

Q&A

VRC 2021-2022: Tipping Point

?????: R13

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.

??????

[Are ESD Boards Considered Non-Functional Decoration When Unplugged?](#)

[3D Printed License Plate Holders](#)

[Dyeing Rubber](#)

[LED Lights with wireless transmitter functionality](#)

[Scuff controller for VEX IQ](#)

[Button Labels on Controller](#)

[Are custom metal shaft lengths legal?](#)

[Smart cable repair](#)

[Legality of parts](#)

[Can you cut Capped or Motor Shafts?](#)

[Cutting 12" Shafts](#)

[Red gears interfering with vision sensors](#)

903: Are ESD Boards Considered Non-Functional Decoration When Unplugged?

30-Oct-2021

R13 R16 R21

Hello,

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.

In order to be “non-functional,” any guards, decals, or other decorations must be backed by legal materials that provide the same functionality. For example, if your Robot has a giant decal that prevents Scoring Objects from falling out of the Robot, the decal must be backed by VEX material that would also prevent the Scoring Objects from falling out.

a. Anodizing and painting of parts is considered a legal nonfunctional decoration. b. Small cameras are permitted as non-functional decorations, provided that any transmitting functions or wireless communications are disabled. Unusually large cameras being used as ballast are not permitted. c. VEX electronics may not be used as non-functional decorations. d. Decorations that visually mimic field elements, or 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 Inspector and Head Referee will make the final decision on whether a given decoration or mechanism violates this rule. e. Internal power sources (e.g. for a small blinking light) are permitted, provided that no other rules are violated and this source only provides power to the non-functional decoration (e.g. does not directly or indirectly influence any functional portions of the Robot). f. Decorations which provide feedback to the Robot (e.g. by influencing legal sensors) would be considered “functional”, and are not permitted. g. Decorations which provide visual feedback to Drive Team Members (e.g. decorative lighting) are permitted, provided that they do not violate any other rules and serve no other function (e.g. structural support).

R16

Robots have one microcontroller. Robots must ONLY use one (1) VEX V5 Robot Brain (276-4810). a. Any other microcontrollers or processing devices are not allowed, even as non-functional decorations. This includes microcontrollers that are part of other VEX product lines, such as Cortex, VEXpro, VEX RCR, VEX IQ, VEX GO, or VEX Robotics by HEXB

R21

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

a. External wires on VEX electrical components may be repaired by soldering, using twist / crimp connectors, electrical tape or shrink tubing such that the original functionality / length is not modified in any way. Wire used in repairs must be identical to VEX wire. Teams may make these repairs at their own risk; incorrect wiring may have undesired results. b. Teams must use the latest official VEXos firmware updates, found at www.vexrobotics.com. Custom firmware modifications are not permitted. c. Teams may make the following modifications to the V5 Smart Motor's user-serviceable features. No other modifications are permitted. i. Changing or replacing the gear cartridge with other official replacement cartridges. ii. Replacing the V5 Smart Motor Cap (276-6780). iii. Replacing the threaded mounting inserts (276-6781).

BLRS Wiki - V5 ESD Protection Board <https://wiki.purduesigbots.com/vex-electronics/v5-esd-protection-board>

It is my understanding these boards are illegal for use during competition. But, as these boards don't violate <R16> or <R21> when unplugged on a robot, if the team follows <R13>, these would be considered non-functional decoration. Is this a correct interpretation?

Thank you for your time!

?? ???? ?????? committee

It is my understanding these boards are illegal for use during competition. But, as these boards don't violate <R16> or <R21> when unplugged on a robot, if the team follows <R13>, these would be considered non-functional decoration. Is this a correct interpretation?

Yes, this is correct.

756: 3D Printed License Plate Holders

5-Mar-2021

R13 R27

Nit picking question for sure but since it came up at an event it would be helpful to get clarification. Are 3D printed license plate holders allowed to hold custom and/or VEX standard license plates? I assume they would be per <R13> and <R27> just as the game manual notes custom 3D printed plates are, but the question arose as to whether they were in fact functional due to the fact that they are "holding the license plate".

<R27> notes that "License Plates are considered non-functional decorations" Perhaps adding "license plate attachments/holders" to this description would clarify should this be the case.

