

# Q&A

## VRC 2019-2020: Tower Takeover

Tagged: R7



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](mailto:support@vex.com) or [sales@vex.com](mailto:sales@vex.com).
- For game questions, suggestions, or concerns outside of specific and official rules questions, contact [GDC@vex.com](mailto:GDC@vex.com).

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## VEX-U hardware allowances.

### R7 VEX U

Hardware for VRC is given under <R7> c. Any commercially available #4, #6, #8, M2, M2.5, M3 or M4 screw up to 2" long (nominal), and any commercially available nut and/or washer to fit these screws.

<VUR2> a. i. expands this to "Small hardware, such as screws and nuts found in VRC field kits, are permitted."

Is the intent of VUR2 to allow any hardware up to size 1/4" (M6) for VEX-U? VEX-Pro does not specifically sell hardware, but some hardware is included in various components, such as VERSADROP has 1/4" and #10 hardware included. Also, Versaframe specifies #8 screws or 5/32" aluminum rivets for assembly, but VEXPRO does not sell either in the catalog. Would aluminum rivets (and any size steel screw or nut for that matter) fall under the "unlimited aluminum and steel" since both types of fasteners could be machined from aluminum or steel bar stock as allowed by <VUR-3>c?

#### Answered by Game Design Committee

The intent of VUR2a-i was specifically in reference to field kits, which are not permitted (per VUR2a). It would not be feasible to differentiate between a screw that came from a field kit and a "normal" screw. VUR2a-i was not meant to stand alone as a blanket allowance for small hardware beyond R7c.

That being said, rivets and hardware found inside of VEXpro kits are considered legal fasteners for VEX U. We will be sure to clarify this in the June 15th update.

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## Legal Parts Appendix

### R7

Will the legal parts appendix be available this year? <R7> indicates that it will be:

Note: A comprehensive list of legal parts can be found in the VEX IQ Challenge Legal Parts Appendix, at [www.vexrobotics.com/vexiq/competition/viqc-current-game](http://www.vexrobotics.com/vexiq/competition/viqc-current-game)

However, it is not on the page.

Thanks!

#### Answered by Game Design Committee

Thank you for bringing this to our attention. The webpage has been updated to include these Appendices.

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## R7.c regarding commercially available nuts for screws

### R7

Rule R7.c allows for "Any commercially available #4, #6, #8, M2, M2.5, M3 or M4 screw up to 2" long (nominal), and any commercially available nut and/or washer to fit these screws."

I would like to ascertain that nuts known as cap nuts (sometimes called acorn nuts) can be used under this rule.

McMaster describes them thusly: "Also known as acorn nuts, they have a smooth rounded head that covers and protects threads while providing a finished appearance."

A link to an example with a picture can be found here: [www.mcmaster.com/#91855a440/=1e8raxb](http://www.mcmaster.com/#91855a440/=1e8raxb)

Thanks

### Answered by Game Design Committee

The rest of <R7c> states the following:

The intent of the rule is to allow teams to purchase their own commodity hardware without introducing additional functionality not found in standard VEX equipment. It is up to inspectors to determine whether the non-VEX hardware has introduced additional functionality or not.

If used simply to protect threads and provide a finished appearance, these nuts would be legal. However, if used for another purpose (such as a form of ball caster or to interact with a sensor in a way that a standard nut would not), then that would be considered "introducing additional functionality" and would not be legal.

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## Non-Vex Screws & Nuts - aluminum / nylon

R7

<R7> Robots are allowed the following additional "non-VEX" components: c. Any commercially available #4, #6, #8, M2, M2.5, M3 or M4 screw up to 2" long (nominal), and any commercially available nut and/or washer to fit these screws. The intent of the rule is to allow teams to purchase their own commodity hardware without introducing additional functionality not found in standard VEX equipment. It is up to inspectors to determine whether the non-VEX hardware has introduced additional functionality or not.

Are we allowed to use aluminum and nylon/plastic screws & nuts (examples below) as long as they are commercially available, are sizes listed above, and are only up to 2" long?

<https://www.mcmaster.com/#93143a194/=1e2q1gl>

<https://www.mcmaster.com/#94735A737>

<https://www.robosource.net/aluminum-screws-nuts/253-alu-screw-0500.html>

<https://www.mcmaster.com/#94812A400>

### Answered by Game Design Committee

Yes, these would be legal.

In general, as long as the screws do not provide additional functionality beyond a standard screw (such as an eye bolt), "any screw" means "any screw". Properties like material type or color are irrelevant.

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## R7i 1/8" Nylon Paracord

R7

R7 states: "Robots are allowed the following additional "non-VEX" components: i. An unlimited amount of 1/8" (or local metric equivalent), braided, nylon rope"

Is ?" 100% nylon braided paracord legal under this rule? For example,

[www.homedepot.com/p/Everbilt-1-8-in-x-500-ft-Black-Premium-Nylon-Paracord-70070/206192268](http://www.homedepot.com/p/Everbilt-1-8-in-x-500-ft-Black-Premium-Nylon-Paracord-70070/206192268)

### Answered by Game Design Committee

Yes, this is legal, so long as it is 1/8" in diameter and made of braided nylon.

