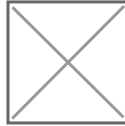


Q&A

VRC 2019-2020: Tower Takeover

Tagged: R17



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

[Cortex Non-Functional Decorations](#)

[Pneumatics and Motor Counts](#)

[R17 Is the 2x8 smooth plate allowed as a decoration with your robots name on it?](#)

[Legality of FLEX Wheels now that they are no longer appear on VEX Robotics product site](#)

[Clarification on whether the presence of factory-applied lubricant in a new V5 Smart Motor cartridge under <R17> affects the interpretation of <R20b>](#)

[Is marking a part on the robot with a sharpie/pen to aid a driver in operating the robot illegal?](#)

[Bearing Attachment Rivet - 276-2215 and 2815 Q&A](#)

[Using pneumatic cylinders as gas shocks](#)

472: Cortex Non-Functional Decorations

2-Jan-2020

R12 R16 R17

Under rules <R12>, <R16>, <R17>, may teams using the V5 Control System use a Cortex VEXNET 2.0 Key as a non-functional decoration?

Answered by Game Design Committee

No, this is not legal.

448: Pneumatics and Motor Counts

9-Dec-2019

R17

If, using a v5 system, if a team were to directly attach the pneumatic tank to the actuator, without using the solenoids (or any electrical device) to control them, would it still count against their motor count, reducing it to 6 instead of 8? The reason for asking is that a team wanted to use a constant pressure output which never needed to change throughout the round.

Answered by Game Design Committee

The full text of rule R17 reads as follows, with a portion bolded for emphasis:

<R17> Robots use one control system. Robots may use either:

Option 1: A VEX ARM® Cortex®-based Microcontroller, up to ten (10) 2-Wire Motors or VEX Servos (in any combination up to ten) and a legal VRC pneumatic system per <R19>.

Option 2: A VEX ARM® Cortex®-based Microcontroller, up to twelve (12) 2-Wire Motors or VEX Servos (in any combination up to 12) and no pneumatic components, excluding pneumatic tubing.

Option 3: A V5 Robot Brain, up to six (6) V5 Smart Motors, and a legal VRC pneumatic system per <R19>.

Option 4: A V5 Robot Brain, up to eight (8) V5 Smart Motors, **and no pneumatic components**, excluding pneumatic tubing.

It sounds like you are attempting to utilize Option 4 (eight motors). In this case, no pneumatic components are permitted, whether connected to a solenoid or not. Therefore, any time a pneumatic tank or actuator is present on a VRC Robot, they are exercising Option 3 (or Option 1).

3087: R17 Is the 2x8 smooth plate allowed as a decoration with your robots name on it?

9-Feb-2026

R6 R17

I know you can not use the 2x8 smooth plate as a license plate, but can they be used as a decoration? Thank you.

Answered by Game Design Committee

Placing a sticker or writing with marker on the 2x8 Smooth Panel would be considered non-functional decorations, provided they do not violate any aspect of [<R17>](#).

3023: Legality of FLEX Wheels now that they are no longer appear on VEX Robotics product site

7-Jan-2026

G3 R17

[<R17>](#) Apparently VEX Robotics has purged FLEX Wheels from their website. As written, in the Game Manual, the parts must appear in the VEX Robotics product website or on the legacy/discontinued parts list. FLEX Wheels do not exist in either location, and the link in the Game Manual to VEX Pro line goes to "404 page not found".

Can the GDC make this a G3 situation and allow for FLEX Wheels this coming competition week? Or should Head Referees deem them an illegal for V5 competition?

Answered by Game Design Committee

Flex Wheels by VEX Robotics remain legal in the VEX V5 Robotics Competition. This includes all previously legal Flex Wheels (1.625", 2", 3" and 4") in all durometers (30A, 45A, 60A), as well as VersaHex Adaptors and Versahubs.

The GDC has no further information on when Flex Wheels will return to the VEX Website for sale. Please contact the Sales Department at VEX Robotics for more information and/or inquiries about purchasing Flex Wheels.

Additionally, we (the GDC) have determined that using the VEX Robotics website to determine legality of parts in the VEX V5 Robotics Competition is no longer ideal, and have created a new supplementary document to assist in determining legality of parts in the competition. This living document will list all of the parts that are legal in the VEX V5 Robotics Competition. It will live as a Google Sheets document, making updates easy and immediate. Because updates are immediate, the document should always be considered up-to-date and binding.

We will update rule [<R17>](#) to reference the new V5RC Legal Parts List in the next game manual update, along with any other rules as needed.

The VEX V5 Robotics Competition Legal Parts List is available at the following link: <https://link.vex.com/V5-Competition-Legal-Parts>.

This document is brand new and, although we have reviewed it for accuracy before release, it may require ongoing updates to ensure all legal parts have been captured in the document. If you notice any omissions or errors while reviewing and reading this document, please contact us at gdc@vex.com to share your concerns. All parts that were previously legal through listings on the VEX Robotics website are still legal for use, and should be included in this new document.

We have chosen to release the V5RC Legal Parts List now to ensure Teams are able to complete Robot inspection and compete with their current Robots and parts with minimal stress. We ask for your patience while we work to improve this new document, and we appreciate your help in identifying necessary corrections and additions.

2990: Clarification on whether the presence of factory-applied lubricant in a new V5 Smart Motor cartridge under <R17> affects the interpretation of <R20b>

12-Dec-2025

R17 R20

When motor cartridges are purchased from the VEX Robotics website, they contained oil (see photo). As the cartridges are used, the oil wears out making new cartridges perform better than used ones.

