Field 3	Sat 9:47 AM	1660A	29651Z	8686M	32222J
Q7	Field 1	Sat 9:51 AM	29356Z	97735C	8686G	8686P
Q8	Field 2	Sat 9:54 AM	29651D	29651F	8686R	8686D
Q9	Field 3	Sat 9:58 AM	32222J	29651B	33249H	13115B
Q10	Field 1	Sat 10:01 AM	13115A	33249E	97735C	32222A
Q11	Field 2	Sat 10:05 AM	8686M	29651C	8686P	13115D

Figure MS-1: An example of a *Qualification Match* Schedule

Midfield - The square-shaped central area of the *Field* in which *Robots* attempt to end the *Match* to score additional points. The Midfield is an infinitely tall three-dimensional volume bounded by the inner edges of the white tape line square, and can be entered by all *Robots* during the *Autonomous Period* See Figure Q-1.

Notebooker - Any *Student Team* member who contributes to the *Team's* engineering notebook or associated documentation. *Adults* are permitted to teach Notebookers associated concepts, but should never work on the engineering notebook or other documentation.

Offensive - A category of strategies, *Robot* actions, and/or *Robot* statuses that can be employed by a *Team* during a *Match* ; see rules GG14 and GG15 for more information. A *Robot* is Offensive while it is engaged in actions that could directly increase its *Alliance's* score for the current *Match*. Examples include, but are not limited to:

- Adding a *Scoring Object* to a *Goal* to score points

- Moving toward a *Goal* with a *Scoring Object* that could earn points for their *Alliance*
- Changing the status of a *Toggle*
- Achieving (or attempting to achieve) any *Robot* status that adds points to their *Alliance's* score
- Obtaining (or attempting to obtain) *Scoring Objects*

Owned - A yellow *Pin Half* status. Each yellow half of a *Placed Pin* can be Owned by an *Alliance* under certain conditions. See SC5.

Placed - A *Scoring Object* status. See SC2.

Pin - A *Scoring Object* measuring approximately 1.6" (40mm) in diameter and 6.5" (165mm) tall. Each Pin consists of two *Pin Halves*, with one of the following color combinations: red/yellow, blue/yellow, red/blue, or yellow/yellow.



Figure P-1: The four types of *Pins* in a VEX V5 Override *Match*

Pin Half - One of two halves that make up a *Pin*. Each Pin Half is colored red, blue, or yellow.

Possession - A *Robot* / *Scoring Object* status. A *Scoring Object* is considered Possessed by a *Robot* if at least one of the following is true:

- The *Scoring Object* is fully supported by the *Robot*, or fully supported by a *Scoring Object* Possessed by the *Robot*.
- The *Robot's* movement in all directions would result in maintained control of the *Scoring Object* (i.e., the *Scoring Object* moves along with the *Robot* as the *Robot* turns and moves forward, backward, left, and right).

Example 1 (*Possession*): A *Scoring Object* held by a *Robot's* intake, either in the air or along the *Floor*, would be considered Possessed since the *Scoring Object* would move along with the *Robot* as the *Robot* turns and moves in all directions.

Example 2 (No *Possession*): *Scoring Objects* being pushed forward on the *Floor* by the front face of a *Robot* would not be considered Possessed by that *Robot*, since driving backward would cause the *Robot*

to lose control of those *Scoring Objects* (i.e., the *Scoring Objects* would not move backward with the *Robot*, and would become separated from it). This remains true whether the *Robot's* face is flat, convex, or concave, as long as movement in at least one direction would result in the *Robot* losing control of the *Scoring Object*(s).

Practice Match - see *Match*.

Preload - The *Pins*, one (1) per *Robot*, placed by each *Team* prior to the start of each *Match*. See SG5.

Quadrant - One of four designated triangular areas of the *Field*. Each Quadrant contains two *Goals* and one *Toggle*. *Robots* may score *Pins* in the *Goals* within a Quadrant and may attempt to set that Quadrant's *Toggle* to control ownership of yellow *Pins Scored* in that Quadrant.

A *Quadrant* is defined by the outer edges of the white tape lines, the *Field Perimeter*, and the colored tape that defines the *Load Zones*.

