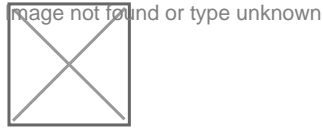


Q&A

VRC 2019-2020: Tower Takeover

Tagged: R5



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 Tower Takeover 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 Tower Takeover rules questions.

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

Index

[R5 and multiple sizing tools](#)

[R5 Rubber Bands](#)

[R5e Clarification on Components from V5 Beta](#)

[Inspection question](#)

[Using field wall to maintain starting size](#)

[VEX IQ Robot dimensions when using the "template"](#)

[<R5>, <R14>Is it Legal to Use 393 Motor Refurb Gears and V5 Cartridges as Mechanical Compnents?](#)

[Robot Size Rules Clarification](#)

[Use of Vex Gray Tinted polycarbonate sheets](#)

[is 3D printed parts are allowed?](#)

[R5: Horizontal Expansion While Hanging & Tilted](#)

[Expansion & Robot Orientation Clarification](#)

[Size Requirements](#)

[Is this material allowed?](#)

[R6 Latex Tubing \(10'\) 275-1262](#)

[Hinged tracking wheel held in starting size by field tile - G4 / R5](#)

951: R5 and multiple sizing tools

2-Dec-2021

R5

R5 Reads:

<R5> 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. a. Per <SG2>, Robots may expand beyond their starting size constraints after the start of a Match. 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. It is at the Event Partner's discretion how size will be inspected at a given event. Possible methods may include the Robot being placed in a "sizing box" with interior dimensions matching the above size constraints, or by using the VEX Robotics Competition Robot Sizing Tool while the Robot is placed on a flat surface. A Robot may not touch the box walls or ceiling or the Robot Sizing Tool sides when being measured. There are two VEX Robotics Competition Robot Sizing Tools that may be used: <https://www.vexrobotics.com/276-2086.html> and <https://www.vexrobotics.com/276-5942.html>

The head ref certification course adds this clarification:

It is at the Event Partner's discretion how size will be inspected at a given event. Possible methods may include the Robot being placed in a "sizing box" with interior dimensions matching the above size constraints, or by using the VEX Robotics Competition Robot Sizing Tool while the Robot is placed on a flat surface. A Robot may not touch the box walls or ceiling or the Robot Sizing Tool sides when being measured.

<R5>

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.

- a. Per <SG2> Robots may expand beyond their starting size constraints after the start of a Match.
- 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.

It is at the Event Partner's discretion how size will be inspected at a given event. Possible methods may include the Robot being placed in a "sizing box" with interior dimensions matching the above size constraints, or by using the VEX Robotics Competition Robot Sizing Tool while the Robot is placed on a flat surface. A Robot may not touch the box walls or ceiling or the Robot Sizing Tool sides when being measured.

There are two VEX Robotics Competition Robot Sizing Tools that may be used: <https://www.vexrobotics.com/276-2086.html> and <https://www.vexrobotics.com/276-5942.html>

Special Note to Referees

The rule is that the Robot must be smaller than 18" x 18" x 18". Whether you use a box, the sizing tool, or a tape measure, this does not change the rule. All of these ways to measure the size of a robot are tools for you to ensure that the robot is smaller than 18" x 18" x 18". If the tool you are using is slightly larger than 18" then the robot should not touch the tool. If an oversize team tells you that they have passed inspection at every other event, then maybe those other events were using a slightly larger tool. This does not change the rule, and you should keep to the rule. Having a tape measure on hand so that you can show a team that the tool is to specifications would be helpful.

So, the sizing tool is up to the EP's discretion.

The problem is that the old tool is smaller than 18", and the new tool is larger than 18", and a sizing box would be exactly 18". This is a recipe for chaos, and has been a great source frustration in our experience.

(Later edit, while awaiting an answer.) A further source of confusion is that the game manual states "...smaller than 18 inches" while the Q&A sometimes says "18 inches or smaller." These are two different specifications that seem

insignificant until a student is tearing a robot apart to pass inspection that they thought they were prepared for.

For the past few years we have had incredibly stressful encounters where we attend an event that use the old sizing tool (which until recently was unavailable). My teams use the new sizing tool religiously and end up at events where they're told they're out of size and suddenly are tearing their robots apart to pass inspection. Months of work have been dashed in minutes in these situations.

