

## Q1 Question about 4.9.1 Cargo. Is there a standard PSI

**Q:** Question about 4.9.1 Cargo. Is there a standard PSI that the orange balls are inflated to. We pumped up the ball and it only reached 11.5-12" the description states the ball should be 13". The description did not give a inflation value. The difference in sizes and pressure will affect the ability to pick up and handle the cargo.

**A:** No, per [Section 4.9.1]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536804198](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536804198)), they are inflated to a size specification. No psi specification is defined.

(Asked by **4049** at Jan 9th 19)

## Q2 Is it legal to remove opponent's null hatch panel if there is no cargo loaded?

**Q:** Is it legal to remove opponent's null hatch panel if there is no cargo loaded? G5 says: Don't mess with opponents' **\*\*scored\*\*** GAME PIECES. A ROBOT may not remove a GAME PIECE from an opponents' ROCKET/CARGO SHIP. GAME PIECES which become dislodged because of incidental contact with the ROCKET/CARGO SHIP are not considered a violation of this rule.

**A:** No, per [Section 5.1.1-F]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536804204](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536804204)), the Null HATCH PANELS are secured to the CARGO SHIP with hardware; removing them will be considered field damage in violation of !G15-G.

(Asked by **4909** at Jan 9th 19)

## Q4 Question in regards to G21. Tethering a part to a robot during the match?

**Q:** Per G21. " Keep it together. ROBOTS may not intentionally detach or leave parts on the FIELD." Are you able to tether a part via rope or string to your robot during the match and retract into the robot at the end of the match? You technically are not leaving a part on the field.

**A:** There are no rules that prohibit a ROBOT from having a MECHANISM attached via non-rigid coupling (such as rope). Note that this MECHANISM must still comply with !R4 and must avoid entanglement hazards per !G15 and !G19.

(Asked by **1708** at Jan 9th 19)

## Q5 Considering a HATCH PANEL worn out or damaged

**Q:** For purposes of determining if a HATCH PANEL is suitable for play or should be replaced, at what point is the soft side loop faster considered to be 'worn out'/damaged' enough to be replaced? We understand the difficulty of providing a concrete answer, but is it possible to list the guidelines the field staff will be using when making this decision? Similarly, what are the conditions and guidelines for determining when the hard side hook faster on the ROCKET and CARGO SHIP should be replaced?

**A:** HATCH PANELS will be replaced when the loop tape is no longer suitable for gameplay (i.e. the HATCH

PANEL will not remain attached to the HATCH when a reasonable amount of force is applied by a CARGO attempting to exit the BAY). Hook tape on the ROCKET and CARGO SHIP will be replaced if they become degraded to the point that HATCH PANELS can no longer meet similar criteria.

(Asked by **5052** at Jan 9th 19)

## Q6 Height of Robot during match

**Q:** With regards to the height of the robot: the height at the beginning of the match is set and the top of the robot during climb can not exceed 6'6", is there a height limit during the match proper?

**A:** There is no rule that generally limits a ROBOT'S height outside of the HAB ZONES, but please always keep !S1 in mind.

(Asked by **5243** at Jan 9th 19)

## Q7 Does a robot have to be completely contained within the horizontal plane (Hab Zone)

**Q:** Per 5.3: For the purposes of assessing SANDSTORM and HAB Climb Bonuses described in Table 5-1, a ROBOT is considered to have started from, or climbed to, a HAB Level if: 1. the ROBOT'S BUMPERS are fully above the Level's platform and... Does "fully above the Level's platform" mean to indicate that no portion of the BUMPERS can 'hang' off the side of a platform, even while it is above the point, providing the ROBOT meets all other climbing rules?

**A:** No, the ROBOT does not need to be contained to a vertical projection of the HAB PLATFORM Level in order to score. The use of the word "above" is intended to refer to "at a higher level or layer than."

(Asked by **5147** at Jan 9th 19)

## Q8 climb end game levels

**Q:** will the 12 points of the level 3 end game climb be rewarded based on the elevation of the robot or the robot being physically on the third platform?

**A:** [Section 5.3]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536804208](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536804208)) details the two conditions that must be met for a ROBOT to be considered climbed to a specific HAB level. This incorporates both the relative height of the ROBOT'S BUMPERS and the elements supporting the ROBOT. For example, a ROBOT whose BUMPERS are above level 2 on the HAB cannot be considered climbed to level 2 if the ROBOT is partially supported by level 1 (or by other ROBOTS who may be partially supported by level 1).

(Asked by **6968** at Jan 9th 19)

## Q9 Can S4 escalate to a red card for egregious behavior?

**Q:** In the blue box for S4, it references an example of an escalation to a red card for egregious behavior. In the violation itself, the penalty is a yellow card with no mention of a potential red card. Which is correct? Note: we don't plan on violating this rule, we were just confused on the difference in language from other rules that escalate

to a red card.

**A:** Both are correct. The violation as listed in a given rule is the violation that will be applied if that rule is violated. However, as stated in Rule !C1 and subsequently in [Section 12.2.1] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536804243](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536804243)), YELLOW and RED CARDS can be additionally applied for egregious ROBOT actions or team member behavior above and beyond the stated violation for a rule.

(Asked by **5052** at Jan 9th 19)

## Q10 Pneumatic Compressor

**Q:** According to R86, "compressed air on the ROBOT must be provided by its one onboard compressor only." Does this mean that teams cannot recharge their air tank via an off-board compressor? Are teams required to have an onboard compressor to use pneumatics this year?

**A:** Correct. No compressor located off the ROBOT may be connected to the ROBOT's pneumatic system.

(Asked by **1569** at Jan 9th 19)

## Q11 Rule R1: "Fixed"?

**Q:** R1: "must have a FRAME PERIMETER ... that is comprised of fixed, non-articulated structural elements of the ROBOT." What does "fixed" mean? Do frame elements need only to be securely fastened to each other? Do they need to be "fixed" relative to the floor or to the robot's wheels? In an 'H' shaped robot (viewed from above), is the horizontal piece part of the Frame Perimeter? If not, may the horizontal piece be articulated?

**A:** Yes, this means that all FRAME PERIMETER elements must be fixed relative to each other. It does not prohibit ROBOT elements that a team may consider "frame" but that are not part of the FRAME PERIMETER from being articulated. See the blue box under !R1 for a description of how FRAME PERIMETER is determined.

(Asked by **5607** at Jan 9th 19)

## Q12 team drawings

**Q:** Where are the team drawings so that we can build the field elements?

**A:** [Official Field Drawings](<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>) can be found in the [Playing Field Information](<https://www.firstinspires.org/robotics/frc/playing-field>) link on the [Game & Season Materials](<https://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>) webpage.

(Asked by **5457** at Jan 9th 19)

## Q13 Rocket Cargo Loading ports

**Q:** The lowest port on the rocket "A PORT is one of three (3) 1 ft. 4 in. (~41 cm) diameter holes in the "front" face of each ROCKET. The center of the lowest PORT is 2 ft. 3½ in. (~70 cm) from the carpet, and the distance between the centers of each PORT is 2 ft. 4 in. (~71 cm)." in the manual we see that the center of the lowest port is 2 ft 3 1/2 inches from the floor in the manual however, the drawings show the lowest port at 26.8" that is about a 3/4" difference. Which is correct???

**A:** Assuming the 26.8" dimension you are referencing is in regards to the TE-19113 drawing, both dimensions agree with each other. In the assembly of TE-19113, TE-19113-01 is spaced off the floor by another part, resulting in the PORT being 2 ft. 3½ in from the floor, matching what is called out in [Section 4.3] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536804189](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536804189)).

(Asked by **6060** at Jan 9th 19)

## Q14 Cargo Ship / Rocket Blockade

**Q:** We do not see a rule that prevents an opposing robot from blocking the hatch or cargo loading positions in front of the cargo ship or the rocket for an unlimited amount of time. The rules are pretty clear that only one opposing robot is allowed in each end of the field. From our understanding, that means one robot could sit in front of an opposition Rocket for the entire match. We'd like clarification that we are interpreting the rules correctly or that we didn't miss anything.

**A:** There are no rules that prohibit a single ROBOT from blocking access to a ROCKET or CARGO SHIP after the SANDSTORM period, however, note that !G16 does prohibit contact with an opponent's ROCKET starting at T-minus 20s.

(Asked by **1325** at Jan 9th 19)

## Q15 Can you extend 30 in. beyond the frame perimeter at multiple points at the same time?

**Q:** R4. Robots may not extend more than 30 in. beyond their frame perimeter. As I read this and view the diagram, is the robot able to have multiple protrusions (from any side) of up to 30 in. past the frame perimeter at the same time, or is there a maximum of one protrusion at a time?

**A:** Your interpretation of the diagram is correct. A ROBOT may protrude up to 30 in. from the FRAME PERIMETER from multiple sides simultaneously and remain in compliance with !R4.

(Asked by **3889** at Jan 9th 19)

## Q16 If a robot tips over trying to climb to the 3rd level of the HAB at the end of the game

**Q:** If a robot tips over trying to climb to the 3rd level of the HAB at the end of the game but ends up being fully supported by the 3rd level surface AND the bumpers are completely above the horizontal plane of the 3rd level is that considered a legal "climb"? In this same scenario, what if part of the robot (not the bumpers) extends below the 3rd level horizontal plane, but is not touching the surface of either the second or first level--is the climb still legal then?

**A:** We believe !Q7 answers your question, though it does not specifically address your question about a tipped-over ROBOT. The criteria specified in [Section 5.3] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536804208](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536804208)) will be applied regardless of the orientation of the ROBOT or location of elements that compose the ROBOT (in other words, being "tipped over" doesn't preclude the criteria from being applied). If all criteria are met, and no other rules have been broken, then the climb will be awarded.

(Asked by **6753** at Jan 9th 19)

## Q17 Climbing using Alliance Wall?

**Q:** According to section 5.3 of scoring, one of the possible listed scenarios for a climb is that "the robot is only supported by: alliance wall". Is there any rule about attaching something to the wall to assist with the climb?? Or is this part of the rule simply pertaining to a robot that happens to be touching or leaning against the alliance wall when it finally comes to rest in the HAB at the end of the game regardless of what level it is on?

**A:** Rule !G15 prohibits a number of actions with respect to the ALLIANCE WALL.

(Asked by **6753** at Jan 9th 19)

## Q18 Vacuum generator

**Q:** I know the manual says it has to adhere to COTS rules, but I would like to know if this is 100% legal before my team starts pursuing a design: <https://www.smcusa.com/products/ZZK2-Manifold-for-ZK2-Vacuum-Unit~90231>

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536804183](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536804183)) and, if needed, resubmit a different question.

(Asked by **2197** at Jan 9th 19)

## Q19 Can we pressurize our robot's pneumatic systems before a match?

**Q:** Rules R85.A & R86 state that a robot is required to both have an onboard compressor and use only it to provide air to the pneumatic system. These rules do not, however, clarify at which times these compressors are allowed to run, leading my team to question if we are allowed to pre-pressurize our robot, or if all the air has to come from the compressor running during the match. Are we allowed to have our compressor running before a match / are we allowed to "pre-pressurize" our system?

**A:** Yes, per !R46-A, stored compressed air is a legal energy source at the start of the match.

(Asked by **5411** at Jan 9th 19)

## Q20 Distance between posts?

**Q:** I am not able to find a schematic that tells the distance between the "posts" that stick out on the side of the Cargo Ship. What is the distance (from left to right) between the posts (ie how much room does your 19 inch hatch panel really have to be able to stick flat to the side of the Cargo Ship?)

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. Any measurements or materials information can be derived from the [official Field Drawings] (<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), [SolidWorks' eMeasure site] ([https://frc-cdn.firstinspires.org/2019VRContent/eDrawings\\_2019Field.html?Measure=True](https://frc-cdn.firstinspires.org/2019VRContent/eDrawings_2019Field.html?Measure=True)), or other tools available on the

[Playing Field page](https://www.firstinspires.org/robotics/frc/playing-field).

(Asked by **6753** at Jan 10th 19)

## Q21 What counts as Level 3?

**Q:** 5.3 states that "each ROBOT which has climbed the HAB PLATFORM (value corresponds to the Level to which the ROBOT has climbed)." G14 states "Don't climb on each other unless in the HAB ZONE. A ROBOT may not be fully supported by a partner ROBOT unless the supporting ROBOT is in contact with its HAB ZONE." If a Robot is supporting another Robot in their own HABZONE above the height level, will the second bot be awarded the points for that level, i.e. 6 for Level 2, 12 for Level 3.

**A:** We believe !Q8 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **3242** at Jan 10th 19)

## Q22 Number of Game Pieces

**Q:** In Section 5.1.1 it says "24 game pieces are staged on each side of the field for each match". However when I start counting, it appears that there may be 24 cargo and 24 hatch panels?? So wouldn't this be more like 48 "game pieces"?

**A:** Good Question! See [Section 5.1.1]

(https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\_Toc536804204) as updated in [Team Update 2]

(https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf).

(Asked by **6753** at Jan 11th 19)

## Q23 Vacuum pumps

**Q:** The rules state that only one air compressor is permitted. I don't see any rules regarding the number of vacuum pumps. Are there any?

**A:** As per the Blue Box under !R84, vacuum pumps are not considered a pneumatic item and are not disallowed or regulated per se. However, pay special attention to !R34 as the motor within the vacuum pump is very likely not one of the allowed motors.

(Asked by **6811** at Jan 10th 19)

## Q24 HAB Platform Dimensions

**Q:** Can you please specify the dimensions of the Level 1 of the Hab Platform. In the game manual it states that the Level 1 dimensions including the little ramps up to the flat 3 in elevated Level 1 surface has a total length of 3 ft x 10ft 8 in. (including ramps of 11.5 in) The math seems to conflict with what the diagram and VR Model portray. Does the flat portion of the Level 1 Habzone measure 3 ft x 10 ft 8 in? Or does the top measure 24.5 in x 105 in?

**A:** Please see [Team Update 01]

(https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate01.pdf).

(Asked by **6987** at Jan 10th 19)

## Q25 HABZONE Scoring

**Q:** In the rules it states that to score in the HAB Level a robot must: 1) Robot bumpers are fully above that Level's Platform and 2) the robot is only supported by -surfaces of the HAB at or above that Level -Alliance wall, and/or - another robot which has climbed to that HAB Level or Higher. Will a Robot Score in Level 1 if it has a part touching the game field carpet outside Level 1? This extension touching the carpet will not support the robot, but rather be a resting structure.

**A:** No, a ROBOT \*with an extension\* that is touching the carpet ~~outside Level 1~~ \*such that it is resting on the carpet is supported by the carpet and\* will not be considered to have climbed. The extension is part of the ROBOT, therefore if the extension is ~~touching~~ \*supported by\* the carpet, some part of the ROBOT is supported by something other than the 3 allowable sources per [Section 5.3]  
([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534739724](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534739724)).  
\*(revised 1/15/19 per [Team Update 03]  
(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate03.pdf>))\*

(Asked by **6987** at Jan 10th 19)

## Q26 Deployable Inflatable Object

**Q:** My team was wondering if it would be legal to deploy an inflatable ramp, as long as it stays attached to our robot, and stays within the maximum PSI?

**A:** There are a number of rules that may impact the legality of such a device. One that comes to mind is !R82 which would require that the device be rated for 70psi.

(Asked by **6768** at Jan 10th 19)

## Q27 Multiple batteries running compressor

**Q:** In Q19, you clarified that teams are allowed to "pre-pressurize" their pneumatic systems using the onboard compressor. Is there a rule stating that this compressor must be ran with the same battery used in the following match? If not, teams would be allowed to create large stores of onboard potential energy (in the form of compressed air) to augment the total energy capacity of the robot battery. This would give an unfair advantage to some teams (in terms of total energy available per match).

**A:** There are no rules governing which exact battery is allowed or required to be used on a ROBOT during a MATCH, so long as the battery is legal per !R39.

(Asked by **451** at Jan 10th 19)

## Q28 FRC Events/FMS API

**Q:** When will the score breakdown for the FRC Events/FMS API be released?

**A:** Per the clarifying note in [the documentation](<https://frcevents2.docs.apiary.io/#reference/match-results/score-details>), the score details will be available at some point during the first three weeks of February (i.e. on or before

February 15th).

(Asked by **1678** at Jan 10th 19)

## Q29 Hatch Panel

**Q:** Is a hatch panel still considered fully supported and scored if it is only on one of the Hook and Loop strips and not the other?

**A:** There is no requirement that the HATCH PANEL be connected to both strips of Hook on each side of a HATCH in order to be considered scored.

(Asked by **6768** at Jan 10th 19)

## Q30 G4 and the Depot Cargo

**Q:** Does G4 apply to a robot that causes CARGO in the DEPOT to disperse while the robot is holding one GAME PIECE? Aka, would hitting the CARGO out of the DEPOT be considered "exercising extended or repeated influence"?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. It is not possible to definitively state whether the scenario described in the question constitutes "extended or repeated control". There are ways that action could be accomplished that would violate !G4 and ways that it would not.

(Asked by **1678** at Jan 10th 19)

## Q31 Air Volume

**Q:** So, I have seen the rules about the maximum amount of PSI we can have stored on our robot but I haven't seen any rules concerning volume. What is the maximum volume of stored air can we keep on our robot?

**A:** There are no rules specifically restricting the max air volume that may be stored on a ROBOT.

(Asked by **6768** at Jan 10th 19)

## Q32 Points for HAB climb with G12 Violation

**Q:** Does G12 negate the points earned by climbing the HAB PLATFORM? (e.g. A robot climbs to Level 3 of the HAB PLATFORM but is in violation of G12. Does the robot score the 12 point HAB Climb Bonus?)

**A:** No, negation of points is not specified as a violation in rule !G12

(Asked by **1678** at Jan 10th 19)

## Q33 Questions Regarding YELLOW CARD and RED CARD interaction in PLAYOFF

**Q:** Are the following statements correct? 1. A YELLOW CARD issued during the playoff matches results in the

entire ALLIANCE, defined as up to 4 teams, being issued a YELLOW CARD. 2. Since multiple teams on the same ALLIANCE are issued YELLOW CARDS, the entire ALLIANCE is issued a RED CARD, which results in zero points for that MATCH and the ALLIANCE losing the match.

**A:** No. A single YELLOW CARD earned by a member of an ALLIANCE during playoffs is only applied once to the ALLIANCE - otherwise, there would be no need for YELLOW CARDS in Playoffs. If any member of the ALLIANCE earns another YELLOW CARD during the MATCH or in subsequent MATCHES, the YELLOW CARD will be promoted to a RED CARD for the ALLIANCE as per [Section 12.2.1](https://frc-qa.firstinspires.org/manual/\_Toc534739759) as updated/clarified in [Team Update 02](https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate01.pdf).

(Asked by **1678** at Jan 11th 19)

## Q34 Unused AM14U3 Drive Base Legal?

**Q:** Our team was going to last years drive base again, but according to our interpretation of 10.4 R-15 that is not legal. The team had an unopened AM14U3 and we began opening it, after Kickoff, getting the frame designed and cut in order to meet size restrictions. After reading Team Update 1, we were confused as they increased max robot spending order to help teams that opted out of drive bases. Does this make an unused AM14U3 illegal or can we use for this year?

**A:** You are correct that a FABRICATED drivebase from a previous season violates !R15. However, per [Section 10.1](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\_Toc534739745), "Items that are no longer commercially available but are functionally equivalent to the original condition as delivered from the VENDOR are considered COTS and may be used." These items should be cost accounted at Fair Market Value as described in !R14.

(Asked by **3036** at Jan 10th 19)

## Q35 Extrusions from the bottom in the Hab Zone

**Q:** As per of G23 and R25, which talk about the robot bumper rules in the Hab Zone. We were wondering if climbing using a Rack and Pinion system extruding out of the bottom of the robot with a drive motor were to break any rules in anyway?

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8](https://frc-qa.firstinspires.org/manual/\_Toc534739699) and, if needed, resubmit a different question.

(Asked by **6004** at Jan 10th 19)

## Q36 Use of suction cups

**Q:** Is the use of suction cups on the alliance wall permissible as a means of reaching level 3 in the hab zone?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. However, please pay special attention to !G15 part C.

(Asked by **2935** at Jan 10th 19)

## **Q37 Can we use a Dart, 12 in. Actuator kit?**

**Q:** DART, 12 in. Actuator Kit

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8](https://frc-qa.firstinspires.org/manual/\_Toc534739699) and, if needed, resubmit a different question.

(Asked by **7250** at Jan 10th 19)

## **Q40 Perimeter during HAB zone**

**Q:** Is your robot allowed to extend past the 30in frame perimeter in the HAB zone

**A:** During a MATCH, IR4 restricts the maximum extension beyond a ROBOT'S frame perimeter everywhere except where further restricted by !G10.

(Asked by **4508** at Jan 10th 19)

## **Q41 Robot contact while fully extended**

**Q:** Can a defensive robot contact an opposing robot while that robot is extended to place cargo or hatch panels into the upper levels of the rocket ship?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. That being said, !G3, !G17, and !G20 are rules that legislate ROBOT to ROBOT contact with opponent ROBOTS outside of the opponent's HAB ZONE. If a review of those rules doesn't answer your question and you need additional clarity on any of those rules, please rephrase your question and resubmit.

(Asked by **5436** at Jan 11th 19)

## **Q42 What is considered "throwing" a hatch panel?**

**Q:** In rule G6 is says that ROBOTS may not shoot HATCH PANELS into the air, kick them across the floor using an active MECHANISM, or eject them across the floor in a forceful way (i.e. HATCH PANEL is propelled a significant distance). If we were to line up with our bumper against the rocket and eject the hatch panel from robot frame (about 3 inches away) onto the rocket is that considered "shooting"?

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6329** at Jan 11th 19)

## **Q43 Game Piece Within Robot Perimeter at Beginning of Match**

**Q:** Can at the start of the match the robot hold a game piece outside of it's perimeter

**A:** GAME PIECES are not considered part of the ROBOT, so there is no requirement that GAME PIECES preloaded on the ROBOT satisfy !G1-C.

(Asked by **3336** at Jan 10th 19)

## Q44 Field Element Materials - Paint

**Q:** Regarding the Team Element Shopping List, we are interested in knowing the type of white paint used for the rocket. We intend to utilize the reflective tape and want to ensure our camera can distinguish between the reflective tape and the white paint adjacent to it. Specific brand is not necessary, just the style of white paint (gloss, matte, semi-, etc.).

**A:** The ROCKET is not painted. As described in GE-19122 (and other ROCKET plastic drawings) the plastic is screen printed (it's light gray, Pantone 649C), with the screen printed side being assembled on the inside of the ROCKET. For samples of what this looks like when viewed from a camera with green LED lighting, see the vision images provided here:

<https://github.com/wpilibsuite/allwpilib/releases/download/v2019.1.1/2019VisionImages.zip>

(Asked by **4284** at Jan 10th 19)

## Q45 Robot extension at end game

**Q:** Can a manipulator that is used to lift the robot up to level 3 at the end of the game, be extended more than 30 inches once it comes to rest on the final level? Provided it does not touch anything itself.

**A:** We believe !Q40 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **4728** at Jan 10th 19)

## Q46 Throwing Hatch Panels

**Q:** Per the 2-foot limit referenced in R6 as well as the shooting limitation described in G6, a robot cannot launch a hatch panel from a significant distance. The question we are asking is what constitutes a launch of a game piece greater than 24 inches? For example: a gripping mechanism holds a hatch panel under compression and lifts to a height appropriate for scoring on the top level of the rocket then releases the compression on the hatch panel causing the hatch panel to drop to the floor. If

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **747** at Jan 11th 19)

## Q47 Plastic Bits on Hatch Panels

**Q:** In the event that bits of hook material from hook tape, or similar fasteners, are left on a hatch panel, would this qualify as damaging the hatch panel as specified in G15 - G?

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **246** at Jan 11th 19)

## Q48 Can we roll covers?

**Q:** G6 and R6 prevent launching covers using an active mechanism. Can covers be rolled along the ground (not launching in the air) either by mechanical force, or by gravity alone using a ramp?

**A:** Good question. !G6 has been updated in [Team Update 03]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate03.pdf>) to clarify that any way a ROBOT causes a HATCH PANEL to traverse across the floor is "ejecting in a forceful way." If that doesn't answer your question, please rephrase and resubmit.

(Asked by **5406** at Jan 15th 19)

## Q49 Do 8" Wheels on west coast drive violate bumper rules?

**Q:** Do 8" Wheels on west coast drive violate bumper rules? R33 states: Additionally, any gap between the backing material and the frame: B. not more than 8 in. (~20 cm) wide In order for the wheel to move, there would be a greater than 8" gap with full side bumpers.

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8]([https://frc-qa.firstinspires.org/manual/\\_Toc534739699](https://frc-qa.firstinspires.org/manual/_Toc534739699)) and, if needed, resubmit a different question.

(Asked by **1786** at Jan 10th 19)

## Q50 What level of the Habitat do the sides of the habitat count as?

**Q:** If a team were to be in contact with the side of the Habitat while meeting all of the other Habitat criteria for a tier such as level 3, would that count as a level 3 Habitat climb or would that count as a different level and if so which level would it count for.

**A:** HAB PLATFORM Levels 1, 2, and 3 (as described in [Section 4.5]([https://frc-qa.firstinspires.org/manual/\\_Toc534739707](https://frc-qa.firstinspires.org/manual/_Toc534739707))) define the starting elevation for each Level. To be credited for a Level climbed, the ROBOT must fully meet the criteria defined in [Section 5.3]([https://frc-qa.firstinspires.org/manual/\\_Toc534739724](https://frc-qa.firstinspires.org/manual/_Toc534739724)) for that Level or greater - that includes not being supported by any surfaces lower than that Level. The only surface of the HAB PLATFORM at or higher than Level 3 is the Level 3 deck/platform itself, so a ROBOT ~~in contact with~~ \*supported by\* side surfaces of the HAB PLATFORM cannot be credited with a Level 3 Climb. Instead, the ROBOT will be credited with the Level for which all of the evaluation criteria is true for, if such a Level exists. \*\*"Contact with" does not necessarily mean "supported by," and such distinctions are evaluated and scored by human REFEREES. Teams are encouraged to make sure that it's obvious and unambiguous that a ROBOT is not being supported by anything below the desired Level. (revised 1/15/19 per [Team Update 03]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate03.pdf>))\*

(Asked by **1684** at Jan 10th 19)

## **Q51 minimum age**

**Q:** What is the minimum age for the driver of a team?

**A:** There is no minimum age for members of a \*FIRST\* Robotics Competition team.

(Asked by **6510** at Jan 11th 19)

## **Q52 Climbing level 3 or 2**

**Q:** If the robot is supporting level 2 and level 3 at the same time and its bumpers are above level 3 will it consider level 3 or level 2?

**A:** We believe !Q50 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **5554** at Jan 10th 19)

## **Q53 G14. States supporting ROBOT is in contact with HAB ZONE**

**Q:** Does this mean just a portion of the supporting robot (possibly just extension) needs to be in the HAB ZONE or does the supporting robot need to be completely inside the HAB ZONE.

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **5560** at Jan 11th 19)

## **Q54 Clarification on G23**

**Q:** If we are trying to scale to Level 3 and our bumpers are within the hab zone, but a piece of metal extending out of our frame perimeter is breaking the vertical plane of the hab zone, would this be in violation of G23 if our bumpers were to go out of the bumper zone?

**A:** The last sentence of !G23 itself defines that the only metric of a ROBOT being "completely in its HAB ZONE" is the position of its BUMPERS, and not any ROBOT extension.

(Asked by **4130** at Jan 10th 19)

## **Q55 R25, G23 AND R 26 CLARIFICATION, OR CONTRADICTION?**

**Q:** R25 states that bumpers must be located entirely within the bumper zone, except as allowed by G23, which seems to indicate that bumpers may be outside the bumper zone, when the robot is fully within the HAB zone. R26, then states that bumpers may not be articulated. Does R26 still apply in the HAB zone? May bumpers be outside the bumper zone, while the robot is within the HAB zone, provided they are in the zone for the rest of the match?

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **522** at Jan 11th 19)

## Q56 Lift in Habzone

**Q:** Can a robot deploy a lift system downward from chassis (eg pneumatic pistons) to raise itself up to the next hab level? Would this be interpreted as the robot standing "Normally on the flat floor." Or would that be in violation of the 7.5" bumper zone rule (R25)?

**A:** !G23 provides an exception to !R25 if the ROBOT is "completely in its HAB ZONE."

(Asked by **5672** at Jan 11th 19)

## Q57 Q27 Battery Clarification

**Q:** I would like to confirm the response to Q27 as I read it (Q27 - Multiple batteries running compressor). I understand you cannot rule absolutely on hypothetical scenarios, but I would like to understand the Q27 reply better. If a team were to charge their air tanks (prior to a match) using the onboard compressor and a (legal) battery on the robot, are they allowed to then replace said battery with a second fully charged (also legal) battery prior to the match start?

**A:** There are no rules that prohibit this.

(Asked by **451** at Jan 10th 19)

## Q58 Sandstorm Viewing Restrictions

**Q:** Given that the HUMAN PLAYERS, COACHES, and DRIVERS are in compliance with H9 and H10, is it legal for them to view the big screen at the event during the SANDSTORM PERIOD? Will the official FIRST video crews be given specific directives about what to video or display at the venue during the SANDSTORM PERIOD?

**A:** There are no rules that prohibit this. There are no specific guidelines that will be provided to production crews with regards to the SANDSTORM PERIOD. Teams should expect that screens at events will be in variety of locations and may display any combination of full field, partial field, and zoomed-in camera shots.