Each *Quadrant* is described as red or blue based on the *Alliance*-colored *Goal* it includes. See Figure Q-1.

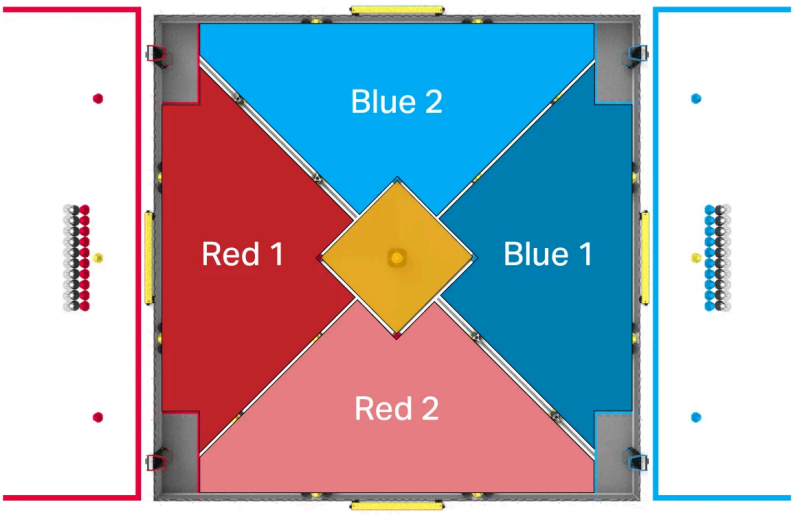

Figure Q-1: An overhead view of the Override *Field* with the four *Quadrants* (red and blue) and *Midfield* (yellow) highlighted.

The *Quadrant* labels (Red 1, Red 2, Blue 1, and Blue 2) correspond to scoring input areas in *Tournament* Manager.

Qualification Match - see *Match*.

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*.

Robot Skills Match - see *Match*.

Scoring Object - A *Cup* or *Pin*.

Scored - A *Scoring Object* status. See SC3.

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*.

Skills Stop Time - The time remaining in a *Robot Skills Match* when a *Team* ends the *Match* early. See RSC5 for more details.

Strategist - Any *Student Team* member who contributes to the *Match* strategies used to score points during a *Qualification Match* or *Robot Skills Match*, including assessing the impact of other *Teams'* performance and strategies on the *Team's* strategy (e.g., scouting). *Adults* are permitted to teach Strategists associated concepts, but should never create or dictate a *Team's Match* strategy.

Strength of Schedule Points (SP) - The third basis of ranking *Teams*. Strength of Schedule Points are equivalent to the score of the losing *Alliance* in a *Qualification Match*. In the event of a tie, both *Alliances* receive Strength of Schedule Points equal to the tie score. If both *Teams* on an *Alliance* are Disqualified, the *Teams* on the not Disqualified *Alliance* will receive their own score as Strength of Schedule Points for that *Match*.

Student - A person that meets the Student Eligibility Policy requirements for their respective competition program and level.

Team - One or more *Students* make up a Team. In the context of this game manual, *Student* Team members fill multiple roles related to *Robot* design, build, coding, strategy, and documentation. See G2, G4, G5 for more information. *Adults* may not fulfill any of these roles. See Appendix D for more information about Team classifications and *Student* roles.

Time-out - A single break period no greater than three minutes (3:00) allotted for each *Alliance* during the *Elimination Bracket*. See GG7.

Toggle - One of four (4) triangular shaped *Field Elements* mounted to the *Field Perimeter*, which determine Ownership status of yellow *Pin Halves* in the corresponding *Quadrant*. Each Toggle has 3 differently colored sides that, when viewed from inside the *Field*, indicate whether the Toggle is neutral (yellow) or set to an *Alliance* color (red or blue). Toggles are 25.8″ (656.2mm) long, and each face of the triangle is approximately 2.05″ (52.2mm) wide. See SC4 for more information.

