

Q1 Clarification on meaning of "straddle" in G302

Q: G302 says "ROBOTS may not reach into or straddle the LOWER EXIT." In this case, does straddling mean to have a portion of your robot on both sides of the LOWER EXIT, and potentially above the LOWER EXIT? And does that mean that a robot in the path of cargo exiting the LOWER EXIT, but whose bounding box does not intersect the LOWER EXIT is not straddling?

A: Your described definition sounds consistent with the common definition of "straddle" that is intended. Yes, a ROBOT may be parked in the path of exiting CARGO without violating !G302 provided it is not straddling the LOWER EXIT.

(Asked by **857** answered Jan 12th 22)

Q2 Climb on Hangar Truss

Q: Can the robot use the hangar truss to climb to a rung

A: Per !G301, only the RUNGS are exempt from items A-E.

(Asked by **4176** answered Jan 12th 22)

Q3 Robot Height.

Q: If I use launch a grappling hook on a rope, does that count as part of the robot and exceed the 5 ft 6 inches height?

A: Yes, if the item is attached to your ROBOT, it is considered part of your ROBOT.

(Asked by **4176** answered Jan 12th 22)

Q4 Defense causing another robot to shoot out of bounds

Q: G401 states that robots ejecting cargo from the field is a foul, and G201 says that robots may not use strategies that intend to force an opponent to violate a rule. If a defending robot hits another robot in the process of shooting a ball and causes that shot to land out of bounds, would this be a violation of G401 on the shooting robot or a violation of G201 on the defending 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. Generally, rule !G201 requires a "Strateg[y] clearly aimed at forcing the opponent ALLIANCE to violate a rule". If the ROBOT'S action could be consistent with standard gameplay, such as legally defending an opponent ROBOT, it is unlikely !G201 would be called.

(Asked by **6831** answered Jan 12th 22)

Q5 Human Players shooting between Auto and Teleop

Q: H504 says that during TELEOP (actually says AUTO, but assuming that is a typo), human players can only introduce CARGO to the field through the GUARD. Does this period start immediately after AUTO ends, or does it not include the delay after AUTO and before the start of TELEOP? If so, can human players take shots during that delay period?

A: We have corrected the manual to reflect the change described in [Team Update 01] (<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate01.pdf>). Our apologies, and thank you for letting us know! Table 5-1 describes when AUTO ends (the timer displays 0:00, meaning CARGO cannot be entered using the criteria in !H404 after that point) and when TELEOP begins (the timer displays 2:15, meaning that TELEOP-specific rules do not apply until then).

(Asked by **6831** answered Jan 12th 22)

Q6 Cargo PSI Question

Q: The description of Cargo states that "CARGO is inflated to 3½ psi." However, a Cargo ball inflated to 3.5 psi is very deflated and doesn't conform to the "bounces back to a height between 2 ft. 1 in. (~64 cm) and 2 ft. 6 in. (~76 cm) (as measured from the bottom of the ball)" section of the Cargo description. 3.5 psi is much too low to be the correct psi; what is the intended psi of the Cargo?

A: Thanks for the question. We are pretty sure the PSI is correct. Keep in mind, gauges designed to read higher pressures tend to be inaccurate when measuring lower pressures. We recommend a gauge designed to read in the 15-20 psi range or lower ([this gauge](<https://soccer.epicsports.com/prod/14762/champion-sports-pressure-gauge.html>)) will be used at official events). Alternatively, your gauge may be broken. If your gauge is of an appropriate range and you've confirmed it's functioning properly, please send additional details to firstroboticscompetition@firstinspires.org.

(Asked by **135** answered Jan 13th 22)

Q7 Climbing to high and transversal rungs directly by tilting bot

Q: By tilting the bot without extending below the frame perimeter, it is possible to grab onto the high or traversal rungs without first climbing the mid bar while still within the 5'6" height limit relative to the frame perimeter and the 16in extension limit on both sides. Is this a legal climb?