(Asked by **4028** at Jan 10th 19)

## Q59 Do you have a part number and supplier for the textured HDPE material for the HAB surface?

**Q:** What is the part, material number or product and supplier for the HDPE surface material of the HAB? Where or from whom can a sample of this surface be obtained?

**A:** *FIRST* uses a local plastic supply company to source this plastic material. Teams can contact most local plastic supply companies in their area with the information listed on the drawings to source the material for their

use.

(Asked by **4121** at Jan 11th 19)

## Q60 R1 and Orientation

**Q:** Is the Frame perimeter dependent on the orientation of the robot? i.e. if a robot is orientated with bumpers perpendicular to the ground is the frame perimeter the same as if the robot was parallel to the floor?

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **3937** at Jan 11th 19)

## Q61 hook and loop fastener

**Q:** I want to make sure I am using the correct strength hook and loop fasteners to test adhesion between a hatch and a game element.

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>) for a specification of the hook tape used on the HATCHES.

(Asked by **2144** at Jan 11th 19)

## Q62 Hab Zone and Bumpers

**Q:** G23 States:Keep your BUMPERS low. BUMPERS must be in the BUMPER ZONE (see R25) during the MATCH unless a ROBOT is completely in its HAB ZONE or supported by a ROBOT completely in its HAB ZONE. A ROBOT is "completely in its HAB ZONE" if its BUMPERS are entirely between its ALLIANCE WALL and the vertical plane defined by its HAB LINE. We were hoping for a better Interpretation of this rule, would a Robot be allowed to lift its entire frame (bumpers included) off of the ground as still be legal?

**A:** Our apologies, we don't understand your question. Please rephrase, in relation to which part of IG23 needs clarity, and resubmit.

(Asked by **6004** at Jan 11th 19)

## Q63 Venturi Effect

**Q:** Under rule 84 are COTS components that utilize compressed air to create a venturi effect suction system allowed?

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6137** at Jan 11th 19)

## Q64 Rocket hook fasteners

**Q:** what exact hook fasteners are placed on the rocket?

**A:** We believe !Q61 answers your question. If it does not, please rephrase your question and resubmit.

(Asked by **1574** at Jan 11th 19)

## Q65 Use of pneumatic cylinders

**Q:** Can a team use pneumatic cylinders to lift the robot onto the Habitat 2 and 3 levels for end game activities to score points. In addition as long as some part of the robot is touching the floor of the game surface or habitat floor?

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **7056** at Jan 11th 19)

## Q66 Manipulator extension length's at end game

**Q:** We understand the rule about not extending more then 30" during the first 2 minutes of the match. We also understand that our robot cannot extend higher then 6'6" at the end of the match. Our question is: Can a manipulator extend out more then 30" past the bottom of the frame perimeter during the last 30 seconds of the match if it is used to lift the robot up to level 3? Manipulator would not be touching anything at the end of the match.

**A:** The only rule governing vertical extension from the FRAME PERIMETER after the start of the MATCH is !G12. !R4 governs horizontal extension from the FRAME PERIMETER and does not apply to vertical extension.

(Asked by **4728** at Jan 11th 19)

## Q68 G6/R6 Contradiction and Clarification

**Q:** Per Game Rule G6, it s stated "No throwing HATCH Panels", however, later on in the Robot Rules R6, it is stated "A ROBOT may not be designed to launch a HATCH PANEL more than 2 ft. (~60cm) beyond its FRAME Perimeter (Reference G6). Our assumption is that Game Rules overrule Robot Rules, but would like to confirm that it is a RED CARD to launch a HATCH PANEL.

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2410** at Jan 11th 19)

## Q69 Do G16 Violations apply regardless of who initiates contact?

**Q:** Regarding Game Rule G16, it states "Don't touch opponents' ROCKETS at the end of the MATCH." Does this

rule apply regardless of who initiates the contact with the ROCKET, or would forcing an opponent into contact with the ROCKET at T

**A:** Please see the Blue Box below !C8, specifically examples 'a' and 'd'.

(Asked by **2410** at Jan 11th 19)

## **Q70 Are human players allowed to move Game Pieces from one Holder to the other?**

**Q:** Are human players allowed to move Game Pieces from one Game Piece Holder to the other side of the Alliance Station DURING the match (Teleop period), or must the robot cross the field to the other Loading Station if there are no remaining Game Pieces in the Game Piece Holders on that side of the alliances field.

**A:** There are no rules explicitly prohibiting the movement of GAME PIECES within the ALLIANCE STATION after the start of the match (though !H9 may prevent access to some GAME PIECES during the SANDSTORM).

(Asked by **6829** at Jan 11th 19)

## **Q71 Pre-populating Game Pieces**

**Q:** (Based off of rule 5.1.1 Part F) Does that mean each team on an alliance may prepopulate 2 Game Pieces? (1 per Bay) giving the entire alliance the option to prepopulate 6 Game Pieces? (1 into each of the 6 Bays?)

**A:** That's correct. Each team is assigned 2 BAYS to prepopulate at the start of the MATCH.

(Asked by **6829** at Jan 11th 19)

## **Q72 Can a robot reach into the Rocket Port when placing Cargo?**

**Q:** Can a robot reach into the Rocket Port when placing Cargo?

**A:** There are no rules that prohibit a ROBOT from reaching into a ROCKET.

(Asked by **6829** at Jan 11th 19)

## **Q73 Is the radius shown in Figure 10-1 intentional?**

**Q:** Regarding R4, Figure 10-1 (as shown in Team Update 01) shows a radius at the vertex between two segments of the allowed 30 inch FRAME PERIMETER extension. However, there is no mention of a radius in the language of the rule. Is the radius shown in Figure 10-1 intentional?

**A:** Yes, the radius is intentional. The 30 inch measurement from the FRAME PERIMETER sweeps an arc when transitioning between adjacent edges. A sharp corner would result in a measurement greater than 30 inches away from the FRAME PERIMETER.

(Asked by **6343** at Jan 11th 19)

## **Q74 Arduino UNO**

**Q:** Can we use arduino in addition

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **7086** at Jan 11th 19)

## **Q75 R6 Enforcement**

**Q:** R6 states that a robot may not be designed to launch hatch panels >2ft. The word "designed" seems to imply specifically robots made with this capability in mind. However, the inclusion of this sort of prohibition in the robot rules as well as game rules, particularly under the "Safety & Damage Prevention" heading, seems to imply it would prohibit the incidental inclusion of this capability as well. Is an incidental launch capability prohibited on a robot? Is this part of inspection?

**A:** Yes, the use of the word "designed" in !R6 is intended to simply convey that Inspectors cannot measure all possible scenarios that may occur. ROBOTS should be designed so that they do not violate !R6 when operated, whether the violation is an intentional part of the design or not.

(Asked by **2713** at Jan 12th 19)

## **Q76 Can you grab the sides of the Level 3 HAB PLATFORM?**

**Q:** G15A-G are the rules that disallow interacting with most arena elements, but it makes an exception for parts A-D (grabbing grasping, attaching, and hanging) from the HAB PLATFORM itself Would a robot be allowed to use a pair of under 30" manipulating extension to grab the two vertical sides of the level 3 platform adjacent to the level 2 platforms in order to haul itself up onto it?

**A:** There are no rules that would strictly prohibit grabbing the HAB PLATFORM, but teams are encouraged to pay attention to the construction of FIELD elements to ensure their design will not cause damage.

(Asked by **2834** at Jan 11th 19)

## **Q77 Crossing center line and other alliance's cargo ship line to retrieve CARGO**

**Q:** Can a robot cross the center-line and the opposing alliance's Cargo Ship Line to retrieve CARGO that is on the carpet? We didn't see any such restrictions but wanted clarification

**A:** While there are no rules that explicitly prohibit ROBOTS from picking up CARGO from the opponent's side of the FIELD, there are several rules that restrict the circumstances of when and how this can be done. Be sure to carefully consider rules !G3, !G9, !G10, and !G11.

(Asked by **4048** at Jan 12th 19)

## **Q78 Do we gain game points by preloading cargo to the cargoship?**

**Q:** In the manual, it says that points cannot be gained by Null Hatch Panels. Is it the same for the cargo.

**A:** All scored CARGO (whether pre-populated or not) will earn MATCH points. Note that per [Section 5.3] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534739724](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534739724)) scores will not be updated until after the end of the SANDSTORM PERIOD and that per [Section 4.4] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534739706](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534739706)) BAY floors will tilt at the end of the SANDSTORM PERIOD to dump any CARGO not retained by a HATCH PANEL or Null HATCH PANEL.

(Asked by **7439** at Jan 12th 19)

## **Q79 Is there any size limit for items worn/held by drivers as part of the OPERATOR CONSOLE?**

**Q:** Aside from the vertical height limit of 6ft 6in, are there any restrictions on how long/far a worn or held OPERATOR CONSOLE component may be?

**A:** The Blue Box under !C10 provides general guidelines regarding tethers on OPERATOR CONSOLES, and !R100 provides additional guidance on general OPERATOR CONSOLE safety.

(Asked by **5012** at Jan 11th 19)

## **Q80 Ferrite bead noise filter**

**Q:** Per R63, a capacitor can be applied across motor leads to serve as a noise filter. Can we wrap one or two turns of the motor wires through a ferrite bead to serve the same purpose? It has been approved via Q&A in past years, and it's less prone to motor damage than soldering capacitors.

**A:** A ferrite bead does not alter the power pathway and would not be a violation of !R63.

(Asked by **1351** at Jan 11th 19)

## **Q81 Can the robot extend beyond the frame perimeter above and below the bumpers?**

**Q:** Per R4, can the robot extend beyond the frame perimeter either above the bumpers or below the bumpers, or both, during play?

**A:** There are no rules that restrict ROBOT extensions to above or below the BUMPERS.

(Asked by **3407** at Jan 11th 19)

## **Q82 Modification on wheels?**

**Q:** Is it okay to buy an off the shelf 8" Pneumatic Wheels from Harbor Freight made for a dolly? Is it against the rules to attach a hex hub and or the regular kop hubs to make them usable with the original drive chassis?

**A:** FABRICATED ITEMS, as described in [Section 10.1]([https://frc-qa.firstinspires.org/manual/\\_Toc534739745](https://frc-qa.firstinspires.org/manual/_Toc534739745)), must follow all COMPONENT rules outlined in [Section 10.4](<https://frc->

qa.firstinspires.org/manual/\_Toc534739748). Please remember, these items should be cost accounted at Fair Market Value as described in !R14.

(Asked by **6519** at Jan 11th 19)

## Q83 End of Game Extension Perimeter

**Q:** At the end of the 2:30 can any of our pieces be out side of the perimeter of the robot but still within the 30 inch extension range

**A:** There are no rules that require a ROBOT to be contained inside its FRAME PERIMETER as the MATCH ends. Nor are there rules that legislate ROBOT extensions after the MATCH has ended.

(Asked by **3336** at Jan 11th 19)

## Q84 Weight of hatch

**Q:** What is the weight of one hatch?

**A:** Openings on the ROCKET or CARGO SHIP, individually referred to as a HATCH, cannot be carried, lifted, or otherwise moved by ROBOTS and its weight is likely not useful for teams. However, if you instead wanted to know the weight of a HATCH PANEL, this information is found [here on the VEXpro Website] (<https://www.vexrobotics.com/217-6562.html#Weight>).

(Asked by **6519** at Jan 11th 19)

## Q85 Rocket dimension on side with ports

**Q:** What is the dimension across horizontally for the front piece (the side with the ports)? And are all three sides of the rocket the same in width? (as it is in height)

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. Any measurements or materials information can be derived from the [official Field Drawings] (<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), [SolidWorks' eMeasure site] ([https://frc-cdn.firstinspires.org/2019VRContent/eDrawings\\_2019Field.html?Measure=True](https://frc-cdn.firstinspires.org/2019VRContent/eDrawings_2019Field.html?Measure=True)), or other tools available on the [Playing Field page] (<https://www.firstinspires.org/robotics/frc/playing-field>).

(Asked by **6519** at Jan 11th 19)

## Q86 Does "surfaces of the HAB" include vertical surfaces?

**Q:** In section 5.3 (Scoring), one of the climbing requirements is that "the ROBOT is only supported by surfaces of the HAB at or above that level". Does this refer to only horizontal HAB surfaces (the decks) or both horizontal and vertical (walls) surfaces? Put another way, if a robot is leaning (resting) against a vertical surface of the HAB (that is not the ALLIANCE WALL), is that considered being "supported" by a surface?

**A:** Yes, the HAB Climb Bonus scoring criteria defined in [Section 5.3] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/Sections/Section05.pdf>) includes ALL surfaces of the HAB PLATFORM - both vertical and horizontal. If a ROBOT is leaning (resting) against a vertical surface of the HAB PLATFORM, it is considered being supported by a surface.

(Asked by **4048** at Jan 11th 19)

## Q87 Beginning Level Points

**Q:** In the beginning of the match during the sandstorm, can you start on the second or third level of the habitat? If so, will starting on those upper levels give you points for the game corresponding to their position, i.e. 12 for the third, 6 for the second and 3 for the first?

**A:** We believe Sections [5.1.2]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534739721](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534739721)) and [5.3]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534739724](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534739724)) answer this combination of questions. If additional clarity is needed, please rephrase and submit a new question.

(Asked by **5103** at Jan 11th 19)

## Q88 Hab Zone perimeter and end game configuration

**Q:** A. Does the robot need to be within its perimeter (start configuration) when the game ends? B. Can our robot have a protrusion below its wheels for climbing at the end of the game and count for a climb so long as the protrusion does not support the weight of the robot? C. Does the 30 inch rule apply in the hab zone also? Can we extend that thirty inches in the hab zone?

**A:** We believe !Q40, !Q45, and !Q66 answer your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **4470** at Jan 11th 19)

## Q89 Can a robot be supported by another robot fully or partially at the start of a match?

**Q:** 5.1.2 states that Teams stage their ROBOT on their HAB PLATFORM such that it is fully and only supported by HAB PLATFORM Levels 1 and 2. But 5.3 states that For purposes of assessing SANDSTORM...a ROBOT is considered to have started from, or climbed to, a HAB Level if: 2. the ROBOT is only supported by: surfaces of the HAB at or above that Level, ALLIANCE WALL, and/or another ROBOT which has climbed to that HAB Level or higher. Does that mean you can start a match supported by another robot?

**A:** [Section 5.1.2]([https://frc-qa.firstinspires.org/manual/\\_Toc534739721](https://frc-qa.firstinspires.org/manual/_Toc534739721)) defines the required ROBOT staging on the HAB PLATFORM prior to the start of the MATCH. [Section 5.3]([https://frc-qa.firstinspires.org/manual/\\_Toc534739724](https://frc-qa.firstinspires.org/manual/_Toc534739724)) strictly defines scoring for SANDSTORM and HAB Climb bonuses. Therefore, no, ROBOTS may not support other ROBOTS at the start of the MATCH.

(Asked by **5458** at Jan 11th 19)

## Q90 Defensive Parking

**Q:** Are defending robots able to park in front of a port or pickup area? If so is it a penalty?

**A:** We believe !Q14 answers part of your question, and !G13 likely answers the other half of your question. If it does not, please rephrase your question and resubmit.

(Asked by **6498** at Jan 11th 19)

## Q91 Bosch Motor 6004 Ra3.353-01

**Q:** My question is, is the gearbox attached to the old 2016 Bosch Motor 6004 Ra3.353-01 allowed if attached to the legal 6004.RA3.194.06?

**A:** There are no rules that explicitly prohibit/restrict gearboxes that can be used on the ROBOT (though others may indirectly do so like those in [Section 10.3] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534739747](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534739747)), [Section 10.4] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534739748](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534739748)), etc.). However, note that per the Blue Box below !R35, the gearbox attached to the Bosch 6 004 RA3 194-06 motor is considered integral and may not be removed.

(Asked by **1802** at Jan 11th 19)

## Q92 Pre-Loading Game Pieces on Cargo Ship

**Q:** 5.1.1 Game Pieces point F. states: Each team must prepopulate one (1) CARGO or one (1) Null HATCH PANEL ... in each of their two (2) designated CARGO SHIP BAYS... We want a bit of clarification. Must a team make the same selection for each of the two Bays, or can the two Bays have different game pieces? (i.e. can you select 1 Cargo and 1 Null Hatch Panel?)

**A:** Each Team has the option to prepopulate the same or different GAME PIECES in each of their two (2) designated CARGO SHIP BAYS.

(Asked by **857** at Jan 11th 19)

## Q93 Compressor and Vacuum Pump Internal Motor Legality

**Q:** In answering Q23, you said the motor in a vacuum pump probably won't be a legal motor. The motor inside the compressor isn't on the approved motor & actuator list in R34. Should we be concerned about the legality of the motor in our compressor? Why or why not? If not, why are the rules for a motor in a vacuum pump different than the rules for one in a compressor? (If answer to Q23 still stands, teams wishing to use a vacuum pump will have to make their own from scratch. Is this your intent?)

**A:** Please see [Team Update 02] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6241** at Jan 11th 19)

## Q94 Starting From Level 3 Then Moving down to Level 2

**Q:** Is it possible to start from HAB PLATFORM Level 3 and then move down to Level 2? Will doing this lose points?

**A:** We believe your question is answered in [Section 5.1.2]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534739721](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534739721)). If not, please rephrase and resubmit.

(Asked by **5737** at Jan 11th 19)

## **Q95 eclipse frc2019**

**Q:** Can we use eclipse at frc2019

**A:** There are no rules specifying the development environment used to create robot code. The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [\*FIRST\* Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **7086** at Jan 11th 19)

## **Q96 SANDSTORM BONUS from Level 3**

**Q:** Section 5.3 states that a SANDSTORM BONUS is awarded when "each ROBOT whose BUMPERS fully cross the HAB LINE during the SANDSTORM PERIOD. Value corresponds to the Level from which the ROBOT started." There are values for Level 1 and 2, but not for level 3. If a robot starts the SANDSTORM period on Level 3 and its BUMPERS fully cross the HAB LINE, will it be awarded a Level 2 SANDSTORM BONUS because it satisfies the requirements of starting on the HAB as described in 5.3 paragraph 4?

**A:** We believe the answer to !Q94 also answers your question. If it does not, please rephrase your question and resubmit.

(Asked by **1511** at Jan 11th 19)

## **Q97 Pneumatic Cylinder Length and Restrictions**

**Q:** Is there a limit to the size of the pneumatic cylinders we can use this year, or is there a restriction to the cylinders we can use?

**A:** There are no rules that restrict the size of pneumatic cylinders used on a ROBOT.

(Asked by **6768** at Jan 11th 19)

## **Q98 Is there a panel that prohibits how far a robot can extend into the loading station?**

**Q:** In Section 4.8.1.2 it states all the loading station dimensions including the backstops, but there are no dimensions referencing a possible wall/panel prohibiting the reach of a robot through the centre of the hatch. However, in the field CAD there is a wall shown behind the hatch panel portion of the loading station. We would like some clarification as to whether there is a wall/panel behind this part of the loading station and the dimensions of this wall if there are any.

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. Any

measurements or materials information can be derived from the [official Field Drawings] (<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), [SolidWorks' eMeasure site] ([https://frc-cdn.firstinspires.org/2019VRContent/eDrawings\\_2019Field.html?Measure=True](https://frc-cdn.firstinspires.org/2019VRContent/eDrawings_2019Field.html?Measure=True)), or other tools available on the [Playing Field page] (<https://www.firstinspires.org/robotics/frc/playing-field>).

(Asked by **771** at Jan 11th 19)

## Q99 Clarification of R6 regarding R4

**Q:** R4 states the a robot may extend up to 30 in outside the frame perimeter, R6 states that a robot may not launch a hatch more than 2ft (24 in) from the frame perimeter. Are we correct to interpret this that if, for example, robot had a mechanism protruding 12 in from the from the frame perimeter, as allowed by R4, it now can't launch a hatch more than another 12 inches as per R6?

**A:** Please see [Team Update 02]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>) which updates the distance in !R6 to 3 ft. You are correct that because !R6 is measured from the FRAME PERIMETER, designs which extend outside the FRAME PERIMETER will not be permitted to launch a HATCH PANEL as far (from the mechanism) as designs that do not.

(Asked by **4180** at Jan 11th 19)

## Q100 Compressor for tire inflation and tools

**Q:** Assuming the venue allows it from an electrical power perspective, is a small industrial compressor suitable for running tools allowed in the pits? Can the aforementioned compressor be used to inflate tires on the robot? If the venue does not allow an AC powered compressor is a battery powered inflator acceptable?

**A:** There are no rules that prohibit use of a safe, event approved compressor for pit tools or to inflate pneumatic tires per !R46 part E. There are no rules that prohibit battery powered compressors in the pit, but please contact the Regional Director or District Event contact for your particular event to learn if compressors and/or battery powered compressors are allowed at your event.

(Asked by **58** at Jan 12th 19)

## Q101 G4 Penalty

**Q:** Regarding G4, if a robot picks up a game piece and a 2nd game piece accidentally becomes lodged on the robot, can the first game piece be dropped? If so, can the stuck piece be unstuck through deliberate actions of the robot without getting a yellow card? If not, is a yellow card given if the stuck game piece comes loose during normal activities such as climbing the HAB?

**A:** Good question. Please see ~~[Team Update 03]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate03.pdf>)~~ \*\*[Team Update 04] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate04.pdf>)\*\*. If that doesn't answer your question, please rephrase and resubmit. \*(updated 1/18/19)\*

(Asked by **58** at Jan 15th 19)

## Q102 Clarification on R4

**Q:** With regard to R4, how will a violation of this rule be determined? Would a robot that has the mechanical capability to extend beyond 30" of its frame perimeter, yet never did so in a match still be in violation of this rule?

**A:** Good question. Please see [Team Update 03]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate03.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2169** at Jan 15th 19)

## Q103 R1 and Team Update 02 clarifying question

**Q:** R1 now states The ROBOT (excluding BUMPERS) must have a FRAME PERIMETER, contained within the BUMPER ZONE and established in the ROBOT'S STARTING CONFIGURATION. Does this mean a ROBOT starting within HAB ZONE may not start on some form of mechanism raising their frame and BUMPERS outside of the BUMPER ZONE even if the total height starts under 48" and in normal play the BUMPERS will be in the BUMPER ZONE? In other words the robot must start with BUMPERS between 0 and 7.5" from the floor?

**A:** Correct. In STARTING CONFIGURATION, BUMPERS must be in the BUMPER ZONE.

(Asked by **5458** at Jan 12th 19)

## Q104 Bumpers in the Hab Zone

**Q:** As per G23, bumpers must remain in the bumper volume other than when in the Hab Zone. Once in the HAB zone, can bumpers raise independently of the rest of the robot? (ie. the bumpers raise independent of the chassis)

**A:** Per !R26, BUMPERS may not be articulated relative to the FRAME PERIMETER. This does not prevent them from moving relative to what a team may consider "chassis" if that element does not actually make up the FRAME PERIMETER.

(Asked by **4932** at Jan 13th 19)

## Q105 Incidental contact of the playing surface by the hook side of hook and loop tape

**Q:** Would incidental contact of the playing surface by the hook side of hook and loop tape, which generates a resulting normal reaction force, be consider a violation of G15 and or R7? Is the intent to generate traction a requisite for enforcement of these rules?

**A:** The parenthetical text in !G15, part C, "including the use of hook tape to anchor to the FIELD carpet" includes a nod to intent. If, in the judgement of the REFEREE, the ROBOT is not attempting to "anchor to the FIELD carpet," !G15 is not violated.

(Asked by **1983** at Jan 14th 19)

## Q106 Hook Tape Leaving Debris on HATCH PANEL

**Q:** Is it possible to use hook tape for collecting hatch panels? Is it a direct violation of the newly updated Rules? If so, how is our team supposed to prove to the referee that it wouldn't leave debris on the HATCH PANEL?

**A:** There is no explicit rule against using hook tape to manipulate HATCH PANELS, though we will note that some variants of hook tape are likely to "aggressively wear" the loop tape on the HATCH PANEL and are therefore prohibited. The initial assessment of any ROBOT components that may damage GAME PIECES will be made by the Inspector, or Lead ROBOT Inspector (LRI), per !R8. If a Head REFEREE suspects a team is damaging GAME PIECES they will likely refer that team back to the LRI for re-inspection. The LRI will then re-inspect the ROBOT, likely including a demonstration of interaction with GAME PIECES.

(Asked by **5737** at Jan 13th 19)

## Q107 Min perimeter requirements

**Q:** Does R24 requirement of at least 6 inches of bumper per side from outside corner restrict the cutout opening to be at least 6 inches from each corner? Or does the entire exposed edge get covered if less than 6 inches

**A:** There is no minimum length of a FRAME PERIMETER side. Per !R24, "If a FRAME PERIMETER side is shorter than 12 in. (~31 cm), that entire side must be protected by BUMPER". However, we are concerned by your use of the word cutout, please read the Blue Box below !R1 carefully (especially the example) and review Figures 10-1 and 10-3, where the solid black outlines represent the FRAME PERIMETER, to ensure you are determining your FRAME PERIMETER correctly.

(Asked by **6344** at Jan 13th 19)

## Q108 Clarification on Q50's answer to contact with sides of platform level vs supported

**Q:** Q50 is clear if the robot is using the vertical sides of the Habitat it is considered supported below the scoring plane. Section 5.3 indicates supported by not contact with. If the robot is in contact with but obviously not using that vertical surface for support such that if the vertical surfaces was removed the robot would remain in place. Is this single point of contact still consider supporting the robot as long as nothing contacts the next lowest horizontal surface?

**A:** Good question! Please see the Blue Box added to [Section 5.3] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534986398](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534986398)) in [Team Update 03] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate03.pdf>). Contact does not necessarily mean support, but teams are encouraged to make sure it's clear to REFEREES that any contact below a Level is not supportive. If that doesn't answer your question, please rephrase and resubmit.

(Asked by **3244** at Jan 15th 19)

## Q109 10.4 Budget Constraints exception of required robot components no acquired using KOP opt

**Q:** There are many required components that all Robots MUST have. ie NI RoboRio, CTRE PDP, CTRE VRM, and OpenMesh Radio. The fair Market Values equals ~\$825. Are any of these required elements excluded from the budget Constraints?

**A:** All of the listed items are provided in the KOP and thus meet the exemption criteria in !R12-B.

(Asked by **3244** at Jan 13th 19)

## Q110 Clarification on Q14

**Q:** In the answer to Q14 you said that an opponent robot can block a hatch or cargo loading positions in front of the cargo ship or rocket, but I am looking for clarification if a robot is trying to access the area the opponent robot is blocking is that still allowed? Or is there a time limit the opponent can block access of the cargo ship or rocket from another robot with clear intentions of reaching that area?

**A:** There are no restrictions on how long a ROBOT can attempt to block a HATCH, PORT, or LOADING STATION (however note !G13 if attempting to block a LOADING STATION or !G16 if attempting to block a ROCKET). There are also no restrictions on blocking a HATCH, PORT, or LOADING STATION even if the opponent is trying to access them.

(Asked by **3536** at Jan 14th 19)

## Q111 Is the maximum protrusion from the robot cumulative?

**Q:** In Q15, you said "A ROBOT may protrude up to 30 in. from the FRAME PERIMETER from multiple sides simultaneously and remain in compliance with R4." I am looking for clarification if the 30 in. is cumulative across all sides, or if you can extend 30 in. from each side simultaneously?

**A:** Per the answer to !Q15, a ROBOT may extend from multiple sides of the FRAME PERIMETER simultaneously with all extensions being up to 30 inches each (i.e. the ROBOT could expand to occupy the entire volume shown in Figure 10-1) .

(Asked by **5229** at Jan 12th 19)

## Q112 Source for hatch GE-19153 loop material.

**Q:** Is there a source for the hatch GE-19153 loop fastener material cut to shape, available for teams to purchase? For replacement of damaged hatch loop material or hatch manufacture. If this is not Q&A applicable please give directions to correct place to ask.

**A:** No, there is no source provided for cut HATCH PANEL fastener material.

(Asked by **3461** at Jan 12th 19)

## Q113 Throwing Hatch as projectile motion

**Q:** Rule G6 and R6 allow the HATCH to become a projectile. The specification of a 3 foot horizontal distance from FRAME PERIMETER is potentially ambiguous: 1. What height is the projectile launched from before striking the ground? 2. If the HATCH as a projectile, instead of assuming it strikes the ROCKET at Tier 3, was allowed to travel unimpeded without striking the ROCKET, it would certainly travel farther if shot from 72". 3. A mechanism on a robot capable of such a misfire would be dangerous.

**A:** Inspectors will work with the team to identify the "worst case" scenario, i.e. the ROBOT'S configuration at which it would furthest shoot a HATCH PANEL and measure to make sure it doesn't violate R6.

(Asked by **2028** at Jan 14th 19)

## Q114 Definition of nominal flow rate R86

**Q:** Rule R86 states that compressor specifications must not exceed nominal 1.10 CFM flow rate---there is no indication at what PSI this nominal rating indicates. Please advise.

**A:** The lack of specification of a PSI indicates that compressor cannot exceed this flow rate at any PSI.

(Asked by **2197** at Jan 13th 19)

## Q115 Driver using First Person View Headset (FPV)

**Q:** Can the driver use a FPV headset to drive the robot during the sandstorm or entire match? and if yes is there a brand limitation or cost?

