

# Q&A

## VRC 2022-2023: Spin Up

Tagged: R4

Welcome to the official VEX Robotics Competition Question & Answer system, where all registered teams have the opportunity to ask for official rules interpretations and clarifications. This Q&A system is the only source for official VRC Spin Up rules clarifications, and the clarifications made here from the Game Design Committee (GDC) are considered as official and binding as the written [Game Manual](#) itself.

**Please review the [Q&A Usage Guidelines](#) before posting.** This system is only intended for specific VRC Spin Up rules questions.

- For event, registration, or other competition support questions, please contact your [REC Foundation Manager](#).
  - For VEX technical support, contact [support@vex.com](mailto:support@vex.com) or [sales@vex.com](mailto:sales@vex.com).
- For game questions, suggestions, or concerns outside of specific and official rules questions, contact [GDC@vex.com](mailto:GDC@vex.com).

## Index

[Height IQ](#)

[Tetherbots and R4](#)

[Important Starting Size Clarification](#)

[Touching the Sides of Sizing Tool During Inspection](#)

[Starting Match With the Preload in the Robot](#)

[Robot Size and Starting Position Problem](#)

[Robot Size Rules Clarification](#)

[<R4> Using External Factors to Stay In Size](#)

[Robot head orientation in starting configuration](#)

[Can robots start away from the field perimeter?](#)

[Field Displays <S2> <S1> <R4>](#)

[Pneumatic Alterations Clarification](#)

[Size requirement for VEX IQ robot for 2018-2019? \(Found the answer already\)](#)

---

## Height IQ

1-Mar-2021

G4 R4

Can the robot height be more than 15 inches? or is it just at the start at 15 and then can extend further when match begins?

### Answered by committee

Please review the [Q&A Usage Guidelines](#) before posting, specifically point 3, "Quote the applicable rule from the latest version of the manual in your question". Often, you'll find that by quoting the rule, you'll answer your own question.

Robot height is governed by rule G4, which reads as follows, with a few portions bolded for emphasis:

<G4> Pre-match setup. At the beginning of a Match, each Robot must meet the following criteria:

1. Only be contacting the Floor and/or the field perimeter.
2. Fit within an 11" x 19" (279.4mm x 482.6mm) area, bounded by the Starting Positions.
3. Be no taller than 15" from the Floor.

An offending Robot will be removed from the Match at the Head Referee's discretion. They will not receive a Disqualification, but they will not be permitted to play in the Match.

Note 1: Robots must be placed on the field promptly. Repeated failure to do so could result in a violation of <G1>.

**Note 2: Robots may expand beyond their starting size constraints after the start of the Match.**

The exact definition of the term "promptly" is at the discretion of the Head Referee and the Event Partner, who will consider event schedule, previous warnings or delays, etc. **Once the Match starts, expansion is unlimited.**

If this does not answer your question, please feel free to rephrase and re-submit.

---

## Tetherbots and R4

13-May-2020

R4

R4 states:

Robots must be safe. The following types of mechanisms and components are NOT allowed: c. Those that pose an unnecessary risk of Entanglement

The definition of Entanglement states:

Entanglement – A Robot status. A Robot is Entangled if it has grabbed, hooked, or attached to an opposing Robot or a Field Element.

Say a Robot has multiple drive bases (known as a "tetherbot") connected by V5 smart cables (the "tether"). In some past seasons it has been said that in order to satisfy R4c, the tether must be backed by a rigid material (see <https://www.vexforum.com/t/answered-partner-minibot/27092> ). Is it still the case that tethers must be backed by a rigid material?

### Answered by committee

Say a Robot has multiple drive bases (known as a "tetherbot") connected by V5 smart cables (the "tether"). In some past seasons it has been said that in order to satisfy R4c, the tether must be backed by a rigid material (see <https://www.vexforum.com/t/answered-partner-minibot/27092> ). Is it still the case that tethers must be backed by a rigid material?

R4 does not provide any specific build guidelines. To minimize any risks of confusion or conflict during inspection, Teams should make it abundantly clear to Head Referees that their Robots do not pose any unnecessary risks of Entanglement.