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. If you have a specific question about a specific rule, please rephrase and resubmit.

(Asked by **4089** answered Jan 12th 22)

Q8 Shooting cargo across the center line in auto

Q: G210 covers the robot directly crossing the center line, but does not currently disallow shooting cargo from your side to the opposing side to strategically disrupt the pre-placed cargo. Is this intended to be a legal strategy?

A: Launching CARGO across the CENTER LINE does not violate !G210.

(Asked by **4089** answered Jan 12th 22)

Q9 Truss Contact During Climbing

Q: Is deliberate contact with the truss during the act of climbing allowed as long as it is not one of the interactions explicitly disallowed by G301?

A: There are no rules that prohibit contact with the truss structure that does not violate !G301.

(Asked by **2659** answered Jan 12th 22)

Q10 Multiple robots loading from a terminal at once

Q: Would two or three robots actively loading from a single terminal at the same time violate G203 if they backed away from the terminal immediately after receiving cargo?

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, multiple ROBOTS briefly blocking opposing ALLIANCE access to a single TERMINAL while they load CARGO, provided the REFEREE does not infer that they're "working together" to do so, is not a violation of !G203."

(Asked by **4089** answered Jan 12th 22)

Q11 Strategically pushing and herding cargo while controlling 2 cargo

Q: Strategically pushing and herding cargo while controlling 2 cargo does not fit any of the definitions outlined in G403. Is this a legal strategy?

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. If the CARGO is pushed or herded in a way that invokes the definition of CONTROL, then that CARGO applies to the limit described in !G403.

(Asked by **4089** answered Jan 13th 22)

Q12 Collision resulting in both robots unable to drive

Q: In the rare case in which two robots during eliminations collide and are unable to drive, they both initiated the collision and would both get a red card at the same time per G205. Because both red cards are given at the same time, neither robot committed the violation first and the game manual does not describe this situation. Which alliance would lose the match in this scenario.

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. If ALLIANCES earn simultaneous RED CARDS, they both lose the MATCH, and the outcome is a tie.

(Asked by **4089** answered Jan 13th 22)

Q13 Human player movement used for CARGO delivery during AUTO

Q: Can the HUMAN PLAYER, during AUTO, do an underhand or overhand volleyball serve action to deliver the CARGO on the FIELD? In other word, is there any restriction to the type of movement used by the HUMAN PLAYER to deliver the CARGO to the field?

A: There are no rules prohibiting this provided the action is safe.

(Asked by **5528** answered Jan 12th 22)

Q14 Is it legal to climb directly to the high and transversal rungs

Q: Provided that the height, extension, and bumper zone regulations are followed, is it legal to climb directly to the high or traversal rungs

A: There are no rules explicitly prohibiting this.

(Asked by **4089** answered Jan 13th 22)

Q15 Catching Cargo and Momentary Control

Q: Is catching CARGO released by an UPPER EXIT and then re-shooting it into the goal without ever establishing greater-than-MOMENTARY CONTROL (e.g. less than approximately 3 seconds from initial contact to exiting the robot per the definition of MOMENTARY) permitted by G405?

A: Please see [Team Update 02](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate02.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2659** answered Jan 15th 22)

Q16 G107 Blue Box Graphic

Q: The Blue Box for G107 provides three examples of situations that may or may not violate G107. Is Example C meant to have a MECHANISM extending past the dotted line provided in the graphic? Current versions feature no such MECHANISM.

A: Good catch! The graphic has been corrected in [Team Update 02](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/2022TeamUpdate02.pdf>).

(Asked by **8833** answered Jan 16th 22)

Q17 Controlling Caught Cargo

Q: As long as CARGO released by an UPPER EXIT is caught and brought into contact with something that isn't the ROBOT or other ROBOT-controlled CARGO (ex. the floor) in a less-than-MOMENTARY amount of time, is it necessary to ever relinquish CONTROL of the caught cargo to avoid a G405 violation?