If a robot needs to be less than 18", then VEX should not have manufactured and distributed a sizing tool that is 18 1/8" (the new tool). In the world of engineering, specs are everything. It's an inconsistent message to kids to say, "your robot must be precisely less than 18," which is very appropriate for the engineering world, but then design, manufacture, and distribute a sizing tool that regulates those specs that is itself out of specs.

How can we standardize this so that teams can move forward with clarity? Below I suggest a couple of solutions.

Our program has four of the new sizing tools. At \$44 dollars each (plus shipping), it would be difficult to throw them all away and purchase the old sizing tools. Perhaps VEX could do a trade in program and recall all the new sizing tools and exchange them for the old ones that are available again.

One drawback to this option is that many teams have months developing robots using the new sizing tool as the standard. With this new ruling, many will have to redesign in light of this new ruling.

In Tennessee, our regional reps came to the solution that teams bring the new sizing tool to competitions so that they can demonstrate that they pass inspection with a VEX-issued sizing tool. This would allow teams teams around the world to continue to use the (tens of thousands? hundreds of thousands?) of dollars worth of new sizing tools that have been purchased or distributed.

Having proposed two potential solutions, I'll end with this.

The head ref course clarification adds this quote:

"If an oversize team says they have passed inspection at other events, then maybe those other events were using a slightly larger tool." This is really a misleading quote. For teams newer than around five years old, then it's not about using "A" slightly larger tool, but THE only sizing tool that was available, that VEX manufactured and issued to EP's to run events. This quote makes it sound like the EP's or teams arbitrarily decided to use a flawed measuring tool, when in reality this was what was issued to us as THE standard to use in inspection.

I'm requesting that VEX/REC take more responsibility for this issue than is shown in the last quote, which places the responsibility of the issue on teams and EPs. We need Vex to use it's authority to make a crystal clear ruling that brings order to this issue. Simply citing the manual as the standard and leaving it to the EP's to interpret is a recipe for chaos and frustration, that actually does more harm by undoing solutions such as what our region has established.

Thanks in advance.

Matthew Monahan 663 Coach Chattanooga, TN

Two PS thoughts.

If this ruling stands, I think any team would be foolish to not throw away their new sizing tools and buy the old ones, which is the smallest standard.

Which tool will be used at Worlds?

Answered by Game Design Committee

I'm requesting that VEX/REC take more responsibility for this issue than is shown in the last quote, which places the responsibility of the issue on teams and EPs.

Although we appreciate your thoughts on this subject and will take it under advisement for future seasons, this request is outside of the scope of the Q&A forum and we must reiterate the following line from the [Q&A Usage Guidelines](#):

The Q&A system is for rules clarifications only. For game questions, suggestions, or concerns outside of specific and official rules questions, contact GDC@vex.com.

To answer the specific question that was asked:

Which tool will be used at Worlds?

As noted in G21, gameplay and inspection details pertaining specifically to VEX Worlds will be included in the April 5 Game Manual Update.

82: R5 Rubber Bands

17-Sep-2018

R5

What are the rules on using rubber bands?

Is their specifics on how you can utilize them on your robot?

What types of rubber bands are okay and not okay?

Are the VEX IQ orange rubber bands okay? (<https://www.vexrobotics.com/rubber-bands.html>)

Answered by Game Design Committee

Please see the following rules:

R5 Robots may be built ONLY using official VEX EDR components, unless otherwise specifically noted within these rules. c. Products from the VEXpro, VEX IQ, or VEX Robotics by HEXBUG product line cannot be used for robot construction, unless specifically allowed by a clause of R7. i. **Products from the VEXpro, VEX IQ, or VEX Robotics by HEXBUG product line which are also cross-listed as part of the VEX product line are legal.** A cross-listed product is one which can be found in a VEX EDR section of the VEX Robotics website.

The rubber bands you refer to are cross-listed to the VEX EDR section of the VEX Robotics website: <https://www.vexrobotics.com/vexedr/products/accessories/other/rubber-bands.html>

R7 Robots are allowed the following additional “non-VEX” components: b. Any parts which are identical to legal VEX parts. For the purposes of this rule, **products which are identical in all ways except for color are permissible.** It is up to inspectors to determine whether a component is “identical” to an official VEX component.