It is impossible to issue a blanket ruling that would encompass all hypothetical Robot designs (or, in this case, rigid backing materials). In most cases, "cable carriers" made of VEX metal are typically sufficient for satisfying R4. However, we are not going to provide a definition of "rigid" or a guaranteed/recommended build solution.

## Important Starting Size Clarification

26-Feb-2020

G4 R4

<G4> Robots begin the Match in the starting volume. At the beginning of a Match, each Robot must be smaller than a volume of 18" (457.2 mm) long by 18" (457.2 mm) wide by 18" (457.2 mm) tall. Using Field Elements, such as the field perimeter wall, to maintain starting size is only acceptable if the Robot would still satisfy the constraints of and pass inspection without the Field Element. Robots in violation of this limit will be removed from the field prior to the start of the Match, at the Head Referee's discretion.

<R4> Robots must fit in a sizing box. At the beginning of any Match, Robots must be smaller than 18" (457.2 mm) long by 18" (457.2 mm) wide by 18" (457.2 mm) tall.

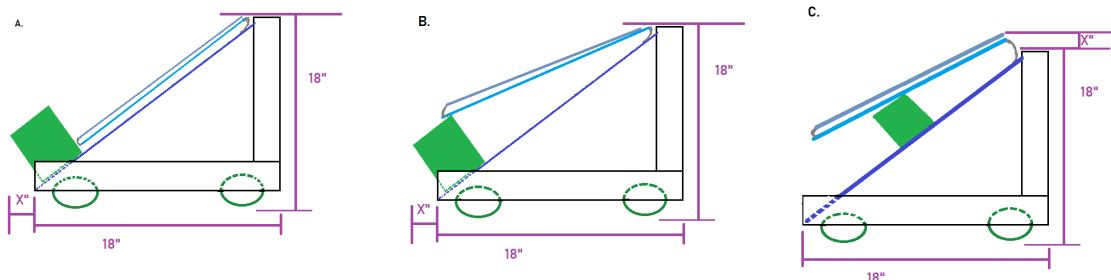
Q&A 439 <https://www.robotevents.com/VRC/2019-2020/QA/439> Q&A 423 <https://www.robotevents.com/VRC/2019-2020/QA/423>

Although you have answered questions about starting size in the past (see q&a's listed above), we are still a bit confused on the legality of the situations drawn below.

A & B: The robot itself is in size, but the preload is out of 18" (length wise)

C : The robot itself is out of size (height wise because of its tray), while the preload is inside of the robot

We are mainly concerned with this: if you were to put the preload into your robot and by doing so it forces a section of your robot c



Thank you!

### Answered by committee

First, thank you for quoting the relevant rules, searching for similar Q&A posts, and providing a clarifying image.

A & B: The robot itself is in size, but the preload is out of 18" (length wise)

These would both be legal. These are both scenarios that were intended to be covered by Q&A 439, as linked.

C : The robot itself is out of size (height wise because of its tray), while the preload is inside of the robot

This would not be legal.

Another way to word the response from Q&A 439 would be as follows:

G4 and R4 are intended to refer to Robot size only. The word 'Robot' refers to the VEX definition of 'Robot': *"Anything that has passed inspection that a Team places on the field prior to the start of a Match."* An inspection-passing Robot consists of VEX metal, wheels, gears, electronics, etc.

The hypothetical Robot C may have passed inspection (and therefore satisfied R4). Once it is placed on the field, the Head Referee is now checking its compliance with G4. Since some portion of the metal, wheels, gears, and electronics that make up the 'Robot' are now outside of the 18" x 18" x 18" size restriction, it is now in violation of G4.

---

## Touching the Sides of Sizing Tool During Inspection

21-Feb-2020

R4

<R4> Robots must fit in the sizing box. At the start of each Match, the Robot must be able to satisfy the following constraints: a. Only be contacting the Floor and/or the Field Perimeter. b. Fit within an 11" x 19" (279.4mm x 482.6mm) area, bounded by the Starting Position. c. Be no taller than 15" from the Floor

When being sized, can a robot touch the sizing box walls or ceiling or the Robot Sizing Tool sides and still pass sizing inspection, or would this be considered out of size via R4? This has been a point of contention at some events for robots that are close to being out of size. Thank you.