Thank you!

?? ???? ?????? committee

Are 3D printed license plate holders allowed to hold custom and/or VEX standard license plates?

It is impossible to provide a blanket answer that will encompass all possible Robot and License Plate holder designs, based on a hypothetical description. However, a non-functional structure that serves the sole purpose of supporting an official License Plate would be considered an extension of the License Plate as a non-functional decoration, and would therefore be legal.

As with all questions regarding non-functional decorations, it will ultimately be at the Head Referee and/or inspector's discretion whether a given part is considered "functional" or not. In the context of a hypothetical License Plate holder, using the 3D printed material to provide additional structural support for a Robot mechanism would definitely be considered "functional".

754: 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

?? ???? ?????? 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.

748: LED Lights with wireless transmitter functionality

22-Feb-2021

R13

<R13f> clarifies that small power internal power sources are permitted for powering nonfunctional decorations:

f. Internal power sources (e.g. for a small blinking light) are permitted, provided that no other rules are violated and this source only provides power to the non-functional decoration (e.g. does not directly or indirectly influence any functional portions of the Robot).

Additionally, past rulings ([#698](#)) have stated teams are permitted to power and control light strips via an externally accessible port on the V5, provided that teams do not violate <R13g> or other robot rules in the process.

g. Decorations which provide feedback to the Robot (e.g. by influencing legal sensors) or to Drive Team Members (e.g. status indicators) would be considered “functional” and are not permitted.

Some LED Light Strips additionally have a wireless IR receiver (built in) and remote which allows them to be remotely controlled (switching colors, blink configurations, etc.).

Are these light strips legal? Would it be legal to change these light strips during a Match?

?? ???? ?????? committee

No, this would not be legal. Wireless communication with a Robot of any kind, other than VEXnet, is explicitly prohibited by several rules.

R13, part c:

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

R14:

<R14> No Wi-Fi. The Vision Sensor must have its wireless transmitting functionality disabled.

R17:

<R17> Robots use VEXnet. Robots must ONLY utilize the VEXnet system for all Robot communication.

[...]

Teams are permitted to use the Bluetooth® capabilities of the V5 Robot Brain and/or V5 Controller in team pits or outside of Matches. However, VEXnet must be used for wireless communication during Matches.

R21, part b:

<R21> One or two controllers per Robot. No more than two (2) VEX wireless remotes may control a single Robot during the tournament.

[...]

b. No other methods of controlling the Robot (light, sound, etc) are permissible.

519: Scuff controller for VEX IQ

31-Jan-2020

R13

Would a scuff controller add-on to the VEX IQ controller be legal?

We've seen a few of these in the VRC game, and our IQ teams are asking if something *similar* would be legal in Squared Away.

<https://events.vex.com/VRC/2019-2020/QA/337>



R13: Parts may NOT be modified. a. Examples of modifications include, but are not limited to, bending, cutting, sanding, gluing, or melting. b. Cutting metal VEX IQ or VEX EDR shafts to custom lengths is permitted. This is the only legal exception to this rule.

?? ???? ?????? committee

Yes, the attachment shown in the attached photo would be legal, provided it is easily removable and does not modify electrical components in any way.

2965: Button Labels on Controller

5-Dec-2025

R13

Are teams allowed to mark, label, or color code buttons on their controller by using something like a sharpie or stickers?

[<R13>](#) says:

- a. No physical or electrical modification of the Controller is allowed under any circumstances.

Do labels count as physically modifying the controller?

?? ???? ?????? committee

Teams are allowed to mark and/or label their controllers.

291: Are custom metal shaft lengths legal?

30-May-2019

R13

Last year, the rules for cutting shafts was permitted as long as they were "equivalent to legal VEX IQ shafts", to quote from the updated game manual:

<R13> Parts may NOT be modified. a. Examples of modifications include, but are not limited to, bending, cutting, sanding, gluing or melting. b. Cutting metal VEX EDR shafts to lengths which are **equivalent to legal VEX IQ shafts** is permitted. This is the only legal exception to this rule.

but this year, the rules state that custom lengths are permitted:

<R13> Parts may NOT be modified. a. Examples of modifications include, but are not limited to, bending, cutting, sanding, gluing, or melting. b. Cutting metal VEX IQ or VEX EDR shafts to **custom lengths is permitted**. This is the only legal exception to this rule.