So, if you had rubber bands that were identical in size and material to VEX rubber bands, but were a different color, these would be legal.

R3 The following types of mechanisms and components are NOT allowed: c. **Those that pose an unnecessary risk of entanglement.**

If using rubber bands, make sure to use them in a way that would not pose an unnecessary risk of entanglement, such as making a "net" that drags on the floor, or stretching over long distances without a rigid guard.

72: R5e Clarification on Components from V5 Beta

10-Sep-2018

R5

R5e states:

Components obtained from the V5 beta program, including V5 beta firmware, are not legal for competition use. 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.

I would like clarification on this both from a team mentor standpoint and an Event Partner standpoint. Does the Beta component restriction include things such as bulk motor/sensor wire, claw, push buttons, and motor cartridges? I don't know if those will be distinguishable from production V5 parts, and if not, they would be difficult to prevent usage of through inspection.

Answered by Game Design Committee

In general, using any components that were received for free as part of the beta program for competition use is not in the spirit of the VEX Robotics Competition and would be considered a violation of the V5 beta agreement. That said, to answer each of your specific questions:

- The Claw changed color from light gray to black, similar to the electronics, and is not legal for use.
- The Bumper Switch changed color from a white cap to a black/red cap, similar to the other electronics, and is not legal for use.
- Beta motor cartridges are functionally and cosmetically identical to production cartridges. Inspectors will not be expected to identify the difference between beta and production motor cartridges.
- Beta Smart Cables are functionally and cosmetically identical to production cables. Inspectors will not be expected to identify the difference between beta and production Cables.

717: Inspection question

23-Dec-2020

R5

The kids added a rubber band to aid in lifting risers, however if the robot is powered off the rubber band pulls the lifting mechanism above the 15" inspection limit. When it is powered on, there is no problem lowering the lifting mechanism below the 15" limit for inspection. Is this acceptable?

Answered by Game Design Committee

Yes, this is legal.

646: Using field wall to maintain starting size

3-Sep-2020

G4 R5

Relevant rule segments: <G4> Using Field Element, such as the field perimeter wall, to maintain starting size is only acceptable if the Robot would still satisfy the constraints of <R5> and pass inspection without the Field Element.

<R5> 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. a. Robots may expand beyond their starting size constraints after the start of a Match. 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.

Would it be a correct interpretation of G4 to allow: A robot mechanism that needs the field perimeter to stay within the size constraints but can be temporarily constrained for inspection purposes with a mechanism assuming the mechanism will not be in place during a match. The temporary mechanism in this case would still be attached to the robot but not engaged at the beginning of the match, as the field perimeter would be holding the robot in size.

Answered by Game Design Committee

No, this would not be legal. This would be considered a possible violation of R3 parts "a" and "b", which state:

<R3> Robots must pass inspection. Every Robot will be required to pass a full inspection before being cleared to compete. This inspection will ensure that all robot rules and regulations are met. Initial inspections will take place during team registration/practice time.

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 hypothetical question represents a Robot with two functional configurations, one of which would pass inspection, and one of which would not.

558: VEX IQ Robot dimensions when using the "template"

19-Feb-2020

R5

To whom it may concern.

It would be nice to get some clarification from VEX directly. If a bot in the size testing template touches the sides but moves through the template, is it or is it not exactly 11 inches. Our understanding is that the pieces from VEX and the connector holes are either 1/4 or 1/2 inch. To us and our measurements and likely others the bot was going to be 10 1/2, (10 3/4 with odd cross connectors) or 11 or 11 1/4". All that is to say the bot either does not rub, rubs a little or will not fit. Our experience at Worlds was as long as they could push it through the template all was good. We were not the only ones confused by this at check-in this past weekend at a Signature event.

We put a tape measure over it and it's exactly 11" front middle and back.

The head ref prior to sending it through said to the guy putting it through the template, I am not concerned about the width, yet the moment it touched the sides the other ref was sure we were too wide.

The head ref had measured it with a tape measure and it was spot on 11".

Perhaps Vex can clarify this for anyone using the template.

Thank you,

Scott Bowman.

Answered by Game Design Committee

While the VEX IQ Challenge Sizing Tool is a useful tool to have at events, the Game Manual is the official and final ruling on what should be considered legal.

Rules R5 and G5 are quoted as follows:

<R5> Max Robot size is 11" x 19". Robots must be demonstrably able to comply with the expansion rules set forth by <G5>.