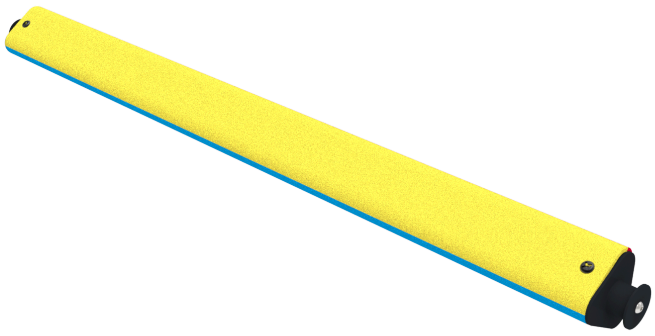

Figure T-1: A *Toggle*

Tournament - A competition event that includes scored *Matches*, and which is run by an *Event Partner*.

Violation - The act of breaking a rule in the game manual. See Appendix C for additional information on Violations and penalties.

- *Minor Violation* - A *Violation* which does not result in a *Disqualification*.
- *Major Violation* - A *Violation* which results in a *Disqualification*.
- *Match Affecting* - A *Violation* which changes the winning and losing *Alliance* in the *Match*.

Win Percentage (WP) - Replaces *Win Points* in a league event. Win Percentage is calculated by the number of wins divided by the number of *Qualification Matches* the *Team* plays. In cases of a tie, the *Team* is given a 0.5 number of "wins" for that *Match*. The *Autonomous Win Point* is also considered 0.5 "wins," added to the total number of wins.

Win Points (WP) - The first basis of ranking *Teams*. *Teams* will receive zero (0), one (1), two (2), or three (3) Win Points for each *Qualification Match*. Unless a *Team* is Disqualified, both *Teams* on an *Alliance* always earn the same number of Win Points.

- One (1) **Win Point** is awarded for completing the *Autonomous Win Point* task(s).

- Two (2) *Win Points* are awarded for winning a *Qualification Match*.
- One (1) **Win Point** is awarded for tying a *Qualification Match*.
- Zero (0) *Win Points* are awarded for losing a *Qualification Match*.

Appendix C - Rule Violations

This appendix is intended to provide additional guidance regarding rule *Violations* within the VEX V5 Robotics Competition, and offer further explanation on how *Violations* may be interpreted and enforced during *Matches*. It is designed to promote consistency in officiating and to help *Teams* better understand how actions on the *Field* may impact scoring, *Match* outcomes, and referee decisions.

This appendix does not supersede any existing rule, but instead serves as a secondary resource to aid in their application. If no *Violation* Notes are found in a given rule, then it should be assumed that the below "default" definitions apply.

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 *Tournament* may escalate to a *Major Violation* at the *Head Referee's* discretion or as specified in a rule. *Minor Violations* carry over into *Elimination Matches* unless otherwise specified within 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.

Violation Notes by Rule

Specific Game Rules

SG1

1. The *Match* will not begin with any conditions in this rule unmet. If a *Robot* cannot meet these conditions in a timely manner, the *Robot* will be removed from the *Field* and rules <R2d> and GG2 will apply until the situation is corrected. They will not receive a *Disqualification*, but should receive a *Minor Violation* and will not be permitted to play in the *Match*.

SG2

1. Incidental/insignificant infractions that occur during a *Match* are only considered *Minor Violations*. Repeated *Minor Violations* should only escalate to a *Major Violation* in extreme circumstances. Examples of *Minor Violations* include, but are not limited to:
    - Loose wires
    - Broken zip ties / rubber bands
    - Bent or broken mechanical components that are not used for strategic gain

SG4

1. Due to the difficulty of determining *Match Affecting* implications of this rule, most *Violations* should be considered Minor. However, blatantly intentional and/or *Match Affecting Violations* (especially during *Elimination Matches*) may still immediately escalate to a *Major Violation* at the *Head Referee's* discretion.

SG5

1. See SG1.

SG7

1. All *Violations* of this rule (Major or Minor) will result in the *Autonomous Bonus* being awarded to the opposing *Alliance*. See <SG8b> for a potential exception caused by *Autonomous Line* interactions.
2. Intentional, strategic, or egregious *Violations*, such as intentional contact with an opposing *Robot* while contacting the foam tiles on the opposing side of the *Autonomous Line*, or the interactions

described in <SG7e> will be considered *Major Violations* and should result in a *Disqualification* for the *Match*.