A: If CONTROL is gained before the criteria in !G405 have been met, and is maintained for a greater-than-MOMENTARY amount of time, even if the criteria are later met, !G405 has been violated.

(Asked by **2659** answered Jan 13th 22)

Q18 Cargo Scoring during AUTO

Q: Cargo scored during AUTO counts toward the total of 20 Cargo?

A: Yes, all ALLIANCE CARGO scored in the MATCH count towards the CARGO BONUS.

(Asked by **4546** answered Jan 13th 22)

Q19 Making contact with Alliance wall

Q: Is making contact with the Alliance wall and not damaging it breaking G301 or any other rule?

A: No, making contact with the wall does not violate any rules. We expect teams to contact that wall at various times during the match for various reasons. However, teams should keep in mind that impacts with extreme forces can certainly increase your chances of actually damaging the walls in which case you would be in violation of !G301.

(Asked by **6072** answered Jan 13th 22)

Q20 Do fan inflated devices violate R804?

Q: Looking for clarification on how fan inflated devices interact with R804 and if they are exempt from being considered a pneumatic device.

A: A device which utilizes contained air under pressure meets the definition of a pneumatic device (with the exception of items B and C in the !R804 Blue Box, which are pneumatic devices by this definition, but are specifically exempted) and would not be permitted if it does not meet the restrictions specified in [Section 9.8 Pneumatic System](https://firstfrc.blob.core.windows.net/frc2022/Manual/HTML/2022FRCGameManual.htm#_Toc92292258). If the device is generally open to atmosphere such as a "Tube Man", it would not be considered a pneumatic device.

(Asked by **4418** answered Jan 13th 22)

Q21 G107 Around the ALLIANCE HANGAR

Q: If a ROBOT extends in such a way that it blocks both entrances to the opposite ALLIANCE HANGAR, a FOUL would be issued per G107 at the moment that the extension reaches beyond 16 inches, with no recurring fouls occurring if the MECHANISM stays beyond 16 inches. Because the ROBOT is the sole ROBOT blocking the ALLIANCE HANGAR, G203 would not apply in this case. Is this a correct application of the rules, and do any other game rules or FOULS apply to this situation?

A: Correct, !G203 is not invoked if only a single ROBOT. [Section 11.2.1](<https://firstfrc.blob.core.windows.net/frc2022/Manual/Sections/2022FRCGameManual-11.pdf>) states that "YELLOW CARDS and RED CARDS are used in _FIRST_ Robotics Competition to address team and ROBOT behavior that does not align with the mission, values, and culture of _FIRST_." Breaking a rule repeatedly or continuously for strategic advantage _may_ fall in to that category; the ultimate decision is made by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **8833** answered Jan 13th 22)

Q22 Time to climb

Q: Can the robots climb only during the last 30s of the match, or is it possible to scale on the rungs during any moment of the match?

A: There are no rules that restrict when a ROBOT can engage with their HANGAR.

(Asked by **3478** answered Jan 13th 22)

Q23 Driving up the wall

Q: Provided that g301 is not violated, is it legal to drive up the wall such that the wall is partially supporting a robot's weight?

A: We cannot rule absolutely on hypothetical ROBOT designs or their implementation, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Additionally, per [Section 1.10](<https://firstfrc.blob.core.windows.net/frc2022/Manual/Sections/2022FRCGameManual-01.pdf>), the Q&A "is not a resource for firm predictions on how a situation will play out an event. Questions about the following will not be addressed... * rulings on vague

situations, * challenging decisions made at past events, or * design reviews of a ROBOT system for legality." As such, broad questions along the lines of "is this particular ROBOT action legal?" are outside the scope of the Q&A and for the team to determine after thorough review and analysis of the rule set. Instead, the Q&A supports understanding and clarification of rules. If a question states that a ROBOT does not violate a specific rule, and asks if it violates any other rules, the answer will be along the lines of this answer. Instead, please review all rules thoroughly, and if any rules are unclear and you're unable to use them to make your own determination, please submit a question inquiring about that particular rule.