<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.

The official tool is one way to demonstrate compliance with these rules, but the tool itself is not the rule - the size is.

We put a tape measure over it and it's exactly 11" front middle and back.

This is correct; the inside faces of the sizing tool are exactly 11". So, if a Robot were to brush up against the edge of the sizing tool but is able to pass through it without deforming, it would (in most cases) be a legal robot of the max dimension.

With that said, a Robot brushing the edge of 11" is, by definition, pushing the limits of the rule. Therefore, as always, edge-case scenarios are to be handled at the discretion of the Head Referee. We would advise Teams to take this into account when Students are designing their Robot.

490: <R5>, <R14>Is it Legal to Use 393 Motor Refurb Gears and V5 Cartridges as Mechanical Components?

17-Jan-2020

R5 R14

Legality of part usage from 393 motor refurb kit and V5 Motor Cartridges as mechanical components?

In previous years it was ruled legal that 393 motor internal gears, sold in refub kits, can be used outside of a motor as mechanical components, since they are sold as a separate item. <https://www.vexforum.com/t/answered-further-question-about-r15/23896/2> <https://www.vexforum.com/t/answered-is-it-legal-to-re-use-internal-motor-parts-outside-of-motors/30764>

Questions for the Tower Takeover Season: A. (R5) Does the above positive ruling still stand regarding the legal use of refurb kit gears? B. (R14) Additionally, are V5 Motor Cartridges legal to use as mechanical components external to the V5 motor?

Thank you from Vexmen Team 81K Magik

Answered by Game Design Committee

A. (R5) Does the above positive ruling still stand regarding the legal use of refurb kit gears?

Yes, this is legal.

B. (R14) Additionally, are V5 Motor Cartridges legal to use as mechanical components external to the V5 motor?

There are no rules prohibiting this, thus it is legal. However, any modifications to the cartridge would be considered a violation of R22. Also, please bear in mind that there are no VEX-legal components that can interface with the internal half of the cartridge. Removing parts from a V5 Smart Motor to do so would also be considered a violation of R22.

382: 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 Game Design 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.

331: Use of Vex Gray Tinted polycarbonate sheets

20-Aug-2019

R5 R9

Now that VEX sells the Gray Tinted Polycarbonate sheets, does the use of this product fall under <R5>? This would imply a team could use as much of the tinted polycarbonate sheets as they want provided they still abide by the 18 x 18 x 18 size requirements. Or will it still fall under <R9>? This would imply a team can still only use a single piece or combination of pieces with initial overall dimension of 12" x 24". How shall I instruct my teams this year regarding the Tinted Polycarbonate sheets (p/n: 217-6626 and 217-6627)? Thank you.

Answered by Game Design Committee

This is a good question! Let's take a look at a few rules which work together here:

<R9> is the rule which covers polycarbonate legality:

<R9> A limited amount of custom plastic is allowed. Robots may use non-shattering plastic from the following list; polycarbonate (Lexan), acetel monopolymer (Delrin), acetel copolymer (Acetron GP), POM (acetel), ABS, PEEK, PET, HDPE, LDPE, Nylon (all grades), Polypropylene, FEP; as cut from a single 12" x 24" sheet up to 0.070" thick.

However, <R5a> explicitly states that VEXpro products cannot be used.

<R5> Robots are built from the VEX EDR system. Robots may be built ONLY using official VEX EDR components, unless otherwise specifically noted within these rules. Teams are responsible for

providing documentation proving a part's legality in the event of a question. Examples of documentation include receipts, part numbers, official VEX websites, or other printed documentation.

a. Products from the VEXpro, VEX IQ, or VEX Robotics by HEXBUG product line cannot be used for Robot construction, **unless specifically allowed by a clause of <R7>** or cross-listed as part of the VEX EDR product line.

However, the bolded portion above does point us to R7 for a possible exception:

d. **Any parts which are identical to legal VEX parts are permitted.** For the purposes of this rule, products which are identical in all ways except for color are permissible. It is up to inspectors to determine whether a component is "identical" to an official VEX component.

The gray polycarbonate you refer to would fall under <R9>, because even though it happened to be purchased from VEXpro, it is functionally similar to any other vendor's legal polycarbonate, per <R5d>. Therefore, it is legal (provided no other rules are violated, such as the 12" x24" restriction in <R9>).