### Answered by committee

We believe this is the same question as this similar Q&A:

<https://www.robotevents.com/VIQC/2019-2020/QA/558>

If this is not the case, please feel free to rephrase and re-submit.

---

## Starting Match With the Preload in the Robot

3-Dec-2019

G4 R4

Good evening,

I have a question regarding the preload and how it may affect sizing at the beginning of the match. While reading R4 and G4, the rules state that the robot must be in the 18x18x18 constraint at the beginning of the match without mention of the preload. In Virginia tournaments, however, teams who are resized on the field are allowed to remove their preload and be measured. Is it legal for the robot itself to be out of size with the preload in the robot in the beginning of the match?

Thank you, Korvex Robotics

### Answered by committee

Good morning. Please see [this similar Q&A](#), which states that the Preload is not intended to be used when considering Robot size as it pertains to G4 and R4.

## Robot Size and Starting Position Problem

24-Oct-2019

G5 R4

Hi all, I spoke with our regional rep, and he directed me here for this question. I notice that there have been similar problems but people didn't seem to realize what is causing the difficulties.

As stated in the following rules, the robot must be 11 x 19.

<G5> Expansion is limited during a Match. During the Match, Robots may not expand beyond the following restrictions: a. Horizontally, beyond an 11" x 19" (279.4mm x 482.6mm) area. b. Vertically, beyond the 15" (381mm) high starting requirement.

Also as stated by the following rule, it must fit inside the starting area of 11 x 19.

<R4> Robots must fit in the sizing box. At the start of each Match, the Robot must be able to satisfy the following constraints: a. Only be contacting the Floor and/or the Field Perimeter. b. Fit within an 11" x 19" (279.4mm x 482.6mm) area, bounded by the Starting Position. c. Be no taller than 15" from the Floor.

The problem that I have discovered is the following. The starting areas are NOT 11 x 19. On our two fields bought two years apart the starting areas for length and width are both about a 32nd of an inch short in either directions as shown in the two following pictures.

![[img](https://www.robotevents.com/storage/markdown/uploads/V1LBoQXTadECev05s71ZmG1bLwNoDcZm1n6DZ)

![[img](https://www.robotevents.com/storage/markdown/uploads/8N9M2WQn1YB01Jz9LdjfXkG6bPfk6NUE35Jm0)

In previous years and games, this was not a problem. This year though the tolerances are very small.

Making the robot size smaller would not work. The way the pieces are made, the robot would have to be smaller.

A rule addition allowing the robots to be slightly (thickness of an axle) outside the starting area would solve the problem.

Thanks for the time.

Sam Schursky  
Team 6277  
The Harvey School  
Katonah, New York

### Answered by committee

First, please review this similar Q&A. Although it is asking a slightly different question than yours, it includes some relevant background information regarding Robot size rulings and tolerances.

<https://www.robotevents.com/VIQC/2019-2020/QA/382>

It looks like your root question is the following:

We have groups that have robots that are exactly 11 by 19. They would pass inspection (assuming the measuring device does not rely on the field which might have the same problems) but be ever so slightly off.

slightly outside of the starting positions. Their definitely needs to be a rules clarification on this.

A rule addition allowing the robots to be slightly (thickness of an axel) outside the starting area as long as it passes inspection of course would be a good solution.

Thank you for your suggestion, but this rule addition will not be made. The intents of VIQC's sizing rules are for Robot size to be checked during inspection and then enforced at the beginning of each Match. Having a different sizing rule for a Match vs inspection would negate the purpose of the inspection process.

They would pass inspection (assuming the measuring device does not rely on the field which might have the same problems) but be ever so slightly outside of the starting positions.

The official [VIQC Sizing Tool](#) does utilize the field as its reference. Relying on a common field ensures a standardized expectation for Teams, inspectors, and Head Referees, regardless of which event they attend. Some manufacturing variance is to be expected in any physical product, as is variance if using different measuring methods.

