

Q&A

VRC 2021-2022: Tipping Point

Tagged: R6

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 Tipping Point 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 Tipping Point rules questions.

- For event, registration, or other competition support questions, please contact your [REC Foundation 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.

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Commercially Available Standoffs

5-Jan-2022

R6 R7 R8 R12

Hello,

This question comes with the changes to "identical parts" and standoffs not being considered under R12.

R12

Robots may use any commercially available #4, #6, #8, M3, M3.5, or M4 screw up to 2.5" (63.5mm) long (nominal), and any commercially available nut, washer, and / or non-threaded spacer (up to 2.5" (63.5mm) long) to fit these screws.

R6, R7 and R8 do not mention standoffs as an exception for what can be used from a third party.

Are standoffs purchased from third parties legal if they are identical in all ways besides color to what VEX Robotics / VEX Robotics resellers provide?

Thank you for your time!

Answered by committee

Yes. R12 will be updated to include standoffs in the February 1 Game Manual update.

Does using 393 motor controllers to control LED Strips violate rule R31c or R6b?

22-Nov-2021

R6

Hello,

Our team has wired up 5v LED strips to work with the vex v5 system. The LEDs are being run by the motor controllers for 393 motors, with LED cabling soldered to the output wires, and the neutral spliced into one of the 3 wire ends. Is this Legal? Would this be considered a violation of rule R13c, or R6b?

Thanks!

Here is R13c for reference: "VEX electronics may not be used as non-functional decorations"

And R6b: "Electronics from the VEX Cortex control system are not permitted. This includes the VEXnet Joystick, VEXnet Partner Joystick, VEX ARM® Cortex-based Microcontroller, VEXnet Key 1.0 and 2.0, 2-Wire Motor 393, and any other electronic components which are not compatible with the VEX V5 system"

Answered by committee

Thank you for quoting the relevant rules in your question. Per R13-c and R6-b, no, this would not be legal.

Problems with the new Cortex rule in VRC due to V5 system backordered

1-Oct-2021

R6

Background

We registered and activated an independent VRC team this season, but ran into some troubles. We bought an EDR super kit a few years ago before V5 was released, so the kit came with Cortex. New rules this season state that we are not allowed to use electronics from the Cortex system. I understand that VEX requires upgrade as technology advances and this will result in older versions to become obsolete. However, V5 EDR super kit, system bundle, and some separate electronics are backordered. I searched through the forum to see if other people encountered similar problems and this is what I found: <https://www.vexforum.com/t/problems-with-the-new-cortex-rule/93623>

They ordered V5 products before September 24 and the product will not arrive before M

Question

Is there any chance to allow Cortex for at least this year so VEX has more time to manufacture and ship V5, or is there anything we can do to get a V5 system bundle in time? Thanks.

Answered by committee

Is there any chance to allow Cortex for at least this year so VEX has more time to manufacture and ship V5, or is there anything we can do to get a V5 system bundle in time? Thanks.

There are no plans to change rule R6-b at this time. We would recommend contacting sales@vex.com or your [REC Foundation Team Engagement Manager](#) for assistance.

Dyeing Rubber

1-Mar-2021

R6 R13

Hello,

There has been debate in the community about the legality of dyeing rubber.

R6

Robots are built from the VEX V5 or Cortex system. Robots may be built ONLY using official VEX V5 and Cortex 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.

R6-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.

R13

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 will have final say in what is considered "non-functional". Unless otherwise specified below, non-functional decorations are governed by all standard Robot rules.

2013 Q&A <https://www.vexforum.com/t/answered-boiling-wheels/23048>

Recently it has come to my attention that there is a way to modify the opaque green rubber of the dual roller omni wheels and high traction tires through the process of submerging the wheel in a pot of boiling water.

Dyeing Rubber wikiHow (Method 1) <https://www.wikihow.com/Dye-Rubber> Step 2

Fill a pot with water and heat it on a low to medium stove setting. The water should be hot, but not boiling—close to, but less than 212 °F (100 °C) is ideal.

Step 4

Place the object in the bowl and leave it to soak. Keep it in the pan for up to 2 hours, depending on how strong or bright you want the new color to be.

The 2013 Q&A states that “hyper-hydrating” rubber is illegal for use in VRC because it is ‘not safe’. Hyper-hydrating rubber only requires boiling water while teams are allowed to use more dangerous power tools like bandsaws and dremels.

The community would like an official test done by the GDC to see how “hyper-hydrating” 3.25, 4” and the different durometers of flex wheels modifies their properties.