**A:** We cannot comment on specific part/design legality. There is no \*specific\* prohibition against headsets as part of the OPERATOR CONSOLE, though they may not impede the ability to wear safety glasses and also be able to see the wearer's eyes (per !E02), cause a hazardous situation for the wearer or those near the wearer, or violate any other rules that apply to items brought to and used in the ARENA. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **7231** at Jan 14th 19)

## Q116 RG23, May a bumper change position when in the HAB ZONE?

**Q:** When in the HAB ZONE,(and only in the HAB ZONE) Would " Example 2: A ROBOT deploys a MECHANISM which lifts the BUMPERS outside the BUMPER ZONE (when virtually transposed onto a flat floor). This violates R25." Given G23, would this violate R25 IF the robot is FULLY within the HAB ZONE. We realize that it DOES violate R25 as the example states, OUTSIDE of the HAB ZONE. G23 seems to allow for this WITHIN the HAB ZONE. Please clarify if possible. THANKS!

**A:** Please see [Team Update 03] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate03.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **522** at Jan 15th 19)

## Q117 Climb HAB before end game?

**Q:** Are teams allowed to climb the HAB prior to End Game?

**A:** There are no rules that govern when ROBOTS may begin climbing the HAB PLATFORM. With that said, however, be sure to review [Section 5.3]([https://frc-qa.firstinspires.org/manual/\\_Toc534739724](https://frc-qa.firstinspires.org/manual/_Toc534739724)) to understand all of the scoring requirements for each HAB Climb Bonus.

(Asked by **2543** at Jan 15th 19)

## Q118 Portable Charger for Laptop

**Q:** Are DRIVERS allowed to have Portable Chargers for their laptops in the DRIVERS STATION?

**A:** There are no rules that specifically prohibit portable chargers for devices that are part of the OPERATOR CONSOLE (don't forget about the 2A 120V outlet available that's described in [Section 4.8.1] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534986385](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534986385))) provided they don't pose a safety risk to the user or those nearby.

(Asked by **3242** at Jan 14th 19)

## Q119 Can we use stepper motors?

**Q:** We want to use step motor with a FIRST Choice part(<https://www.firstchoicebyandymark.com/fc-rld-20-s-38-lc>). But stepper motors aren't in the allowed motors list? If we can't use step motors why is this part distributed on FIRST Choice?

**A:** Correct, stepper motors are not legal. Teams are invited to use the referenced item with motors listed in Table 10-1.

(Asked by **7439** at Jan 14th 19)

## Q120 Restrictions on rule R4

**Q:** For rule R4, if the robot is on its side and the bumpers are perpendicular to the floor how is R4 measured then, on the X plane or Y plane? (for example if the robot height is over 30 inches, and it falls on its side is considered to have broken R4?)

**A:** As per [Team Update 02] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>), the FRAME PERIMETER is established when the ROBOT is in its STARTING CONFIGURATION (see updated !R1). The established FRAME PERIMETER translates with the ROBOT as the ROBOT changes orientation. If the BUMPERS are perpendicular to the floor (and completely within the HAB ZONE), horizontal extensions are measured in the Y plane (vertical plane) and height is measured in the X plane (horizontal plane) with respect to the floor.

(Asked by **5032** at Jan 15th 19)

## Q121 5.1.1 E and F clarification

**Q:** Does the additional Game pieces mentioned in 5.1.1 E and F , The Cargo and Null Hatch Panels that will populate the cargo ship, count against the 24 Hatch Panels and 24 Cargos mentioned at the beginning of 5.1.1? So for instance, if an alliance chose to fill their cargo ships during preload with only cargo are there 32 cargo pieces in play on that side or still 24?

**A:** Great Question! The additional GAME PIECES mentioned in [Section 5.1.1]([https://frc-qa.firstinspires.org/manual/\\_Toc534739720](https://frc-qa.firstinspires.org/manual/_Toc534739720)) Parts E and F are in addition to the 24 HATCH PANELS and 24 CARGO mentioned in [Section 5.1.1]([https://frc-qa.firstinspires.org/manual/\\_Toc534739720](https://frc-qa.firstinspires.org/manual/_Toc534739720)) A thru D. Therefore, if all three Teams in an ALLIANCE choose to preload CARGO into all BAYS of the CARGO SHIP, there would be 32 CARGO available on the ALLIANCE'S side of the ARENA.

(Asked by **4180** at Jan 15th 19)

## Q122 rules on 5ghz wireless access point

**Q:** Are we allowed to use a low power 5ghz wireless access point for our scouts to use as it would not interfere with the robots running on the 2.4ghz spectrum. Sources for info. <https://www.fcc.gov/document/5-ghz-unlicensed-spectrum-unii> <https://www.fcc.gov/news-events/blog/2015/02/23/driving-wi-fi-ahead-upper-5-ghz-band>

**A:** No. This is prohibited per !E12.

(Asked by **537** at Jan 14th 19)

## Q123 Two robots on level 3 at end game

**Q:** If 2 robots pass the criteria for scoring on the level 3 platform (bumpers over and the robot is supported by only the platform or another robot on the platform) is the alliance awarded points for both robots being on level 3 (ending in 24 parking points)? Or is there a maximum of one robot per hab platform (ending in 12 parking points)?

**A:** There is no limit to the number of ROBOTS that can earn a HAB Climb Bonus on each Level (beyond the maximum number of ROBOTS on an ALLIANCE, of course).

(Asked by **6443** at Jan 15th 19)

## Q124 Does a robot have to be supported by the top of a HAB platform to be scored as such?

**Q:** If a robot's bumpers are completely above the HAB level 3 platform, but the robot is supported by arms or "clamps" attached to the side of the platform (below the horizontal plane of the top piece of the level 3, but above the vertical plane on the level 2 platform), is the robot considered on level 2 or 3 for endgame scoring?

**A:** We believe !Q50 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **498** at Jan 14th 19)

## Q125 vertical downward protrusion

**Q:** Is there any rule for vertical protrusion underneath the robot at the end of the match for climbing so long as that the protrusion does not support the robot at the end of the match?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. However, please be sure to review !G23, and if you have questions about specific rules please rephrase your question and resubmit.

(Asked by **4470** at Jan 14th 19)

## Q126 R24 Clarifying Question

**Q:** Rule R24 states: ROBOTS are required to use BUMPERS to protect all outside corners of the FRAME PERIMETER. According to R1, Minor protrusions no greater than ¼ in. (~6 mm) such as bolt heads, fastener ends, weld beads, and rivets are not considered part of the FRAME PERIMETER. Does this mean that a

protrusion less than 1/4in that forms a small corner (such as a gusset) needs to be protected by a bumper per the bumper rules?

**A:** A gusset is not considered a minor protrusion with respect to !R1.

(Asked by **321** at Jan 15th 19)

## Q127 End Game Frame Perimeter

**Q:** Last year the maximum extension from frame perimeter did not apply during endgame. I cannot find any specific exclusion or exception in this year's manual. Can we extend more than 30" past our frame perimeter while on the HAB station during the endgame?

**A:** No. Please see !Q40 for further clarification.

(Asked by **7327** at Jan 14th 19)

## Q128 Definition of Fair Market Value for BOM

**Q:** If we purchase an item from a website like Ebay at a price significantly lower than the original vendor's price, what price are we supposed to list in our BOM? Do we list the amount that we acquired the item for, or do we list the price that the item costs if purchased from the original vendor? R14 says that we need to include the Fair Market Value of each item, but there is no definition of Fair Market Value or an example in the blue box that discusses purchasing items at a discount.

**A:** Good question. Please see [Team Update 03]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate03.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6241** at Jan 15th 19)

## Q129 Driver controller contact and match timing?

**Q:** Can any part of the drivers' body be in contact with parts of the operator console at or before match start (T-150s) and at or after match end (T-0s)?

**A:** There are no rules that prohibit DRIVER contact with parts of the OPERATOR CONSOLE before or after a MATCH.

(Asked by **900** at Jan 14th 19)

## Q130 Determining Violations of R6

**Q:** R6 states that a robot should not be able to launch Hatch Panels farther than 2 ft. from its Frame Perimeter. Also stated is that this will be measured with a stationary robot from where the Hatch Panel first contacts the ground to the robots Frame Perimeter. My question is: say a team designed a robot which places Hatch Panels at the highest level of the Rocket, will it be required to demonstrate that its robot does not violate R6 from its maximum height?

**A:** We believe !Q113 answers your question. If it does not, please rephrase your question and resubmit. Please

use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **3339** at Jan 14th 19)

## Q131 Clarification on 5.1.1 E and F in regard to Null Hatches

**Q:** Per 5.1.1 E there are two cargo pieces loaded in the cargo bays facing the player station, and per F each member of the alliance may load a null hatch panel or cargo into to any two bays . Based on F, we are assuming that if a cargo is preloaded into a bay, a team may not place a null hatch panel over that piece and leave another bay empty and that preloaded cargo in the cargo ship can only be sealed in with a hatch panel during the course of the match, including the cargo in front facing bays

**A:** Your interpretation of Section [5.1.1 part E]([https://frc-qa.firstinspires.org/manual/\\_Toc534739720](https://frc-qa.firstinspires.org/manual/_Toc534739720)) is correct, but your interpretation of part F is incorrect. Each Team is designated two (2) BAYS on the CARGO SHIP that they are allowed to preload, see [Figure 5-2]([https://frc-qa.firstinspires.org/manual/\\_Toc534739720](https://frc-qa.firstinspires.org/manual/_Toc534739720)) for the Team/BAY assignments. [Section 5.1.1 part F]([https://frc-qa.firstinspires.org/manual/\\_Toc534739720](https://frc-qa.firstinspires.org/manual/_Toc534739720)) allows a Team to place either a Null HATCH PANEL or a CARGO into each of their two designated BAYS; exactly one (1) GAME PIECE must be preloaded into each BAY - combining GAME PIECES into a single BAY is not allowed.

(Asked by **4180** at Jan 14th 19)

## Q132 Clarification on the rules for extending outside the field at the loading station

**Q:** How far can robots legally reach outside of the field to grab a hatch panel from the loading station?

**A:** There is no rule that prevents ROBOTS from extending beyond FIELD boundaries (note, per [Section 4.1]([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534986377](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534986377)), inward-facing surfaces of the ALLIANCE WALLS are part of the FIELD). Contact with anything outside the FIELD, except brief incursions inside the CARGO Chute, is prohibited per !S5. Measurements can be derived from the [official Field Drawings](<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), [SolidWorks' eMeasure site]([https://frc-cdn.firstinspires.org/2019VRContent/eDrawings\\_2019Field.html?Measure=True](https://frc-cdn.firstinspires.org/2019VRContent/eDrawings_2019Field.html?Measure=True)), or other tools available on the [Playing Field page](<https://www.firstinspires.org/robotics/frc/playing-field>).

(Asked by **1816** at Jan 14th 19)

## Q133 Use of Audience Displays during the Sandstorm Period

**Q:** Given that it is legal to view the field from the Audience Display, per Q58, what will happen if drive teams attempt to view the field using the Audience Display during the SANDSTORM PERIOD? Is this considered a violation of H10? If not, what will happen at events where the display is visible from one ALLIANCE STATION, but not the opposing ALLIANCE STATION?

**A:** As specified in !Q58, there is no penalty for looking at the Audience Display during the SANDSTORM PERIOD. There are no guarantees that the information on the Audience Display will be helpful, timely, or even easily visible to teams during this period.

(Asked by **6352** at Jan 14th 19)

## Q134 Hatch Game Piece Loop Fastener Color

**Q:** Will all competition hatch game pieces be equipped with white loop fastener material only or will black loop fastener material be used as well? Should one anticipate a mixture of hatch game pieces, some with white and some with black loop fastener material during competition?

**A:** All loop tape used on HATCH PANELS in competitions will be white 3M™ Fastener SJ3571 loop tape (PN 70070457349), as indicated in [Section 4.9.2] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534986389](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534986389)).

(Asked by **4415** at Jan 15th 19)

## Q135 Can we use an Air Cylinder that can extend twice?

**Q:** Can we use an air cylinder that can extend twice? Although I am pretty sure that there is no explicit rule against doing this, I was asked by my team members to make sure.

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] ([https://frc-qa.firstinspires.org/manual/\\_Toc534739699](https://frc-qa.firstinspires.org/manual/_Toc534739699)) and, if needed, resubmit a different question.

(Asked by **5737** at Jan 14th 19)

## Q136 R89 Air Tanks

**Q:** In regards to R89 and Q31, is it safe to interpret there are no regulations on the size of air storage tanks allowed? We are looking at a 1 gallon storage tank.

**A:** There are no rules that restrict the amount of compressed air storage allowed on a ROBOT. We cannot comment on part/design legality. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **3179** at Jan 15th 19)

## Q137 Technician Rules & Regulations

**Q:** Where is the technician allowed to stand during the match, and can he communicate with rest of his drive team during sandstorm & teleop?

**A:** The TECHNICIAN will stand in the event designated location as described in [Section 5.1.3] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc534986396](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc534986396)) and !H2-B. Per !H13, the TECHNICIAN may not coach or use signaling devices during the MATCH.

(Asked by **195** at Jan 15th 19)

## Q138 FTC motors legal in FRC

**Q:** (R37)I understand the reason that to make it easier for inspection that the number of legal motors was limited

this year. The AndyMark NeverRest motor is, of course, popular in FTC. The MATRIX motors are also used by GoBilda and because it is the same motor was ruled legal in FTCI. <https://ftcforum.usfirst.org/forum/tech-challenge-rover-ruckus-presented-by-qualcomm/robot-inspection-and-build-rules-aa/robot-electrical-parts-and-materials/65388-motors-and-servos-answers> . Can you provide guidance?

**A:** No, motors not listed in Table 10-1 in !R34 are not legal for use.

(Asked by **7152** at Jan 15th 19)

## **Q139 Inclusion of ALIGNMENT LINES and Rule R9**

**Q:** Would the inclusion of line markings on the robot, identical in material and width to the ALIGNMENT\_LINES (4.2), violate R9.c. "Any devices or decorations specifically intended to jam or interfere with the remote sensing capabilities of another ROBOT, ... targets described in the Vision Targets section)", provided they were used for the purpose of alliance robot alignment strictly in the HAB zone?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. The inclusion of markings that mimic ALIGNMENT LINES (or other vision target) may or may not interfere with other teams' ROBOTS at your event. If it does, you will be required to modify the design such that it doesn't.

(Asked by **1757** at Jan 15th 19)

## **Q140 Bumpers Moving when in Hab Zone**

**Q:** Since R26 states that bumpers may not be articulated relative to the frame perimeter, would it be legal to have the bumpers mounted on an articulating arm which extends from somewhere inside the chassis and keeps the bumpers fixed around the frame perimeter and within the bumper volume until the end game, when the robot reaches the Hab Zone? At this point the articulating arm would raise the bumpers outside of the frame perimeter.

**A:** BUMPERS that articulate relative to the FRAME PERIMETER violate !R26, which does not have an exception for a ROBOT inside its HAB ZONE.

(Asked by **4932** at Jan 15th 19)

## **Q141 Can Anderson Powerpole products be used to connect electrical instead of butt connectors?**

**Q:** Are teams allowed to use Anderson Powerpole connectors for connections between motor controllers and motors as opposed to crimping butt connectors?

**A:** There are no rules requiring the use of crimping butt connectors. Please see !R61 for restrictions on electrical connectors in branch circuits.

(Asked by **6188** at Jan 15th 19)

## **Q142 Programming vs Mechanical limitations**

**Q:** There is a rule saying that no part of the robot may extend over 30" past the edge of the robot's bumper. Is it

within the rules if we build a claw that is mechanically able to extend 35" past the edge of the bumper, but limit it through programming code to never go over 30" past the edge of the bumper?

**A:** Your interpretation of !R4 is incorrect, the ROBOT'S BUMPER and the ROBOT'S FRAME PERIMETER are not the same. However, Please see [Team Update 03] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>), specifically the updated language in the !R4 Blue Box. If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6969** at Jan 16th 19)

## Q143 picking up hatch covers with vacuum cups

**Q:** Is it permissible to use a pneumatic venturi to generate vacuum for a vacuum cup to pick up Hatch covers

**A:** Please see [Team Update 02] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate02.pdf>), specifically the updated !R84 part M. If that doesn't answer your question, please rephrase and resubmit after reviewing [Section 1.8] ([https://frc-qa.firstinspires.org/manual/\\_Toc534739699](https://frc-qa.firstinspires.org/manual/_Toc534739699)).

(Asked by **3773** at Jan 15th 19)

## Q144 Hatch GE-19153 loop drawing incorrect.

**Q:** The Hatch GE-19153 Loop, Panel drawing is not the same as the hatches supplied in the KOP, as well as the replacement items supplied by VEX. Could you release the updated drawing.

**A:** Oops! Sorry about that, and thank you for your patience. The drawing package and CAD models have been updated in [Team Update 06] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate06.pdf>) to include the correct cut pattern for the HATCH PANEL'S loop tape.

(Asked by **3461** at Jan 25th 19)

## Q146 G4 YELLOW CARDS

**Q:** Does the G4 YELLOW CARD for releasing all controlled GAME PIECES apply as soon as a ROBOT simultaneously controls greater than one (1) GAME PIECE, or only after after a ROBOT incurs a YELLOW CARD for simultaneously controlling greater than two (2) GAME PIECES? For example, if a ROBOT controls two (2) GAME PIECES at one time and then releases them both (not necessarily simultaneously) over the remaining course of the match, does this incur a YELLOW CARD?

**A:** ~~There are two independent circumstances in which a team can receive a YELLOW CARD once !G4 has been violated. One is if they control more than two GAME PIECES at a time. A second opportunity for a YELLOW CARD is if all GAME PIECES are released from the ROBOT during the MATCH (not necessarily simultaneously), so that at some point it controls no GAME PIECES. Depending on how !G4 is violated (by controlling 2 GAME PIECES or by controlling 3+ GAME PIECES) and what happens after the violation (does the ROBOT release them all?), a team may receive 0, 1, or 2 YELLOW CARDS.~~ \*\*Please see [Team Update 04] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate04.pdf>). If that doesn't answer your question, please rephrase and resubmit.\*\* \*(updated 1/18/19)\*

(Asked by **623** at Jan 16th 19)

## Q147 Inner Diameter Sizing for Pool Noodles

**Q:** Per rule R31-C, bumpers must be constructed using 2.5" outer diameter (nominal) pool noodles. Are there any restrictions on the maximum inner diameter the pool noodle can have?

**A:** There's no maximum inner diameter specified in the rules, however please see [Team Update 04] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate04.pdf>), which prevents teams from modifying an inner diameter. If that doesn't answer your question, please rephrase and resubmit.

(Asked by **1923** at Jan 18th 19)

## Q148 Programming vs Mechanical limitations in regard to launching HATCH PANELS

**Q:** Q142 asks about code limiting mechanical capability and the same logic extends to HATCH PANEL throwing. Robots must not be designed to shoot HATCH PANELS 3ft beyond the frame perimeter per R6. If the robot has the possibility of allowing the HATCH PANEL to travel 3ft beyond the frame perimeter mechanically, yet due to the use of sensors and programming the robot is designed to never launch a HATCH PANEL unless there's a HATCH within 3ft so that G6 is never violated, does this still violate R6?

**A:** Software limits are part of the design of the ROBOT and may be used to satisfy !R6. Make sure to be prepared to explain to Inspectors how your ROBOT complies with !R6 and demonstrate any associated software/systems.

(Asked by **2990** at Jan 17th 19)

## Q149 R9 m - Military Grade or Self Defense

**Q:** Rule R9 m states "High intensity light sources used on the ROBOT (e.g. super bright LED sources marketed as 'military grade' or 'self-defense') may only be illuminated for a brief time while targeting and may need to be shrouded to prevent any exposure to participants" The lights on the new Limelight are very intense, do these fall into R9? Would these need to be turned off when vision is not actively in use?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. We strongly recommend you err on the side of caution and expect to be asked to turn bright lights off when not in use or shroud from FIELD STAFF and audience members.

(Asked by **4910** at Jan 17th 19)

## Q150 Placing a Hatch Panel While Cargo is Rolling Out G4

**Q:** Does a robot preventing a cargo from rolling out of an unhatched rocket port by covering the port with itself count as having extended or repeated control of a game piece as per G4?

**A:** Please see [Team Update 04] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate04.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **11** at Jan 18th 19)

## Q151 Is it allowed to use EcoFlex Rubber?

**Q:** Can we use Ecoflex rubber (platinum-catalyzed silicon) for gripper purposes?

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **7439** at Jan 16th 19)

## Q152 Sticking Objects to the Glass

**Q:** Does the sandstorm screen drop down in the driver area or on the other side of the glass? Can we still stick objects to the glass? For example sticking a monitor to the glass?

**A:** The SANDSTORM shutters are raised and lowered on the FIELD side of the PLAYER STATION. !G15 Part C prohibits teams from attaching to the FIELD (barring exceptions defined in !G15).

(Asked by **6768** at Jan 16th 19)

## Q153 Fair Market Value

**Q:** Follow up question to Q128 and the Update to R4 in Team Update 3: If a team purchases a damaged COTS computing device for a reduced rate that can be verified by multiple vendors at the same price point (say, \$400) and a replacement for the damaged component for \$100, is the Fair Market Value of that device the sum of its individually purchased components or the value of a complete and working device?

**A:** The Fair Market Value of a device is the value as procured from and defined by the VENDOR, i.e. there's no need to equate it to a comparable item in brand new condition (please note !R13).

(Asked by **4028** at Jan 17th 19)

## Q154 Clarification of Example 3 on R14

**Q:** The example states that special discounts are being given out to FIRST teams by NI and "other FIRST suppliers." Nvidia has a education discount on their Jetson TX2 that is attainable by all FRC teams due to FRC teams being an educational program. I am wondering if Nvidia qualifies as "other FIRST suppliers," and we can use the discounted price on our BOM if we purchase the board through the discount? Thank You!

**A:** Yes, VENDOR discounted pricing provided to all *FIRST* Robotics Competition teams may be reflected on your BOM.

(Asked by **5927** at Jan 16th 19)

## Q155 Opposing Team Loading Station

**Q:** Is there a rule preventing a Red Alliance robot from taking hatch panels from the Blue Alliance's loading station on their side of the arena, which is in their Hab Zone? I understand only one Red robot can be on the Blue side at a time.

**A:** There are no rules that restrict from which LOADING STATION a ROBOT can retrieve GAME PIECES.

(Asked by **379** at Jan 16th 19)

## Q156 Meeting R6 with either hardware or software

**Q:** According to R4, both hardware and software constraints are satisfactory solutions to meeting R4. Using that same logic, would both hardware and software solutions be satisfactory ways of preventing a robot from launching a hatch panel further than 3 feet in competition, and in doing so complying with R6?

**A:** We believe !Q148 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **1241** at Jan 17th 19)

## Q157 Hatch Panels Placed in Cargo Bays

**Q:** Is there a rule preventing an alliance from placing hatch panels into any of the cargo bays of the cargo ship during a match?

**A:** Please see !G8.

(Asked by **379** at Jan 16th 19)

## Q159 Pressurized pneumatics

**Q:** If we have two back to back matches, can we leave our pneumatics system pressurized or do we have to empty the system and then repressurize?

**A:** There are no rules that require a team release any stored air between matches provided that the ROBOT can be safely transported as needed while pressurized.

(Asked by **7222** at Jan 16th 19)

## Q160 Vacuum pump legality

**Q:** Would it be legal to use a KOP motor to drive two unmodified Bimba pneumatic cylinders to generate suction? I don't believe the answers to 18, 23, 93, and 143 answer my question.

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Generally, if a system only generates a vacuum, and not positive pressure, it would qualify as not being a pneumatic component per part 'a' of the Blue Box below !R84; pneumatic rules would not apply, but all other rules would need to be followed. If the device does create stored air pressure as part of it's operation, it would be a pneumatic component and all pneumatic rules in [Section 10.9]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc535335857](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc535335857))

would apply.

(Asked by **5115** at Jan 17th 19)

## Q161 How many human players are behind the drivers station?

**Q:** Will a human player from each alliance team be allowed behind the drivers station (3 human players), or will it only be two (one for each loading station)?

**A:** Each team is entitled to the DRIVE TEAM members detailed in Table 5-3 in [Section 5.5] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc535335830](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc535335830)).

(Asked by **195** at Jan 17th 19)

## Q162 R37: Electromagnet usage in FRC

**Q:** Our team is considering use of a small electromagnet in our robot design. Does R34 or R37 cover this device? An electromagnet is an electric solenoid, but is not an actuator. If R34 applies, it will have to meet the 10 W/12V requirements of an electrical solenoid actuator. If R37 applies, it would fit under "Electric Solenoid" or "Custom Circuits". In which case it must be "low load". However, there is no definition of "low load" that we can find. Advice appreciated!

**A:** An electromagnet that operates without causing readily discernible motion would not be considered an actuator and would therefore not need to meet the requirements of !R34. Such a device would be considered a CUSTOM CIRCUIT, and must follow all the rules required of that classification. Load generally refers to the power consumption of a component or circuit, and the sum of all loads being supplied power by a power regulating device (where applicable per !R37) cannot exceed the limits set by !R59.

(Asked by **5985** at Jan 17th 19)

## Q163 Cargo inflation

**Q:** Is there any standard on the diameter of the ball? How much can the diameter vary? And how is this diameter being ensured?

**A:** [Section 4.9.1]([https://frc-qa.firstinspires.org/manual/\\_Toc534739714](https://frc-qa.firstinspires.org/manual/_Toc534739714)) was updated in [Team Update 01] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate01.pdf>). If that doesn't answer your question, please rephrase and include references to rules that you need more clarity on.

(Asked by **4470** at Jan 17th 19)

## Q164 Clarification on S6

**Q:** S6 states "Drive teams May not extend any body part into the cargo chute. Momentary encroachment into the chute is an exception to this rule". We were wondering if we could get some clarification on what is meant by momentary contact. For example, if a human player were to quickly reach their hand into the chute and back out, would this violate S6?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. The intent of !S6 is to prevent DRIVE

TEAM members from getting hurt, but make exceptions for minor (i.e. probably not dangerous) infractions that invite "nuisance" penalties.

(Asked by **2607** at Jan 18th 19)

## Q165 Does tipping violate G23?

**Q:** If a robot is outside either HAB zone and tips over (unintentional or intentional), does this violate G23? Example 1 from R25 makes me believe this would NOT be a violation of G23.

**A:** No, a simple change in orientation of a ROBOT does not itself violate !G23 - as the first example in the Blue Box under !R25 demonstrates.

(Asked by **1076** at Jan 21st 19)

## Q166 Does Windows Sucker count as attaching

**Q:** So we are planning to use windows suckers on our robot to carry hatch panels one place to another but we have doubts about if its counted as grabbing the game piece or attaching to game piece

**A:** We cannot comment on part/design legality. However, please note the exclusion for GAME PIECES in the rule of !G15.

(Asked by **6025** at Jan 18th 19)

## Q167 Throwing Cargo

**Q:** Can we throw cargo into the designated area? If so, how far can we throw it?

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **6768** at Jan 21st 19)

## Q168 G4,"repeated control"

**Q:** G4: If a robot has control of a hatch panel (A) and a cargo piece (B) becomes lodged in the Robot, that's a foul. If the robot then releases A, and gains control of a new hatch panel C, is that a second foul? Or is that "repeated control" and just part of the original foul? Does "release" as used in G4 mean "loses control"? E.g., if a cargo piece is lodged in a robot, the robot tips over accidentally and the cargo piece rolls out, has it been 'released' (potentially incurring a yellow card)?

**A:** Please see [Team Update 04] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate04.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **5607** at Jan 18th 19)

## Q169 G4 Yellow Cards further clarification

**Q:** I did not find the answer to Q146 to be clear enough and am requesting further clarification (since we are dealing with Yellow and Red cards here). "If ROBOT releases all GAME PIECES, YELLOW CARD". Does this trigger at a minimum possession of 2 or 3 game pieces? The order of the current violation-text makes me think 3 game pieces, but the Q146 answer sounds more like 2 game pieces. Which is it?

**A:** Please see [Team Update 04]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate04.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **1076** at Jan 18th 19)

## Q170 Vacuum Storage

**Q:** Is storage of vacuum on the robot allowed? It would not really be pneumatic storage by the usual definition. Of course, the vacuum pump would need to comply with the requirements (like an allowable motor).

**A:** There are no rules that specifically prohibit storage of air under negative pressure.

(Asked by **3049** at Jan 18th 19)

## Q171 Level 1 Deck

**Q:** In reference to the level 1 deck and ramp, does the 3ft deep include the 11.5" ramp? Or, is the deck alone 3ft deep plus the 11.5" ramp?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. Any measurements or materials information can be derived from the [official Field Drawings] (<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), [SolidWorks' eMeasure site] ([https://frc-cdn.firstinspires.org/2019VRContent/eDrawings\\_2019Field.html?Measure=True](https://frc-cdn.firstinspires.org/2019VRContent/eDrawings_2019Field.html?Measure=True)), or other tools available on the [Playing Field page] (<https://www.firstinspires.org/robotics/frc/playing-field>).

(Asked by **6573** at Jan 18th 19)

## Q172 What qualifies as a Hydraulic Fluid?

**Q:** Would Mineral Oil or non-water based substances be considered a Hydraulic Fluid in relation to R9.G?

**A:** As per [Miriam-Webster Dictionary] (<https://www.merriam-webster.com/dictionary/hydraulic%20fluid>) a hydraulic fluid is a fluid, usually of low viscosity (as oil or glycerol but seldom water), used in a hydraulically operated mechanism. If said liquids are instead being used as a lubricant, they must adhere to !R11.