(Asked by **4089** answered Jan 13th 22)

Q24 G303 and the field wall

Q: Would driving a wheel against the alliance/hanger wall (for a protracted length of time, ie not as incidental contact) violate G303? Such an action could result in the wall partially supporting the weight of the robot (perhaps as much as 50% of the weight). It could also cause markings on the wall, either minimally each time or significantly, depending on a number of factors. This action would be strategic, in an effort to solve or minimize the difficulty of game tasks.

A: Assuming you are referring to !G301, it would not be explicitly prohibited provided it does not damage any ARENA elements. The ALLIANCE WALL was not designed to support ROBOTS and we are unable to assess whether a particular ROBOT design would damage either of the two types of FIELD perimeter (as described in [Section 5.1](https://firstfrc.blob.core.windows.net/frc2022/Manual/HTML/2022FRCGameManual.htm#_Toc92292209)). Similarly, the floor protection, carpet, and the tape used to attach these is designed and tested for ROBOTS driving on it rather than the forces that may be applied in this scenario.

(Asked by **2177** answered Jan 14th 22)

Q25 Does R619 allow using Rev ATO breakers in the PDP?

Q: Specifically, can any breaker value of the Rev ATO breakers be used with the PDP, including the 40A breakers? The CTRE documentation for the PDP indicates that the slots these breakers fit in are intended for 20A-30A breakers, however the ATO breaker page gives indications that a 40A breaker can be used in those slots but may result in diminished performance (increased tripping). Clarity around the legality of this usage would greatly help teams!

A: Yes, !R619 permits using the REV 40A ATO breaker in the CTR Electronics PDP. CTR Electronics is in the process of updating their documentation.

(Asked by **2177** answered Jan 17th 22)

Q26 What is the launchpad in the hanger for

Q: What purpose does the Launch Pad in the Hangar serve?

A: See !G207 and [this part](<https://youtu.be/LgniEjI9cCM?t=62>) of the game animation.

(Asked by **204** answered Jan 14th 22)

Q27 G404 B Hoarding

Q: Can alliances pick up opposing alliance balls and store them within their robot during the climb within the last 30 seconds?

A: There are no rules prohibiting this provided no more than 2 CARGO are in CONTROL of the ROBOT per !G403.

(Asked by **6479** answered Jan 13th 22)

Q28 Rule G210 wording clarification

Q: Rule G210 states that when across the centerline in Auto "a robot may contact neither an opponent ROBOT nor CARGO still in its staged location on the opposite side of the field..." Does the term opponent in this rule apply to CARGO as well as ROBOT meaning that a ROBOT is allowed to cross the centerline and touch only its alliance's CARGO?

A: Please see [Team Update 01](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate01.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2815** answered Jan 13th 22)

Q29 G103 Clarification

Q: Currently, Rule G103 states "BUMPERZONES must be in the BUMPER ZONE (see R402) during the MATCH." Obviously, the robot's BUMPERZONES will exceed the height of the BUMPER ZONE when they proceed to climb in the HANGAR ZONE, but this language is missing from the rule. Is this statement missing from the rule, or are robots expected to climb without their bumpers outside this zone?

A: Per the definition of BUMPER ZONE (from !R402) it is "in reference to the Robot standing normally on a flat floor". In other words, the evaluation of the BUMPER ZONE of a particular ROBOT moves along with the ROBOT.

(Asked by **1468** answered Jan 13th 22)

Q30 Human Player Rolling Cargo Under the Terminal in Auto

Q: Provided that they don't cross the PURPLE PLANE, can the human player roll a ball on the floor of the terminal out onto the field?

A: Yes, this would be a permitted way of entering CARGO during AUTO per !H404.

(Asked by **3005** answered Jan 13th 22)

Q31 Does an extension below the frame of the robot count towards the height extension limit?