For example, the VIQC Field Perimeter has a very slight draft angle as an injection molded plastic part; so, if you lay a ruler from the perimeter to the black line, a difference of less than 1mm could easily occur depending on where you rest the ruler against the wall.

So, as an overarching answer to this question, we are going to refer to rule G3:

<G3> Use common sense. When reading and applying the various rules in this document, please remember that common sense always applies in the VEX IQ Challenge.

The intent of G4, G5, R5, and R6 is to provide a design constraint in the form of Robot size that is reasonably observable by a volunteer inspector/referee, and consistently enforceable across all events worldwide. It is not a reasonable expectation for an event to use digital calipers to measure Robot size; it *is* a reasonable expectation for an event to use the tools that are available to all Teams, such as a standard field, a publicly available physical sizing tool, and human observation. To avoid potential conflicts, we would advise Teams remind mindful of these realities when designing their VEX IQ Robots such that they do not rely on a possible variance of 0.03" to determine their legality.

---

## Robot Size Rules Clarification

18-Oct-2019

R4 R5

Can clarity please be provided as to which rule ultimately governs the size of the robot? Our teams' robots are 11" wide. How should rule R4 be interpreted with respect to R5?

At a recent tournament, my team was told by the lead inspector that regardless if their robot passes inspection, if the referees determine that the robot is not within the 11" by 19" starting position on the game field floor, then the match would not start until it is or the team will be disqualified. I was told that the referees would use being able to see the enclosed white floor area around the robot to make that determination. This is subjective in nature considering that if the part of the robot that is 11" wide is not contacting the floor. To truly make this assessment, the referees will need to have a starting position measuring tool.

At a recent league event, my teams' robots passed inspection and were not told of this starting position ruling at match time.

For the past 5 years that we have been fortunate to compete in the VEX IQ Challenge, as well qualifying for 4 World Championships, we have never encountered this interpretation of the robot sizing for the matches. It has been that as long as the robot passes inspection and as long as the driver placed their team's robot the best possible into the starting position at the start and during the match, no one is disqualified and the match starts and/or continues.

Also, regarding VEX IQ Robot Sizing Tool part no. 228-5293, although not stated, will it be used as the official measuring tool at World Championship? More importantly, may it be stated that this is the official tool to use for robot sizing?

Thanks in advance James Ibanez

## Answered by committee

Can clarity please be provided as to which rule ultimately governs the size of the robot? Our teams' robots are 11" wide. How should rule R4 be interpreted with respect to R5? [...] At a recent tournament, my team was told by the lead inspector that regardless if their robot passes inspection, if the referees determine that the robot is not within the 11" by 19" starting position on the game field floor, then the match would not start until it is or the team will be disqualified.

R4 states the following, with a portion bolded for emphasis:

<R4> Robots must fit in the sizing box. At the start of each Match, the Robot must be able to satisfy the following constraints:

- a. Only be contacting the Floor and/or the Field Perimeter.
- b. Fit within an 11" x 19" (279.4mm x 482.6mm) area, bounded by the Starting Position.
- c. Be no taller than 15" from the Floor.

This rule works in conjunction with <G4>. <R4> is an "inspection rule", meaning that a Robot may not pass inspection if it cannot satisfy these constraints. However, <G4> is a "game rule", meaning that **even if a Robot passed <R4> in inspection (i.e. it is theoretically capable of satisfying the constraints), Head Referees will still be watching for it before each Match.**

G4 states the following, with a portion bolded for emphasis:

<G4> Pre-match setup. At the beginning of a Match, each Robot must meet the following criteria:

- a. Only be contacting the Floor and/or Field Perimeter.
- b. Fit within an 11" x 19" (279.4mm x 482.6mm) area, bounded by the Starting Position.**
- c. Be no taller than 15" from the Floor.

> An offending Robot will be removed from the Match at the Head Referee's discretion. They will not receive a Disqualification, but they will not be permitted to play in the Match.

Note: Robots must be placed on the Field promptly. Repeated failure to do so could result in a violation of <G1>.