(Asked by **6711** at Jan 18th 19)

## Q173 Loading Station Dimensions

**Q:** 4.8.1 notes "A CARGO dropped into the chute falls out the FIELD side of the LOADING STATION through a 1ft 2.25 in long square hole . . .). The CAD file appear to show this hole as 13.75" square. What is the correct

answer?

**A:** We suspect the discrepancy you describe is because of the way the smaller dimension was attained. The cutout is as specified in the drawings (with a 1 ft. 2 1/4 in. opening), but it has filleted corners. The length of each edge is 1 ft. 1 3/4 in., which excludes the fillets.

(Asked by **620** at Jan 20th 19)

## **Q174 During sandstorm, will the field tell the robots to be in Autonomous or Teleop mode?**

**Q:** During sandstorm, will the field tell the robots to be in Autonomous or Teleop mode?

**A:** The mode transitions for 2019 matches are documented in the [New for 2019!]  
([http://wpilib.screenstepslive.com/s/currentCS/m/getting\\_started/l/1028812-new-for-2019](http://wpilib.screenstepslive.com/s/currentCS/m/getting_started/l/1028812-new-for-2019)) document on Screensteps under Game Specifics.

(Asked by **3142** at Jan 19th 19)

## **Q175 Cargo Placement**

**Q:** Can a Red alliance robot place cargo into the Blue alliance's cargo ship bays? Would this be a violation of G8?

**A:** Provided that the challenge associated with scoring GAME PIECES in other BAYS is not eased or amplified, placing CARGO into an opposing ALLIANCE'S CARGO SHIP BAYS (e.g. to get it off the floor) would not be a violation of !G8.

(Asked by **379** at Jan 19th 19)

## **Q176 Battery Cable Lengths**

**Q:** In rule R5B, does the 12" include/exclude the wire inside the crimps of the Anderson SB battery terminal and battery lugs?

**A:** The 12" of cable allowed per !R5-B is measured as the insulated cable between the Anderson battery terminal and the battery lugs.

(Asked by **2604** at Jan 20th 19)

## **Q177 LabView Registration**

**Q:** Can you tell me where to find the serial number for our team so we be able to install Labview?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **6667** at Jan 19th 19)

## Q178 BOM Cost for Grown Parts

**Q:** Per I1, the ROBOT includes the BUMPERS, and per R12, the BOM consists of all items on the ROBOT (granting exceptions). As a service project, one of our members planted seeds that have now become trees, if we wish to use the wood from the trees after cutting and planing to create our BUMPERS, is it acceptable to account for the cost of the seed as the fair market value of the wood? R15 allows bumpers to be created prior to kickoff.

**A:** Per I14, you will need to consider both raw material and labor to determine Fair Market Value of the wood, though labor done by team members does not count. In this specific instance, labor was done both by team members and Mother Nature, who surely had a hand in developing the seed into a tree. A clever team will consider Mother Nature to be a team member, sidestepping the issue of valuing her work, which a reasonably astute observer would correctly identify as priceless, making your robot worthy of adoration, but unworthy of passing inspection per I12

(Asked by **900** at Jan 19th 19)

## Q179 HATCH PANEL between two HATCHES

**Q:** It appears physically possible to attach a HATCH PANEL so that it's contacting the hook and loop of 2 ROCKET HATCHES. How would that be scored? Can it count at the HATCH PANEL for 2 BAYS? What if a second HATCH PANEL is attached between the same HATCHES, but on the other side?

**A:** The HATCH/BAY which a HATCH PANEL is scored on will be assessed by the Official Scorer responsible for scoring that FIELD element. If two HATCH PANELS are scored between two HATCHES, one would be assigned to each HATCH.

(Asked by **7510** at Jan 21st 19)

## Q180 Should we expect cargo to be outside of the 13in +- 1/2 tolerance?

**Q:** Per section 4.9.1 Each CARGO is an orange 13-in. (~33 cm)  $\pm 1/2$  in. (~1.2 cm) diameter rubber playground ball. Your answer at Q1 states CARGO will be inflated to a size specification. How strongly will this be enforced during competitions will there be some device for referees and volunteers to assure Cargo size will fall in this range? Should teams expect all cargos to be within this tolerance at all times? Or should teams consider size changes outside this parameter

**A:** Event volunteers will be making their best effort to ensure that all GAME PIECES are functional and within specified tolerances. Having said that, GAME PIECES that start within tolerance may drift out of tolerance over the course of the event and there is no comprehensive procedure to check all GAME PIECES prior to every MATCH. If FIELD STAFF notice a damaged or out of tolerance GAME PIECE they will replace or adjust the GAME PIECE as necessary. Teams are encouraged to point out GAME PIECES they believe may be damaged or otherwise out of tolerance to FIELD STAFF who will assess whether the GAME PIECE is still suitable for play.

(Asked by **3478** at Jan 20th 19)

## Q181 Does FIRST have guidelines for the number of students to load a robot on and off the field

**Q:** We consistently see 2 students loading a robot on and off the field. Industry standard recommends an adult not lift more than 50lbs during their workday. Shouldn't FIRST require a minimum of 3 students to lift the robot if its over 100lbs?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For suggestions or feedback, please e-mail [firstroboticscompetition@firstinspires.org] (mailto:firstroboticscompetition@firstinspires.org)

(Asked by **5420** at Jan 20th 19)

## Q182 Two Pneumatic regulated system in series

**Q:** We are wondering if we can use two regulators to create a second working pressure system. We would place the second regulator after the primary regulator so all of our air is flowing through our primary "higher" pressure regulator.

**A:** Yes, as long as all air passes through a single primary regulator as specified in !R88, additional pressure regulators permitted per !R84-H may be located downstream in order to regulate to different pressures.

(Asked by **2512** at Jan 19th 19)

## Q183 Clippard Voucher

**Q:** Has anyone had issues with using the Clippard Voucher? I've attempted multiple times and the code says invalid.

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For Kit of Parts questions, please visit contact [frcparts@firstinspires.org](mailto:frcparts@firstinspires.org).

(Asked by **3267** at Jan 21st 19)

## Q184 Custom Pneumatic Actuators Allowed?

**Q:** In the rule book, there are no specific limitations cited for using custom pneumatic actuators. Our team is wondering if it is possible for us to engineer and manufacture soft gel components (most likely silicon) similar to those in the video link below. If so, what sort of specifications must our team provide to pass inspection?  
<https://www.youtube.com/watch?v=ebBWUzIXsms>

**A:** There are specific restrictions regarding pneumatic actuators. Please see !R81 and !R84.

(Asked by **3219** at Jan 21st 19)

## Q185 Multiple field elements supported partially supported

**Q:** Could you please define the partially supported clause of rule G4 and how it is measured? Does this mean I can control one game piece partially in conjunction with the rocket or cargo ship and am fully controlling another is this in violation of this rule?

**A:** "Partial support" has no FRC specific definition. Per Merriam-Webster, partial is defined as "of or relating to a part rather than the whole : not general or total" and support is defined as "to hold up or serve as a foundation or

prop for"; therefore "partial support" would be holding something up, but not totally (i.e. something else is also holding it up). For example, if CARGO is being held inside the CARGO SHIP by a HATCH PANEL still being controlled by a ROBOT, the CARGO does not contribute to the ROBOT being in violation of !G4.

(Asked by **4470** at Jan 21st 19)

## Q186 Required Starting Positions?

**Q:** Section 5.1.2 states that if we care about robot placement on the hab we need to notify the Head Referee immediately. It also states that there is a set order for starting positions this year. So I am reading that our robot's starting position is based on our Alliance Station. For example if we are Red 1 we start on the left part of the habitat, Red 2 middle of the habitat and so on. Are we interpreting this correct?

**A:** No, the text you are referring to is about order of placement (i.e. timing), not location. The first sentence of [Section 5.1.2]  
([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc535590148](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc535590148)) describes the location that ROBOTS must be placed.

(Asked by **3036** at Jan 21st 19)

## Q187 Regarding Q175 Cargo Placement

**Q:** Regarding Q175, can a Red alliance robot place cargo into the Blue alliance's cargo ship bays? Would this be a violation of G11? As cargo being placed into a Bay would at some point travel through air without any other contact with a physical object.

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. The answer to !Q175 referred specifically to whether the described action would violate !G8 and did not declare the action to be objectively legal in all scenarios.

(Asked by **379** at Jan 21st 19)

## Q188 Scoring at T=0

**Q:** If a robot has clearly achieved a HAB level (either 1, 2 or 3) at T=0 and then moves to a lower level afterwards (because of being disabled) within the 5 seconds, will the higher level be awarded or does the rule only apply to robots and game elements that are in motion when T=0? Does the robot need to maintain the achieved level for at least 5 seconds after T=0 to be awarded the level achieved?

**A:** Per [Section 5.3]  
([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc535590151](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc535590151)), if "the ROBOT changes state after being DISABLED at the end of the MATCH" scores are assessed "five (5) seconds after the ARENA timer displays zero (0)".

(Asked by **2495** at Jan 20th 19)

## Q189 LabVIEW Robotics Simulator

**Q:** Is there a type of website or link to download/get the LabVIEW Robotics Simulator from national Instruments?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **2151** at Jan 20th 19)

## Q190 Habitat material

**Q:** Can you elaborate on the texture of the HDPE sheets used on the habitats platform?

**A:** The "orange peel" terminology used in the manual is the terminology provided to FIRST by the supplier. The texture is bumpy like the peel of an orange.

(Asked by **3336** at Jan 21st 19)

## Q191 Pneumatic cylinder port diameter legality?

**Q:** Section R84-C states that the port of a solenoid valve can be a maximum of 1/8". If a Pneumatic cylinder has a 1/4" port but is connected to a valve that complies with R84 can it be used? Our understanding of the rule is that there is no restriction on the port size of the pneumatic cylinder is this correct?

**A:** That's correct. There is no restriction on port sizes for pneumatic devices other than solenoid valves.

(Asked by **3478** at Jan 21st 19)

## Q192 Robot safety rule clarification?

**Q:** Under the game manual's safety rule s1, it talked about dangerous robots not being being allowed. One of the examples mentions "Uncontrolled motion that cannot be stopped by the DRIVE TEAM". Would lifting the Robot into a rolling motion onto the level 3 platform be considered a violation of this rule?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. In general, the "uncontrolled" motion example in the IS1 Blue Box refers to uncontrolled motion that is dangerous or very likely to become dangerous. An action taken by a ROBOT that initiates a brief motion that cannot be stopped (e.g. releasing a spring), and is otherwise judged to be safe, is not likely to be a violation of IS1.

(Asked by **2543** at Jan 21st 19)

## Q193 Define constraints of G11

**Q:** In G11, what defines the active mechanism to kick across the floor or eject the cargo in a forceful way? Would drive train/bumper impact be legal per these definitions, as it is not ejecting or kicking the cargo with an active mechanism.

**A:** An "active MECHANISM" is a MECHANISM that moves relative to the rest of the ROBOT. If a ROBOT is not using an active MECHANISM to kick CARGO across the floor, then that clause of the rule is not invoked. Similarly "eject" requires that something be in the ROBOT, in order to "eject" it out. Contact with BUMPERS does not meet either of these definitions and would not be considered a violation of IG11.

(Asked by **6887** at Jan 22nd 19)

## Q194 How is scoring assessed with the removal and placement of null hatch panels.

**Q:** If one of our alliance members was to remove our own null hatch panel and place it on the rocket how would we be scored for that panel placed? Additionally if a team member were to hand us a null hatch panel that was previously placed on the cargo ship and we were to place it on the cargo ship or the rocket ship would we get points for the placement of the panel?

**A:** We believe !Q2 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **4500** at Jan 21st 19)

## Q195 Noise from a vacuum

**Q:** Is there a noise requirement if we want to use a vacuum in our design? In R9 part B we read that audio devices must not be distracting, does this apply to a vacuum? If so, is the noise from a small car vacuum considered distracting?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Example 'b' in the !R9 Blue Box provides some examples of devices which produce the amount of volume and/or pitch that may be considered distracting ("Speakers, sirens, air horns"). If you believe your device makes noise comparable to these devices, then it may be ruled illegal. If your device makes noise on the order of a typical vacuum cleaner running, that is unlikely to be "distracting" when compared with the other noises at a typical event.

(Asked by **6391** at Jan 22nd 19)

## Q196 Talon Breakout Board

**Q:** Team 4415 has built a breakout board which consists of a passive Printed Circuit Board (PCB) that attaches to a Talon SRX data port to conduct the signals to larger connectors. It is acceptable to attach our PCB to the TALON using the tapped holes next to the data port? That is, would a passive PCB be considered "wires, Cables, and signal lines", under R73-E? Here is a link to our design files:  
<https://github.com/VCHSRobots/TalonBreakoutV2>.

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Meanwhile, note that PCB traces are considered signal lines and would be permitted per !R73-E.

(Asked by **4415** at Jan 22nd 19)

## Q197 Loading Station Frost King Door Sweep

**Q:** Could you clarify the length of the three pieces on the frost king door sweep in the loading station?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. Any measurements or materials information can be derived from the [official Field Drawings] (<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), [SolidWorks' eMeasure site] ([https://frc-cdn.firstinspires.org/2019VRContent/eDrawings\\_2019Field.html?Measure=True](https://frc-cdn.firstinspires.org/2019VRContent/eDrawings_2019Field.html?Measure=True)), or other tools available on the [Playing Field page] (<https://www.firstinspires.org/robotics/frc/playing-field>).

(Asked by **3336** at Jan 22nd 19)

## Q198 Cargo Front

**Q:** What are the side dimensions of the cargo front single te-19107?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. Any measurements or materials information can be derived from the [official Field Drawings] (<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>).

(Asked by **3336** at Jan 22nd 19)

## Q199 Are Stabilus Lift-O-Mat Automotive Hatch Lifters Allowed?

**Q:** Per R84, only certain pneumatic system items are listed. Would a Stabilus Lift-O-Mat be allowed considering there are no fluids in it?

**A:** We cannot comment on part/design legality. However, the blue box in !R84 (Part B of the last blue box) clarifies that gas shocks are not subject to pneumatic rules.

(Asked by **302** at Jan 22nd 19)

## Q200 When can we start to climb and stay at the hab zone?

**Q:** Is it forbidden to climb on hab zone before the last 20 seconds? When can we start climbing for level 3?

**A:** We believe !Q117 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **7439** at Jan 22nd 19)

## Q201 HATCH PANEL between two HATCHES (Followup to Q179)

**Q:** in Q179 it was asked if a single HATCH PANEL covering 2 BAYS would be scored as one or two BAYS covered, but wasn't addressed clearly. Second, if a single HATCH PANEL (as described in Q179) is also holding 2 CARGO in the respective BAYS, would both CARGO be scored?

**A:** As described in !Q179, the HATCH/BAY that the HATCH PANEL is scored on will be assessed by the Official Scorer responsible for scoring that FIELD element. Each HATCH PANEL will only be scored for one HATCH. Per [Section 5.3] ([https://frc-qa.firstinspires.org/manual/\\_Toc534739724](https://frc-qa.firstinspires.org/manual/_Toc534739724)), CARGO can only be scored in a BAY with a Null HATCH PANEL or a scored HATCH PANEL. One HATCH PANEL can not be scored for two HATCHES, so one HATCH PANEL can not result in two scored CARGO.

(Asked by **5881** at Jan 22nd 19)

## Q202 Is it legal to paint motors?

**Q:** Is it allowed to paint a motor? I.e. Spray painting a colored band around the motor.

**A:** ~~No, please see !R35.~~ \*\*!R35 allows use of paint for minimal labeling purposes only.\*\* \*(updated 2/15/19)\*

(Asked by **3452** at Jan 22nd 19)

## Q203 Inflating cargo

**Q:** May we bring a sports pump to the driver's station to inflate the cargo on the field with us to insure a larger diameter ball?

**A:** No, please see !H1 and !H14. If you believe, prior to a MATCH, that CARGO in the ARENA is outside the specified tolerance, please bring it to the attention of FIELD STAFF.

(Asked by **7222** at Jan 22nd 19)

## Q204 Clarification of R13

**Q:** Our team would like to use AndyMark's Raptor drive (AM-4020) for our robot. They sell the drive as left and right components (AM-4020L, AM-4020R) and as a kit (AM-4020). Each component individually fits within the cost constraints of R13. Because the vendor sell's the pair as a kit (totaling more than \$500), would this preclude the use of these components, even if we purchased the items separately and constructed our own base from these components?

**A:** Wheel modules are clarified in Example 3 of the Blue Box under !R13.

(Asked by **4573** at Jan 22nd 19)

## Q206 Bumpers at Cargo Ship Line

**Q:** As Rule G9 is written; Does this mean if one ROBOT is fully beyond the opponent's CARGO SHIP LINE playing defense and a second ROBOT's BUMPERS stray over the opponent's CARGO SHIP LINE while working at the cargo bay closest to the FIELD MIDLINE, a FOUL would result? Does it also mean if two ROBOTS working at the cargo bay closest to the FIELD MIDLINE on both sides of the CARGO SHIP both simultaneously stray over the opponent's CARGO SHIP LINE, a FOUL would result?

**A:** Yes, if an ALLIANCE has two ROBOTS whose BUMPERS have broken the plane or are completely beyond the opponent's CARGO SHIP LINE, regardless of what game action they may be performing, this is a violation of !G9.

(Asked by **2832** at Jan 22nd 19)

## Q207 Throwing Game Pieces

**Q:** Section 8.2.2 Defines in G6 that you cannot launch hatch panels more than 3 ft. Though nothing is stated about the distance of the cargo. Assuming a completely legal robot is designed to shoot the cargo, What is the farthest a robot is allowed to shoot or launch the cargo?

**A:** While there are no specific limits placed on the *distance* a ROBOT may shoot CARGO (assuming the ROBOT is within !S1), there are locational limits (such as !G11) to consider as well as practical limitations such as !G7 and the height of the ceilings and/or lighting trusses erected in a venue.

(Asked by **6768** at Jan 22nd 19)

## **Q208 Is the cargo always going to be 13in if so how are they being insured**

**Q:** Is the ball always going to be 13in or is it a variance in size

**A:** We believe !Q180 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **5279** at Jan 22nd 19)

## **Q209 Pnaumatic cylinder with a scratch**

**Q:** We have this pneumatic cylinder that accidentally dropped. The corner got a small dent, but we are certain it does not alter the functionality at all. We were wondering if we could still use it on the robot, considering rule R-83? the link below is a picture of the sylinder. <https://drive.google.com/file/d/13LEHuTqnkA9U7C8V6TWpBI3C0-1j5cZO/view?usp=sharing>

**A:** We cannot comment on part/design legality. Minor scratches or dings aren't likely to impede a ROBOT'S likelihood of passing Inspection. That being said, any modification is a violation of !R83. Also, if you think an Inspector might be concerned that the damage threatens the integrity of the item (invoking !S1), you should probably consider discarding (recycling) that part.

(Asked by **7239** at Jan 22nd 19)

## **Q210 Are their any restrictions to the outline color on white colored numbers on bumpers**

**Q:** R29. Team numbers must be displayed and positioned on the BUMPERS such . . . A. consist of Arabic numerals at least 4 in. (~11 cm) high, at least ½ in. (~13 mm) in stroke width, \*and be either white in color or outlined in white\* with a minimum 1/16 in. (~2 mm) outline If the number color is white, are there any restrictions on the outline color? can the outline be Black? Gold? Silver? the opposite of the bumper color (red/blue)? Is this an inclusive or exclusive OR?

**A:** Per !R29 numbers must either be white (i.e. the whole number is white) or outlined in white. There is no provision for white numbers outlined in another color.

(Asked by **1745** at Jan 22nd 19)

## **Q211 Durring the Match**

**Q:** Can you use a headset to talk to your drivers/drive coach

**A:** We cannot comment on part/design legality or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and [Section 10.10] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc535590181](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc535590181)) and, if needed, resubmit a different question.

(Asked by **5279** at Jan 22nd 19)

## Q212 Network Bandwidth Limiting - R67-B

**Q:** Elaborating on R67-B (and the following blue box), can you provide specifics on the network rate limiting? If packets are sent at greater than 4 Mbps, are they effectively FIFO buffered (resulting in increased latency but no loss), or are excess packets merely dropped? Can greater than 4 Mbps of data be passed for a short interval, as long as the long-term average rate remains below the limit? In other words, in a Cisco environment, what would the arguments to the "rate-limit" statement be?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **696** at Jan 23rd 19)

## Q213 Bumper backing material spanning bumper segments

**Q:** Can bumper mounting brackets extend horizontally into a gap between two bumper segments? The two bumper segments are the standard bumpers containing .75 inch plywood, 2 2.5 inch noodles and a fabric covering them.

**A:** Please see the Blue Box beneath !R30 and !R31-G regarding determination of whether a mounting component is part of the BUMPER or ROBOT. Significant deviation from the BUMPER cross-section shown in Figure 10-6, except as allowed per !R32, is not permitted.

(Asked by **2846** at Jan 24th 19)

## Q214 Setting up a Raspberry PI co-processor with the 2019 preflashed SD.

**Q:** I am trying to use a Raspberry PI 3 B as a on board coprocesser for vision processing and I was following the directions on [wpilib.screenstepslive.com](http://wpilib.screenstepslive.com) and it says to upload a c++ .exe file (I am programming with c++) to run my vision code but how do you get that .exe file. I was going to make one with VS (not VScode) but you can't use the WPI librarys. How do I make that .exe file to upload to the rPI I already have my VP code written. (side note the WPI website does this kind of thing alot.)

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **6918** at Jan 23rd 19)

## Q215 If brushes let a HATCH PANEL through is it considered an ARENA FAULT?

**Q:** In 4.8.1.2 it says that HATCH PANELS are retained by brushes until retrieved from their position by a ROBOT. If a HATCH PANEL were to somehow come out of the LOADING STATION without the influence of a ROBOT then would it be considered an ARENA FAULT? If not, would the HATCH PANEL still be considered in play? And if it is considered no longer in play, is a new HATCH PANEL provided by FIELD STAFF for replacement?

**A:** We cannot comment absolutely on hypothetical scenarios, especially those relating to ARENA FAULTS as defined in [Section 12.3]([https://frc-qa.firstinspires.org/manual/\\_Toc534739760](https://frc-qa.firstinspires.org/manual/_Toc534739760)). The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. If it is determined that a FIELD element (including the LOADING STATION) is not functioning correctly with no outside influence (ROBOTS, other GAME PIECES, DRIVE TEAMS, etc.), it is possible that it would be considered an ARENA FAULT. All GAME PIECES within the FIELD are always considered "in play."

(Asked by **2655** at Jan 23rd 19)

## Q216 separate a part from robot's body

**Q:** I have a question about robot construction and robot parts. This question is about first 15 seconds (autonomous mode) and last 30 seconds of the game. Can we separate a part from our robot's body and put the part on the hab platform during the match (like a capsule, leaving from the space ship). This part will be independent from the robot and will be stable on the hab platform during the match to provide the safety of all robots (in front of the level 3). Because we have an idea for level 3.

**A:** Please see !G21.

(Asked by **6435** at Jan 23rd 19)

## Q217 Minimum Pneumatic Hosing and Fitting Size

**Q:** Is there any minimum requirement for using pneumatic tubings and fittings? ie: if one of our components require 4mm tubing is that legal as per R84?

**A:** !R84-D specifies a maximum outside diameter for pneumatic tubing, and there aren't any min./max. size requirements for fittings.

(Asked by **6987** at Jan 23rd 19)

## Q218 Parts Cost Analysis

**Q:** If a company were to lend or donate a COT Part/component for our team to use during the season, How is the cost of this part determined? How does this factor into the overall cost of our robot since our team will not be paying out of pocket.

**A:** For donated items (regardless of if they're on temporary loan or permanently gifted), please see Example 2 in the Blue Box under !R14.

(Asked by **6987** at Jan 23rd 19)

## Q219 Cargo delivery to opposing alliance's CARGO SHIP

**Q:** We're not sure how to interpret how Rule G11 applies if Blue ROBOT A delivers a CARGO into the Red alliance's CARGO SHIP; can you please clarify? Previous responses to Q175 and Q187 do not answer this question. Please note that this question has been worded in a format suggested by section 1.8 Question and Answer System.

**A:** There are no rules that prohibit a ROBOT from scoring CARGO in an opponent's ROCKET or CARGO SHIP. The delivery method may or may not violate !G11, and the assessment will be done by the REFEREES at your event

(Asked by **2363** at Jan 23rd 19)

## Q220 Filling both rocket ships

**Q:** Can we get two ranking points if we fill both rockets with hatches and cargo? For example, say the alliances tie for the match but the red team has filled both rocket ships. Does the red alliance get 1 ranking point for the tie and 2 ranking points for filling both rockets? Or is 1 ranking point the maximum you can get for filling both rockets?

**A:** [Section 5.3]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc535590151](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc535590151)) describes the Ranking Point being awarded for completing at least one ROCKET, not each ROCKET that is completed. An ALLIANCE can only be awarded 1 Ranking Point per match for completing a ROCKET.

(Asked by **5424** at Jan 23rd 19)

## Q221 How are removed hatch panels scored?

**Q:** If we were to remove our own null hatch panel from the cargo ship and then place it on the rocket ship, would that hatch now be considered scored?

**A:** We believe !Q2 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **195** at Jan 23rd 19)

## Q222 Angle of the retroreflective tape

**Q:** The FRC manual says that the pieces of tape will be rotated approximately 14.5 degrees. I was wondering what size of error we should expect? Can we assume it will be 14 to 15 degrees? 14.3 to 14.7? 13 to 16? 10 to 19? What's a reasonable range?

**A:** Please see [Team Update 06]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate06.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **1155** at Jan 25th 19)

## Q224 Can a compressor be used as a non-pneumatic (vacuum pump)

## device?

**Q:** In Q23 it was stated "...pay special attention to R34 as the motor within the vacuum pump is very likely not one of the allowed motors." Under R34 it states "One (1) compressor compliant with R86 and used to compress air for the ROBOT'S pneumatic system" is allowed. If a compressor is compliant to R86, does that make it's included motor allowed per R34? Can a compressor per R86 be used in a vacuum pump configuration, not a pneumatic device per R84, and it's included motor be compliant with R34?

**A:** !R34 means that, if a team is using pneumatics on their ROBOT, the motor in the compressor that complies with !R83 and !R85 is legal. If the compressor is not used as part of the ROBOT'S pneumatic system, it's only permitted if its motor is one of the other motors listed in the table in !R34.

(Asked by **834** at Jan 24th 19)

## Q225 Can we use suckers (ventosas in spanish)?

**Q:** <http://www.rindustriales.com/wp-content/uploads/2013/01/fotos-ventosas-para-vacio.jpg>

**A:** We cannot comment on part/design legality or questions that are overly broad, vague, and/or include no rule references. We think your answer can be found in !G15, however. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **6896** at Jan 24th 19)

## Q226 Scoring Cargo in an Opposing Alliance Cargoship

**Q:** Q175 clarifies that cargo can be placed in the cargo ship of an opposing alliance but remains unclear as to how it is scored. Would a cargo placed by the red alliance into the cargoship of the blue alliance score for the red or blue alliance? In addition, do the rules for scoring cargo in the opposing alliance's cargo ship also apply to hatch panels?

**A:** CARGO and HATCH PANELS are alliance-neutral GAME PIECES; as such, GAME PIECES scored on/into ALLIANCE-owned FIELD elements (CARGO SHIP, ROCKET) score for that ALLIANCE regardless of what ALLIANCE placed them there. Please pay special attention to !G10, !G11, and !G16.

(Asked by **7500** at Jan 24th 19)

## Q227 Conjured materials on BOMs?

**Q:** As a follow-up to Q178, where we were instructed to possibly include Mother Nature as a source of materials, could you please provide additional guidance on how to correctly attribute materials conjured by Wizards, such as Gandalf the Grey, as he seems to be present in the BOM Template link (<https://firstfrc.blob.core.windows.net/frc2019/AuxDocx/2019BillofMaterial-Template.xlsx>) per the blue box in I5? Additionally, how do we correctly account for the labor cost of low-effort memes?

**A:** We think you're trying to point out that the link to the BOM Template in the manual isn't correct. Please see [Team Update 06](<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate06.pdf>).

(Asked by **900** at Jan 25th 19)

## Q228 Motor Controller (Talon/Victor) pigtail replacement.

**Q:** Are we permitted to change-out the short pigtail leads on motor controller. Effectively swapping it out with identical silicone wire (same color and gauge) in order to increase its length.

**A:** No, modifications to these devices are prohibited per !R73. De-soldering the wire pigtails is not one of the exceptions listed in items A-O of !R73.

(Asked by **2028** at Jan 24th 19)

## Q229 Vacuum pump conversion from a legal compressor

**Q:** Our team converted a Viair Compressor from AndyMark so it now creates vacuum instead of creating compressed air. It's still using the same motor, cylinder & piston that it came with. I think this should be legal if the compressor is legal, since it is still a pneumatic device, just creating negative instead of positive pressure. Is it legal?

**A:** We believe !Q224 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **834** at Jan 25th 19)

## Q230 Loading Station Wood Drawing

**Q:** I've found Loading Station drawing 19108 on the website. However, it appears incomplete as a practice field component, as it doesn't have a frame to show how it would be integrated next to the driver's station. I'm looking for practice (wood) field instructions on how to build the panel next to the driver's stations for the Loading Station.

**A:** Practice field elements aren't designed intended to be integrated in to a full field. Instead, they offer stand-alone mock-ups of certain season specific elements.