224: is 3D printed parts are allowed?

24-Jan-2019

R5 R7

Hi I was wondering if we can use some 3D printed pieces on the robot like this battery holder below. That piece is not a active functioning mechanism on the robot. So, can we consider it like an electrical tape?

<https://www.thingiverse.com/thing:275299> My second question is as you know ordering from vex sales takes too much time and we didn't have enough time to order a VEXnet Backup Battery Holder. So I have ordered some 9 volt battery clips and modified with a 2 pins connector. It is functioning properly on the robot but is that allowed to as well? Thanks.

Answered by Game Design Committee

The only permissible non-VEX components in the VEX Robotics Competition are detailed in <R7>. The parts you have described are not included in this list, and would also not be considered non-functional decorations under <R8>. Thus, they would not be legal.

211: R5: Horizontal Expansion While Hanging & Tilted

16-Jan-2019

Hanging R5

When a robot is hanging from the Hanging Bar, it can tilt at an angle to the floor.

A robot that is built below the 20 inch horizontal length limit might then be more than 20 inches (when measured horizontally) due to that tilt.

Would this be a violation of R5?

If so... what if the robot is swinging when it first pulls up onto the Hanging Bar and is moving in and out of that violation?

As a reference, it was ruled during "Bank Shot" that robot's expansion would be "measure as if the robot was sitting flat on the field" (see link below)

<http://www.vexiqforum.com/forum/vex-iq-challenge-discussion/viqc-bank-shot/10245-size-constraints-when-on-the-ramp>

Thanks, Paul

Answered by Game Design Committee

It is always impossible to provide a blanket ruling on a hypothetical Robot design based on a snapshot description of an interaction during a Match. However, the answer given in the linked previous Q&A generally applies in this scenario as well, within the bounds of G3 (use common sense!).

Robot dimensions should be measured as though the Robot is resting on a flat surface. A Robot which swings from the Hanging Bar, but would be of a legal size if resting on a flat surface (in the same configuration / expansion / orientation) would not be in violation of R5.

2089: Expansion & Robot Orientation Clarification

7-Aug-2024

SG2 SG3 R5

[<SG2><SG3>](#)

Hello! I hope the season has been well for you all so far.

Speaking with a range of teams I wanted to seek clarification on rules SG3, SG2 as well as a clarification on Robot Inspection.

As per SG3:

Vertical expansion is limited and robots may expand vertically but never contact and/or break the plane of two levels of the ladder at a given time. Similarly, Horizontal expansion is limited to not being able to exceed an overall footprint of 24" x 18".

The note in SG2c specifically says that: > Horizontal Expansion is measured from the robots perspective, i.e., it does "rotate with the robots." Robots that tip over, or rotate while Climbing, are still restricted to expanding "from the one side" in the chosen direction that was measured during inspection.

Based on this wording I want to clarify a few specific cases provided no other rules are broken:

1. Is it legal for a robot that passes inspection to "flip itself over" as a part of an intentional strategy so that it can expand horizontally with no limit (as it will never break two planes of the ladder), whilst maintaining the 24"x18" footprint specified in SG2 & only expanding "horizontally" in the configuration defined during inspection? Would this be a legal strategy teams could employ to develop wallbots for defense in matches?
2. If point 1 is legal, instead of a robot flipping itself over, as the footprint is determined during Inspection, are teams able to start their robot "on it's side" so that the robot does not need to flip itself over? Specifically, are teams able to start their robot in a different orientation to how it was inspected?
3. If point 2 is illegal, would all robots be required to start with the "defined bottom" parallel to the ground? If this is the case, would point 1 still be legal?
4. If point 2 is legal and teams are able to start their robot in any orientation, how would on-field inspections impact the above ruling? Would the robot's orientation on the field become it's "new orientation"? Or could teams rotate their robots to the desired orientation for the inspection purposes than return it to being "on it's side"?

I would assume that the intent and leniency granted in the note attached to SG2 is to not punish teams who accidentally fall over when attempting to elevate, and just want to clarify the above cases in the event any teams try to exploit any potential loopholes within the current rules.

Thank you for the clarifications, and I wish you a pleasant season!