1. Does “hyper-hydration” change the properties of rubber enough to affect the outcome of a match (and to break R13)?

a) If the answer to the bolded question is no, is boiling wheels with the intent of “hyper-hydrating” with no intent of modifying color legal?

b) If the answer to the bolded question is yes, is there a specified amount of time and water temperature that would be considered “hyper-hydration”? There have been teams who get a nice rubber color with water at 190F and a higher dye concentration.

2. Is there a preferred way teams should dye their omni-wheels and flex wheels that doesn’t cause it's properties to be changed enough to break any rules?

Thank you for your time

Answered by committee

First, thank you for the well-organized question and for quoting the relevant rules from the Game Manual.

is boiling wheels with the intent of “hyper-hydrating” with no intent of modifying color legal?

Yes.

<VUR6> Clarification

7-Dec-2020

R6 R7 R8 R10 R12 R20 R22 VUR2 VUR3 VUR5 VUR6 VUR8

In this previous ruling, it was determined that <VUR5> takes priority over <VUR6>:

<https://www.robotevents.com/VEXU/2020-2021/QA/674>

However, this is contradictory to every other instance of past rulings regarding <VUR6> and the wording of <VUR6> in the game manual.

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For example, consider a typical custom sensor such as the pixy camera:

<https://www.robotshop.com/en/charmed-labs-pixy-2-cmucam5-image-sensor.html>

This sensor violates <R6>, <R7>, <R8>, <R10>, <R12>, <R20>, <R22>, as well as <VUR3> and <VUR8>.

VUR3 restricts the materials allowed, but this sensor violates the allowed materials.

VUR8 restricts the screw sizes allowed, but this sensor may have smaller screws than the allowed limit.

As another example, consider a vex IQ sensor: <https://www.vexrobotics.com/228-3014.html>

This sensor would violate <R6>, <R7>, <R8>, <R10>, <R12>, <R20>, <R22>, as well as <VUR3> and <VUR2b>.

<VUR2b> restricts teams from using any vex IQ electronics, which would include this sensor.

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Because <VUR6> specifically states "There is no restriction on sensors and other additional electronics that Robots may use for sensing and processing" it has been understood by most VexU teams that <VUR6> takes priority over all the other rules in the game manual. Logically this would also mean <VUR6> would take priority over <VUR5>.

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Several other Q/As over the years have verified this as correct as the wording on <VUR6> has not significantly changed since these rulings:

<https://www.vexforum.com/t/answered-vexu-speakers-as-part-of-custom-sensor/42312>

<https://www.vexforum.com/t/answered-vex-u-old-college-q-a-updates/23810>

<https://www.vexforum.com/t/answered-custom-sensor-housing/19582/2>

These three Q/As verify that <VUR6> would take priority over <VUR3> and <VUR8> as well as all the regular game manual rules mentioned above.

Furthermore, the following Q/A shows that <VUR6> would also take priority over <VUR5>:

<https://www.vexforum.com/t/answered-vex-u-non-vex-servo-motors-for-a-custom-sensor/35538>

This allowed external non vex motors used solely for manipulating custom sensors.

If this were the case, it would agree with the wording of <VUR6>. There are numerous sensors and processing boards that rely on motors to operate.

For example, many full field lidar systems such as:

<https://www.robotshop.com/en/rplidar-a1m8-360-degree-laser-scanner-development-kit.html>

rely on an integrated motor to spin the lidar enabling it to map the field. VexU teams have legally used similar lidar systems in the past and may plan to do so again this season.

Another example would be the Nvidia Jetson Xavier NX listed below:

<https://www.nvidia.com/en-us/autonomous-machines/embedded-systems/jetson-xavier-nx/>

This processing board has a built-in fan on its heatsink that is critical to its function as a processing unit.

A third example is the pixy tilt and pan kit: <https://pixycam.com/pixy2-pan-tilt-kit/> (ruled legal in the above Q/A linked).

Without these integrated motors, none of these sensors or processing units could function as intended.

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Therefore, which rules, if any, restrict the "no restriction" clause of <VUR6>?

Furthermore, if <VUR5> does not apply to <VUR6>, then was the previous ruling in QA#674 an error?

If <VUR5> is applicable, are 360-degree Lidar sensors and the Nvidia Jetson processing boards also illegal? If all VexU appendix rules also apply to <VUR6>, then does that mean that there are no legal VexU custom sensors?

Answered by committee

If all VexU appendix rules also apply to <VUR6>, then does that mean that there are no legal VexU custom sensors?

Please see 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 Robotics Competition.

The intent of the answer in the linked Q&A was to prohibit using VUR6 as a loophole to install cooling fans on a Robot.