(Asked by **4470** at Jan 25th 19)

## Q231 Is robot allowed to be one when retrieving robot?

**Q:** After drive teams are allowed on the field to retrieve their robots, is the robot allowed to stay on (No Programming) in order to assist retrieval of the robot? To be specific my team intends to extend upwards in order to climb. If our robot fails to climb and is disabled while extended up in the air, we will need electrical assistance to bring it back down. I want to know if this would be legal since the game manual does not specify.

**A:** Please see !G2.

(Asked by **3588** at Jan 25th 19)

## Q232 Closed Loop Air System

**Q:** We have a prototype that utilizes a balloon for which the air used to inflate it is stored in a closed loop fashion within one side of a cylinder and the balloon itself. The air is transferred between the balloon and the cylinder via pressure from an externally connected pneumatic system (therefore the air in the balloon-cylinder system is

dissociated from the pneumatic system). Does this transfer of air between the balloon and cylinder violate any pneumatics rules via R84's exemption b/d?

**A:** Please understand that we cannot "rule" on part/design legality. Any/all compressed air on the ROBOT (a closed-loop system that stores compressed air in your example is by definition a pneumatic system) must comply with !R86, and all pneumatic COMPONENTS used on a ROBOT (except those exempted by the final blue box in !R84, none of which seem to apply to the system in question) must adhere to all pneumatic rules.

(Asked by **612** at Jan 28th 19)

## Q233 Solenoid Valve Threads

**Q:** As per R84.C "Solenoid valves with a maximum  $\frac{1}{8}$  in. (nominal, ~3 mm) NPT, BSPP, or BSPT port diameter or integrated quick connect  $\frac{1}{4}$  in. (nominal, ~6mm) outside diameter tubing connection." Are solenoid valves with a 7mm metric thread legal for use? Only NPT, BSPP, and BSPT are explicitly listed. The "(nominal ~3mm)" from R84.C is misleading/incorrect, as  $\frac{1}{8}$ " NPT fittings have a nominal diameter closer to 10.3mm or 0.405 inches. For reference, the First Choice valves are 7mm metric thread.

**A:** M7 is smaller than  $\frac{1}{8}$  NPT, BSPP, or BSPT and would therefore be permitted.

(Asked by **5895** at Jan 25th 19)

## Q234 Is it legal to use convertible bumpers?

**Q:** Is the use of convertible bumpers, switchable from red to blue and vice versa by the folding of a flap, legal to be used on the field if there is still minute amounts of the opposite alliance color still visible along the corners and backs? (May expose up to approximately half an inch of the inverse color). This question regards the necessity of covering the exposed opposite color with colored duct tape to mask it. According to rule R28, the bumpers must display "Red or Blue".

**A:** There are no rules that prohibit use of convertible BUMPER covers. !R28 requires red \*or\* blue BUMPERS and makes no accommodation for red \*and\* blue BUMPERS. Please see [Team Update 07] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate07.pdf>) for clarification on the inward facing surfaces of the BUMPER.

(Asked by **4533** at Jan 29th 19)

## Q235 Bumper Hard Parts R31.B

**Q:** R31.B with (A,E,F,G) Starts identifying Bumper Hard Parts that extends beyond the FRAME PERIMETER. Are there any Vertical limits at or inside the frame Perimeter? Example would be a 1" x 2" extruded angle attached such as the horizontal part is extending into the robot but above the 7.5" bumper zone.

**A:** Per !R25 BUMPERS must be entirely located within the BUMPER ZONE. See the Blue Box below !R30 for guidance on whether a part of an attachment system is part of the BUMPER (and therefore needs to stay within the BUMPER ZONE) or part of the ROBOT (and therefore needs to stay within the FRAME PERIMETER).

(Asked by **3244** at Jan 28th 19)

## Q236 Linear actuator limits

**Q:** IN the rule book, there is a rule regarding electrical solenoid actuators, but is there anything regarding the stroke length for a non-solenoid linear actuator?

**A:** Linear actuators powered by motors other than those allowed in !R34 are not permitted. There is no explicit length limit on linear actuators powered by motors permitted per !R34.

(Asked by **2246** at Jan 28th 19)

## Q237 Is the edge of the platform part of the horizontal surface?

**Q:** Q50's answered: "To be credited for a Level climbed, the ROBOT must fully meet the criteria defined in Section 5.3 for that Level or greater - that includes not being supported by any surfaces lower than that Level." Is the edge between the horizontal and vertical surface of that level considered part of the surface for a scored climb? I.e. does a robot touching only the horizontal surface and the edge, but not the vertical face of the platform, AND the bumpers are above the platform, meet 5.3?

**A:** Level's are described in [Section 4.5]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536196942](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536196942)) and in reference to their corresponding decks and resulting heights. As a result, the threshold for the Level is the plane defined by the top, upward facing surface **\*\***(or surfaces, if considering Level 1)**\*\*** of the deck. The small deck edges that extend vertically down from the top surface of the deck are below the Level as described, even though they're part of the plastic deck FIELD element. \*(updated 2/5/19)\*

(Asked by **2052** at Jan 29th 19)

## Q238 Hatch Panel Loading Station competition field design

**Q:** Section 4.8.1.2 details the Hatch Panel portion of the Loading Station. We have built a model to the specifications of TE-19108 & the rubber fork of the Frost King brushes forms an ~1/4" rubber lip requiring a vertical lift of the panels before they can be removed through the brush portion. We have examined the CAD models of the competition field and don't see a corresponding lip. Is it expected to be able to remove a panel with only a motion perpendicular to the alliance wall?

**A:** Thank you for pointing out that there's a difference between the FIELD version of the LOADING STATION HATCH PANEL dispenser and the Team Version. It is possible to remove a HATCH PANEL from the official FIELD'S LOADING STATION without lifting it. TE-19108 performs similarly to the FIELD LOADING STATION (GE-19130 and GE-19155), but there are differences. GE-19138 and TE-19108-16 have slightly different profiles, which results in the HATCH PANEL on the TE version sitting slightly lower relative to the assembly. This means the HATCH PANEL is more likely to be caught by the lip of the bottom brush on the TE version than the official FIELD version. Please look for updated Team Drawings and more information about this in [Team Update 08] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate08.pdf>) (link won't be live until update published on 2/1)

(Asked by **2834** at Jan 29th 19)

## Q239 Driver Station and FMS

**Q:** When connected to the FMS will we be able to open a localhost webpage on the computer for use in our game strategy?

**A:** There is no rule that would prohibit this.

(Asked by **3157** at Jan 28th 19)

## **Q240 Can we use a D-Link as a network switch if its routing and wireless ability is disabled?**

**Q:** Can we use an old D-Link that used to be standard for FIRST if we disable the routing and wireless ability? we have some network cameras that we would like to use and only have the 2 Ethernet ports and need more. If not what can we use to do this?

**A:** There are no rules prohibiting the use of a wireless device for other purposes if the wireless can be verified to be disabled.

(Asked by **3055** at Jan 28th 19)

## **Q241 Definition of work space for E39?**

**Q:** We noticed that in the Event Rule E39, it says, "Structures must be safe. Teams may not build any structure that supports people or items for storage above the work area." Our current pit design includes a wall of shelves reaching to about 7 ft. (above head level) My question is, since nobody is working under the highest shelf, does it count as a "work area" or can we store items on the highest shelf while remaining in compliance with E39?

**A:** Since no one is working under the highest shelf, it does not count as a work area. However, please use extra caution when storing anything above head level.

(Asked by **6995** at Jan 28th 19)

## **Q242 Is the Drive Base Opt Out still considered to be part of the Kit of Parts?**

**Q:** The KOP definition states that the KOP includes PDV's and the Kickoff Kit. The Drive Base Opt Out AndyMark voucher is not explicitly listed as a PDV or as part of the Kickoff Kit. But because it is an option within the Kickoff Kit and still a voucher, would this qualify as part the Kit of Parts and be exempt from the BOM as stated in R12 (assuming that we are able to show proof of purchase using the voucher as stated in the blue box under R12)?

**A:** Yes, the AndyMark voucher is "a Product Donation Voucher (PDV) from the current season," and thus any item paid for completely using this voucher is considered a 2019 Kit of Parts item.

(Asked by **41** at Jan 28th 19)

## **Q243 Bosch Motor 6004 RA3-194-06**

**Q:** We are a Rookie team who received the seat motor in our kit of parts. The Andy Mark Dio Kit does not come with with the kit of parts and is out of stock. <https://www.andymark.com/products/bosch-seat-motor-dio-kit> Can we use an additionally purchased VictorSPX 217-919 or Talon to connect the motor and program it with the Roborio similar to motors for driving? We only want the seat motor to receive power on/off for movement. The VictorSPX green/yellow cables would only connect to the Roborio.

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [FIRST Forums](http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition).

(Asked by **7609** at Jan 29th 19)

## Q244 Can we use a square pneumatic piston as air tank?

**Q:** Our team would like to purchase a square pneumatic piston and turn it into an air tank. We would like to remove the rod and assemble the cylinder to an air tank using another, identical, part that will seal the other side of the pneumatic piston. Example: [www.indiamart.com/proddetail/square-profile-pneumatic-cylinder-16768682697.html](http://www.indiamart.com/proddetail/square-profile-pneumatic-cylinder-16768682697.html) We would like to remove the rod on the right and replace it with a seal identical to the one on the left. We fear that this is considered "abrasive removal"

**A:** !R83 does not make an exception for removal of cylinder rods.

(Asked by **4590** at Jan 29th 19)

## Q245 Bumper Attachment Q213 Clarification

**Q:** R30 provides that attachment elements attached to the BUMPER are part of the BUMPER. R31D requires cloth to cover both wood & noodle. R24 requires 6 in. coverage from each corner of framer perimeter. A gap between 2 BUMPER segments along one side of robot is permissible Figure 1-3. R31G requires a rigid fastening system, which complies with Figure 10-6 in the vertical cross-section. Can a metal attachment system, extend beyond the wood/cloth portion along the frame perimeter & join segments?

**A:** As pointed to in the answer to !Q213, the bare cross-section of a simple metal attachment system is unlikely to meet the cross-sectional requirement in Figure 10-6 in any gaps between BUMPER segments. Therefore, any attachment system that is used to join non-contiguous segments of BUMPER must be built into your FRAME PERIMETER (and must meet !R3 and all other FRAME PERIMETER rules).

(Asked by **6886** at Jan 29th 19)

## Q246 Q237 follow up: Is the edge of the platform part of the horizontal surface?

**Q:** The definition of an edge is a line or line segment that is the intersection of two plane faces (as of a pyramid) or of two planes. I'm unsure what you're referring to in your answer, but "small deck edges extending vertically down" is unclear and not my question. The edge by definition is on the plane defined by the top, upward facing surface of the deck. Please answer if a robot touching only the horizontal surface and the edge (the line formed by horizontal and vertical surface), meet 5.3.

**A:** The edge of the horizontal surface is part of the horizontal surface and is therefore at or above the Level. However, please pay close attention to the Blue Box in [Section 5.3] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536539434](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536539434)), "SANDSTORM and HAB Climb Bonuses are evaluated and scored by human REFEREES. Teams are encouraged to make sure that it's obvious and unambiguous that a ROBOT is not being supported by anything below that Level."

(Asked by **2052** at Jan 29th 19)

## Q247 BOM Value for Replacement Voucher Items?

**Q:** If Team A purchases two Motor Controllers using a Product Donation Voucher from 2019 but only one of them is paid for in full by the voucher and the other motor controller is set aside but eventually brought out to replace the original Motor Controller after an accidental miswiring of the ROBOT, how should the cost of the functionally equivalent replacement Motor Controller be accounted for on the BOM?

**A:** Per !R12-B, identical replacements for items that meet the KOP definition may be exempted.

(Asked by **900** at Jan 30th 19)

## Q248 Linear Actuator Question

**Q:** Hello, our team is looking to use linear actuators to climb this year. We are looking at and have purchased the following: [https://www.amazon.com/gp/product/B00JYOIZ64/ref=ppx\\_yo\\_dt\\_b\\_asin\\_title\\_o00\\_\\_o00\\_s00?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B00JYOIZ64/ref=ppx_yo_dt_b_asin_title_o00__o00_s00?ie=UTF8&psc=1) Would these be fine as they are COTS on one plane of motion?

**A:** We cannot comment on part/design legality, or the legality of hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. However, it is unlikely that the motor found within that particular part is listed in the Table 10-1 in !R34.

(Asked by **5902** at Jan 30th 19)

## Q249 Drive Setup

**Q:** Can we have dual monitor setup in the driver station?

**A:** There are no rules that explicitly prohibit this.

(Asked by **3336** at Jan 30th 19)

## Q250 Compressor used as vacuum pump on intake side

**Q:** The answers to Q224 and Q229 basically state that a compressor (e.g. VIAIR 90C) is only considered a compressor if it is used to generate compressed air, in which case such compressor's motor is then considered legal per R34. Such compressor cannot be used as a vacuum pump. Can a compressor be used as a vacuum pump (on its intake side) if it were also used to generate compressed air simultaneously? It's a legal compressor with a side job

**A:** !R34 allows for the use of a compressor to provide compressed air for the ROBOT. Using the compressor motor to do any other work, including drawing a vacuum, is a violation of !R34.

(Asked by **871** at Jan 30th 19)

## Q251 Can we use inflatable(Expandable) tubing?

**Q:** Can we use inflatable(Expandable) tubing? If yes, what are some restrictions on the size of the

tubing(diameter)?

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **2637** at Jan 30th 19)

## Q252 Bumper Distance

**Q:** Could you clarify how far the bottom of the bumper can be from the ground?

**A:** It is difficult to comment on questions that are overly broad, vague, and/or include no rule references. However, we think rules !R25 and !R31-A provide the measurements you need in determining the allowable range of the BUMPER ZONE from the floor and nominal size of bumpers, respectively. In the future, please consult [Section 1.8] ([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536539409](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536539409)) before submitting questions.

(Asked by **3336** at Jan 31st 19)

## Q253 When can robot climb to hub zone?

**Q:** Can the robot go to the hab zone before the last 15 seconds? And can it transfer from hab level 2 to 3?

**A:** We believe !Q117 answers the first part of your question. There are no rules explicitly prohibiting a ROBOT transferring from HAB Level 2 to HAB Level 3.

(Asked by **7439** at Jan 30th 19)

## Q254 Technician use of battery powered Drill/Driver

**Q:** Can the Drive team technician use a battery powered drill/driver with hex nut to retract a mechanism on the robot at end of match once they are cleared to enter the field (Note: Robot will not be enabled).

**A:** As stated in the Blue Box of !G2, "The safety of teams and volunteers in close proximity to ROBOTS and ARENA elements on the FIELD is of the utmost importance, therefore ROBOTS or ROBOT COMPONENTS may not be energized or powered in any way on the FIELD once the MATCH has concluded." Using a battery powered drill/driver to retract a mechanism on the robot is considered "powering" the mechanism.

(Asked by **3414** at Jan 30th 19)

## Q255 Reversre cylinders use

**Q:** We would like use a larger 1 1/2 "x 5" to operate two 3/4" x 2" cylinders thru a solenoid valve the big cylinder would be attached to a lead screw to move in and out as the big cylinder retracts so would the small cylinders as a closed system max pressure is about 30psi.

**A:** We cannot comment on part/design legality or reply in the absence of a question about Game, ROBOT, or

Event rules. Please consult [Section 1.8]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/Sections/Section01.pdf>) and, if needed, resubmit a different question.

(Asked by **3458** at Jan 31st 19)

## Q256 Bumper rule clarification

**Q:** If our chassis has an opening in it, does the bumper have to go all the way to the interior edge of the opening, or does the 6 inches from the corner of our robot satisfy the bumper rules?

**A:** We cannot comment on part/design legality and won't use the Q&A to instruct or coach teams on how to make their ROBOT legal. We believe !R24 and Figure 10-2 (along with the Blue Box in !R1) have the information you seek. If not, please consult [Section 1.8]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/Sections/Section01.pdf>) and, if needed, resubmit a different question.

(Asked by **6443** at Jan 31st 19)

## Q257 Nature of identical parts?

**Q:** Per R12-B and the answer to Q247, can you further clarify identicality to mean "functionally identical", "cosmetically identical", or both? Are markings or scratches on a part enough to make the part non-identical?

**A:** *~~Identical replacements*, per !R12-B, refers to replacement items from the same VENDOR(S) with the same part number(s) in suitable condition to be used in competition. Please be aware that the final decision as to legality of a particular COMPONENT, MECHANISM, or ROBOT lies with the Lead ROBOT Inspector (LRI) at each event.~~ \*\*Darn, this answer wasn't right, sorry! Please see [Team Update 08]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate08.pdf>).\*\* \*(updated 2/1/19)\*

(Asked by **900** at Jan 31st 19)

## Q258 Identical parts, different vendors, different part numbers

**Q:** Based on the answer to Q257, is your intent to make it so that a CIM Motor purchased from Vendor A with a PDV but goes bad, cannot be replaced with an identical CIM Motor from Vendor B that was not purchased with a PDV?

**A:** Thank you for pointing out the error, that was not the intent. Please see [Team Update 08]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate08.pdf>).

(Asked by **5012** at Feb 2nd 19)

## Q259 Equivalent Copper Wire

**Q:** Per R60, there does not seem to be any room for allowing non-copper connectors, plugs, solder, or tinned copper wire. The rules make reference to the SB connector for the battery, but does not appear to explicitly state non-copper connectors, plugs, solder, or tinned copper wire are legal. This came to our attention as the KOP provided wire appears to be tinned copper wire. This also brought to my attention that no rules were made to allow any type of non-copper plug.

**A:** Very generally speaking, the manual is written with the intent to make the design space as open as reasonably possible, and as such, rules are only written when constraint is deemed necessary. As a result, if there's no rule that prohibits something, it's permitted. Tinned copper wire is copper wire and is compliant with !R60.

(Asked by **6887** at Feb 4th 19)

## Q260 Vision Targets Upside Down

**Q:** Manual and field drawings show the vision targets on the alliance wall in different orientations from left to right; the reversed markings are on the 2019 Game & Season Manual (updated 1/29/19) Section 4.8.1 Alliance Wall (page 25), as well as the Online eDrawings\_2019Field. Other images show the targets in the same orientation; which is correct?

**A:** Good question, and thank you for pointing that out! Please see [Team Update 08] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate08.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **4183** at Feb 2nd 19)

## Q261 Pneumatic cylinder to operate another cylinder

**Q:** Can we use one cylinder to operate two other cylinders without the use of a compressor and all the other regulators, tanks. The pressure by compressing the bigger cylinder is approx 30psi to a valve before the two other 3/4inch cylinders. Are we going to violate any rules as a closed system.

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. We believe !R46 and !R86 answer your question, but if you find them unclear, please rephrase your question and resubmit.

(Asked by **3458** at Feb 1st 19)

## Q262 assessing hab climb bonuses with climbing on each other

**Q:** According to the description in the section 5.3 , if we want to let other robot climb on us to get to HAB level 3. Do our robot have to climb to level 3 first ? is that what "the ROBOT is only supported by another ROBOT which has climbed to that HAB Level or higher" means? (we have satisfied R4 G14)

**A:** Per Section 5.3, a ROBOT may not get credit for a Level (assuming all other criteria are met) if another ROBOT supporting it is not at or above that Level.

(Asked by **7626** at Feb 4th 19)

## Q263 10 sec grace period

**Q:** what would happen if a robot has fallen over the grace period(10 sec) in G17? we didn't see any rule mention about it

**A:** The "grace period" is simply a short period of protection while a ROBOT attempts to recover after falling over. After the grace period, the protection is removed and game play resumes as normal.

(Asked by **7626** at Feb 4th 19)

## Q264 POE and Regular Power

**Q:** In previous years the power from our radio has come unplugged, can we do both a power over ethernet injector for the radio AND the normal 12 volt plug, or is two power sources to the radio illegal?

**A:** There are no rules that prohibit connecting power to the radio via the 12V plug and (per the Blue Box in !R54) using any PASSIVE CONDUCTORS to inject the VRM power into an Ethernet cable plugged into the radio port labeled "18-24v POE."

(Asked by **6768** at Feb 1st 19)

## Q265 Usage of a gas cylinder without a pneumatic system

**Q:** Our team is considering using a cylinder without using any pressurized air. The cylinder will always be open unless it is forced to close by an outside force. We will use the cylinder like a kind of a spring that is loose unless we use force to close it and then the air pressure that is created inside because we closed it will open it back as soon as we stop applying the force. Can we use this cylinder on our robot without the pneumatic system including a compressor, pressure switch exc?

**A:** We believe !Q199 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **2212** at Feb 4th 19)

## Q266 What's the definition of ARTICULATED?

**Q:** we want to know the exact definition of ARTICULATED regarding R1 and R26, is a movement in only one axis considered ARTICULATED? like lift up one side of the chassis, or its only when involves two axis, like a pivot in one point.

**A:** While there is no *FIRST* Robotics Competition-specific definition of **articulated**, [The Oxford Dictionary defines articulated](#) as, "having two or more sections connected by a flexible joint." This definition seems sufficient for !R1 and !R26.

(Asked by **2576** at Feb 2nd 19)

## Q267 What are the bumper requirements for the Raptor Tank Treads from AndyMark?

**Q:** We are using the Raptor tank treads, and they are only about 3 inches wide. There is the description in the rules that says that 6 inches of bumper needs to exist on all corners if material is that wide. But, since the raptors are so narrow, we would only need to cover those about 3 inches to effectively be covering our corners. Do we still need to extend the bumpers 6 inches even though we only have about 3 inches of material at the corner to cover, or can we just wrap the 3 inch corner?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular

ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. !R24 may answer your question and ROBOT rules apply regardless of the wheel module a team selects. If still unclear, please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question while referencing the specific rule about which you have a question.

(Asked by **4019** at Feb 2nd 19)

## Q268 Producing FABRICATED ITEM for gripping mechanism

**Q:** We want to make an FABRICATED ITEM for gripping mechanism. This gripper will be inflate by the air from compressor. Can we produce pneumatic actuators from a material rated by their manufacturers for pressure of at least 125 psi (~862 kPa), or installed downstream of the primary relieving regulator (see R89), and rated for pressure of at least 70psi (~483 kPa)?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Please note that the only permitted pneumatic components are listed in !R84 and cannot be altered per !R83.

(Asked by **7439** at Feb 4th 19)

## Q269 Is the reference to Figure 8-2 in rule R24 intentional?

**Q:** Rule R24 states "...at least 6 in. (~16 cm) of BUMPER must be placed on each side of each outside corner (see Figure 8 2) and must extend to within ¼ in. (~6 mm) of the FRAME PERIMETER corner." However, Figure 8-2 provides examples of rule G24 compliance. The relationship between rule R24 and Figure 8-2 does not seem to be obvious. Is the reference to Figure 8-2 in rule R24 intentional?

**A:** Nope, that's an error (the reference should be Figure 10-2), and thank you for letting us know. We will fix it!

(Asked by **6343** at Feb 4th 19)

## Q270 Can you cross the cargo ship line with a collector but not the bumpers to avoid a foul?

**Q:** If a robot's bumpers have not crossed the opponents' cargo ship line, would having only a collector cross the line be considered a violation of G9 and G10? This specifically states that the BUMPERS need to cross the line but says nothing about a collector extended past the bumpers. The collector would move to outside the bumpers so if it crossed the opponent's cargo ship line, would the collector be able to cross the line without the bumpers crossing the line be considered crossing the line?

**A:** !G9 and !G10 specifically reference and are only measured by the location of the ROBOT'S BUMPERS in relation to the opponent's CARGO SHIP LINE and no other ROBOT element.

(Asked by **1507** at Feb 4th 19)

## Q271 What is the exact Fair Market Value?

**Q:** My team purchased identical products in 2018 and 2019 from VEXpro, over which time the prices were raised. Is the Fair Market Value of the 2018 product equal to the price at which it was sold or the price that it currently

sells for? Q128 and Q153 reference item repairs and secondhand purchases, R14 references only secondhand, inherited, discounted, identical, and donated parts but there is no mention of a single vendor raising the price of a product.

**A:** If an item is currently commercially available, the Fair Market Value is the cost the item is currently available for (i.e. the price any other team would have to pay).

(Asked by **4068** at Feb 4th 19)

## **Q272 775 Connect reversed direction**

**Q:** Can we use the Vexpro 775 Connect with the PCB soldered to the 775 motor with the Anderson connectors facing AWAY from the motor as well as along side the motor? It looks as if we could if we leave the plastic housing off. The plastic housing isn't integral to the PCB. Other makers of similar 775 motor connection products don't even have a plastic housing.

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. While there are no rules explicitly governing if/how a COTS motor connector product is used, there are a variety of rules that concern themselves with the safety, reliability, and isolation of electrical connections.

(Asked by **2028** at Feb 4th 19)

## **Q273 Clarification of Q196: Attaching PCB to Talons**

**Q:** Under R73, Is it permissible to attach a circuit board to the outside of a TALON SRX using the tapped screw holes at the data port?

**A:** There are no rules that explicitly prohibit this.

(Asked by **4415** at Feb 5th 19)

## **Q274 If wheels are on the Level 1 Hab Zone ramp at the end of the match did it climb?**

**Q:** 4.5 "The decks define the levels for scoring purposes as follows. The lowest deck and the ramp form Level 1" it says the deck AND ramps form level 1 In an answer to Q237 it is stated that "the threshold for the Level is the plane defined by the top, upward facing surface of the deck." If a robot on level 1 has 2 wheels on the ramp did it climb level 1? 4.5 says that the ramps are part of level 1 but Q237 says a plane made by the top surface of the deck is the threshold for the level

**A:** Good point, thank you. The answer to !Q237 should have included acknowledgement that Level 1 has more than one top, upward facing surface and will be edited to reflect that. Sorry about that! Yes, a ROBOT that meets the criteria listed in [Section 5.3](<https://firstfrc.blob.core.windows.net/frc2019/Manual/Sections/Section05.pdf>) with wheels supported by Level 1 ramps qualifies for Level 1 HAB Climb Bonus.

(Asked by **2993** at Feb 5th 19)

## **Q275 Clarification on Q262**

**Q:** Does that mean our alliance won't get any credit if we let other team to climb to lv3 while we are at lv1?

**A:** [Section 5.3]

([https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#\\_Toc536804208](https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm#_Toc536804208)) indicates that final scores are assessed at the end of the MATCH, or 5 seconds after the MATCH if not all elements have come to rest. A ROBOT that is supported at the end of the MATCH by a ROBOT that qualifies for a Level 1 HAB Climb bonus will not qualify for any HAB Climb Bonus above Level 1. A ROBOT that is not supported by another ROBOT at the end of the MATCH will always meet the third criteria of part 2 for assessing a climb at any Level.

(Asked by **7626** at Feb 5th 19)

## **Q276 Can a robot push a hatch panel into the loading station while collecting cargo?**

**Q:** If a robot is attempting to collect cargo from the loading station while a hatch panel is in the loading station, can the robot push the hatch panel against the loading station while the cargo is being collected in order to avoid accidentally collecting both cargo and a hatch panel at the same time (and thus violating G4)? Or would such an action itself be considered a violation of G4?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision about whether the ROBOT was seen as having extended or repeated control over more than one GAME PIECE would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **199** at Feb 6th 19)

## **Q277 Progressive Automations Linear Actuator**

**Q:** Is the progressive automations linear actuator IP66 legal to be used on the robot?

**A:** We cannot comment on part/design legality, or the legality of hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. However, it is unlikely that the motor found within that particular part is listed in the Table 10-1 in !R34.

(Asked by **2151** at Feb 6th 19)

## **Q278 elevating the frame perimeter elements**

**Q:** Given the answers to Q11 and Q140, as well as R1, is it legal to articulate the members of your frame that comprise the FRAME PERIMETER along the vertical projection of the established FRAME PERIMETER, while in the hab zone? If not, is it legal raise the entire robot, including the elements comprising the FRAME PERIMETER, on a mechanism that, while active, prevents the FRAME PERIMETER and attached bumpers from being in the bumper zone when sitting on a flat surface?

**A:** No to the first part, that would be a violation of !R1. Yes to the second part, that's specifically allowed by the HAB ZONE exception of !G23.

(Asked by **2177** at Feb 6th 19)

## Q279 10 watt continuous duty on solenoids R34

**Q:** We are looking at a solenoid with 38 Watt draw at 12 VDC with a 1" stroke. This:

<https://www.mcmaster.com/70155K511> This will not be used continuously. Only momentary (approx 1 second per use) to push the ball out of the bot. Since the use of the solenoid is momentary does the continuous duty maximum wattage of 10 watts still apply? Applicable rule R34: <https://frc-qa.firstinspires.org/manual/rule/R/34>

**A:** Electrical solenoid actuators may only be used if they're rated per the specifications detailed in !R34. !R34 does not govern how devices that meet the rating requirements are used.

(Asked by **4041** at Feb 6th 19)

## Q280 Follow up to Q278 - where do we draw the line?

**Q:** Per the answer to Q278, it's legal to use a mechanism to lift the robot, which includes the elements that comprise the FRAME PERIMETER, but not legal to lift just the elements that comprise the FRAME PERIMETER. What elements of the robot, or what percentage of the robot, needs to remain in a fixed position, relative to the elements that comprise the FRAME PERIMETER, when performing such an action in order for it to be considered legal under G23 and not violate R1?