Q: In Q7 it is left to the HEAD REFEREE to determine if pitching without a lower extension is legal. If the ROBOT is sitting flat on the ground and extended upwards to the limit of extended height inside the HANGAR (5' 6"), does an additional extension by a MECHANISM below the ROBOT within the FRAME PERIMETER, but less than 16" in order to induce an upward pitch on the ROBOT violate the 5' 6" extended height limit inside the HANGAR?

A: Yes, the described ROBOT would be taller than 5'6" when measured from the floor and would violate !G106. Also note !G103 when considering mechanisms extending downward from the ROBOT.

(Asked by 5623 answered Jan 14th 22)

Q32 Cargo contact when Hanging?

Q: 6.4.1 in Scoring says "To qualify for HANGAR points..., a ROBOT may only be contacting", followed by a list that doesn't include CARGO. If a ROBOT is hanging from a RUNG and would qualify for HANGAR points, but then a CARGO ball rolls over, contacts the ROBOT (and is clearly not supporting the ROBOT), and remains in contact until 5 seconds after the ARENA timer displays 0, does the ROBOT receive zero HANGAR points?

A: Please see [Team Update 03](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate03.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by 20 answered Jan 18th 22)

Q33 Please clarify HUMAN PLAYER use of signaling to guide ROBOTS to the TERMINAL?

Q: H303 lists "non-powered signaling" as ok in item "B", and also says, in IV.b, that communicating with the robot is ok. But it also says that "mimicing" vision targets used on the field is not ok. What constitutes "mimicing"? Is all retroreflective material banned? H303 also says that a "large signaling device" would be a safety hazard. Could you clarify what dimensions constitute "large"? The size of a ping pong paddle? A tennis racket? A hockey stick? An open umbrella? Thanks! :-)

A: There is no specific definition of "mimicing". Generally a target of substantially different size and/or shape would be unlikely to be mimicing the field Vision Targets, even if it is made of similar material. There is no specific threshold for a "large" signalling device becoming unsafe as it would depend on other factors such as shape, material, and usage. Remember that you will be sharing a TERMINAL AREA with a member of the other ALLIANCE! Also note that per !H403 you may not signal to the ROBOT during AUTO.

(Asked by 100 answered Jan 14th 22)

Q35 Can the robot radio be powered by a passive POE injector?

Q: Rules R616 and R617 seem to suggest that the wireless bridge (radio) can not be powered by a passive PoE injector connected directly to the non-switchable fused channels on the PDH (20,21,22). But instead a passive PoE injector must always be powered by the VRM. Is this the correct interpretation of these rules for this use case?

A: Per !R616 the radio must be powered by either a VRM or RPM.

(Asked by 4418 answered Jan 17th 22)

Q36 Can we use sealed hydraulic speed controller

Q: Deschner Corporation makes Kinechek Leak Proof Hydraulic Speed Regulators We are interested in using Model 3021-19-1 1/4 in our robot. Is this legal. They are commercially available.

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. That being said, please see the blue box in !R203, particularly item g.

(Asked by 5430 answered Jan 17th 22)

Q37 Can Velcro be used to manipulate Cargo?

Q: Can velcro (hook and loop) be used to acquire and manipulate cargo by the robot?

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. That being said, there are no rules that explicitly prohibit use of hook-and-loop fastener for use with CARGO, but please refer to !G301, particularly item f.

(Asked by 1884 answered Jan 17th 22)

Q38 question regarding Table 9-2, electromagnetic door lock

Q: Regarding Table 9-2, Is an electromagnetic door lock considered half of an "Electric Solenoid" and limited to 10W (R501) or a "Custom Circuit" and limited to a 15A circuit breaker? FYI: the door lock in question is 500mA at 12V.

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 an electromagnet that causes readily discernible motion when energized or de-energized is considered an actuator and therefore needs to meet the requirements of !R501. An electromagnet does not cause readily discernible motion is not an actuator and therefore does not need to meet the requirements of !R501. Such a device is considered a CUSTOM CIRCUIT, and must follow all the rules required of that classification.