Answered by Game Design Committee

Intentionally exploiting a loophole in vertical expansion to get past the horizontal expansion limit is not allowed, and should be considered a Violation of rule [<SG2>](#). The overall intent of the expansion rules is to prevent wall bots and/or Climbs that skip rungs, and to avoid penalizing Robots that tip or slip slightly while Climbing.

We'll try to better reflect this intent in the next game manual update.

182: Size Requirements

14-Dec-2018

R5

We are inquiring about the sizing requirements for bots. In previous years, there was a requirement that at no point could the robot go over 20" even diagonally. Is that no longer the case this year?

<https://drive.google.com/file/d/1YVvk34bULHSOFiBfihyxFceJsoiTb3Cfd/view>

Based on the measuring tool we are well under the requirement, but we are over based on a 20" diagonal. Clarification would be appreciated.

Answered by Game Design Committee

<R4> At the start of each Match, the Robot must satisfy the following constraints:

- 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).

<R5> A Robot may not expand beyond its 11" x 20" (279mm x 508mm) constraint at any time during the Match. However, Robots are permitted to expand beyond their 15" (381mm) starting height constraint at any time during the Match.

The only horizontal sizing constraint in the VEX IQ Challenge is this 11"x20" rectangle. There is no point-to-point restriction on other internal distances.

We were unable to open your Google Drive link due to restricted sharing permissions, but as long as the Robot satisfies the constraints of R4 and R5, it should be legal.

169: Is this material allowed?

5-Dec-2018

R5 R7

Hi,

I need a answer to this forum.

<https://www.vexforum.com/index.php/35819-is-this-material-allowed>

I will thank.

Cordially, Aleksander Pérez

Answered by Game Design Committee

No, this is not legal. Please review R5 and R7. This material is not sold by VEX Robotics, and it is not listed in these rules as an exception to this general guideline.

128: R6 Latex Tubing (10') 275-1262

26-Oct-2018

R6 R5

Hello

I am a robotics coach and I am wondering if my team can use the following item in this year in Turning point it appears that we are allowed to use all official VEX products but I was not sure if we could use the following items under rule R6?

1. R6 Latex Tubing (10') 275-1262 <https://www.vexrobotics.com/275-1262.html#Description>

<R6> Official VEX products are ONLY available from VEX Robotics & official VEX Resellers. To determine whether a product is "official" or not, consult www.vexrobotics.com. A complete list of authorized VEX Resellers can be found at www.vexrobotics.com/find-a-reseller.

<R5> Robots may be built ONLY using official VEX EDR components, unless otherwise specifically noted within these rules.

C. Products from the VEXpro, VEX IQ, or VEX Robotics by HEXBUG product line cannot be used for robot construction, unless specifically allowed by a clause of <R7>. i. Products from the VEXpro, VEX IQ, or VEX Robotics by HEXBUG product line which are also cross-listed as part of the VEX product line are legal. A cross-listed product is one which can be found in a VEX EDR section of the VEX Robotics website. For example, the Rubber Shaft Collar (228-3510) is a VEX IQ component that can be found on the VEX EDR "Shafts & Hardware" page:

<https://www.vexrobotics.com/vexedr/products/accessories/motion/shafts-andhardware.html>

Thanks for your Assistance.

Answered by Game Design Committee

Yes, as this is a VEX EDR product that is found on the VEX website, it is legal within R5 and R6.

1056: Hinged tracking wheel held in starting size by field tile - G4 / R5

15-Feb-2022

G4 R5

Some teams use hinged tracking wheels on their robots that allow the wheel to constantly be in contact with the field tiles. In some cases when a robot is lifted, these tracking wheels will drop down since there is nothing holding them in place and may even be using elastics or some other mechanism to create a downward force to ensure field tile contact.

G4 specifies that a 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" and not using field elements to maintain starting size.

Assuming a team does not have a mechanism in place to keep their tracking wheels from dropping down before the start of a match when not in contact with the field tiles would this be considered a violation of G4 and possibly R5 if the robot becomes out of starting size thus either requiring the robot be removed from the field prior to the start of a match or not pass inspection to begin with?

Answered by Game Design Committee

In the context of G4 / R5, it is a fair assumption that a Robot will begin the Match (and be inspected) while placed on a field tile. The scenario described in this question (i.e. a mechanism which rests on a field tile when measured within the 18"x18"x18" volume) would be legal.