Q&A

VEX V5 Robotics Competition 2026-2027: Override

Tagged: R16

Welcome to the official VEX V5 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 V5RC 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 V5RC game rules questions.

- For event, registration, or other competition support questions, please contact your 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

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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!

> **Answered by 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.

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 committee**
>
> No, this is not legal.

36: R16ci Question

11-Jul-2018
R16

As an addition to the cabling question in https://www.robotevents.com/VRC/2018-2019/QA/35 ,

R16ci states:

> "Using the V5 Smart Cable Crimp Tool, V5 Smart Cable Stock, and V5 Smart Cable Connectors to create custom-length Smart Cables is permissible."

1. Are the "V5 Smart Cable Connectors" identical to standard RJ11 connectors?
2. If the answer to 1 is yes, then would it be legal to, under R7b, use off the shelf RJ11 connectors? Example.
3. Would it be legal to use an off the shelf RJ11 crimper instead of the V5 Smart Cable Crimp Tool? Example.

> **Answered by committee**
>
> *1. Are the "V5 Smart Cable Connectors" identical to standard RJ11 connectors?*

> *2. If the answer to 1 is yes, then would it be legal to, under R7b, use off the shelf RJ11 connectors? Example.*
>
> V5 Smart Cable Connectors are identical to standard 4p4c connectors (not RJ11 connectors). Using off-the-shelf connectors along with official V5 Smart Cable Stock would be permissible. However, note that off-the-shelf 4p4c cable is not permitted, per the other Q&A that you linked.
>
> *3. Would it be legal to use an off the shelf RJ11 crimper instead of the V5 Smart Cable Crimp Tool? Example.*
>
> Yes, this would be legal.

35: Making V5 Smart Cables

10-Jul-2018
R16

Copied from: The_Original_Kev May 7 According to R16:

i. Using the V5 Smart Cable Crimp Tool, V5 Smart Cable Stock, and V5 Smart Cable Connectors to create custom-length Smart Cables is permissible. Teams who use custom cables acknowledge that incorrect wiring may have undesired results.

Alternatives can be used if they are identical to vex parts. Is there any difference between commercially available rJ11 cables and the VEX V5 Official cables or are they completely identical, and if they are identical, are teams allowed to use alternatives.

> **Answered by committee**
>
> The V5 Smart Cables are not identical to all off-the-shelf 4p4c cables. VEX cables are built to a certain specification to fully support the features of V5 Smart Motors and sensors. As we cannot guarantee that off-the-shelf cables are built to this same spec, they may not perform as expected and could pose a potential safety hazard. Thus, they are not permitted. Inspectors can verify that a team is using official cables by checking for "V5" logos that are stamped along the cable.

3157: R16 Vision Sensor Legality and legal parts list concerns

27-May-2026
R16

R16 states:

> Any questions or concerns about legal parts should be directed to the official Q&A System on events.vex.com.

This is both a question and a concern. The VEX V5 vision sensor 276-4850 (sold by vex and used by teams for many years) is no longer listed in the competition legal parts list.

I have several questions/concerns:

- Does this mean that the V5 vision sensor is no longer legal for use in V5RC? If so, why was this change made?
- What other previously legal parts have been removed from the list since last season? It's hard to find previous versions of the list because its updated on a continual basis, and there are zero changelogs whatsoever. So, in order to determine what changed teams somehow must memorize the entire list and compare their memory to what is currently in the list.
- Why are changes to the list not at least announced so that teams can review their parts in use? As it stands, many teams are likely to find out for the first time at a tournament inspection that their parts are no longer legal, because a silent edit to a google doc was made without their knowledge.

Answered by committee

This was a mistake. The 276-4850 Vision Sensor has been added to the VEX V5 Robotics Competition Legal Parts List.

3151: Is the heat dissipation for motor legal?

18-May-2026
R16

A.Is it legal to use active cooling devices for motor during the match? B.Is it legal to use active cooling devices for motor outside of the match? C.Is it legal to use passive cooling devices for motor? D.Is it legal to use thermal paste serves as an aid to heat dissipation for motor?

Answered by committee

A) There is no rule explicitly preventing cooling devices during a match, however these devices must comply with all Robot Rules, including but not limited to R12, R16, R18, and R19.

B) There are no rules preventing cooling devices from being used before or after a Match.

C) There is no rule explicitly preventing cooling devices during a match, however these devices must comply with all Robot Rules, including but not limited to R12, R16, R18, and R19.

D) Thermal Paste is not legal for use in the VEX V5 Robotics Competition.

2589: V5 Smart Motor Cap use vs modification

28-Feb-2025
R15 R16

<R15><R16>According to rule R15, motor caps do not count as electrical components, therefore allowing them to be modified and be in accordance with rule R16 which states that modifications to non-electrical components are permitted. However, R15, section e, states that V5 Smart Motor Cap is not considered part of the motor. Does this allow us to take the motor cap off and replace it with one made of polycarbonate in order to reduce weight and spacing, or do we have to have an official V5 Smart Motor Cap attached to the motor.<R15>

Answered by committee

> Does this allow us to take the motor cap off and replace it with one made of polycarbonate in order to reduce weight and spacing?