Sensors containing an internal motor which is integral to their operation, such as a LIDAR or pan-tilt Pixy, would be permissible. It would not be feasible for an inspector to take apart a LIDAR module to see if there is a motor inside of it. It is, however, feasible for an inspector to check if a fan is being used to cool a V5 Smart Motor.

To prevent confusion, we would advise Teams with external processors that require thermal protection to utilize a [passive heat sink](#) instead of an active cooling fan.

Flashlight for Vision Sensor Clarification

20-Dec-2018

R6 R8

"<R6> "<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."

<R8 note G> "Decorations that visually mimic field elements or could otherwise interfere with an opponent's Vision Sensor are considered functional and are not permitted. This includes lights, such as the VEX Flashlight. The Head Inspector and Head Referee will make the final decision on whether a given decoration or mechanism violates this rule."

Vex flashlight: <https://www.vexrobotics.com/276-2210.html>

Provided that it does not mimic any field elements, is it legal to use the vex flashlight to increase the consistency of the V5 vision sensor in driver control? If so, is it legal to use reflective or opaque non-vex components to project the light more accurately onto the flag? Thank you!"

Answered by committee

Provided that it does not mimic any field elements, is it legal to use the vex flashlight to increase the consistency of the V5 vision sensor in driver control?

The color that a Vision Sensor "looks for" depends upon an expected lighting condition. This is why the same Sensor may require a re-calibration when looking at the same object in sunlight vs under a flashlight.

The intent of <R8g> was to prevent the scenario where a Robot's use of the Vision Sensor was impaired by an opponent's external and unpredictable light source. It should be an expected part of the design challenge to calibrate a Vision Sensor for a given event venue's lighting conditions. However, it would be impossible to prepare for lighting condition changes mid-match, such as an opponent introducing an external light source.

So - the use of a VEX Flashlight in conjunction with your own Vision Sensor is not, by itself, illegal. However, if your opponent is using a Vision Sensor to look at the same area that you are shining a flashlight on, this could be interpreted by a head referee as a violation of <R8g>. Thus, it is impossible to provide a blanket ruling that would cover all contexts.

is it legal to use reflective or opaque non-vex components to project the light more accurately onto the flag?

There are no rules preventing this, provided that no other rules are violated in the process. Specifically, the material must satisfy all of the constraints of <R7>, especially <R7e>.

Legality of Field parts on robots

13-Dec-2022

Robot Rules and Inspection R6 R11

I have noticed in recent tournaments that some teams appear to have been using parts that originate from VRC field kits. I understand that polycarbonate can be legal assuming that it fits within the sizing restrictions but our question specifically centers around Nuts. Rule R11 gives a detailed explanation of legal fasteners for robots as listed which seems pretty straightforward.

[<R11>](#)

I've noticed that some teams may be using larger nuts as part of their endgame expansion projectiles that look like they could be the 1/4" lock nuts used in the VRC field perimeter. What I would like to clarify is whether these nuts are competition legal. The vex website lists the field perimeter as being VRC Legal under the V5 platform; however, I am unsure if this might fall into the bounds of the red box in rule R6 as listed below due to being "competition support materials".

[<R6>](#)

Clarification would be appreciated, thank you!

Answered by committee

Thank you for your question! 1/4" nuts, whether from the VRC field perimeter or any other source, are not legal for use on VRC Robots.

As you noted, 1/4" screws and nuts are not included in the list of legal commercially-available fasteners in rule [<R11>](#), and the use of competition support materials is prohibited by the red box following rule [<R6>](#).

Versa Hub Adapters

9-Dec-2022

R6

[<R6>](#)

Under rule R6 it states that no VEX Pro parts are to be used. I am asking about Versa Hub Adapters that teams are using Part 217-8079 and 217-2592. They pull up as pro parts on VEX website. I also found the Vex library article that says they are legal. Here is that link: <https://kb.vex.com/hc/en-us/articles/10487034781076-Flex-Wheels-for-V5>. The section I found it on is the parts substitution. I am hosting a tournament tomorrow and the question is: Are the versa hub adapters listed above legal for VRC game play? Thank you for your time.

Answered by committee

Thank you for your question, and for pointing out this omission. The following VEX VersaHub product listings are legal for use in the VRC competition, as included on [this page of the VEX website](#):

- 1.125" Bearing Bore Plastic VersaHub Spacer (1/2" Wide); SKU#: 217-2591
- 1/2" Hex Bore Aluminum VersaHub; SKU#: 217-2592
- 1.125" Bearing Pilot Plastic VersaHub (1/4" Wide, w/ Plate Sprocket Mount); SKU#: 217-3234 (Discontinued)
- 1/2" Hex Bore Plastic VersaHub; SKU#: 217-4009 (Discontinued)
- 1/2" Hex Bore Plastic VersaHub v2; SKU#: 217-8079

Rule [<R6>](#) will be revised to reflect this in the next Game Manual update.