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## Hardware specified by VEXpro, but not available from VEXpro.

### R7 VEX U

Sorry to be so nitpicky, but there are a couple points on hardware that was not clarified on the June 15th update:

"Answered by Game Design Committee That being said, **rivets and hardware** found inside of VEXpro kits are considered legal fasteners for VEX U. We will be sure to clarify this in the June 15th update." (emphasis mine).

There are six references to a McMaster Carr part within the vexpro product specifications, two for master links, three for screws, and one for a washer.

On the page for roller chain: [www.vexrobotics.com/roller-chain.html](http://www.vexrobotics.com/roller-chain.html) "Note: VEXpro does not offer a #35 master link for purchase separately. We recommend McMaster-Carr part number 6261K191 as a suitable replacement. The #25 Roller Chain requires a standard master link. VEXpro does not offer a standard #25 master link. We recommend McMaster-Carr part number 6261K108 as a suitable replacement."

And on the page for the linear gussets:

[content.vexrobotics.com/vexpro/pdf/217-4399-20180116.PDF](http://content.vexrobotics.com/vexpro/pdf/217-4399-20180116.PDF) "(Note: Some McMaster parts required)" and the BOM lists the following: McMaster P/N 91251A555 1/4-20 x 3.250" Screw

McMaster P/N 91251A553 1/4-20 x 2.750" Screw

McMaster P/N 91251A550 1/4-20 x 2.000" Screw

McMaster P/N 92141A029 9/32" ID x 5/8" OD Washer

Additionally, the versaframe page notes using 5/32 rivets for assembly (<https://www.vexrobotics.com/versaframestock.html>), but these are not sold by VEXpro, only 1/8 rivets are available.

Do the references to McMaster-Carr parts, and to a 5/32 rivet, make these McMaster-Carr parts legal for VEX-U?

If so, then would the legality of a 1/4-20 x 3.250" screw (McMaster 91251A555) make any shorter screw lengths of 1/4-20 screw legal also (since long screws can obviously be cut shorter). In the same way, VEXpro sells a #10-32 x 2.5 long screw and 10-32 locknut (in kit 217-4824), so would this make #10 screws up to 2.5 long also be legal?

Thank you for your time and consideration.

### Answered by Game Design Committee

Sorry to be so nitpicky, but there are a couple points on hardware that was not clarified on the June 15th update.

No apology needed, these types of questions are beneficial to all teams as we work through the nuanced implications of this year's VEX U rules.

Do the references to McMaster-Carr parts, and to a 5/32 rivet, make these McMaster-Carr parts legal for VEX-U?

For the most part, yes.

The #25 master link (6261K108) is legal for this purpose (alongside VEXpro #25 chain).

The following items will be clarified in the August 17th manual update:

- All rivets up to 1/4" will be legal
- 1/4-20 screws, washers, and nuts will be legal
- #10 screws, washers, and nuts will be legal (in addition to the #4, #6, and #8 screws as specified in R7-c)

## Are the number plates legal or illegal?

### R7

Howdy!

The number plates from the last few year's games are not in the legal or illegal appendices.

I assume they are not allowed for robot construction because of < R7 > c:

c. Only the VEX IQ components specifically designed for use in Robot construction are allowed. Using additional components outside their typical purpose is against the intent of the rule (i.e. please don't try using VEX IQ apparel, team or event support materials, packaging, **Field Elements**, that are not listed in the Legal Parts Appendix or other non-robot products on a VEX IQ Challenge Robot)

Emphasis mine.

I would also think that the plates could be used as a non functional decoration.

But what I THINK doesn't matter... How say you?

### Answered by Game Design Committee

The number plates used on VEX IQ Challenge fields can be considered equivalent to part 228-2500-292, Blank VRC / VEXU Team Number Plate, which is included in the Legal Parts Appendix. Therefore, yes, they are legal. We will look into updating the Legal Parts Appendix to reflect this more clearly in the future.

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## Making Smart Cords

R7

Are teams allowed to make SMART Cords using cable and a crimper?

### Answered by Game Design Committee

No, this is not legal.

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## Use of Color Filter for Vision Sensor

R7

Under R7a color filters are allowable for Light Sensors, is it an option to use color filters for the VEX Vision sensor? A color filter could be employed to assist in the more accurate detection of a single color--i.e. green, orange, etc. This is important given the fact that the flashlight is not compatible with V5.

### Answered by Game Design Committee

This would be permissible if the hypothetical filter satisfied all other Robot rules, such as R9:

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

- Shattering plastic, such as PMMA (also called Plexiglass, Acrylic, or Perspex), is prohibited.
- Plastic may be mechanically altered by cutting, drilling, bending etc. It cannot be chemically treated, melted, or cast. Heating polycarbonate to aid in bending is acceptable.

## Can a team make custom paddles for their controllers?

R7

<R7> VEX IQ parts only. Robots may be built ONLY from official robotic components from the VEX IQ product line, unless otherwise specifically noted within these rules.