The exact definition of the term "promptly" is at the discretion of the Head Referee and the Event Partner, who will consider event schedule, previous warnings or delays, etc.

The Head Referee and inspector's interpretation of R4 at your event was correct. A Robot which has passed inspection must still demonstrably abide by G4 in each of their Matches.

Violation of G4 is not intended to escalate to an immediate Disqualification, but the Robot in question should not be permitted to play in the Match. However, excessive delays caused by non-compliance may still result in a violation of G1 as stated in the Note.

I was told that the referees would use being able to see the enclosed white floor area around the robot to make that determination. This is subjective in nature considering that if the part of the robot that is 11" wide is not contacting the floor. To truly make this assessment, the referees will need to have a starting position measuring tool.

There is no required method by which Head Referees are expected to enforce G4. In most cases, the visual check you describe should prove sufficient. However, for a Robot which pushes the limit of allowable size, a measuring tool could be as simple as sliding a VEX IQ beam or plate along the edges of the Starting Position. (the crossbar of the VEX IQ Challenge Sizing Tool, turned vertically, could also be used)



Also, regarding VEX IQ Robot Sizing Tool part no. 228-5293, although not stated, will it be used as the official measuring tool at World Championship? More importantly, may it be stated that this is the official tool to use for robot sizing?

We will confirm this in the April 10th Game Manual Update, which usually includes any specific rule changes or clarifications pertaining to the World Championship.

---

## <R4> Using External Factors to Stay In Size

26-Aug-2023

R4

<R4> Robots must fit within an 18" x 18" x 18" volume.

a. Compliance with this rule must be checked using the official VEX Robotics On-Field Robot Expansion Sizing Tool: <https://www.vexrobotics.com/276-5942.html>. b. 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 <G6>. c. 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.

1. Can a Robot use a Preload to stay in size?
2. Can a Robot use a field perimeter wall to stay in size?

### Answered by committee

Thank you for your question. As described in rule <G5>,

Using Field Elements, such as the field perimeter wall, to maintain starting size is only acceptable if the Robot would still satisfy the constraints of <R4> and pass inspection without the Field Elements.

Rule <G5> will be expanded in the next game manual update to include Preloads in this requirement.

---

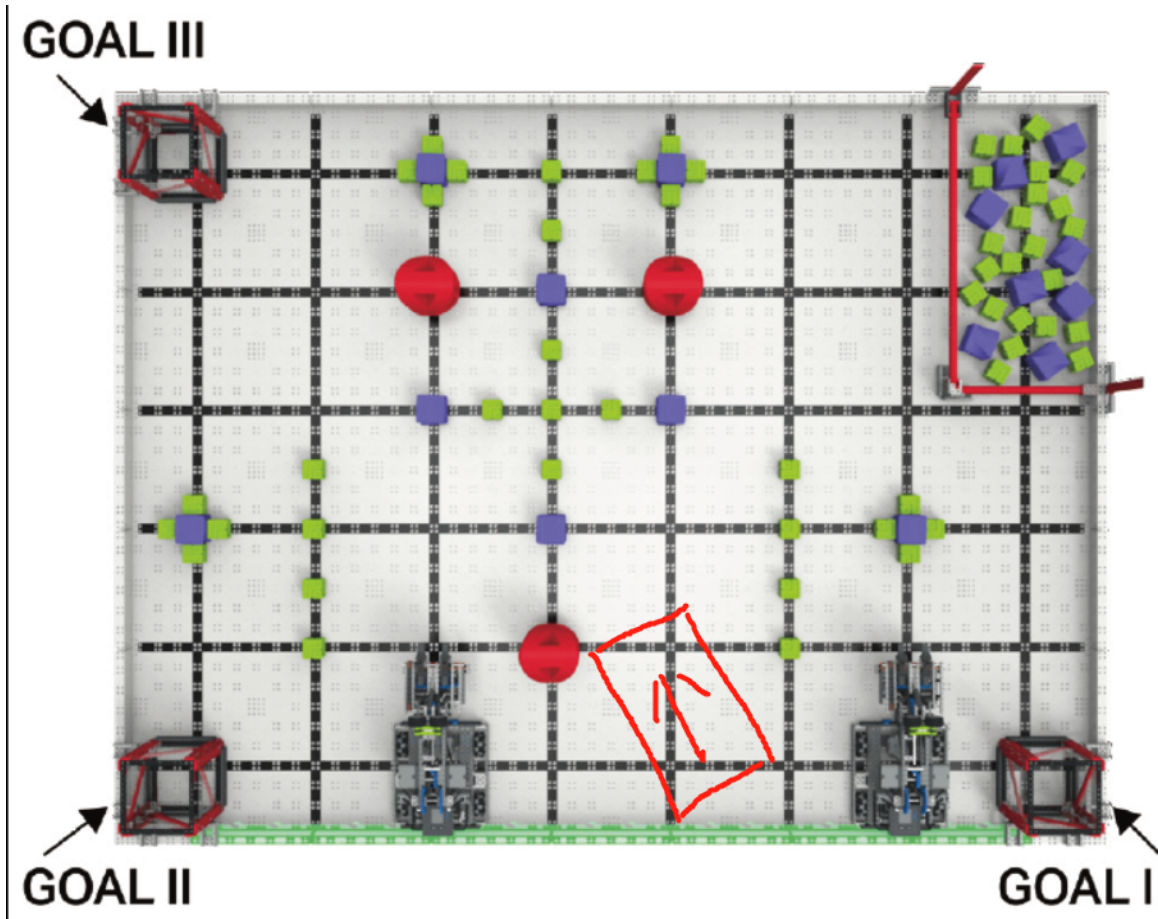
## Robot head orientation in starting configuration

