

Q&A

VRC 2021-2022: Tipping Point

Tagged: R18

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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840: Motor Count with Pneumatics

12-Aug-2021

R18

This year the game manual mentions a maximum of 8 Smart Motors and a pneumatic system. In previous years, use of pneumatics limited the motors to 6. Is that still the case or can we use pneumatics and then 8 more motors?

Answered by committee

Please review the [Q&A Usage Guidelines](#) before posting, specifically point 3, "Quote the applicable rule from the latest version of the manual in your question". Often, you'll find that by quoting the rule, you'll answer your own question.

Per rule G22:

Previous Definitions, Rules and Rulings found in documents and Q&A's from previous seasons do not apply to the current game.

Rule R18 reads as follows, with a portion bolded for emphasis:

<R18> Robots use one control system. Robots may use a V5 Robot Brain, **up to eight (8) V5 Smart Motors, and a legal VRC pneumatic system.**

a. V5 Smart Motors, connected to Smart Ports, are the only motors that may be used with a V5 Robot Brain. The 3-wire ports may not be used to control motors of any kind.

b. The 5.5W V5 Smart Motor, found in the V5 Workcell system, is not legal for use.

There is no rule which sets a different limit on the number of V5 Smart Motors that may be used alongside a pneumatic system.

2836: Pneumatic tubing out of stock

5-Oct-2025

R18

<R18><R18><R18>Hi all, What happens if you need pneumatic tubing and it is out of stock? are you allowed to use functionally equivalent pneumatic tubing? <R18>

Answered by committee

Thanks for your question. As stated in clause C of [<R18>](#), non-VEX tubing is not allowed on VIQRC Robots.

1893: R18 is PVC a legal type of plastic?

25-Jan-2024

R18

<R18> states:

A limited amount of custom plastic is allowed. Robots may use custom-made parts cut from certain types of non-shattering plastic. It must be possible to have cut all of the plastic parts on the Robot from a single 12" x 24" sheet, up to 0.070" thick.

d. Legal plastic types include polycarbonate (Lexan), acetal monopolymer (Delrin), acetal copolymer (Acetron GP), POM (acetal), ABS, PEEK, PET, HDPE, LDPE, Nylon (all grades), Polypropylene, and FEP.

e. Shattering plastic, such as PMMA (also called Plexiglass, Acrylic, or Perspex), is prohibited.

Is PVC (in its sheet form of course) considered a legal non-shattering plastic? In certain extreme scenarios it can certainly shatter, however at the same time it has been deemed safe for use as structural components in the field elements themselves, which from my understanding are made from PVC pipes. Therefore can the GDC please clarify whether for the purposes of R18 whether PVC sheet is considered a legal plastic type?

Answered by committee

PVC is not included in the list of permitted plastic types in [<R18>](#), and is therefore not legal for Robot construction.

1860: 217-6626, 217-6627 Polycarbonate sheet and R18

8-Jan-2024

R18

[<R6>](#) states:

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. 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 evidence.

[<R18>](#) states:

A limited amount of custom plastic is allowed. Robots may use custom-made parts cut from certain types of non-shattering plastic. It must be possible to have cut all of the plastic parts on the Robot from a single 12" x 24" sheet, up to 0.070" thick.

a. The intent of the area/thickness constraints is to limit the number of custom plastic parts used in Robot construction, not to define an absolute volume. For example, using a sheet which is 0.035" thick does not permit two 12" x 24" sheets' worth of parts. b. Plastic parts do not have to be literally cut from the same original 12" x 24" sheet. However, all individual parts must be able to "nest" or rearrange into a 12" x 24" area.

i. A collection of parts which theoretically have a total surface area of 288 in², but cannot

c. 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.

d. Legal plastic types include polycarbonate (Lexan), acetal monopolymer (Delrin), acetal copolymer (Acetron GP), POM (acetal), ABS, PEEK, PET, HDPE, LDPE, Nylon (all grades), Polypropylene, and FEP.

e. Shattering plastic, such as PMMA (also called Plexiglass, Acrylic, or Perspex), is prohibited.

f. The PET Sheet Variety Pack (276-8340), sold by VEX, is considered "plastic" in the context of this rule, and is subject to the same limitations as "off-the-shelf" plastic sheets.

g. This rule does not apply to 3D printed plastic parts. 3D printed parts are not permitted in the VEX Robotics Competition, except as non-functional decorations (per [<R8>](#)) or as custom License Plates (per [<R9>](#)).

The '1/32" Gray Tinted Polycarbonate Sheet (36" x 72")', VEX part number 217-6626 is legal under R6, as well as its sibling 217-6627. However, there is no clause under R18 which restricts the maximum portion of this sheet which can be used. Therefore, there is some confusion over whether 217-6626 allows for "bypassing" the plastic limit. This is likely the result of an oversight in R18f, which provides such a restriction for a similar vex product, 276-8340. If a similar clause were added for 217-6626 and 217-6627, then this would prevent this confusion and/or inconsistency.

Thank you.

Answered by committee

As a reminder, per the [Q&A Usage Guidelines](#) "The Q&A system is for rules clarifications only". For game questions, suggestions, or concerns outside of specific and official rules questions, feel free to contact GDC@vex.com.

With that being said, we appreciate this suggestion, and will be sure to include this clarification in a future Game Manual update.

In the meantime, to be clear - the polycarbonate sheets sold by VEX (217-6626 and 217-6627) are considered "plastic" in the context of [<R18>](#), and are subject to the same limitations as "off-the-shelf" plastic sheets.

1616: <R18>Custom Plastic Clarification

15-Aug-2023

R18

[<R18>](#)

According to robot rule <R18> "c. 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.", heating to bend plastic is acceptable.

We want to confirm whether vacuum forming plastic would be legal to use on our robot.

Answered by committee

We want to confirm whether vacuum forming plastic would be legal to use on our robot.

Vacuum-formed plastic is not legal for use on VRC Robots, with the exception of non-functional decorations as allowed by rule [<R8>](#).

1606: R18 specification (decorative plastic)

6-Aug-2023

R18

[<R18>](#)[<R18>](#)The R18 rule says that a 12x24 plastic limit is tolerated. But the question we had was: does decorative such as huge decorative plastic panel on the side of the robot will be consider in the 12x24? or is it just a 12x24 fonctionnal plastic allowed?

[<R18>](#)

Answered by committee

Rule [<R18>](#) limits the amount of plastic that can be used for functional components, and does not include plastic used as legal decoration. Teams should be prepared to provide a 'map' of their functional plastic that shows that it could have been cut from a single sheet. [This article in the REC Library](#) provides some additional guidance on how teams and inspectors should determine whether a specific plastic component is functional or decorative.

The following quote from rule [<R8>](#) should also be kept in mind:

"To be considered "non-functional," any guards, decals, or other decorations must be backed by legal materials that provide the same functionality. For example, if a Robot has a giant decal that prevents Triballs from falling out of the Robot, the decal must be backed by VEX material that would also prevent the Triballs from falling out. A simple way to check this is to determine if removing the decoration would impact the performance of the Robot in any way."