**A:** Apologies for the confusion. We inferred the first part of !Q278 was saying that frame members were articulated in reference to each other, which is not permitted per !R1. Provided the structural elements of the frame that make up the FRAME PERIMETER are fixed (to each other), that collective frame can move relative to the rest of the ROBOT in the context of !G23.

(Asked by **2177** at Feb 6th 19)

## Q281 Custom Circuits and Splicing

**Q:** Can a single CUSTOM CIRCUIT include more than one non-actuating device (e.g. camera, light source, sensor) if incoming wires are spliced into a single lead according to R56?

**A:** There are no rules prohibiting this.

(Asked by **1089** at Feb 6th 19)

## Q282 Is the Rhino Track Drive a legal base to use?

**Q:** Our team has purchased a Rhino Track Drive System (am-3322). According to rule 10.3 R7., "Traction devices must not have surface features such as metal, sandpaper, hard plastic studs, cleats, hook-loop fasteners or similar attachments that could damage the ARENA..." That is a concern that we have with the treads but overall are we correct in assuming that the Rhino Drive system a legal drive system for the 2019 competition season?

**A:** We cannot comment on part/design legality. Please consult [Section 1.8]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **7251** at Feb 6th 19)

## Q283 R26 bumper rule clarification, Articulation during game play?

**Q:** This year's KOP chassis basically has C-channel outside perimeter. The KOP bumper brackets for the sides provide a way to mount them flush to the frame perimeter, however they impede the bumpers from being installed from the top, bottom, or back to make have a one piece bumper possible. A solution is to attach the side bumpers to the rear bumper using hinges so the brackets could go into the chassis side rails. All sides would still be rigidly attached to the robot. Is this legal?

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **6591** at Feb 6th 19)

## Q284 VR Headsets and rule E02

**Q:** Does rule E02 apply just the ability of others to see the wearer's eyes through the required safety glasses, or does it apply to any worn item? We need to understand if this rule prohibits the use of a head mounted display attached to the operator console being used during the match.

**A:** E02 applies to any worn item over the eyes. This includes, but is not limited to, safety glasses, VR Headsets, FPV goggles, periscopes, and binoculars.

(Asked by **1729** at Feb 6th 19)

## Q285 Is it legal to construct bumpers using plywood with a thickness of 18mm?

**Q:** Our team has found a significantly cheaper plywood option marked as nominal 3/4", with an actual thickness of 18mm. R31-A states that it is legal to use plywood with an actual thickness of 23/32", which is equivalent to 18.25mm.

**A:** If plywood is sold as 3/4" nominal it meets the requirements of R31-A.

(Asked by **4604** at Feb 7th 19)

## Q286 R54: Can we use the second pair of 12V 2A VRM

**Q:** With the radio connected to the first pair of 12V 2A VRM terminals, can we connect anything to the second pair or must they remain unused?

**A:** Per R54 nothing else may be connected to the 12V 2A terminals of the primary VRM.

(Asked by **2393** at Feb 7th 19)

## Q287 R34: Automotive motors from prior KOP

**Q:** If our memory is correct, in previous seasons, automotive motors from prior years' KOP were allowed. But this

year, R34 specifically lists automotive motors instead of just saying "various" as it says on the 2018 game manual. Does this mean that any automotive motor (such as the Van Door Motor) from a prior year's KOP that is not listed in R34 is disallowed?

**A:** Correct. The only motors allowed are those listed in !R34.

(Asked by **4048** at Feb 7th 19)

## **Q288 R1 "minor protrusions" Clarification Question**

**Q:** In reference to the robot's frame perimeter, R1 states that "Minor protrusions no greater than 1/4 in. such as bolt heads, fastener ends, weld beads, and rivets are not considered part of the frame perimeter." Do those examples encompass all minor protrusions that are excluded from the frame perimeter? And more specifically, would strips of hook side tape that is less than 1/4 in. and is also fixed and non-articulating fit the definition of a "minor protrusion"?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. The phrase "such as" is used provide examples, not an exhaustive list. Generally minor protrusions should be minor in both extension and cross sectional area as described in the Blue Box in !R2.

(Asked by **4961** at Feb 7th 19)

## **Q289 Is there a ranking point awarded for opponent decscoring from the CARGO SHIP?**

**Q:** Rule G5 states "A ROBOT may not remove a GAME PIECE from an opponents' ROCKET/CARGO SHIP" with the penalty listed as "FOUL per GAME PIECE de-scored and opponents are awarded one (1) Complete ROCKET Ranking Point if neither of their ROCKETS are completed at T-minus 0s". If an opponents robot removes a panel from our CARGO SHIP, would we -- in addition to the foul pt -- also be awarded the complete ROCKET ranking point?

**A:** Yes, that's correct.

(Asked by **2834** at Feb 7th 19)

## **Q290 R94 - Can you cascade 2 solenoids series to select between two different pressures?**

**Q:** According to R94, "The outputs from multiple solenoid valves must not be plumbed together." Does this mean that teams cannot plug the output of one solenoid valve into the input of another, or only that the outputs of two solenoids cannot be joined together? We would like to cascade two solenoids in series to select between two different pressures.

**A:** !R94 does not prohibit plumbing the output of a pneumatic solenoid to the input of another solenoid. However, take care to make sure the resulting configuration complies with !R93.

(Asked by **5724** at Feb 7th 19)

## Q291 Electrical Panel Construction

**Q:** Can the panel that holds the power distribution, motor controllers, ROBORIO etc be made of sandwiched aluminum with a polyethylene core? Not sure if this relates to rule R49 in section 10.7

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event.

(Asked by **6811** at Feb 7th 19)

## Q292 Is shielded wire legal?

**Q:** Is there any reason that shielded wire (wire like an extension cord with a layer of insulation around several smaller multi strand wires) would be illegal to run motors? It is all 18 gauge wire and they would all be fully insulated. The shielding would simply contain all of the wires to keep them together.

**A:** There are no specific rules against using shielded, multi-conductor wire where each conductor is properly insulated and color coded by the manufacturer per !R62 and is properly sized and of the correct type for use per !R60.

(Asked by **3954** at Feb 8th 19)

## Q293 Human player max game piece manipulation?

**Q:** How many game pieces are human players allowed to hold at one time during the match? Ex. Can a human player hold 2 hatch panels at a time on his/her way to the portal?

**A:** The only rule that directly sets a limit on the number of GAME PIECES that any member of the DRIVE TEAM may hold at once during a MATCH is !H8.

(Asked by **195** at Feb 8th 19)

## Q294 Depot Rail Width

**Q:** In section 4.6 of the game manual it describes the rail for the depot as; "A rail is a 1½-in. (~3 cm) tall and 4-in. (~10 cm) wide steel barrier that is attached to the ARENA carpet using 2-in. (~5 cm) wide 3M™ Hook Fastener SJ3572." However, in the "FIRST Official CAD Models" cad drawing GE-19031, GE-19167, GE-19168, GE-19169 and GE-19182 show the width to be 3". Which width is it?

**A:** Good catch! Please see [Team Update 10] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate10.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2337** at Feb 8th 19)

## Q296 Can you extend more then 30 inches of horizontal distance when the robot is sideways?

**Q:** In figure 8.2 of rule G24, the frame perimeter appears to translate to be parallel with the orientation of the robot.

Would this mean that when the robot's frame perimeter is at a 90 degree angle to the floor, the robot can extend a mechanism more than 30 inches of horizontal distance, so long as it stays within the robot's (now vertical) frame perimeter extension limits? Thank you.

**A:** Yes. That is correct. However, please note that a ROBOT which appears to intentionally change its orientation as part of gameplay (i.e. tip over) will be considered "standing normally" in that orientation and must comply with !R25 (except as permitted in !G23).

(Asked by **5700** at Feb 8th 19)

## **Q297 Is white sheathing around red and black power wire allowed?**

**Q:** Expanding on R62, is power wire that is sold with a white protective sheathing allowed? Underneath the two wires are red and black to comply with R62. Example product:

[https://www.amazon.com/dp/B0758C SSDN/ref=cm\\_sw\\_r\\_cp\\_api\\_i\\_S6zxCb5HZ6VFF](https://www.amazon.com/dp/B0758C SSDN/ref=cm_sw_r_cp_api_i_S6zxCb5HZ6VFF)

**A:** There's no rule that prohibits sheathing on legal wire, however please keep in mind that an Inspector must be able to verify that wiring complies with all rules including !R62.

(Asked by **2579** at Feb 10th 19)

## **Q298 What code will run during the Auto**

**Q:** During the sandstorm period how will the robot be running code the Autonomism or Telop if we are driving during this time labview

**A:** We believe !Q174 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **5279** at Feb 10th 19)

## **Q299 Bag and Tag Criteria for Bumpers**

**Q:** Do the bumpers need to be completed and included in the bag and tag process and deadline?

**A:** We believe !R17 answers your question. If it does not, please rephrase your question and resubmit. Please search the Game Manual before posing a new question.

(Asked by **7905** at Feb 11th 19)

## **Q300 Authorized Car Lock Actuator**

**Q:** My team and I were wondering if we could use a car door lock actuators? We are thinking about using them to separate the hatch panels from the robot. I checked the rule book and couldn't find a list of legal actuators. Are car door lock actuators legal to use on the robot?

**A:** We cannot comment on part/design legality, we cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. However, we believe !R34 answers your question (pay special attention to actuator specs). If it does not, please rephrase your question and resubmit. Please search the Game Manual before posing a new question.

(Asked by **4418** at Feb 11th 19)

## Q301 R2 "Starting Configuration" clarification

**Q:** In R2 it states that "In the STARTING CONFIGURATION (the physical configuration in which a ROBOT starts a MATCH), no part of the ROBOT shall extend outside the vertical projection of the FRAME PERIMETER". We were wondering if in the starting configuration, do the pre-loaded game pieces need to be within the frame perimeter at the start of the match?

**A:** We believe !Q43 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **31** at Feb 10th 19)

## Q302 PDP Input Power Cover

**Q:** Would a custom 3D printed cover used in place of the included input power cover be considered a violation of R73 or some other rule? The custom cover would accommodate a 90 degree exit of the input power leads. Would it be considered not assembled as shown?

**A:** Replacing the PDP terminals' cover with a custom one is not an exception listed in !R73 and is therefore not permitted.

(Asked by **2590** at Feb 11th 19)

## Q303 Using game pieces as robot parts

**Q:** Can you use the cargo balls as parts of the robot? Will this count as carrying a game piece?

**A:** There are no rules that explicitly prohibit a team from using a GAME PIECE as part of their ROBOT. However, a GAME PIECE is a GAME PIECE regardless of its source (i.e. event or team), so the ROBOT would be in control of one (1) GAME PIECE and subject to !G4 if it controls a second GAME PIECE. Teams using objects as part of their ROBOT that look like GAME PIECES risk REFEREES inferring that the ROBOT is carrying an additional GAME PIECE and assigning violations per !G4.

(Asked by **7239** at Feb 11th 19)

## Q304 SIMS motor needs and encoder

**Q:** Dear FIRST, We have four SIMS am-0255 motors we plan to use and need position feedback. We have an encoder mounting solution that would work if access to the end of the motor shaft was available. The end of the shaft is covered by an aluminium endcap. We understand that performance modifications [R35] are not permitted, but mounting brackets may be up for consideration. Would it be permissible to drill a ~1/4" hole into the centre of the motor endcap to mount the encoder ? FRC6854

**A:** The modification allowed by !R35-A, which is what we feel you're asking about, is restricted only to facilitate physically connecting the motor to the ROBOT to actuate the part, not for any other purpose.

(Asked by **6854** at Feb 11th 19)

## Q305 Can you score points by ending the match on your opponents HAB?

**Q:** From section 5.3 it seems like you would be credited points for ending the game on your opponent's HAB. Is that the intent? "For the purposes of assessing SANDSTORM and HAB Climb Bonuses described in Table 5-1, a ROBOT is considered to have started from, or climbed to, a HAB Level if:" Emphasis on "A HAB Level."

**A:** Good catch! Thank you. Please see [Team Update 11] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate11.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2052** at Feb 12th 19)

## Q306 Bevelling Bumpers

**Q:** Is it legal to bevel the top of bumper plywood?

**A:** Plywood backing that is modified beyond the exceptions permitted in !R31-A (such that the cross section of the bumper is not what's show in Figure 10-6), is not permitted.

(Asked by **3853** at Feb 11th 19)

## Q307 Does R& apply to HAB or just carpet?

**Q:** R7 disallows traction devices which could damage the field, specifically defining them as "designed to transmit any propulsive and/or braking forces between the ROBOT and FIELD carpet." Would this rule apply to robot devices which are specifically designed to deploy only onto the HAB surface, rather than the carpet?

**A:** Your interpretation (as presented) of !R7 is correct in that Inspectors are only reviewing traction devices designed to interact with the FIELD carpet for compliance with !R7. However, please be aware that !R8 and !G15-G apply universally to ROBOTS that may damage the ARENA.

(Asked by **3019** at Feb 11th 19)

## Q308 Starting configuration and sandstorm period

**Q:** My understanding is that we need to have our starting configuration within the 30" perimeter. When the sandstorm/autonomous period starts do we need to stay within that 30" configuration or as soon as the sandstorm starts, can we extend outside of that as long as we stay within the 30" extension limit?

**A:** Prior to the start of the MATCH, the ROBOT must be in complete compliance with !G1. This includes requiring the ROBOT to be within the STARTING CONFIGURATION (see !R2) - e.g. the ROBOT, excluding the BUMPERS, must be completely within the allowed FRAME PERIMETER (see !R1, !R3), and be no taller than allowed (see !R3). Once the SANDSTORM PERIOD starts, the ROBOT is restricted in width/length by !G24 and in height by !G12.

(Asked by **7502** at Feb 11th 19)

## Q309 Allowable part cost

**Q:** We are planning to use a mecanum wheel system on our robot and purchased upgrade kit AM14U4\_MK6 from Andy Mark for \$699. Had the components been purchased separately they would have not exceeded the \$500 limit. We did not opt out of the Kit of Parts and did not use a voucher for any portion of the purchase. Does the purchase exceed the \$500 limit. Per R13 the determining factor seems to be if the assembly kit is functional in only 1 configuration of which our team is unsure.

**A:** Similar to !Q204, wheel modules are clarified in Example 3 of the Blue Box under !R13.

(Asked by **4983** at Feb 11th 19)

## **Q310 where should we sent our robot before the competition?**

**Q:** We (team 7626) participated in San Diego Regional presented by Qualcomm. Where should we sent our robot before we arrived in the U.S?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For logistical assistance, please email us at: .

(Asked by **7626** at Feb 11th 19)

## **Q311 Clarification for R98D**

**Q:** R98D says "The OPERATOR CONSOLE must not... attach to the FIELD (except as permitted by G19)" However G19 is "Don't tear others down to lift yourself up." Did you mean G15C? [Asking for a friend]

**A:** Good catch, and thank you! Please see [Team Update 11]  
(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate11.pdf>).

(Asked by **2834** at Feb 12th 19)

## **Q312 Is an electrical Solenoid considered a CUSTOM CIRCUIT?**

**Q:** The glossary definition of CUSTOM CIRCUIT specifically calls out pneumatic solenoids as an exception, but does not refer to electrical solenoids. This implies electrical solenoids are CUSTOM CIRCUITS. On the other hand electrical solenoids are specifically categorized in R34 (Table 10-2) and R37 (Table 10-2). Do electrical solenoids fall under the category CUSTOM CIRCUITS.?

**A:** Good point. Please see [Team Update 11]  
(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate11.pdf>).

(Asked by **2834** at Feb 12th 19)

## **Q313 Wiring Gauge**

**Q:** Does it say in the rule-book that the gauge of the wire must be marked on the outside of the wire?

**A:** There is no requirement that the gauge of the wire be printed on the outside of the wire itself; however, if a wire is not labeled, the team should be prepared to provide evidence of compliance with rules specifying wire gauge (e.g. !R60). Samples of the wire off-robot showing cross sectional area and product receipts are two ideas that may help accomplish this.

(Asked by **714** at Feb 11th 19)

### **Q314 Is the robot battery with its associated cable required to be bagged with the robot?**

**Q:** Our team will reuse robot batteries from last season, as permitted by R15-C. Based on the description in the definition of FABRICATED ITEM in Section 10.1, it may be the case that a battery with attached cable is neither a FABRICATED ITEM nor a COTS item. Further, R23 only allows FABRICATED ITEMS to be included in the WITHHOLDING ALLOWANCE. If a battery with cable is neither a FABRICATED ITEM nor a COTS item, does R17 require that the battery be bagged with robot on Stop Build Day?

**A:** Good question. Please see [Team Update 11] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate11.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6343** at Feb 12th 19)

### **Q315 How are the cargo nets inside the cargo ship attached to the cargo ship structure?**

**Q:** How are the cargo nets inside the cargo ship attached to the cargo ship structure? There is nothing on the GE-19070 drawing or CAD model that show the attach hardware or its location.

**A:** Per the note on sheet 6 of GE-19070, "Attach nets using 50-lb cable ties.\*\* If using side nets with diamond pattern, also use 18" bungee cords to secure edges.\*\*\* The locations are not specified. \*(updated 2/15/19)\*

(Asked by **4256** at Feb 12th 19)

### **Q316 R33 Bumper support and maximum gap on the AM14U4 frame**

**Q:** R33 states that "Bumpers must be supported by the structure/frame of the robot. ... a minimum of 1/2in at each end of each bumper wood segment must be backed by the frame perimeter ( $\leq 1/4$  in gap). How does the AM14U4 frame with the Bumper kit meet this requirement..since the only metal part that is within the 1/4 in gap is the mounting brackets on those sides (see Andymark <https://www.andymark.com/products/side-bumper-bracket>)

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance regarding a manufacturer's product, please contact the manufacturer directly.

(Asked by **4764** at Feb 12th 19)

### **Q317 Sandstorm Auto vs Teleop**

**Q:** During the sandstorm, are you allowed to change from running auton code to override and start running teleop all during the sandstorm period?

**A:** There are no rules prohibiting a team from switching from autonomous code to teleoperated code during the match; however, note that the Field Management System and Driver Station will force the robot to running in Autonomous mode during the SANDSTORM PERIOD (this does not mean you cannot use joystick control) and

cannot be switched to Teleoperated mode

(Asked by **6085** at Feb 12th 19)

## Q318 Sharing common grounds on solenoids

**Q:** If we have multiple 12v double solenoids, could their signal lines share a common ground wire, as long as it is appropriately spliced into the PCM ports?

**A:** There are no rules prohibiting this; however, note that the PCM is low side switched so this configuration will likely not behave as you are expecting.

(Asked by **5431** at Feb 12th 19)

## Q319 Clarification about G23

**Q:** According to rule G23: "A robot being considered completely within the HAB ZONE is determined by the robot's bumpers being between the wall and the HAB ZONE" In this case, if the robot strategically opens a ramp and if this ramp's edge is over the HAB LINE; does this violate the G23 rule? And can robots be carried on these ramps?

**A:** As you have quoted, !G23 assesses whether a ROBOT is "completely within" the HAB ZONE based on the position of the BUMPERS, the position of other ROBOT elements is irrelevant. A ROBOT that is completely within its HAB ZONE per !G23 would also be at least partially in its HAB ZONE per !G14 and thus could legally support a partner ROBOT.

(Asked by **6697** at Feb 12th 19)

## Q320 R1 FRAME PERIMETER Clarification

**Q:** R1 states: The ROBOT (excluding BUMPERS) must have a FRAME PERIMETER, contained within the BUMPER ZONE and established in the ROBOT'S STARTING CONFIGURATION, that is comprised of fixed, non-articulated structural elements of the ROBOT. When referring to the FRAME PERIMETER being contained within the BUMPER ZONE does this mean the drive train frame, including its wheels/tracks cannot break the horizontal plane of 7.5"?

**A:** The elements that make up the FRAME PERIMETER (as determined per the blue box in !R1) must *exist* within the BUMPER ZONE. However, there is no rule against those structural elements extending *above* the BUMPER ZONE, along with any additional frame or ROBOT components (including, as in your example, wheels/tracks and other drivetrain components). Just remember, any element that is part of the actual FRAME PERIMETER must not be articulated per !R1.

(Asked by **6022** at Feb 13th 19)

## Q321 use of a relay to switch USB

**Q:** We were looking into a way to switch between two USB cameras input to the roboRIO and found that an Elegoo 4 Channel DC 5V relay module with optocoupler works. We switch USB D-, D+, Vcc, and Grnd using a DIO output pulse. The device is powered via a VRM output. Is the use of this device to switch USB cameras legal?

**A:** We cannot comment on part/design legality, and it is difficult to answer absolutely on questions that are overly broad, vague, and/or include no rule references. However, there are no rules that prohibit relays within CUSTOM CIRCUITS.

(Asked by **1731** at Feb 12th 19)

## Q322 G12 Extension Clarification

**Q:** How is the "extension" measured in G12? Clearly a robot on the floor that is over 6' 6" tall is a violation, but, if you robot is 3ft tall (as measured if placed nominally on the floor) but 4ft in the air, is this a violation of G12?

**A:** Per !G12, regardless of the physical configuration, orientation, or position of the ROBOT in space, the ROBOT may not extend above the ALLIANCE STATION WALL. Figure 8-1 provides some helpful examples.

(Asked by **5881** at Feb 12th 19)

## Q323 Vacuum pump

**Q:** If a device that creates negative pressure (vacuum) also creates temporary pockets of positive pressure which are exhausted, is this device subject to pneumatics rules or exempt as per part 'a' of the Blue Box below R84

**A:** A minimal area of positive pressure caused by airflow restriction in an otherwise open system is not considered a pneumatic system.

(Asked by **668** at Feb 13th 19)

## Q324 Bumper material question

**Q:** Wanted to get clarification on bumper material where R31D rugged smooth cloth is given. We have tested using Scuba Neoprene Poly Spandex which has some stretch and is sewable. We made a "sock" that we can pull over the bumper and the slight stretch it looks great. Take a screw driver or piece of aluminum and run along the fabric with force no tears or marks. Seems rugged. This makes it easy to pull over a red or blue cover and we only need one bumper. Button holes for the bolts to go through.

**A:** We cannot rule absolutely on ROBOT designs or specific items, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event.

(Asked by **7152** at Feb 13th 19)

## Q325 Pneumatic System tube adaptor

**Q:** We have a question about the pneumatic system. We use the nominal 6mm tubes and therefore we need a "valve batterie" for splitting the compressed air to the different pneumatic solenoid valves. In R84 is written: "Solenoid valves with a maximum  $\frac{1}{8}$  in. (nominal, ~3 mm) NPT, BSPP, or BSPT port diameter or integrated quick connect  $\frac{1}{4}$  in. (nominal, ~6mm) outside diameter tubing connection". Is it allowed that we use a 10mm adaptor to 6mm tubing to connect the air tanks to the "valve batterie"?

**A:** We cannot comment on part/design legality. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question. Generally, !R84-E permits connecting fittings and does not exclude the sub-category

of adapter fittings.

(Asked by **7650** at Feb 13th 19)

## Q326 Solenoid Valves

**Q:** Hey As per R84.C "Solenoid valves with a maximum  $\frac{1}{8}$  in. (nominal, ~3 mm) NPT, BSPP, or BSPT port diameter or integrated quick connect  $\frac{1}{4}$  in. (nominal, ~6mm) outside diameter tubing connection." Is it allowed to use the FESTO CPE14-M1BH-5L-1/8 Valves for our pneumatic system?

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **7650** at Feb 14th 19)

## Q327 Is Clippard Air Tank AVT-32-16 legal

**Q:** Is the Clippard Air Tank AVT-32-16 legal? Some team members think is was not legal in the past. It is in compliance with R82A psi (rating). It is not the prohibited tank listed in R84J.

**A:** We cannot comment on specific part/design legality. The only tank specifically prohibited is the tank listed in !R84-J, all other tanks that meet all applicable pneumatic rules are permitted.

(Asked by **871** at Feb 14th 19)

## Q328 Using pressurized air as the air pilot for a solenoid valve which is switching a vacuum.

**Q:** We are intending to use pressurized air as the air pilot on a solenoid valve which will be used to control a vacuum. The solenoid valve meets the requirements of R82A (psi) and R84C. Since this solenoid contains pressurized air and the vacuum, is the vacuum system still considered non-pneumatic? We will never put pressurized air into the vacuum system. The pressure is only used to move the piston spool in the valve.

**A:** If the systems are separated such that the vacuum system can never contain pressurized air, the vacuum system would not be considered pneumatic.

(Asked by **871** at Feb 14th 19)

## Q329 Legality of Motor Controller Fans

**Q:** Table 10-1 under R34 allows the use of "...fans that are...part of legal motor controller". Is it legal to use a fan that is distributed as part of a legal motor controller without using the controller? E.g., would it be legal to detach the fan from a Victor 888 and use it on the robot for cooling or other purposes? Furthermore, are such fans considered CUSTOM CIRCUITS (as suggested by footnote 2 of Table 10-2) or actuators (or both) for the purposes of R36 and R37?

**A:** We cannot comment on part/design legality. Per Table 10-1, a fan is permitted if it was "included in any Kickoff

Kit, distributed via \*FIRST\* Choice, part of a legal motor controller (including manufacturer provided accessories), or part of a legal COTS computing device." A fan that was removed from a motor controller no longer complies with the "part of a legal motor controller" criterion but, as all legal motor controllers with fans were distributed via Kickoff Kits or \*FIRST\* Choice in the past, would comply with one of the other criterion (e.g. distributed in a Kickoff Kit or via \*FIRST\* Choice).

(Asked by **6662** at Feb 15th 19)

### **Q330 Unbag robot to film reveal video**

**Q:** Are we allowed to unbag our robot after 2/19/2019 in order to film the robot for our reveal video? We would not have our drivers drive during this time. Could this fall under "demonstration purposes" as we will be sharing this video with sponsors, our local community, and other FRC teams?

**A:** Yes, filming a video to publicize the team would be considered "display" per !R20-F.

(Asked by **6443** at Feb 15th 19)

### **Q332 Can Pressure Vent Plug be placed on "working" side?**

**Q:** The Pressure Vent Plug is governed by R84 ("permitted"), R85 ("at least one...as illustrated"), R88 ("may be in the high-pressure pneumatic circuit"), and R93 ("vent to the atmosphere to relieve all stored pressure in a reasonable amount of time...visible and easily accessible"). Aside from Figure 10-14, nothing appears to disallow having a single vent being on the working pressure side so long as pressure is relieved "in a reasonable amount of time". Can the vent be on the working side?

**A:** There are no rules that dictate exactly where the vent valve may or may not be installed beyond those listed in your question.

(Asked by **857** at Feb 15th 19)

### **Q333 Bumper Color**

**Q:** What is the color range which is considered red for the definition of BUMPER color in R28. Is maroon eligible for the bumper color?

**A:** There is no formal definition of "red". If a product is sold as "red" or is visibly a shade of red it meets the requirements of !R28. Maroon is defined by dictionary.com as "dark brownish-red".

(Asked by **1574** at Feb 15th 19)

### **Q334 bending standard battery terminal leads**

**Q:** Are we allowed to bend 90 degrees the battery ends of the AndyMark battery cable or do the cables have to come straight away from the battery?

**A:** There are no rules requiring a specific direction for battery terminal leads to route away from the battery, nor are there rules that prohibit bending terminals.

(Asked by **6995** at Feb 19th 19)

## Q335 12" battery cable maximum?

**Q:** Does the 12" battery cable requirement prevent shorter cable lengths from the battery to the quick-connect plug?

**A:** !R5-B requires " no more than 12 in. (~30 cm) of cable per leg" to exempt the battery assembly from the weight requirement. Less than 12 inches of cable meets this requirement.

(Asked by **6995** at Feb 18th 19)

## Q336 Changing team name

**Q:** Can you change your whole team name

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For team logistics assistance, please contact .

(Asked by **5279** at Feb 18th 19)

## Q337 Pneumatic Pressure Release Valve

**Q:** In the rules it states that a release valve is required in a pneumatic release is needed for a circuit but if theres no input compressor is one still needed?

**A:** As !R85 states, if pneumatic components are used (on a ROBOT) all of the items A through G are required on a ROBOT. !R85 does not make any allowances for how those pneumatic components are used and does not allow any items A through G to be omitted.

(Asked by **3336** at Feb 18th 19)

## Q338 Solenoid legality?

**Q:** If we have a solenoid with 1/4 inch ports, can we put 1/4 in to 1/8 in bushing to connect to our pneumatic system?

**A:** We're not entirely sure we understand your exact question. Per !R84-C, only valves which have a maximum of 1/8 in. (nominal) NPT, BSPP, or BSPT port diameter or integrated quick connect 1/4 in. (nominal) outside diameter tubing connection are permitted. We believe the answer to !Q325 addresses any inquiry about adapters.

(Asked by **2106** at Feb 18th 19)

## Q339 How are legal motors identified if there are no markings on the motor?

**Q:** We borrowed an am2964a setup with a 2019 legal Neverest 40 motor and the included gearbox. While we have ready and been advised there are no restrictions on the types of gearboxes you can use with legal motors we have no way of identifying/proving the motor is the Neverest. The sleeve identifies the gearbox combo part number. Do we just print out documentation from the AndyMark website?

**A:** Yes, please be prepared with supporting documentation to help your inspector make the inspection process as smooth as possible.

(Asked by **7583** at Feb 18th 19)

### **Q340 AM14U3 Price Estimate?**

**Q:** My team is trying to find a price for a part and can not find it on the manufacturer's website. We are know that we have to the price marked down on the BOM. Could make an close estimate or do we have to contact the manufacturer to find the price for that part?