22-Jun-2023

SG1 R4

<SG1>

There are no specific starting positions, as long as the above criteria are met. How about robot head orientation in starting configuration. Is it ok as the following picture shows.



Answered by committee

Provided the robot meets all of the criteria established in [<SG1>](#), including contact with the field perimeter, this would be a legal starting configuration.

## Can robots start away from the field perimeter?

3-Jun-2023

SG1 R4

Regarding:

- [<R4> Starting Configuration:](#)

a. Only be contacting the Floor and/or the Field Perimeter.

and

- [<SG1> Pre-match Setup:](#)

Contacting the inside and/or top face of the Field Perimeter wall

The ambiguity around "and/or" is our point of inquiry (dictionary: <https://www.merriam-webster.com/dictionary/and%2For>):

Based on the definition and our understanding of "and/or", Rule R4 appears to allow contacting the floor *without* contacting the perimeter ("or"). Surely the intended conjunction is simply "and" here? Something like:

Be contacting the Floor **and** the Field Perimeter inside wall or top face.

Rule SG1 seems to be clearer: Must contact the inside or top face. A bot that only touches the top of the wall is not really materially different than one that only touches the inside wall. Nevertheless, clarification in the Q&A would be appreciated: it's OK for a bot to only touch the floor + **top of wall** but **not** the inside of the wall?

Is it possible that the intended phrasing is something more like:

Contacting the inside face of the Field Perimeter wall. Additional contact with the top face of the Field Perimeter wall is permitted, but not required.

Thank you for any clarification. Sorry, we obviously have some budding lawyers over here.

### Answered by committee

Thank you for your question. Clause A of rule [<R4>](#) will be revised to read, "Only be contacting the Floor and the Field Perimeter" in the next game manual update.

---

## Field Displays [<S2>](#) [<S1>](#) [<R4>](#)

12-Nov-2022

[S2](#) [S1](#) [R4](#)

[<SC2>](#) states:

If a Robot comes in contact with anything outside of the field during the Endgame period or due to an early expansion, including the floor or the outside face of the Field Perimeter, it will automatically receive a Disqualification for that Match.

1. If a Field Display is in use, is it considered outside the field perimeter, such that a team automatically receives a Disqualification if it contacts the field display during Endgame or due to an early expansion?