Curious if you can make custom 3-D parts for controllers. <R7> only covers the robot itself.

### Answered by Game Design Committee

There are no rules prohibiting this, therefore it is legal, provided no other rules are violated (such as G8).

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## Vision sensor

R7

Can the vision sensor be used in the competition?

### Answered by Game Design Committee

The Vision Sensor is included in the VIQC Squared Away Illegal Parts Appendix, and is therefore not legal for competition use.

[link.vex.com/docs/viqc-squared-away-IllegalParts](http://link.vex.com/docs/viqc-squared-away-IllegalParts)

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## (II) Legal parts list

R7

According to the note at the end of <R7>,

Note: A comprehensive list of legal parts can be found in the VEX IQ Challenge Legal Parts Appendix, which will be released alongside the June 14th Game Manual Update (as noted in <G17>.

As this has passed by a couple of weeks, are the lists available somewhere? Thanks!

### Answered by Game Design Committee

We sincerely apologize for the delay in the release of these documents. They have now been posted and can be found at this page:

[www.vexrobotics.com/vexiq/competition/viqc-current-game](http://www.vexrobotics.com/vexiq/competition/viqc-current-game)

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## <R7e>. is Paracord still legal?

R7

With the question of prior Q&A rulings in the air, we would like to know if paracord still meets the definition of unlimited 1/8" braided nylon rope?

[www.vexforum.com/t/answered-alternate-rope/30162](http://www.vexforum.com/t/answered-alternate-rope/30162)

Thank you!

### Answered by Game Design Committee

Please see rule R7e, quoted here for reference:

<R7> Certain non-VEX EDR components are allowed. Robots are allowed the following additional "non-VEX" components:

e. An unlimited amount of 1/8" (or local metric equivalent), braided, nylon rope

The term "paracord" describes neither diameter nor material type.

There are some ropes branded as "paracord" which would be legal, as they are made of braided nylon and are 1/8" in diameter:

- [paracord.com/collections/550-solids/products/acid-brown-1](https://paracord.com/collections/550-solids/products/acid-brown-1)
- [www.homedepot.com/p/Everbilt-1-8-in-x-500-ft-Black-Premium-Nylon-Paracord-70070/206192268](https://www.homedepot.com/p/Everbilt-1-8-in-x-500-ft-Black-Premium-Nylon-Paracord-70070/206192268)

There are also ropes branded as "paracord" which would not be legal, as they either have materials other than braided nylon, or are larger than 1/8".

- [paracord.com/collections/paramax/products/black-paramax](https://paracord.com/collections/paramax/products/black-paramax)
- [paracord.com/collections/1-8-shock-cord/products/1-8-shock-cord-acid-purple](https://paracord.com/collections/1-8-shock-cord/products/1-8-shock-cord-acid-purple)

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## Super Glue

Other R7 R8

Can VEX IQ pieces be super glued on the robot

### Answered by Game Design Committee

No, this would not be legal. Glue is not permitted within the confines of <R7> and <R8>.

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## Smart cable repair

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?





### Answered by Game Design Committee

No, this would not be legal.

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## is 3D printed parts are allowed?

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?  
[www.thingiverse.com/thing:275299](http://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.

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## Tape Restrictions

R7

In the 2018-2019 vex turning point competition, is it acceptable to tape a color filter straight onto the light sensor? I know tape is restricted in most cases but I don't know how else to attach the filter to the light sensor.

### Answered by Game Design Committee

<R7a> states the following:

<R7> Robots are allowed the following additional "non-VEX" components:

- a. Any material strictly used as a color filter or a color marker for a VEX Light Sensor.

This would be legal, provided that is used solely as part of a color filter for the VEX Light Sensor, and not in any additional capacity as a fastener or structural element.

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## Wire Protection

R7

Is is legal to add wire protection against static build up by providing a copper wrap or shielding for the wires. We believe we have lost 2 motor ports on our V5 brain possibly due to this. It has been on our long runs of wires from the brain to the motor and has happened to 2 different ports with the same motor run. I know it has not been shown to absolutely be the cause, but ther are theories that this is a possibility. We would like to try these systems and still be competition legal. We were looking at copper wrap or wire shielding systems. The systems would be solely for protecting the wires. The systems we are looking at are as follows:

<https://www.electriduct.com/Flexo-Conductive-Braided-Sleeving.html>

<https://www.ebay.com/itm/172810245663>

<http://a.co/d/efQ4wCp>

Thank you

### Answered by Game Design Committee

Yes, this would be considered a legal form of cable protection under <R7j>.

<R7> Robots are allowed the following additional “non-VEX” components:

j. Commercially available items used solely for bundling or wrapping of 2-wire, 3-wire, 4-wire, or V5 Smart Cables, and pneumatic tubing are allowed. These items must solely be used for the purposes of cable protection, organization, or management. This includes but is not limited to electrical tape, cable carrier, cable track, etc. It is up to inspectors to determine whether a component is serving a function beyond protecting and managing cables.

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### Is this material allowed?

R5 R7

Hi,

I need an answer to this forum.

[www.vexforum.com/index.php/35819-is-this-material-allowed](http://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.