**A:** For products which are no longer commercially available, teams should make their best effort to locate pricing information. If it cannot be located, a best estimate should be made based on similar products.

(Asked by **3036** at Feb 18th 19)

### **Q341 Driver Station Camera**

**Q:** Would it be legal to have a camera mounted to a pole that extends over the wall giving a live feed to the driver station during Sandstorm? Or would this violate H10: No Peeking?

**A:** Any OPERATOR CONSOLE part which extends over the wall is a violation of !R98-C. If the camera is not part of the OPERATOR CONSOLE it would be a violation of !H1.

(Asked by **2851** at Feb 18th 19)

### **Q342 What can we leave outside of the bag?**

**Q:** Are we able to leave certain parts outside of the bag to practice with and then put said parts back onto the robot before competition?

**A:** We believe !R17 answers your question. If it does not, please rephrase your question and resubmit.

(Asked by **6498** at Feb 18th 19)

### **Q343 ROCKET Ranking Points from coopertition**

**Q:** With regard to G5 and Q289, if, in the spirit of coopertition, two robots on opposing alliances each descore a game piece from the opposing alliance, would both alliances accrue a foul and be guaranteed a complete ROCKET ranking point?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. It's highly likely that one or both ALLIANCES will be carefully scrutinized for !C1, !C3, !C4, and/or !G8 violations, among others.

(Asked by **4653** at Feb 18th 19)

### **Q344 R94 - Connecting solenoid outputs back to working pressure using check valves**

**Q:** The outputs of a 3 position pneumatic solenoid (with a closed center) are first plumbed to the check valve and then back to working pressure, also each output is connected to end of a cylinder. In such a fashion when the pressure vent plug is opened would allow the air pressure trapped in the air cylinder to flow through the check valve to atmosphere when the solenoid is closed.. The outputs of the solenoids are not directly plumbed together. Is this scenario considered a violation of R94?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event.

(Asked by **3081** at Feb 18th 19)

## Q345 Can we use an LED light

**Q:** We would like to know if we would be allowed to hook up an LED light to help a camera see the tapes for the hatch pannels

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **3336** at Feb 18th 19)

## Q346 Operator Console Placement & Sandstorm

**Q:** Multipart question about Operator Console and Sandstorm 1) Is there any restrictions to where the Operator Console be extended to? 2) Does R98-B apply only to depth or length as well? 3) Are we allowed to create a private wired network that connects to a second computer not in the FMS that connects to secondary computers with other teams? In no way causes RF interference or connects to robots, or connects outside of the Player Station. In theory, it would only communicate data.

**A:** 1) Yes, !R98 restricts the size of the OPERATOR CONSOLE and !C10 restricts where it must be located and operated. 2) !R98-A restricts length and !R98-B restricts depth. 3) No, per !C10 the OPERATOR CONSOLE must be used in the PLAYER STATION to which the team is assigned. Connecting to OPERATOR CONSOLES of other teams or placing components of the OPERATOR CONSOLE on another team's shelf would be use outside of the assigned PLAYER STATION.

(Asked by **6887** at Feb 19th 19)

## Q347 Sandstorm H9

**Q:** In reference to H9, if a Human Player's body was between the Starting Lines, but an object they are holding is outside of the Starting lines, would that be a violation of H9 as their persons are legal, but an object they're holding is not in the plane, but H9 does not directly address objects they're holding.

**A:** Good question. Please see [Team Update 13]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate13.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6887** at Feb 19th 19)

## Q348 PCM solenoid output wire colors, must they follow rule R62?

**Q:** In: R62. All non-SIGNAL LEVEL wiring with a constant polarity (i.e., except for outputs of relay modules, motor controllers, or sensors) shall be color-coded along their entire length from the manufacturer as follows: Does the PCM solenoid output wire colors fall under the exception? We are using red and black for the compressor itself, that is not a problem.

**A:** Per Table 10-4 in !R60, PCM outputs are SIGNAL LEVEL.

(Asked by **3142** at Feb 18th 19)

## Q349 Partial support on Rocket Ship

**Q:** If a Hatch Panel is clearly attached to the lower level of the Rocket ship by only one strip of hook and loop tape and is also touching the floor will it still be scored?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Generally, per Table 5-1 in [Section 5.3](<https://firstfrc.blob.core.windows.net/frc2019/Manual/Sections/Section05.pdf>), only HATCH PANELS which are fully supported by a ROCKET or CARGO SHIP count as scored (provided they also meet all other scoring criteria).

(Asked by **2521** at Feb 18th 19)

## Q350 Inspection Checklist vs Game Ruling.

**Q:** In the inspection checklist, sound is listed as a barred component of a robot, however under R9's examples (which are suggestions), it states sound at made by speakers, sirens, airhorns, or other audio device (this assumes the audio device is very loud) that generate a sound loud enough to be a distraction is an example of causing an unsafe condition. So are sound devices banned in competition, or are audio devices allowed as long as they generate sound at a level that is not a distraction.

**A:** The Game Manual is the ultimate authority on all rules. The Inspection Checklist is a very abbreviated reference intended to simplify the process of inspecting ROBOTS. In some cases this results in a rule being substantially simplified (i.e. the examples you have noted simplified to "sound"). This covers 99+% of all cases and keeps the text on single line for that item. If you run into an issue with a device that you believe meets the rule but is being disallowed due to the Inspection Checklist, refer the Inspector to the full rule text or request the assistance of the LRI.

(Asked by **6887** at Feb 18th 19)

## Q351 Habitat 1 in the end game?

**Q:** With the robot supported with all four wheels on the lower habitat, can the robot have an edge of a ramp touching part of the carpet in the end game?

**A:** We believe !Q25 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **3616** at Feb 18th 19)

## Q352 Colored bumper patterns

**Q:** According to R28, "Each ROBOT must be able to display Red or Blue BUMPERS." In Q333, you specified that it does not matter what shade of red or blue, as long as it is visibly the color or sold as the color. Does that mean bumpers may display a pattern, such as tie-dye, as long as the pattern is clearly and entirely the ALLIANCE color, or sold as such?

**A:** No, per !R31-D the fabric must be solid in color.

(Asked by **5431** at Feb 18th 19)

## Q353 Can we exerted our bumpers above the bumper zone during the Sandstorm period?

**Q:** Can our bumpers extend beyond the Bumper Zone to climb down from the second level during the Sandstorm period as long as we are completely within the Hab Zone?

**A:** !G23 contains no restrictions about when in a MATCH this action may occur or which direction a ROBOT must be traveling. If a ROBOT meets the requirements outlined in !G23, then it is exempt from !R25.

(Asked by **753** at Feb 18th 19)

## Q354 Pancake Piston Mounting Holes too small

**Q:** Can you increase the size of the mounting holes on a pancake piston, The hole is for an 8-32 screw but we want to use a 10-24 screw?

**A:** No, please see !R83.

(Asked by **4265** at Feb 18th 19)

## Q355 Wire Gauge Cross Sectional Area

**Q:** R60 specifies minimum wire gauges for items plugged into the Power Distribution Panel. Could multiple wires be used in parallel to power a CUSTOM CIRCUIT (spliced into a single wire for insertion to satisfy R56), as would be done for power over Ethernet, as long as the total cross sectional area of the wires meets or exceeds that of the wire specified for the circuit in R60?

**A:** No, a team constructed "wire" consisting of multiple insulated wires connected in parallel does not meet the requirements of !R60.

(Asked by **4099** at Feb 18th 19)

## Q356 Level 1 HAB

**Q:** How is the HDPE on the level one HAB platform structurally supported?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. Any construction, measurement, or material information can be derived from the [official Field Drawings]

(<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), [SolidWorks' eMeasure site]([https://frc-cdn.firstinspires.org/2019VRContent/eDrawings\\_2019Field.html?Measure=True](https://frc-cdn.firstinspires.org/2019VRContent/eDrawings_2019Field.html?Measure=True)), or other tools available on the [Playing Field page](<https://www.firstinspires.org/robotics/frc/playing-field>).

(Asked by **810** at Feb 18th 19)

## Q357 robot weight limitations

**Q:** is the robot maximum weight bumper-included (125 lbs.)

**A:** We believe !R5, part A answers your question. If not, please rephrase and resubmit.

(Asked by **6402** at Feb 18th 19)

## Q358 Bumper Material on BOM

**Q:** R12 does not specifically exclude bumper materials from cost accounting. Are they considered part of the "ROBOT" for cost accounting purposes?

**A:** Yes, unless BUMPER materials were sourced in a way that makes them part of the Kit of Parts.

(Asked by **2974** at Feb 18th 19)

## Q359 Chassis Pertrusion

**Q:** Can we add a 1/2 inch collar on the exterior of the chassis to hold the main drive shaft in place?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. A 1/2" protrusion is greater than the 1/4" protrusion allowance in !R1 and would therefore define the FRAME PERIMETER. Depending on the size of the "chassis" this may or may not result in a legal perimeter and will also have implications on BUMPER support.

(Asked by **6043** at Feb 19th 19)

## Q360 Bumpers secured to the chassis

**Q:** If our robot chassis is angled in both the front and back, do the entire bumper have to be touching the chassis, or if the bumper is securely fastened to the chassis does it matter if on one side the bumper does not touch the chassis?

**A:** Per !R33 at least 1/2" at each end of each BUMPER wood segment must be backed (<1/4" gap) by a FRAME PERIMETER element.

(Asked by **6043** at Feb 19th 19)

## Q361 Laser Pointer used for teleop aiming

**Q:** Is a class 1 laser pointer allowed for visual aid for the drivers to aim? Is powering it via the VRM allowed and does it need to be controlled via programming or can it just be on whenever the robot is on.

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **7160** at Feb 19th 19)

## Q362 Blocked CARGO at end of SANDSTORM

**Q:** Situation: The Sandstorm period has just stopped. Blueabot has a HATCH PANEL in its possession, and has come to rest an inch in front of the CARGO SHIP. The CARGO SHIP's internal mechanism deploys; the CARGO bumps against the unscored HATCH PANEL, but does not exit the CARGO SHIP. It's obvious that if Blueabot drives forward and places the HATCH PANEL, the CARGO would be secured. What happens now? Does field crew enter the field and remove the CARGO? How would it be scored?

**A:** There are no rules that prohibit a ROBOT from "trapping" a CARGO in the CARGO SHIP at the conclusion of the SANDSTORM. Per the second sentence of !G4 this CARGO partially supported by the CARGO SHIP does not count as controlled by the ROBOT and therefore does not contribute to violating !G4.

(Asked by **3487** at Feb 19th 19)

## Q363 Do we have to Bag COTS Items that we intend to use on the robot?

**Q:** R17 states ". All ROBOT elements (including items intended for use during the competition in alternative configurations of the ROBOT), with the exception of the WITHHOLDING ALLOWANCE per R23, exceptions listed in R15, and COTS items, must be bagged and sealed" when it says "and COTS items, must be bagged and sealed" so we don't have to seal any COTS Items we intend to use on the bot, and we don't have to include them in our withholding allowance? I would just like clarification.

**A:** Correct, there is no limit on COTS parts brought to the event or used during a ROBOT Access Period and they do not count against the WITHHOLDING ALLOWANCE.

(Asked by **6484** at Feb 19th 19)

## Q364 Frame Perimeter

**Q:** "Note: to permit a simplified definition of the FRAME PERIMETER and encourage a tight, robust connection between the BUMPERS and the FRAME PERIMETER, minor protrusions such as bolt heads, fastener ends, weld beads, rivets, etc. are excluded from the determination of the FRAME PERIMETER." Is a collar attached to a gear shaft allowable under this rule?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Minor protrusions should be minor in both extension from the FRAME PERIMETER (must be less than 1/4") and cross sectional area.

(Asked by **6043** at Feb 19th 19)

## Q365 Can you use hard pneumatic tubing?

## Q365 Can you use hard pneumatic tubing?

**Q:** Are we allowed to use hard pneumatic tubing, eg. aluminum tubing (with proper rating)?

**A:** There are no rules that require use of flexible pneumatic tubing. Provided an item meets criteria listed in !R84, it's permitted as part of a ROBOT'S pneumatic circuitry.

(Asked by **3452** at Feb 20th 19)

## Q366 Modified linear actuators

**Q:** Under "Electrical" for the 2019 Inspection Checklist does the 1st point refer to electrical components only or does it prohibit modifying a component that has electrical part on it. For example: modifying a non legal linear actuator (because the motor is not listed in rules) by taking the non-legal motor off and installing a legal one?

**A:** The inspection checklist is not a "rules" document and does not allow or prohibit anything. Instead, it's a shorthand summary of items Inspectors will check at Inspection. The bullet to which you're referring is meant to have inspectors check for compliance with the rules referenced at the end between the angle brackets.

(Asked by **5912** at Feb 21st 19)

## Q367 VRM terminals

**Q:** Our team is looking to use LEDs as decorative lights on our robot. In previous years we have powered them through the VRM 12v / 500mA terminals, however this method seems to conflict with R48. Is powering the lights via the VRM legal or do they need to be powered through the PDP? Can anything other than the radio be powered through the VRM? The only rule we noticed prohibiting anything like this was R54.

**A:** The !R55 exception to !R48 allows a VRM to be attached to the dedicated PDP terminals. !R54 restricts the use of the 12V 2A terminals of that VRM, but does not prohibit using the other terminals on the VRM for other purposes.

(Asked by **5166** at Feb 21st 19)

## Q368 Motor Legality

**Q:** My team was going through our motors and trying to self compliance check, we found some Andymark RS-775's, they are similar to the Banebots 775 motor which is legal and we were wondering if it could be legal, not specifically if we should or shouldn't use it, but we were wondering if they could be legal since they are sill 775 Motors.

**A:** We cannot rule on part legality, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Generally, if a motor is not listed in Table 10-1 (\*as\* listed in Table 10-1, i.e. the part numbers, source company, etc. match), then it's not permitted. Note some versions of AndyMark RS-775's are legal for use under the "AndyMark PG" and "AndyMark RedLine" motor name.

(Asked by **6768** at Feb 21st 19)

## Q369 what's the host name of the robot during play?

**Q:** In our java code, I am referring to our robot as the hostname "roboRIO-6580-FRC.local". Will that name continue to work during the competition? Or do I need to hard code something else? Or what's the best value to use that will work both during build/practice and also at a competition? I read the whole whitepaper on the FMS networking, and couldn't find the answer there. Thanks

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **6580** at Feb 21st 19)

## **Q370 Measurement on robot while in bag?**

**Q:** Are we allowed to take measurements of our Robot between bag day and competition, as long as it remains sealed in the bag? Does this qualify as work on the robot?

**A:** There are no rules prohibiting this.

(Asked by **6995** at Feb 21st 19)

## **Q371 Attach sponsorplate on robot after bag & tag**

**Q:** We would like to take some photos and shoot a little video at a sponsor location. The robot that is in the bag has no sponsor plate with logos. Is it possible to attach this plate for promotional purposes? R20 F ii states: No activity that could be considered "work on" or "practice with" the Robot is allowed. Is this considered "work on"? If yes, is it then possible to put them on for the photo / video shoot and afterwards get the plates off again?

**A:** The contents of the bag can not be modified during a display period (i.e. what was in the bag at the start must be what's in the bag at the end). The rules prohibit activity that is considered 'work on' the robot and/or activity that leaves the ROBOT and/or team members in more competitive states after the display than before. If a Team installs a sponsor panel for a demo then takes it off before re-bagging, it doesn't violate the rule.

(Asked by **6920** at Feb 21st 19)

## **Q372 Wireless communication in operator console per R99**

**Q:** We have an LED strip that we are considering using on our operator console. It has an infrared receiver for remote control. Does this qualify as wireless communication for R99, and if it does, would it still if we did not use the remote control?

**A:** Yes, R99 does not provide an exhaustive list, but infrared communication is wireless communication. As specified in !Q240, devices with wireless can still be used if the wireless can be verified to be disabled.

(Asked by **6995** at Feb 25th 19)

## **Q373 Wiping Down the Surfaces of the HAB Platform**

**Q:** During match set up, would it be legal for drive team members to wipe down the surfaces of the HAB platform with disinfecting wipes to clear them of debris, given it is done in a reasonable time and follows the regulations of C7?

**A:** No, this equipment would not be permitted in the ARENA per !H1. If you have concerns about the state of a part of the FIELD, such as the HAB, please notify the Field Supervisor and/or Head REFEREE prior to the start of the MATCH.

(Asked by **694** at Feb 25th 19)

## Q374 penalty for R20?

**Q:** Despite my numerous protests, our mechanical team decided to fix (read: replace plastic with metal) some parts on the Robot while it was out of the bag for a demo (which our competition drivers were driving at) . Since this violates R20.F.ii (and possibly others, what is the penalty for working on and practicing with your robot after stop build day? Should I be worried about disqualification?

**A:** Please contact FIRST at with the full details and we can discuss these issues on a case-by-case basis.

(Asked by **6995** at Feb 25th 19)

## Q375 Hatch Panels

**Q:** When we put the hatch panels on the field, instead of dropping the hatch panel, is it legal to put it in the spot where you usually drop it and instead push it up through the top of the loading station without extending your fingers outside of the circle that you place the hatch panel? Does it violate H7, H15, or any other rules?

**A:** Please see [Team Update 15]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate15.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **302** at Feb 26th 19)

## Q376 Painting the Robot

**Q:** Our team is looking to paint our robot, but with truck bedliner. I haven't seen anything in the rules on painting the robot, so I had to ask here. Bedliner is somewhat of a rough product after it is painted, can we use it for our robot?

**A:** We cannot comment on part/design legality or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question.

(Asked by **6768** at Feb 25th 19)

## Q377 Does a hatch secured by velcro but also stuck inside the rocket count as scored?

**Q:** During our practices, we have noticed that at times the hatch will be scored on one side of the Velcro but also go inside the opening and get stuck behind the plastic of the other side of the hatch opening. We might have constructed our rocket incorrectly. Does the inside of the rocket also count when determining if a hatch panel is

scored? Would a hatch panel supported by Velcro and the inside of the rocket count as scored?

**A:** Per Table 5-1, an ALLIANCE is awarded points for "each HATCH PANEL (excluding Null HATCH PANELS) attached to a ROCKET or CARGO SHIP such that it is fully supported by that ROCKET or CARGO SHIP and via the hook/loop tape..." If the two criteria are met (i.e. the HATCH PANEL is supported by nothing other than the ROCKET/CARGO SHIP and the hook/loop), the HATCH PANEL is considered scored.

(Asked by **2607** at Feb 27th 19)

## **Q378 Re recent inspection checklist, hatch cover distance**

**Q:** How can a robot score on the rocket's 2nd and top tier hatch cover scoring locations if it is not allowed to move the hatch cover more than 3' above the bumper perimeter ? Wording seems ambiguous.

**A:** The inspection checklist indicates this will be measured from the ROBOT'S FRAME PERIMETER to where the HATCH PANEL first contacts the ground. There is no rule indicating the HATCH PANEL may not be lifted more than 3'. See !R6 for further clarification.

(Asked by **423** at Feb 25th 19)

## **Q380 Are robots that fall to ground after a match, illegal?**

**Q:** Our bot is designed to hang off of the level 3 HAB and might drop off after a match ends if we can't retrieve it for a few minutes. Will this be construed as unsafe under rule S1 and prevent us from passing inspection? We know you aren't allowed to comment on specific designs, but S1 doesn't address acts that happen after the match and we couldn't find any rule that does. In prior years, robots have fallen to the ground after the match so we have assumed that this is ok but would like to be sure

**A:** You're right, we cannot rule on ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Generally, a ROBOT that lowers to the floor after being DISABLED is not considered unsafe; nor is a ROBOT which falls in an expected way based on the way it is suspended. FIELD Staff are encouraged to treat all ROBOTS which appear to be suspended in any way with caution and work with Teams to remove them from the FIELD in a safe way. On the other hand, there are ways that this can happen that are unsafe. For example, if the ROBOT moves quickly or unexpectedly once ALLIANCE partners are out on the FIELD retrieving their ROBOTS in a way that may surprise or injure them, you're likely going to be required to remedy that hazard before being allowed to compete again. !S1 applies in this case because the hazardous condition will have been found 'before the next MATCH' (though immediately after the MATCH that just completed).

(Asked by **694** at Mar 3rd 19)

## **Q381 Use of a second computer for camera vision**

**Q:** We have setup static IPs, enabled routing services on the Drivers Station, made a private 192.x.x.x network between the Drivers Station and a second computer, and are using the Drivers Station as a gateway between the 192.x.x.x and 10.3.59.10 our camera. Will the FMS block these packets?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **359** at Feb 26th 19)

## Q382 Follow up to Q373: would wiping down the HAB before the match be legal?

**Q:** Follow up to Q373: given that H1 refers to actions that occur DURING a match, but not to pre- or post-match actions, would wiping the HAB down before match be legal, as long as it does not damage the field, leave any residues or dampness, and does not delay the match?

**A:** There are no rules that prohibit dusting a FIELD element before a MATCH. However if FIELD staff conclude that such behavior affects the FIELD (such as using any cleaning solutions), delays a MATCH, or otherwise interferes with the event, they're within their right to make that call.

(Asked by **5052** at Feb 28th 19)

## Q383 Using onboard compressor to store air in an offboard tank.

**Q:** The game manual for this year clearly states that all stored air for the pneumatic systems on the robot during an event have to be provided by the compressor on the robot (R86). Would it be allowable to fill an off-board tank using the compressor on the robot during downtime and then use that tank to fill the robot later for when there's quick turnarounds in between matches in order to more properly follow the duty cycle of the compressor?

**A:** No. !R87 clearly states, "No stored air pressure intended for the ROBOT may be located off-board the ROBOT."

(Asked by **4944** at Feb 27th 19)

## Q384 Rocket Base Purpose and Dimension

**Q:** In Section 4.3, what is the "base" and what are its dimensions? We were reviewing the Team Update 13 and are unsure of what the "base" does. And if the "base" allows for our robot to drive onto, to allow for access to the rocket or if the "base" is something that only the rocket is on top of. If the "base" is something only the rocket is on top of, does it change the heights of the hatches and the ball openings?

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. Any measurements or materials information can be derived from the [official Field Drawings] (<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), [SolidWorks' eMeasure site]([https://frc-cdn.firstinspires.org/2019VRContent/eDrawings\\_2019Field.html?Measure=True](https://frc-cdn.firstinspires.org/2019VRContent/eDrawings_2019Field.html?Measure=True)), or other tools available on the [Playing Field page](<https://www.firstinspires.org/robotics/frc/playing-field>). The Rocket Base is Drawing GE-19015, and you can see how it's used in Drawing GE-19025.

(Asked by **7327** at Feb 27th 19)

## Q385 PDP Lacking Ports

**Q:** I our robot we used 9 CIM motors. As you know there are only eight 40A plugs on the PDP. So we plugged one motor controller to a 30A one. We are wondering that, will it be a problem while inspection.

**A:** Table 10-3 details the component and their corresponding breaker limits. A motor controller may be protected using breakers up to 40A and doesn't prohibit protecting that circuit with a lower rated breaker.

(Asked by **7439** at Feb 27th 19)

## Q386 Lubricant Legality

**Q:** What are the restrictions on lubricants in the game. We are thinking about utilizing Liquid Wrench Silicone Spray on our robot, but we would like to know if it is even legal. Thanks

**A:** We believe !R11 answers your question. If it does not, please rephrase your question and resubmit. Please search the Game Manual before posing a new question.

(Asked by **1303** at Feb 28th 19)

## Q387 Demonstration Question

**Q:** Good afternoon! We are planning a sponsorship demonstration per R20, but want to clarify whether flashing of the code to do so is in compliance with the rules on this? We do not plan on having our drive team handling the robot, and it would be a brief display. But, since we have not done a demonstration before, want to ensure we are in compliance with the rules.

**A:** "Flashing of the code" using code that was developed in part, or in whole, after the ROBOT was in the bag violates !R20(a) unless the code was deployed to the ROBOT during an un-bag period per !R21. Flashing of code that was not developed or improved after the ROBOT was in the bag is permitted per !R20(f, iii) so long as the ROBOT was returned to its original state ("old code") at the end of the demonstration (as similarly clarified in !Q371). If this doesn't answer your question please email with more details of your demonstration.

(Asked by **3695** at Mar 4th 19)

## Q388 PCM without pneumatics

**Q:** Can we use a PCM to power LEDs without a pneumatic system?

**A:** There are no rules requiring that a PCM be used exclusively for a pneumatic system.

(Asked by **5567** at Mar 4th 19)

## Q389 Robot Name

**Q:** How do we add the name of our robot? Our team info page on firstinspires is showing last years name.

**A:** The purpose of this Q&A is to answer questions regarding the rules of DESTINATION: DEEP SPACE. For technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **102** at Mar 4th 19)

## Q390 Line Crossing in Sandstorm

**Q:** For Sandstorm bonuses, does it matter when the HAB line was broken? Example: During sandstorm, a robot drives across the Hab line and places a game piece on the rocket, then goes back to the human station to pick up another piece. While they are on the alliance station side of the HAB line, the sandstorm period ends. Do they receive points for crossing the line or do they need to be on the other side when sandstorm ends?

**A:** Per 5.3: "...each ROBOT whose BUMPERS fully cross the HAB LINE **\*\*during\*\*** the SANDSTORM PERIOD". (emphasis added) There's no requirement that they stay across the HAB LINE.

(Asked by **5166** at Mar 4th 19)

## **Q391 Who is the pin being assessed to? Pinning is a defensive move.**

**Q:** G18 and the blue box describe pinning as "to prevent or stop something from moving." When Robot B crosses the center line and declares him self as the sole Defensive robot per G9 and parks in front of a either the Rocket or Cargo Ship that robot is preventing Robot A from moving would Robot B be "pinning" and have to clear 6" away. Same if Robot A made continuous contact not allowing Robot B to Clear forcing the foul Robot A wold be violating G18 also and also penalized. Who is Pinning who?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. !G18 applies to all ROBOTS, offensive or defensive. A "defense ROBOT" can be pinned on the opposite side of the FIELD, or can be pinning on the opposite side of the FIELD.

(Asked by **3244** at Mar 4th 19)

## **Q392 Would installing required updates to robot when unbagged be considered working on robot?**

**Q:** When having the robot out of the bag during any of the exceptions would it be acceptable to apply the required NI updates to the Robot or would this be in violation to R20.F.II "No activity that could be considered "work on" or "practice with" the ROBOT is allowed."

**A:** The rule you reference, !R20(F) is in regards to brief demonstrations. If a ROBOT is out of the bag for exception !R20(F) then the NI updates would be considered "work on" the ROBOT. However, if a ROBOT is out of the bag for exception !R20(G)/!R21 then applying the require updates (or any other work) are fully permitted.

(Asked by **3244** at Mar 4th 19)

## **Q393 Would pushing an opposing robot into our HAB loading zone create a G13 violation?**

**Q:** At GSD several times an opposing defense robot sat in front of our HAB loading station with around them. We pushed them into the HAB Zone so that both robots were entirely in the HAB. The defending robot did not receive a G13 penalty and stayed in HAB, indefinitely shutting down the loading zone. The explanation: we pushed them in thus forcing the penalty. The only time G13 was called was when we lowered our intake to pick up a cargo (dangerous as it could have got into their frame premier).

**A:** We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/HTML/2019FRCGameSeasonManual.htm>) and, if needed, resubmit a different question. !C8 prohibits "Strategies clearly aimed at forcing the opposing ALLIANCE to violate a rule" as judged by REFEREES (and Head REFEREES) at the time of the incident. If !C8 is called, the other violation (!G13 in your example) would not be called.

(Asked by **5687** at Mar 4th 19)

## Q395 Blocking the HAB loading station?

**Q:** Re Q110: A blue robot defensively parks in front of red loading station with some/all of its bumper in red HAB zone preventing red robot from accessing cargo/hatches from that loading station. If red wants to access its loading station the only place to push blue is directly into the loading station. If pushed far enough in would G13 be called against blue or would G8 be called against red for intentionally pushing blue with no direct access to the loading zone since blue is now blocking it?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. We assume you mean !C8, as !G8 doesn't seem to apply. If a REFEREE determines that a ROBOT is utilizing a "Strateg[y] clearly aimed at forcing the opposing ALLIANCE to violate a rule" then !C8 will be invoked.

(Asked by **5687** at Mar 7th 19)

## Q396 When do timeouts/field timeouts start during back to back playoff matches?

**Q:** When do timeouts/field-timeouts start between back to back matches? Does the timer start instantly after the previous match score has been shown or does it start once the field has been cleared of teams?

**A:** Per Figure 12-4, all TIMEOUT timing (FIELD TIMEOUT and Team TIMEOUT Coupon Window) begins on the ARENA Reset Signal (i.e. when the ROCKET nosecones illuminate green).

(Asked by **1102** at Mar 7th 19)

## Q397 Non-Exel B.O.M.

**Q:** so for the duration of the year we've been recording our parts, costs and what-not on google sheets. I was wondering if we have to use Exel, and the provided BOM template or if it's okay as long as it includes all of the categories required in the template.

**A:** The provided template is just an option. An alternate method of showing the same information is permissible so long as it can be physically provided in the same manner at an event.

(Asked by **6484** at Mar 7th 19)

## Q398 Pool Noodle outer diameter

**Q:** R31 C requires approximately 2.5 inch pool noodles, however, would 3 inch be permitted?

**A:** Sorry, as you pointed out !R31-C requires 2.5 inch (nominal) pool noodles.

(Asked by **3192** at Mar 7th 19)

### **Q399 When does a pin end?**

**Q:** In G18 it says that one robot can pin another without penalty for five seconds. It also says that a pin ends once the robot moves six feet away. Doesn't that mean that the length of a pin the robot can do is determined by how fast it moves? A slow robot might only be able to pin another for a very short time. Or is the rule about moving six feet away only for starting the count before a new pin may be done?