[<R17>](#) 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. Product pages on the VEX Robotics website should be used as the official definitive source for determining if a product is a “V5 component.”

[<R20b>](#) 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, Blocks, or other Robots. Grease or lubricant applied directly to V5 Smart Motors or Smart Motor cartridges is prohibited.

Given that new V5 Smart Motor cartridges come pre-lubricated from the factory. Per R17, does this make lubricated cartridges legal and does this have precedence over the conflicting rule R20b which prohibits lubricating them? Is it legal for teams to restore them to their factory state?

Thank you for your time to consider this clarification.



Answered by Game Design Committee

Grease or lubricant applied directly to V5 Smart Motors or Smart Motor Cartridges is prohibited. This is not superseded by the fact that motor cartridges contain grease when purchased new, and is intended to prevent Teams from applying their own lubricants to the motor cartridges.

2862: Is marking a part on the robot with a sharpie/pen to aid a driver in operating the robot illegal?

19-Oct-2025

R15 R17

I was talking with a coach who's team's robot has an elevator. He said they are using a sharpie to mark on the beams where to stop the elevator. My gut reaction was, "Oooh... I think that would be considered a functional decoration or modifying a part and thus would be illegal." My research and thoughts are as follows:

<R15d> Prohibited Items: Tape and/or any other material that adheres to or changes a legal part, other than non-functional decorations as permitted by <R17>. *** Does the Sharpie "adhere" to the part? Does it "change a legal part?" I think we can argue that it does since it is placed for a competitive purpose. <R17> 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. *** Does this sharpie "decoration" affect performance or the outcome of the Match? Again, I think we can argue that it does. b. To be considered "non-functional," any decorations must be backed by legal materials that provide the same functionality. A simple way to check this is to determine if removing the decoration would impact the performance of the Robot in any way. *** Performing this simple check would impact the team's ability to drive the robot but not the robot's performance, per se, so is that "impacting the performance of the robot?" I feel that it is.

In conclusion, I feel that adding Sharpie to help you align something is illegal. BUT at the same time, I feel nit-picky for possibly reading too much into the rules I referenced, since they seem written to address a physical part addition and not some writing on a beam AND because I received mixed answers when I posted on the Referee forum on Facebook.

So the net question of all this is: Is marking a part on the robot with a sharpie/pen to aid a driver in operating the robot illegal?

Answered by Game Design Committee

Thanks for your question, Curt.

Because the mark in your example is specifically being used to affect the outcome of the Match, it is a Violation of rule [<R17>](#). There are numerous legal ways a Team could achieve the same effect with legal VIQRC components (e.g., adding a pin to a beam to mark where the Driver should stop moving the elevator).

2835: Bearing Attachment Rivet - 276-2215 and 2815 Q&A

2-Oct-2025

R17

In Q&A 2815 a team was asking if commercially available plastic rivets were legal and used a photo of plastic rivets that looked like 276-2215 which is on the list of VEX discontinued products but still competition legal: [Discontinued V5 Products](#)

I just want to clarify that this VEX product, if in your robotics toolbox, is still legal to use in competition as indicated under R17 c - from the question it was unclear if they had found a non-VEX supplier for this part.

[<R17>](#)

Thank you in advance!

Answered by Game Design Committee

Hello, Pascal, and thanks for your question.

You're correct. Official VEX plastic rivets (276-2215) are still legal for use in the VEX V5 Robotics Competition. Commercially-available plastic rivets that are not produced and sold by VEX Robotics are not legal.

1455: Using pneumatic cylinders as gas shocks

14-Feb-2023

Robot Rules and Inspection R17

[<R17>](#)

<R17> Pneumatics are limited. A Robot's pneumatic sub-system must satisfy the following criteria:

- a. Teams may use a maximum of two (2) legal VEX pneumatic air reservoirs on a Robot.
- b. Pneumatic devices may be charged to a maximum of 100 psi.
- c. The compressed air contained inside a pneumatic sub-system can only be used to actuate legal pneumatic devices (e.g., cylinders).

The intent of R17a and R17b 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 in Violation of the spirit of this rule.

The intent of R17c is to ensure that pneumatics are being used safely. Pressurized systems, such as a Robot's pneumatic sub-system, 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 R17c 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.

The attached image shows two configurations of pneumatic components with no solenoid. When the shutoff valves are closed, the cylinders essentially behave as gas shocks. The force of the gas shock can be great enough to replace rubber bands in some robot applications, particularly if configuration "B" is used and the system is first charged to greater-than-atmospheric pressure.

Questions:

1. If the system is charged to 100psi or below with the cylinder fully extended before a match, but exceeds 100psi when the cylinder is compressed, would that be a violation of R17b? If so, how should inspectors/referees determine whether the pressure exceeds 100psi when the cylinder is compressed?
2. If the cylinder is compressed using power from a V5 motor (e.g. when pulling back a catapult), would this be considered an element "generating air pressure" as prohibited by the R17 red box?
3. Would configuration "B" in the attached image (where the cylinder is connected directly to a shutoff valve with no reservoir) be legal? [Q&A 1209](#) concerns using pneumatic components without a reservoir, however this configuration is somewhat different to the use case described in that question.
4. If configuration "B" is used on a robot, but there is also a reservoir elsewhere on the robot connected to different cylinders, is the answer any different? In other words, do all of the cylinders used on a robot need to be connected to a reservoir?

A



B



Answered by Game Design Committee

As noted in Q&A 1209, the use of pneumatic tubing and/or cylinders solely for the purposes of storing air without pneumatic tanks is not permitted. Therefore, example "B" would not be legal.

Example "A" satisfies this requirement and would therefore be legal.