Yes.

2551: Non VEX IQ Pneumatic tubing

18-Feb-2025
R16

<R16><R16><R16>

Can you use non VEX IQ Pneumatics silicon tubing, if it's exactly the same as the VEX IQ tubing?

> **Answered by committee**
>
> As described in clause C of rule <R16>, non-VEX tubing and/or fittings are not allowed on Robots for the VEX IQ Robotics Competition.

2283: <R16> Magnets in Protective Brain Cases

10-Nov-2024
R16

<R16>

Hello! As per R16

> Most modifications to non-electrical components are allowed. Physical modifications, such as bending or cutting, of legal metal or plastic components are permittd.

Based on R16, would it be legal for teams to cut off the plastic edges of a V5 Brain's protective case which contain magnets, to use the magnets for other functional purposes on their robot? (Such as creating a new protective brain case out of polycarbonate which would also have mounting holes / additional supportive structures for the robot, or for use in a mechanism on a team's robot)

Would the Protective V5 brain cover be considered an extension of the V5 brain and thus deemed as an Electrical component?

If this is the case, and a protective V5 brain cover is considered as a part of a "Brain" as it is sold alongside it, is it also required during match play? If the cover is connected to the brain and is considered the same component, would a team by definition not have fulfilled Subsystem 2 of <R1> by not having the brain cover be a part of the robot as it does not have a full control system?

Cheers,

> **Answered by committee**
>
> > Would the Protective V5 brain cover be considered an extension of the V5 brain and thus deemed as an Electrical component?
>
> The V5 Brain cover is considered to be part of the V5 Brain.
>
> > Based on R16, would it be legal for teams to cut off the plastic edges of a V5 Brain's protective case which contain magnets, to use the magnets for other functional purposes on their robot?
>
> Physical or structural modifications to the V5 Brain cover are not permitted, and neither it nor its parts can be used for other functional purposes on a competition Robot.
>
> > If this is the case, and a protective V5 brain cover is considered as a part of a "Brain" as it is sold alongside it, is it also required during match play?
>
> The V5 Brain cover is not a required component, although it is recommended. If a Team does not possess a V5 Brain cover, we suggest that they prioritize the safety of the V5 Brain through other means, such as location on the Robot (while still ensuring that the on/off button is accessible during the Match).

2115: Is powder coating allowed?

2-Sep-2024
R16

According to R16b. heat treating of metal elements is not allowed. I have a team that wishes to powder coat their metal parts for decoration. Is this allowed as part of the powder coating process includes baking the part in a 350-400 degree F oven or is this considered heat treating per the game manual?

<R16> Most modifications to non-electrical components are allowed. Physical modifications, such as bending or cutting, of legal metal structure or plastic components are permitted.

b. Metallurgical modifications that change fundamental material properties, such as heat treating or melting, are not permitted.<R16>

EDIT: After further research Vex Aluminum is 5052-H32 This type of aluminum is not heat treatable. I am going to assume that powder coating is therefore allowable unless otherwise noted by committee.

Aluminum 5052 H32

Aluminum 5052 H32 is a high-strength, non-heat-treatable alloy that offers excellent corrosion resistance, good weldability, and formability. The H32 temper designation signifies that the material has been strain hardened and stabilized, resulting in improved strength and workability. It has a smooth, shiny surface and is often used in sheet metal applications where strength and durability are required.

Aluminum 5052 H32 is commonly used in the manufacturing of sheet metal parts for the automotive, aerospace, and marine industries, as well as in construction and architectural applications. It is also used in the production of cooking utensils, electronics, and packaging materials due to its excellent corrosion resistance and non-toxic properties.

FastMetals currently offers Aluminum 5052 H32 in sheet products. The 5052 sheet product is available in a variety of thicknesses and sizes, and is commonly used in the manufacturing of sheet metal parts.

CHEMISTRY: Copper .10 max Silicon .25 max Iron .40 max Manganese .10 max Magnesium 2.2/2.8 Zinc .10 max Chrome .15/.35 MECHANICAL PROPERTIES: Tensile Strength = 33,000 PSI Yield Strength = 28,000 PSI min % Elongation = (2") 12% min

> **Answered by committee**
>
> The heating process required to cure powder coating should not change the fundamental material properties of the V5 metal, so powder coating V5 metal structure is allowed.
>
> However, parts that are painted, coated, or otherwise obscured may be subject to additional scrutiny during Robot inspection to confirm their legality for competition use.
>
> Note: As of October 1, 2024, anodizing or color changing of parts (such as painting/painting, etc., which changes the original appearance of parts) is no longer allowed in events in mainland China.