**A:** A pin ends when "the ROBOTS have separated by at least six (6) feet." The additional condition on being able to start a new pin on the same ROBOT is "must then wait for at least three (3) seconds." As you point out, a ROBOT that wishes to avoid a violation of !G18 must account for how long it takes them to "separated by at least six feet" into the amount of time they can pin an opponent.

(Asked by **151** at Mar 7th 19)

### **Q402 Clarification on R15 and 16**

**Q:** Could a part from a previous robot be used on our current robot if it has received modifications and is used differently than originally designed? Based on our interpretations of R15 and R16 we believe this is permitted; are we correct?

**A:** Provided the elements in question are exceptions listed in !R15 and/or meet the requirements in !R16 (and don't violate any other robot rules), they are permitted.

(Asked by **4180** at Mar 11th 19)

### **Q403 Is a pneumatic air bag allowed?**

**Q:** As title asks, we consider using a pneumatic air bag on our robot to cushion damage from falling from HAB levels. It was not specified in the pneumatic rules.

**A:** !R84 lists the only pneumatic system items permitted on a ROBOT.

(Asked by **4590** at Mar 8th 19)

### **Q404 Robot Access Period start time**

**Q:** 2 day events allow a 6 hour robot access period during the 7 day period before the district event where you are competing begins. Does the 7 day before the event event start at the time load-in or the following day after opening ceremonies?

**A:** The 7-day period ends on the first official day listed for the event on <http://frc-events.firstinspires.org>. For example, the [FIT District Plano Event](#) has an official start day of Thursday, March 14, 2019. Therefore, the 7-day period would be Thursday, March 7 2019 through Thursday, March 14, 2019.

(Asked by **6672** at Mar 10th 19)

## Q405 BOM Cost for Custom FIRST items from Previous First Choice Credits

**Q:** How does one account for items received from FIRST Choice in previous years that are custom parts no available from other sources? For examples the if the team receives the ADIS16448 or Analog Devices 2017-GYRO (ADXRS450) from a previous year. FIRST Choice credits were used for other parts and accounted accordingly on the BOM as \$0. How can should the team account for these custom parts with no available market value?

**A:** The intent behind the answer provided to !Q34 applies here too. For items not commercially available or no longer available, the FMV for a closely comparable item should be used.

(Asked by **2262** at Mar 11th 19)

## Q406 HAB overhang

**Q:** Is it permissible that an element of the robot hang over the platform below the horizontal plane of the platform surface provided the robot is fully supported by the horizontal platform itself?

**A:** Provided that criteria defined in Section 5.3 are met (which don't require that \*all\* parts of the ROBOT be above a Level's platform - only the BUMPERS), the points are awarded accordingly. If a ROBOT'S part is below the Level's platform and is supported in some way by something below that Level's platform, it will affect the HAB Climb Bonus.

(Asked by **6854** at Mar 11th 19)

## Q407 PDP Input Battery Cover Options

**Q:** Can the PDP inputs connections be insulated with tape and not use the battey cover to allow different angled terminal lugs to be used. The connection is still the same as Rule 47 and we are not modifying (replacing) the PDP input cover by R73 (Your answer to Q302).

**A:** Please see [Team Update 17]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate17.pdf>). Note the wires must still be fully insulated per !R45.

(Asked by **4256** at Mar 12th 19)

## Q408 How many bumper mounts are required

**Q:** Is there a minimum required amount of bumper mounts need on a section of bumper, we could find any requirement for mounting distances between.

**A:** !R31-G requires "a rigid fastening system to form a tight, robust connection to the main structure/frame," but does not proscribe a specific number of fasteners or attachment points.

(Asked by **3458** at Mar 11th 19)

## Q409 Hab level two starting position

**Q:** If at the beginning of a match, two robots, in their starting configurations, are able to position themselves on one of the level two HAB platforms with the third robot on the other level two platform can all three robots score six points during the sandstorm?

**A:** There are no specific rules that limit the number of ROBOTS that can start on each HAB Level, so long as all prescribed staging rules are followed (e.g. Section 5.1.2 and !G1).

(Asked by **213** at Mar 11th 19)

## **Q410 2 LRIs, 1 event?**

**Q:** If an event has multiple LRIs, who should a team turn to for the final decision on a matter concerning robot rules? If the two are not in agreement with one another, which LRI has final say?

**A:** In the event that multiple LRIs are assigned to an event, a team can approach either LRI for a decision on a given rule. In the unlikely even that there are multiple assigned LRIs and they also do not agree on a particular rule, the decision will be referred to `_FIRST_` HQ in a manner similar to what is referenced for Head REFEREES in Section 12.2

(Asked by **900** at Mar 12th 19)

## **Q411 Rule G10 and Frame Perimeter**

**Q:** According to rule G10, no part of a robot, except the bumpers, may be outside of the frame perimeter while on the opposing side of the field. If a part of the robot that is designed to usually stay within the frame perimeter during normal game play, accidentally swings outside while defending another robot, does this still incur a penalty?

**A:** The intent is not a factor in the evaluation of !G10, so yes, this would be a violation.

(Asked by **302** at Mar 12th 19)

## **Q412 Coating on competition carpet**

**Q:** We purchased some carpet, like that described in the manual in section 4.1, so we can practice on a surface that is as close to competition conditions as possible. Our robot is sliding on the carpet, although it grips fine on other low-pile carpeting. We found out that new carpet is treated with a fluorochemical, and that might be why it is slippery. Is the competition carpet also treated like this, and if so, is the treatment removed before competition?

**A:** According to our supplier, there isn't a coating applied to the carpet purchased for competitions. That being said, brand new carpet may have slightly different properties than used carpet, however we're unable to quantify the difference.

(Asked by **3926** at Mar 20th 19)

## **Q413 Insulating around PDP input terminals**

**Q:** In meeting the requirements of R45 for insulating the main power wires as they enter the PDP, may the wire insulation system be designed to engage with the PDP's 6-32 female threads such that to a RAO the insulation system would take the external form & appearance of a "cover"? Followup to Q302 and Q407.

**A:** Please see [Team Update 18]

(<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate18.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2363** at Mar 19th 19)

## Q414 Limit on quantity of bumper sets?

**Q:** Is there a limit to the number of bumper sets allowed for each team? R30 allows for "Each set" but doesn't say if teams are required to have fewer than a certain number of bumpers at an event. Can teams have spare bumpers like they can have spare parts? Can teams have multiple bumper configurations as long as all of the configurations meet the bumper rules? Can each of those sets be made from a different type of "rugged cloth"?

**A:** There is no limit to the number of BUMPER sets a Team may have, though note that Inspectors may prioritize getting all ROBOTS fully inspected over inspecting a large number of BUMPERS for one Team. There are no rules prohibiting spare BUMPERS, multiple configurations, or different types of cloth on BUMPERS.

(Asked by **3847** at Mar 14th 19)

## Q415 G19 and C8

**Q:** If there were a member of the blue alliance on the opposing side of the field and another member of the blue alliance were pushed past the opponent's cargo ship line by a member of the red alliance in such a way that the blue alliance will now have two robots on the opposing side of the field, is this a breach of rule G9? However, since they were pushed past the opponent's cargo ship line, is this instead a breach of rule C8? In this case which foul would be given out?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Meanwhile, please see [Team Update 18](<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate18.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **1678** at Mar 19th 19)

## Q416 Withholding question: R15, R23, R17

**Q:** We have some motors that fall under R15-D-ii that we are looking to bring into our event. As we are close on our Withholding Allowance, we are trying to determine if R23 requires these motors to be counted in the 30 lb (per R15, they are Fabricated Items). R17 seems to separate the R15-allowed items from the Withholding Allowance by listing them separately--would this also be the case for R23?

**A:** Per !R23, "Items specified as exempt from !R15 are also exempt from the WITHHOLDING ALLOWANCE limit."

(Asked by **1197** at Mar 18th 19)

## Q417 opposing player preventing hab climb

**Q:** If an opposing teams robot is in the hab zone in the last 30 seconds preventing a tier three climb would a tier three climb be awarded to all teams on the alliance or only the robots that are contacting the opposing robot in the

hab? the g13 rule mentions it but I don't fully understand it.

**A:** Per !G13, only the "contacted opponent ROBOT, and all partner ROBOTS it's fully supporting" are awarded a Level 3 Hab Climb Bonus.

(Asked by **6581** at Mar 20th 19)

## **Q418 After being pushed to other alliance side, Can a robot return from other CARGO SHIP LINE?**

**Q:** According to Update18, a robot forced to crossed opponent's CARGOSHIPLINE and makes a dedicated effort to cross back, isn't violating G9 nor G10 . As G9,G10 updates written now, crossing back from the other CARGO SHIP LINE (let's say robot got pushed from left line, and driving back from right line) consider as an effort to cross back, therefore shouldn't get a foul. Should the situation consider as a foul? Or:in what are the circumstances it won't be penalized?(ex: not hitting an other robot).

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. In general, any effort to cross over the CARGO SHIP LINE without any other game play actions (e.g. hitting other robots, manipulating game pieces, stopping to block access to areas, etc.) is likely to be considered a dedicated effort.

(Asked by **1577** at Mar 20th 19)

## **Q419 Bot name on tank?**

**Q:** Is it legal per R83 too add a sticker on a pneumatic tank with the bot's name on it?

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT part lies with the Lead ROBOT Inspector (LRI) at each event. If a pneumatic item is altered in a way that isn't an exception explicitly listed in !R83, it's not permitted.

(Asked by **7222** at Mar 20th 19)

## **Q420 Are stickers considered COTS items?**

**Q:** For purposes of being in compliance with all ROBOT rules that pertain to COTS items, are decorative stickers that are provided via the KOP, via a sponsor, or purchased from a VENDOR, considered to be COTS items?

**A:** Yuppers.

(Asked by **900** at Mar 20th 19)

## **Q421 Are the Vex 393 motors legal this year?**

**Q:** In the past it has been legal to use the Vex 393 motors however they seem to not be listed in table 10-1. Why was the 393 motor removed for the legal list as it is rated for 12v. Reference link for mentioned motor:  
<https://www.vexrobotics.com/motors.html>

**A:** Rules from previous \*FIRST\* Robotics Competition seasons are not relevant to DESTINATION: DEEP

SPACE as all rules are revisited and may be updated based on a variety of factors (including, but not limited to safety, part availability, rule set simplicity, etc.) each year.

(Asked by **4909** at Mar 20th 19)

## Q422 R20G Robot Access for third two Day Event

**Q:** When attending a third two day event are you still allowed to use the Robot Access period?

**A:** Yes, !R21 does not include a limit on the number of two-day events for which the Robot Access Period applies.

(Asked by **1413** at Mar 20th 19)

## Q423 Closing off part of pneumatic system to pre-load a game piece then manually reopening

**Q:** Is it within the rules to manually close off, depressurize, then reopen one section of a pneumatic system using manual valves while on the field in order to pre-load a game piece? Alternatively, is it within the rules to vent prior to loading then re-pressurize while on the field? To clarify, the compressor would not be running: re-pressurization would be accomplished solely by reopening a manual ball valve to allow pressure to return to the manipulator.

**A:** We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. There are no rules that prohibit a team from de- and re-pressurizing part of a pneumatic circuit manually, provided it's done in a way that complies with all Robot Rules (particularly those in Section 10.9). If you have a question about what any one of those rules means, please rephrase and resubmit.

(Asked by **2152** at Mar 22nd 19)

## Q424 Rule R35 Motor Modification

**Q:** R35 states that "motors must not be modified". With respect to the KOP BOSCH seat motor, would replacement of the internal gears manufactured with a different material but otherwise identical, be considered a modification if the new gears have the same form, fit and function?

**A:** The first part of !R35 ("The integral mechanical and electrical system of any motor must not be modified.") and the second part of its Blue Box ("Note that for the previous KOP Window motors and the Bosch motor, the gearbox is considered integral to the motor, thus the motor may not be used without the gearbox.") state that integral systems cannot be modified and that the gearbox is integral.

(Asked by **175** at Mar 22nd 19)

## Q425 Event panel scoring

**Q:** <https://frc-events.firstinspires.org/2019/NCGUI/qualifications/49> I do not understand how hatch panels , cargo are being scored and both panels and cargo are being scored. Please refer to the above web site for a representative sample match result. Looking at the blue team: I count 8 "b" witch I assume is balls for a score of 24 which is correct. I count 1 "p" which I assume is a panel but it is scored at 6 pts. The discrepancy could be explained that some of "b" had panels on them. Red team

**A:** A "B" on the Event Results web page indicates "Both" as in 1 HATCH PANEL and 1 CARGO. The differentiation between Null HATCH PANELS and HATCH PANELS is not made. In the example cited, three of the HATCH PANELS were scored during the match (two on the CARGO SHIP and the one on the ROCKET), and the rest were Null HATCH PANELS.

(Asked by **6512** at Mar 25th 19)

## **Q426 Viewing of Loading Station During the Sandstorm Period**

**Q:** During the sandstorm period, if drive team members are in compliance with H9 (between the starting lines), is it a violation of H10 (No Peeking) to view or watch the your alliance loading stations. Specifically is it a violation to watch the pre-loaded hatch panel in order to determine of a robot is able to acquire it.

**A:** There are no rules that prohibit a member of the DRIVE TEAM from looking over at/through the LOADING STATION, provided, as you note, other rules aren't violated.

(Asked by **836** at Mar 25th 19)

## **Q427 G20 and contact inside the frame perimeter**

**Q:** For making a call of G20, contact inside the frame perimeter resulting in damage. Would a referee be allow to look inside a robot after the match has ended to better determine if any damage has resulted from contact witnessed inside the frame perimeter during match play?

**A:** Generally, REFEREES make calls real-time during a MATCH as they see them. There are no rules prohibiting REFEREES from looking at ROBOTS or seeking clarification on a call before, during, or after a MATCH. REFEREES use their best judgement on a case by case basis.

(Asked by **179** at Mar 25th 19)

## **Q428 G20: Determining if contact is deliberate**

**Q:** For the purposes of G20, would the act of crossing onto the opponents side of the field and assuming a defensive position fulfill the "deliberate" portion of "deliberate or damaging" contact for the purposes of G20? Therefore make any resulting contact inside the frame perimeter by a robot who assumed a defensive posture an immediate G20 regardless of if damage occurs?

**A:** The "deliberate or damaging" clause in !G20 refers to the contact within an opponent's FRAME PERIMETER, not with the location of the ROBOT on the FIELD. For example, a ROBOT may deliberately be in a particular location on the FIELD, but accidentally/innocuously contact an opponent inside its FRAME PERIMETER. The ultimate decision would be determined by the REFEREES at the event, with the final call made by the Head REFEREE.

(Asked by **179** at Mar 25th 19)

## **Q429 Unbagging after events**

**Q:** In the event we don't qualify for District Championships or World Championships, are we allowed to permanently unbag as soon as the teams for those events are confirmed? Or do we need to wait till one or both of

those events are concluded?

**A:** The manual doesn't state when it's "safe" for a team to consider their official season over, and thus safe to unbag. There's no requirement that you wait until all official events of the season are over, but if you unbag before an event, and then qualify, please email [firstroboticscompetitionteams@firstinspires.org] (mailto:firstroboticscompetitionteams@firstinspires.org) to determine next steps in that exceptional circumstance.

(Asked by **4180** at Mar 27th 19)

## Q430 Robot Access Period

**Q:** Our team is in Michigan and we participate in the 6 hour robot access period the week of our two district events. What are the rules regarding the robot access period after the second district event leading up to the State Championship event? Is there another 6 hour access period?

**A:** The Blue Box under !R20-G lists the "2-day" events for which the unbag time applies. District \*Qualifier\* events are listed, but District \*Championships\* are not. As such, the unbag time does not apply between a qualifier and a championship.

(Asked by **6020** at Mar 27th 19)

## Q431 G20: Determining Deliberate Intent

**Q:** For the purposes of G20, would the act of driving in the direction of an opposing ROBOT fulfill the "initiating" and/or "deliberate" portions of "initiating deliberate or damaging contact" for the purposes of G20 even if any subsequent on or in-frame contact is incidental or unintended (i.e. a mechanism swings forward slightly due to inertia after a BUMPER-to-BUMPER collision between the two ROBOTS)?

**A:** The "deliberate or damaging" clause in !G20 refers to the actual contact within/on an opponent's FRAME PERIMETER, not with any actions/game play/intentions preceding that contact. Generally - if, in the judgement of the REFEREE, contact on/within a ROBOT'S FRAME PERIMETER is neither deliberate nor damaging, !G20 is not violated (e.g. part of a ROBOT swings, accidentally in the REFEREE'S judgement, in to a ROBOT'S FRAME PERIMETER and makes contact and didn't seem to cause damage). If a REFEREE infers the contact to be deliberate or that it caused damage, they're likely to call a !G20 violation.

(Asked by **2655** at Mar 28th 19)

## Q432 G20: Are BUMPERS part of the ROBOT?

**Q:** For the purposes of G20, what part of the offending ROBOT must contact or enter the FRAME PERIMETER of an opposing ROBOT? Are BUMPERS included as part of the ROBOT for the purposes of G20?

**A:** BUMPERS are part of the ROBOT except when specifically excluded (e.g. !R15).

(Asked by **2655** at Mar 27th 19)

## Q433 Is free space part of the ROBOT for G20?

**Q:** Is the empty/free space inside the FRAME PERIMETER of a ROBOT with a concave frame/shape (i.e. the white space in Figure 10-1) considered part of the ROBOT for the purposes of G20? In other words, does entering

this free space without actually touching any part of the physical ROBOT which occupies space and has a mass constitute “contact” for the purposes of G20 assuming all other criteria for G20 have been met?

**A:** No, crossing the vertical projection of the FRAME PERIMETER of a ROBOT without contacting any physical ROBOT elements does not violate !G20.

(Asked by **2655** at Mar 29th 19)

## **Q434 G20 and BUMPER-to-BUMPER Contact**

**Q:** If a ROBOT with a concave frame/shape (i.e. the gray space in figure 10-1) collides with another robot with a similar frame/shape in such a way that they “mesh” like gear teeth, is this considered “deliberate contact” for the purposes of G20 assuming that such a collision would otherwise be considered normal BUMPER-to-BUMPER contact if the ROBOT was not concave?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision about if contact was deliberate is determined by the REFEREES at the event, with the final call made by the Head REFEREE. The features of a ROBOT define a ROBOT'S FRAME PERIMETER (per !R1), but don't change how !G20 is implemented.

(Asked by **2655** at Mar 29th 19)

## **Q435 G20 and Incidental Contact**

**Q:** For the purposes of G20, would contact with an opposing ROBOT which results from a collision in which the offending ROBOT is attempting to score a game piece and the opposing ROBOT in question is in the way constitute “initiating” and/or “deliberate” for the purposes of G20?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **2655** at Mar 27th 19)

## **Q436 G20 and Determining Who Initiated Contact**

**Q:** If two ROBOTS are driving towards each other and contact between the two ROBOTS occurs such that it satisfies the requirements of contact for the purposes of G20 (i.e. damage occurs to both robots), which ROBOT(s), if any, would be considered “initiating” for the purposes of G20? Would the relative velocities of the two ROBOTS be used to determine which ROBOT initiated the contact?

**A:** We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **2655** at Mar 27th 19)

## **Q437 G12 Violation Estimation and Parallax**

**Q:** If the average eye height of a person is 59.63", given an average referee standing 1' from the guardrail and standing 12' from the alliance wall, for a robot to avoid the appearance of violating the G12 limit (6' 6") due to parallax viewing error, it must be 6.67" below the height limit. What is the proper method for proving to a referee

that a robot does not exceed the height limit, in the case that the robot exceeds the height from the referee's perspective? (Math: <http://bit.ly/parallaxCalc>)

**A:** There is no prescribed method for proving to a REFEREE that a ROBOT does not violate a rule. If a behavior is ambiguous (i.e. a REFEREE isn't sure if a violation occurred or not), REFEREES generally give the benefit of any doubt.

(Asked by **319** at Apr 1st 19)

## **Q438 Follow-Up to Q432: Can pushing a ROBOT be considered a G20 violation?**

**Q:** In regards to Q432: If BUMPERS are considered part of the ROBOT, then this would imply that contact between an offending ROBOT's BUMPER and the exposed frame between an opposing ROBOT's set of BUMPERS (i.e., the exposed ROBOT frame shown at the top of Figure 10-2), i.e. pushing a ROBOT, would be a violation of G20 assuming requirements for "deliberate or damaging" have also been met. Is this an intentional implication, or does there need to be a clear intent to do more than just push a ROBOT?

**A:** Please see [Team Update 20] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate20.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2655** at Apr 2nd 19)

## **Q439 Match Replays, First Match, and Pit Closing**

**Q:** If, due to the replay of a match that happens at the end of the day (assuming an event is running behind schedule) and a scheduled match that the team is in immediately after opening ceremonies on the following day, what guidelines are to be followed by the event for closing the pit such that the team has a reasonable amount of time to prepare their robot for the first match on the following day?

**A:** There are no requirements or guidelines for the Pits remaining open after the conclusion of the last match, especially if an event is running behind (allowing of course for teams to return to the Pit and drop things off and collect belongings). Teams should utilize the time between pits opening in the morning and the start of the first match (including during Opening Ceremonies per !E28 -!E30) to prepare their ROBOT if they are not able to the evening before.

(Asked by **900** at Apr 1st 19)

## **Q440 Un-bag time for 2-day DCMP Events**

**Q:** Per R20-G, access to the 6 hours of un-bag is given to teams before 2-day events. These 2-day events are explicitly defined and were mentioned in Q430, however, is there any discrepancy made for 2-day District Championships versus 3-day District Championships (such as Michigan, in the case of Q430 and is the un-bag time permitted for teams attending a 2-day District Championship (such as NCCMP).

**A:** Please see [Team Update 20] (<https://firstfrc.blob.core.windows.net/frc2019/Manual/TeamUpdates/TeamUpdate20.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **1533** at Apr 2nd 19)

## Q441 HAB Level 3 Scoring Criteria for Connected Robots

**Q:** From Section 5.3: "... a ROBOT is considered ... climbed to, a HAB Level if: 1. the ROBOT'S BUMPERS are fully above the Level's platform and 2. the ROBOT is only supported by: o surfaces of the HAB PLATFORM at or above that Level o another ROBOT which has climbed to that HAB Level..." If a robot successfully climbs to HAB level 3, but is connected to an alliance partner on HAB level 1 via a non rigid, non-supporting connection (i.e. a slack rope) is the level 3 robot still scored as such?

**A:** We cannot comment absolutely on hypothetical scenarios, however the blue box in section 5.3 encourages teams to be sure the way the ROBOT is being supported is "obvious and unambiguous." The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **4069** at Apr 1st 19)

## Q442 Compressed Air Use for Cooling Motors Outside of a Match

**Q:** Is stored air pressure described in R86 & R87 only referring to air that is meant for the robot's pneumatic system? Or would this also include canned air intended to cool motors outside of a match or a large air tank used to power tools that are to be used on the robot? Is it acceptable to vent air from external sources (not the robot's legal on board compressor) to atmospheric pressure through portions of the robot to generate cooling outside of a match?

**A:** The restrictions in !R86 and !R87 refer specifically to air for the ROBOT'S pneumatic system. These restrictions do not apply to air used for items on the ROBOT that are not part of the pneumatic system (such as those in the Blue Box below !R84), to power tools, etc.

(Asked by **1746** at Apr 3rd 19)

## Q443 Vented Fittings for Mounting Motors

**Q:** Are vented fittings, like the ones linked below, legal for mounting motors on the robot? I know of no rule applicable to the use of these fittings or why they would be different than using non-vented hardware for mounting the motors. Product link: <https://www.mcmaster.com/93235a244>

**A:** There are no rules prohibiting the use of vented fittings to mount a motor. But please note that !R35 prevents modification of bolts integral to the motor.

(Asked by **1746** at Apr 3rd 19)

## Q444 Walking Robot

**Q:** Rule 1 and Rule 26 both note that bumpers may not be articulated during the match. Given that bumpers are restricted to the Bumper Zone (from the floor to 7.5" above the floor) these rules combine to prohibit a walking robot. Does FIRST intend to prohibit walking robots or will they provide alternate bumper compliance rules for articulated legs?

**A:** !R1 and !R26 prohibit articulation of FRAME PERIMETER elements relative to each other and of the

BUMPERS relative to the FRAME PERIMETER respectively. They do not prohibit motion of the BUMPERS vertically relative to the floor, though they must remain in the BUMPER ZONE !R25.

(Asked by **620** at Apr 6th 19)

## **Q445 Hatch panel partially supported by hook and loop tape but fully supported by rocket**

**Q:** I know Q377 is similar but this weekend we were informed of a different rule being told to HRs in the Head Ref digest. For a hatch panel to be scored does it need to be "fully supported by the hook and loop tape" or does it only need to be "partially supported by the hook and loop tape." Is contact support? Does a hatch panel that is touching nothing but hook and loop tape on a rocket and the rocket count as scored(one per bay)? Are there other possible conditions that need to be met?

**A:** The three conditions that must be met for a HATCH PANEL to be considered scored are that it 1) must be "attached to a ROCKET or CARGO SHIP such that it is fully supported by that ROCKET/CARGO SHIP", 2) it's attached "via the hook/loop tape (contact by an opponent ROBOT does not count as "support" and does not negate a scored HATCH PANEL)," and 3) it's the only HATCH PANEL affiliated with that HATCH. A HATCH PANEL that's partially supported by a ROCKET/CARGO SHIP and partially supported by hook/loop tape meets the first two criteria (assuming it's not attached in any way other than the hook/loop tape), and assuming it meets the 3rd criteria, it's considered scored.

(Asked by **3847** at Apr 8th 19)

## **Q446 Robot Interference from fieldside volunteers.**

**Q:** Rules H1, R9, and R100 provide protections against DRIVE TEAM members, ROBOTS, and OPERATOR CONSOLES as potential sources of interference to robots and their sensor systems. Are there any protections against similar interference from fieldside volunteers? Does interference through these sources warrant a field fault? For example, our vision system received interference from a volunteer's retroreflective vest.

**A:** There are no rules that dictate what FIELD STAFF and other event attendees may or may not wear during an event in regards to reflective material. If there's a concern about interference, recommendations include notifying the Head REFEREE so reasonable efforts can be made to mitigate vision target confusion and taking measures in the ROBOT code to refine the criteria for target recognition.

(Asked by **5012** at Apr 8th 19)

## **Q447 Side Starting Configuration**

**Q:** R25 defines BUMPER ZONE in reference to standing normally on a flat floor. R1 defines perimeter by string taut around the robot in the BUMPER ZONE. Start config in R2 forbids parts to extend beyond frame when projected vertically. R25 explicitly states BUMPERS don't need to be parallel to the floor. So a robot w/in a vertical projection of frame w/BUMPERS transposed to a flat floor, may start at any angle, up to perpendicular to the floor. Does any rule preclude a start with the robot on its side?

**A:** !R1 states that the FRAME PERIMETER is established in the ROBOT'S STARTING CONFIGURATION. !R24 states that BUMPERS must protect all outside corners of the FRAME PERIMETER. !R25 states that BUMPERS must be located within the BUMPER ZONE when standing normally on a flat floor. Combining !R1 and !R24, a

ROBOT starting "perpendicular to the floor" would be evaluated to be in its STARTING CONFIGURATION, resulting in the FRAME PERIMETER evaluation being made in this state. Should the ROBOT then tip to be parallel to the floor, the BUMPERS would likely leave the BUMPER ZONE in violation of !G23. For evaluation of !R2, remember that FRAME PERIMETER is evaluated in STARTING CONFIGURATION, so evaluation of !R2 would be in relation to that measurement, not a measurement that would be made had the ROBOT started flat on the ground.

(Asked by **5401** at Apr 8th 19)

## **Q448 Unbagging to accomodate shipping**

**Q:** Our team bagged the robot at the end of district championships with the bumpers on. We are unable to fit the robot in the crate with the bumpers on. Is it acceptable to unbag the robot to reconfigure the robot for shipping, so long as we do no maintenance work on it?

**A:** No, removing BUMPERS isn't listed as a reason for additional time in !R20. Please email [FRC] (<mailto:frcteams@firstinspires.org>) to inquire about team specific exceptions/process to rules based on extenuating circumstances.

(Asked by **5401** at Apr 9th 19)

## **Q449 Recording conversations with event staff?**

**Q:** Are there any rules that prevent teams from recording conversations and meetings with event staff? Can teams record the drivers' meeting held at each event? Can teams record conversations held in the question box? It's my understanding that both of these are conversations held in public without any reasonable expectation of privacy so they are legally allowed to be recorded but would there be any repercussions such as yellow or red cards?

**A:** There are neither \*FIRST\* Game nor Event rules that prohibit recording audio at events. However, laws regarding recording of conversations vary state-to-state and country-to-country, and, in some cases, recording without consent may be criminal. Please do not record \*FIRST\* event staff without the event staff's consent and please do not challenge any decision of any event staff who refuses to provide such consent. Thank you for the question, as it's not an issue that's been brought to our attention to date. This topic will be reviewed in more detail for future seasons to determine if \*FIRST\* specific regulation is needed.

(Asked by **3847** at Apr 11th 19)