Will this be a permanent change to the rules or will there be a chance that the rules will change back to them being equivalent to legal VEX IQ shafts?

?? ???? ?????? committee

Will this be a permanent change to the rules or will there be a chance that the rules will change back to them being equivalent to legal VEX IQ shafts?

The purpose of this Q&A system is to provide rules clarifications for VIQC Squared Away. The Game Manual is re-written for each year's new VEX IQ Challenge game; therefore, it is impossible (and outside of the scope of this Q&A system) to speculate on rules for future games.

251: Smart cable repair

25-Feb-2019

R7 R8 R13

Hi, if a modular connector breaks a tab, how do we repair it to official Vex IQ specifications? Is it allowable for a team to cut off the bad connector and replace it with a new industry standard DEC 6P6C DEC modular connector using a DEC RJ11 crimp tool?



?? ???? ?????? committee

No, this would not be legal.

1416: Legality of parts

30-Jan-2023

R7 R8 R13

Hello there, Hope you are doing great.

We would like to acquire plastic sheets, precisely 228-7888 > 228-2500-2712, to increase consistency for our robot. However there were some problems regarding stocks. We have placed our purchase order, yet it will take time to receive those parts but not before the tournaments we would like to take part in.

Could you please inform us about is there any possibility for teams to use previous tournament's field elements? In the 2021-2022 VexIQ Challenge Pitching in tournament there were plastic sheets. And those sheets from previous tournaments were huge. So we reshaped them to practice regarding the item, mentioned above. As in the <R13> it is not allowed to modificate parts.

Well, is it legal to use previous VexIQ field element parts in the recent tournament or not? We are asking for clarification regarding those points.

Thank you in advance.

?? ???? ?????? committee

Please refer to the VIQC Slopshot [illegal parts appendix](#). Most unique parts from field and game sets, including the plastic sheets from VIQC Pitching In, are illegal in construction of VIQC robots.

1400: Can you cut Capped or Motor Shafts?

23-Jan-2023

R13

Can you cut Capped or Motor shafts?

<R13> Modifications of parts. Parts may NOT be modified. Examples of modifications include, but are not limited to, bending, cutting, sanding, gluing, or melting. a. Cutting metal VEX IQ or VEX V5 shafts to custom lengths is permitted

?? ???? ?????? committee

As described in rule [<R13>](#), cutting metal VEX IQ or VEX V5 shafts to custom lengths is permitted. This includes metal motor shafts and metal capped shafts.

Plastic shafts may NOT be modified.

115: Cutting 12" Shafts

21-Oct-2018

R13

is it legal to cut a 12" shaft to legal VIQC sizes?

?? ???? ?????? committee

In the interest of convenience for our teams and ease of the inspection process, this is legal.

Teams should remember to prioritize student safety at all times if attempting to cut metal shafts. Adult assistance is a must, and sharp edges should be sanded/de-burred. We would very strongly discourage the use of power tools in a pit space while at an event. Rotary cutters (Dremels) are not a typical sight in an elementary school. So, even though your team may be prepared with a vice and safety glasses, at best it may violate other venue / event rules or cause alarm for nearby teams, and at worst it could be considered a violation of the REC Foundation [Code of Conduct](#).

1029: Red gears interfering with vision sensors

1-Feb-2022

R13

When looking at our vision sensor while other robots are on our field we noticed that it picks up the red on the gears and would interfere with how we sense mobile goals. I know that if they are being used then they are non functional decoration but are they still legal if they interfere with the vision sensor?

?? ???? ?????? committee

Yes, red gears and other components sold by VEX are legal. Rule R13-d, quoted below, refers specifically to non-functional decorations which visually mimic field elements or otherwise directly interfere with an opponent's Vision Sensor, at the discretion of the Head Referee.

<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.

d. 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 Inspector and Head Referee will make the final decision on whether a given decoration

or mechanism violates this rule.

It is impossible to avoid all elements of ambient / environmental visual interference, and this is an expected part of the challenge associated with using advanced sensors. This could include (but is not limited to) things like multi-colored VEX parts, team shirts, varying lighting conditions in different venues, etc.