Legal Wheels?

16-Nov-2022

R6

[<R6>](#) Can we use other flex / compliant wheels in the VEX VRC competition? Flex wheels from VEX are impossible to obtain. Other companies offer similar products (Andymark for instance). If all properties are equal with the exception of the color, can we use other wheels?

[<R6>](#)

Answered by committee

No. As described in rule [<R6>](#), all wheels must either be official VEX V5 components or be built using only official VEX V5 components or other legal materials (e.g., certain types of non-shattering plastic as allowed by rule [<R9>](#)). Wheels from other product lines, including flex / compliant wheels, are prohibited.

How would referees know?

9-Nov-2022

Robot Rules Inspection R6

[<R6><R6>](#) [<R6>](#) The Match configuration will be inspected. The Robot must be inspected in a configuration that will be used for pre-Match setup as described in [<G5>](#) and within the maximum allowed starting size.

How would referees know if a robot is expanding beyond the 11"x19"x15" size limit if the robot inspectors do not need to inspect this? As robots don't always start at the full size capacity, we cannot have referees constantly wondering if a robot is breaking a rule when they expand. It is not fair to the referees nor the students to always be questioned if their robot is legal once they are playing the game. Please elaborate on how we are expected to enforce the size limit considering your answer in the following: <https://www.robotevents.com/VIQC/2022-2023/QA/1260>

Answered by committee

Thank you for your question! In most cases, Referees can use the VEX IQ field tiles to estimate the size of a Robot during a Match. If a Head Referee believes that a Robot has expanded beyond 11"x19" in Violation of rule [<G13>](#), they should measure the Robot in that configuration following the Match. If the robot has expanded beyond the legal limits, the Team will earn a Minor or Major [<G13>](#) Violation based on whether the illegal expansion was Score Affecting.

If a Team's Robot has been believed to be out of size by a Head Referee during a previous event, they should consider asking the Head Referee at later events to measure the Robot in its expanded configuration before their first Match, just to avoid any question of its legality.

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 committee

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

VUR2 and legacy/discontinued products

20-Feb-2022

R6

VUR2 states

Teams may use **any** official VEX Robotics product, other than the exceptions noted below, to construct their Robot. This includes those from the VEXpro, VEX V5, VEX IQ, and VEX GO product lines. To determine if a product is "official" or not, refer to www.vexrobotics.com.

The term *any* implies that the list mentioned is not exclusive as there are other official product lines not mentioned (i.e. EDR/Cortex, EXP, and Toys)

Are VEX EDR/Cortex components, which are not crosslisted as V5, legal for VEXU? (i.e. 2.75" single roller omni wheels, part number 276-2165)

And are parts from the other two lineups (EXP and toys) legal for VEXU?

Answered by committee

The term *any* implies that the list mentioned is not exclusive as there are other official product lines not mentioned (i.e. EDR/Cortex, EXP, and Toys)

And are parts from the other two lineups (EXP and toys) legal for VEXU?

Yes, this interpretation is correct. Yes, VEX EXP and VEX Robotics by HEXBUG / VEX Toys products are legal.

Are VEX EDR/Cortex components, which are not crosslisted as V5, legal for VEXU?

Technically, yes. However, the intent of referencing the VEX website to determine whether a part is "official" or not is to provide some form of documentation for inspectors who may not be familiar with the entire spectrum of VEX products. This is especially true for VEX U, as it cannot be assumed that a VEX inspector is familiar with other product lines. Therefore, if attempting to use a legacy component, we would advise having some form of documentation or evidence that the product in question is an "official" VEX product to assuage any inspector concerns.

Question Regarding Legacy/Discontinued Products

15-Feb-2022

R6

In another Q&A regarding some other part, it was ruled that anything not on the website was not considered legal. How are recently discontinued products such as the V1 high strength gears (the webbing changed in v2) handled? If they were considered not legal anymore due to being discontinued, then every single robot I've seen would have to rebuild with the new gears. The attached image is a screenshot of a previous ruling

In general, the official VEX website can be used as the definitive resource regarding current part availability / legality. Discontinued products that are no longer found on the VEX website are no longer considered "part of the VEX V5 system" (in the context of R6) and are therefore not legal for use.

Answered by committee

For reference, this is the related Q&A, and please also note the two other Q&A's linked from it:

<https://www.robotevents.com/VRC/2021-2022/QA/1016>

Green v1 gears and sprockets are legal for use, and can be considered an exception to the ruling posted above.

We will work to clarify this intent and distinction in future Game Manuals.