3. Deliberate *Defensive* Autonomous strategies, as described in <SG7a>, may also be recorded as G1 *Violations* at the *Head Referee's* discretion.

SG9

1. Incidental interactions, such as unintentional contact with the *Goal* and/or *Scoring Objects* stacked on the *Goal*, should typically be considered *Minor Violations*.
2. Intentional interactions, as well as any interactions (intentional or unintentional) involving the addition or removal of *Scoring Objects* on the *Goal*, will be considered *Major Violations*.

SG10

1. *Violations* should be considered *Match Affecting* if the offending *Team's Alliance* ties or wins the *Match* by 15 points or less, unless the *Head Referee* can indisputably determine that the *Violation* did not affect the outcome of the *Match*. (Note: *Teams* should not expect a *Head Referee* to be capable of determining whether a *Violation* affected the outcome of a *Match* in most instances.)
2. Intentional, strategic, or egregious *Violations* will be considered *Major Violations*.
3. Repeated *Minor Violations* can escalate to a *Major Violation* at the *Head Referee's* discretion, especially in cases where *Violations* occur after multiple prior warnings

SG11

1. For the purposes of *Match Affecting* calculations, each illegal *Match Load* should be considered worth a value of 3 points. These values are not added to the actual score. If subtracting 3 points per illegal *Match Load* from the offending *Alliance's* final score would change the outcome of the *Match*, then the SG11 *Violation* should be considered *Match Affecting*.
2. For the purposes of this rule, the following guidelines should be used for escalating repeated *Minor Violations* to a *Major Violation* during *Qualification Matches*:
    1. Six or more illegal *Match Loads* in a single *Qualification Match*.
    2. Three or more *Qualification Matches* with at least one illegal *Match Load* (i.e., the third *Match* and all subsequent *Matches* with a *Violation*).
3. For the purposes of this rule, only *Match Affecting Violations* should be considered during *Elimination Matches* (i.e., repeated *Minor Violations* in *Elimination Matches* do not compound to *Major Violations*).

1. Point 2a does not explicitly apply during *Elimination Matches*, although the risk of illegal *Match Load* becoming *Match Affecting* still inherently increases as the quantity of *Match Loads* increases.
2. Point 2b does not apply during *Elimination Matches*.

SG12

1. Most *Violations* of this rule should be considered *Minor Violations*. However, repeated *Minor Violations* can escalate to a *Major Violation* at the *Head Referee's* discretion, especially in cases where *Violations* occur after multiple prior warnings.
2. *Violations* involving *Pins Placed* on the *Midfield Goal* that change the outcome of the *Match* in favor of the offending *Robot's Alliance* will be considered *Match Affecting Violations*.

SG13

1. Egregious *Violations*, will be considered *Major Violations*.
2. Repeated *Minor Violations* can escalate to a *Major Violation* at the *Head Referee's* discretion, especially in cases where *Violations* occur after multiple prior warnings.

General Rules

G1

1. Any *Violation* of G1 may be considered a *Major Violation* and should be addressed on a case-by-case basis. *Teams* at risk of a G1 *Major 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

1. 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 programmed by an *Adult* scores points in a *Match*.

G4

1. *Teams* believed to be in *Violation* of this rule should be reported to the Judge Advisor, *Head Referee*, or *Event Partner* for further investigation in coordination with VEX Robotics. Based on the investigation the *Team* may be removed from further *Matches*, have their *Robot Skills Match* scores removed, and/or be removed from consideration from judged awards.

2. *Violations* of this rule will be evaluated on a case-by-case basis, in tandem with VEX Robotics as noted in G1 and G2.

G5

1. A *Team* that circumvents a *Robot* rule for a competitive advantage should receive an immediate *Disqualification* for the current *Match*.

General Game Rules

GG1

1. *Major Violations* of this rule are not required to be *Match Affecting*, and could invoke *Violations* of other rules, such as G1, G2, or G4.

GG8

1. *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 wheel falling off.

GG11

1. The intent of this rule is to ensure that *Robots* abide by commands sent by the tournament software. Temporarily removing the cable to assist with mid-*Match* troubleshooting, with an *Event Partner* or other event technical staff present and assisting, would not be considered a *Violation*.