[<S1>](#) and [<R4>](#) protect field elements, including Field Displays. [<Q&A1263>](#) Asks if pneumatic reservoir nuts are legal for use as a projectile in an Endgame expansion system. The response indicates latitude for inspectors and Head Referees to determine the safety of an expansion system:

The type of Endgame mechanism you describe is potentially legal. Teams, Inspectors, and Head Referees must apply judgment to determine whether any specific mechanism is unsafe as described in rule [<R4>](#), and in particular [<R4d>](#)

2. Is potential damage to a Field Display by an expansion system (such as use of pneumatic reservoir nuts as projectiles) a valid reason to fail a team at inspection based on [R4a](#)?

### Answered by committee

1. If a Field Display is in use, is it considered outside the field perimeter, such that a team automatically receives a Disqualification if it contacts the field display during Endgame or due to an early expansion?

Yes. The Field Display is considered to be outside the Field Perimeter, and contact with the Field Display by a Robot during during Endgame or due to an early expansion is a violation of [<S2>](#) that will result in an automatic Disqualification.

2. Is potential damage to a Field Display by an expansion system (such as use of pneumatic reservoir nuts as projectiles) a valid reason to fail a team at inspection based on R4a?

It is possible to use pneumatic reservoir nuts as part of a safe and legal expansion mechanism. Inspectors and Head Referees must consider the entire mechanism when determining whether a specific expansion mechanism should be allowed. In the right (or wrong) circumstances, nearly any Robot on the Field *could* cause damage to a Field Display in nearly any VRC season. This possibility is not, by itself, a valid reason to fail a Robot at inspection.

---

## Pneumatic Alterations Clarification

9-Nov-2022

R4 R20

<R20> No modifications to electronic or pneumatic components are allowed. Motors (including the internal PTC or 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.

[In this VEX Knowledge base article](#), it states the nut can be removed from the cylinder to reduce weight.

R20 states pneumatic cylinders, reservoirs, solenoids, etc. may not be altered from their original state in any way.

1. Is the removal of the nut on the bottom of the pneumatic **cylinder** (NCJ2D10-200S or NCJ2D10-200) considered to be an alteration from the original state?
2. Is the removal of the nut on the bottom of the pneumatic **reservoir** (US14227-S0400 or NCMZ5-U12001-320) considered to be an alteration from the original state?
3. Can either of these nuts by themselves be used in an end-game launcher's design if the head referee considers the mechanism to be safe per <R4d>
4. If the nut from the reservoir is used outside of the reservoir, is the nut considered to be only the "pneumatic reservoir nut" or is it considered to be an "an entire pneumatic reservoir that has been altered such that only the nut remains"?

### Answered by committee

Thank you for your questions.

1. Is the removal of the nut on the bottom of the pneumatic **cylinder** (NCJ2D10-200S or NCJ2D10-200) considered to be an alteration from the original state?
2. Is the removal of the nut on the bottom of the pneumatic **reservoir** (US14227-S0400 or NCMZ5-U12001-320) considered to be an alteration from the original state?

These are both considered normal uses of the parts, and are not modifications of the pneumatic device.

3. Can either of these nuts by themselves be used in an end-game launcher's design if the head referee considers the mechanism to be safe per R4d
4. If the nut from the reservoir is used outside of the reservoir, is the nut considered to be only the "pneumatic reservoir nut" or is it considered to be an "an entire pneumatic reservoir that has been altered such that only the nut remains"?

Using either of these nuts as part of an Endgame expansion mechanism is allowed, provided no other rules are broken in the process. If used in this manner, the nut is considered to be a pneumatic reservoir nut and not a modified pneumatic device.

---

## Size requirement for VEX IQ robot for 2018-2019? (Found the answer already)

18-Oct-2018

R4

I couldn't find the size requirement of the IQ robot for this year, and I will assume it's the same from last year, but I couldn't remember the size requirement from last year as well. Do anyone know what that is, and where can you find that information on the website or manual?

Just found the answer to my own question: It's at page 19 on the game manual:

a. Only contact the Floor. b. Fit within an 11" x 20" (279mm x 508mm) area, bounded by the Starting Position (see Figures 2 and 11). c. Be no taller than 15" (381mm).

**Answered by committee**

Thank you for searching the Game Manual, and editing your question with the result!