1754: IQ Pneumatics wires too short

7-Nov-2023
R16

We are experimenting with Pneumatics and find the wires coming with Pneumatics Kit are quite short and this makes it very hard to attach the Pneumatics system to the robot properly. We found the extension cables available on VEX site but they are currently not allowed in IQ, would it be possible to make the extension cables also legal for IQ? <R16>

https://www.vexrobotics.com/extension-cables.html

<R16> Pneumatics. Robots using parts from the VEX IQ Pneumatics Kit (228-8795) must satisfy the following criteria: No more than two (2) Air Tanks, including any that aren't connected. No more than (1) Pneumatic Pump, including any that aren't connected. No additional parts that are not included in the VEX IQ Pneumatics Kit (e.g., unofficial tubing or fittings).

> **Answered by committee**
>
> No, using an extension cable between the Air Pump and Pneumatic Solenoid would not be legal.
>
> The Pneumatic Solenoid connects to the Robot Brain with a standard VEX IQ Smart Cable, of which any legal length may be used.

1706: Pneumatic tubing

16-Oct-2023
R16

<R16> unofficial tubing?? when we run out or cut tubing wrong where do we get replacement or can we get same 4mm tubing on amazon? please advise.. vex doesn't offer tubing for iq.

> **Answered by committee**
>
> Please see this similar Q&A post, which we believe answers your question. If it does not, feel free to rephrase and re-submit.

1702: Pneumatics Tubing

16-Oct-2023
R16

Rule <R16> states:

> Pneumatics. Robots using parts from the VEX IQ Pneumatics Kit (228-8795) must satisfy the following criteria: .... No additional parts that are not included in the VEX IQ Pneumatics Kit (e.g., unofficial tubing or fittings).

However, the kits come with very little tubing which is cut into pieces based on robot needs, and it doesn't appear currently possible to buy more kits or IQ tubing.

Is it possible to use the V5 black tubing or is it potentially possible to revisit this rule similar to the rubber bands to allow outside sources of 4mm tubing?

Additionally the legal parts list doesn't show any of the Pneumatics Kit parts or tubing. I assume they are legal based on the rule book inclusion of them.

> **Answered by committee**
>
> > Is it possible to use the V5 black tubing or is it potentially possible to revisit this rule similar to the rubber bands to allow outside sources of 4mm tubing?
>
> The black tubing found in the V5 Pneumatics Kit is not compatible with VEX IQ pneumatics, and is not legal for use.

> Legal replacement / additional VEX IQ Pneumatics Tubing can be found here: https://www.vexrobotics.com/228-7728.html

161: Legal non-functioning decoration? V5 USB extention left mounted during matches

28-Nov-2018
R7 R8 R16

Would a short USB cord left plugged into the V5 programming port be legal during an event? The intent is to save wear and tear on the programming mini USB port in the V5 brain. Example: http://a.co/d/5j3D0nI

> <R7> Robots are allowed the following additional “non-VEX” components:
>
> h. A USB extension cable may be used for the sole purpose of remote mounting of a VEXnet Key 2.0 to a VEX ARM® Cortex®-based Microcontroller.
>
> <R8> Teams may add non-functional decorations, provided that they do not affect the 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 “nonfunctional”.

> **Answered by committee**
>
> Yes, this would be legal, provided that the conditions of R8 and R16 are met. If there is any concern as to whether such a device is functional or not, Teams should be prepared to demonstrate to inspectors and/or referees that such a decoration is non-functional, such as by playing a Match with the device removed.

107: <R16> Clarification for VEX U

15-Oct-2018
R16 VEX U

In VRC rule <R16> f. it is stated that “Welding, soldering, brazing, gluing, or attaching in any way that is not provided within the VEX EDR platform will NOT be allowed.” However, in <VUR3> it states that VEX U teams are allowed to use "An unlimited amount of steel and aluminum." for their designs. Would this mean that soldering or brazing is allowed for VEX U if the team uses steel or aluminum as a filler metal? Furthermore, due to the encouragement of using advanced manufacturing techniques for VEX U, would welding, soldering, brazing, or gluing in general be legal? If not is soldering specifically allowed on additional electronics used for sensing or processing for VEX U?

> **Answered by committee**
>
> Welding, brazing,and gluing can be considered acceptable "fabrication" methods within the context of VUR3, and are permitted in VEX U. We will keep this distinction in mind when revising VEX U rules in the future to be more clear.
>
> Soldering additional electronics within the constraints of VUR6 is permitted. However, VEX electronics (including Robot Brains, Motors, Batteries, etc) may still not be modified in any way, including via soldering.

101: Is it permitted to replace a V5 motor mount insert with a standoff once the insert has stripped?

8-Oct-2018
R16

It occurs from time to time that the small metal extrusion on the threaded motor mounts become shredded. The mount is a standoff shaped structure. So is it permissible to replace it with a standoff?

Is it further permitted to remove the internal insert and mount it outside as described in the turntable mounting instructions provided by VEX?

The concern is that these would both be violations of R16

Thank you for your consideration!

> **Answered by committee**
>
> Yes, this is legal.