GG12

1. See GG13.

GG13

1. In general, *Minor Violations* of SG 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* or earn an *Autonomous Win Point*) and should not be considered when determining whether a *Violation* has been repeated during the event.
2. If a *Head Referee* determines that a *Violation* of an SG or GG rule during the *Autonomous Period* was intentional/strategic rather than accidental/situational, it should be recorded as a *Minor*

Violation or *Major Violation* and considered when determining whether a *Violation* has been repeated during the event.

GG14

1. *Major Violations* of this rule are not required to be *Match Affecting*. Intentional and/or egregious tipping, *Entanglement*, or damage may be considered a *Major Violation* at the *Head Referee's* discretion.
2. Repeated *Violations* within a *Match* or *Tournament* could be considered a *Violation* of G1 and/or S1 at the *Head Referee's* discretion.

GG16

1. 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 *Team* that forced a *Violation*. However, if the forced situation becomes *Match Affecting* in favor of the *Team* that forced the *Violation*, it will be considered a *Major Violation* for the *Team* that forced the *Violation*.

GG17

1. When determining whether a *Holding Violation* was *Match Affecting*, they should consider the full context of the *Match* and both *Robots'* actions, including the following. Because the first three seconds of a Hold are legal game play and not a *Violation*, only the extended portion of a Hold should be considered. *Holding* is an inherently *Defensive* action, so rule GG15 may also be considered if a judgment call is required.
    - How much extra time was included in the *Holding* interaction
    - How long the *Robots* were separated if the *Holding Robot* backs away and returns too early
    - What both *Robots* were doing within the larger context of the *Match*

Robot Rules

R24

1. *Teams* must replace broken plastic pieces that result in temporary, unintentional R24 *Violations*.

Appendix D - Team Classifications and Student Roles

One or more *Students* make up a *Team*. To participate in an official VEX V5 Robotics Competition event, a *Team* must first register on events.vex.com and receive a VEX V5 Robotics Competition *Team* number. A *Team's* unique number identifies their organisation and their *Team* within that organisation. Each *Team* must design and build their own *Robot*, create their own code, develop their own strategies to play the game, and maintain their own engineering notebook if they choose to use one.

- A *Team* is classified as a Secondary School *Team* if all members are Secondary School *Students*.
- A *Team* is classified as a Secondary School *Team* if any of its members are Secondary School *Students*, or if the *Team* is made up of Secondary School *Students* who declare themselves "playing up" as Secondary School *Students* by registering their *Team* as a Secondary School *Team*.
- Once a *Team* has competed in an event as a Secondary School *Team*, that *Team* may not change back to a Secondary School *Team* for the remainder of the season. If a *Team* mistakenly registers as a Secondary School *Team* but is ineligible for that age group, their registration may be revised mid-season with the assistance of VEX Robotics; all prior qualifications for the season will be lost.
- *Teams* may be associated with schools, community/youth organizations, or groups of neighborhood *Students*.

In the context of this Game Manual, *Student Team* members fill multiple roles related to *Robot* design, build, coding, strategy, and documentation. See G2, G4, G5 for more information. *Adults* may not fulfill any of these roles.

- **Designer** - Any *Student Team* member who helps design the *Robot* to be built for competition. *Adults* are permitted to teach Designers associated concepts, but should never work on the design of the *Robot*.
- **Builder** - Any *Student Team* member who helps build the *Robot*. *Adults* are permitted to teach Builders associated concepts, but should never work on the *Robot*.
- **Coder** - Any *Student Team* member who contributes to the computer code that is downloaded onto the *Robot*. *Adults* are permitted to teach Coders associated concepts, but should never work on the code that goes on the *Robot*.
- **Strategist** - Any *Student Team* member who contributes to the *Match* strategies used to score points during a *Qualification Match* or *Robot Skills Match*, including assessing the impact of other

Teams' performance and strategies on the *Team's* strategy (e.g., scouting). *Adults* are permitted to teach Strategists associated concepts, but should never create or dictate a *Team's Match* strategy.

- **Notebooker** - Any *Student Team* member who contributes to the *Team's* engineering notebook or associated documentation. *Adults* are permitted to teach Notebookers associated concepts, but should never work on the engineering notebook or other documentation.