(Asked by 1559 answered Jan 19th 22)

Q39 Cargo Shape Tolerance

Q: Rule 5.7 says "The oversized tennis balls used as CARGO are not manufactured with any tight tolerance. Wall thickness, surface pilling, and shedding may vary." One of the two cargo we received in our kit of parts has a minor diameter of about 8.5 inches and a major diameter of about 10.25 inches. We have also heard that other teams have received cargo that is far from spherical. What should teams expect for tolerances on the shape/roundness of the cargo?

A: There is no spherical tolerance specified for CARGO. That being said, a noticeably warped CARGO should be brought to the attention of ARENA staff. Any CARGO that doesn't reliably process through the HUB (e.g. it has a diameter that exceeds 10 in., it's so warped it doesn't roll, etc.) will be discarded.

(Asked by **324** answered Jan 17th 22)

Q40 Bumper sticking out of field perimeter

Q: Is it possible for a robot's bumper to stick about 2 inches out of the field perimeter while climbing if the movement of the robot is slow and controlled and as long as it's not touching anything (per rule G102)? Dose it violate G101?

A: We cannot comment absolutely on if a ROBOT design is dangerous or hypothetical scenarios. The ultimate decision would be determined by the Inspectors and REFEREES at your event, with the final call made by the Lead Robot Inspector or Head REFEREE. Please note that a ROBOT that contacts anything or anyone outside the FIELD, regardless of if the ROBOT initiated that contact, has violated !G102 and is at risk of violating !G101.

(Asked by **1690** answered Jan 17th 22)

Q41 Which motors can be used? And can we use encoders

Q: Can we use stepper motors for position control. For example nema stepper motors. Can we use brushed dc motors with absolute encoders for position control.

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 1.10](<https://firstfrc.blob.core.windows.net/frc2022/Manual/2022FRCGameManual.pdf>) and, if needed, resubmit a different question. Please refer to !R501, and if anything is unclear or ambiguous, please rephrase and resubmit your question. There are no rules that prohibit the use of encoders.

(Asked by **8500** answered Jan 17th 22)

Q42 Does the 16 inch limit on extension according to G107 apply to total extension?

Q: According to G107 a robot can extend 16" outside of the frame perimeter. Does this mean a robot can extend 16" on each side at once for a total of 32" or only a combination of 16" (i.e. a max of 8" on either side if both are extended)?

A: A ROBOT may extend any number of extensions out any number of sides of the ROBOT FRAME PERIMETER simultaneously. In other words, the ROBOT is permitted to occupy the entire volume indicated by the red dotted outline in Figure 9-2 (found below !R105) after the start of the MATCH.

(Asked by **5480** answered Jan 17th 22)

Q43 Extending below Frame Perimeter to Lift Robot

Q: Can a robot deploy a lift system downward from chassis (e.g. pneumatic pistons) to raise itself up to the Mid Rung? 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 (R402)?

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. As noted in the blue box of !R402, the measurement for determining if BUMPERS are in the BUMPER ZONE is to be made as if the ROBOT is resting on a flat floor. A MECHANISM that, when used, causes BUMPERS to exit the BUMPER ZONE while the ROBOT is still standing on the flat floor violates !R402 and !G103. See Example 2 in the blue box under !R402 for a further example.

(Asked by **801** answered Jan 18th 22)

Q44 CARGO pressure tolerance

Q: What is the tolerance for the air pressure of a CARGO in order to be used for a MATCH? And what will be the frequency of CARGO air pressure refills during competition days?

A: Please see [Team Update 04](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate04.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **1574** answered Jan 21st 22)

Q45 What constitutes cargo ejection?

Q: G401 prohibits ejection "directly or by bouncing off a FIELD element". Is it a FOUL if a ROBOT shoots CARGO at the HUB, but after hitting the HUB, the CARGO goes directly out of bounds? This seems likely for long-range shots. What if the ROBOT shoots CARGO that hits the HUB, then the FIELD surface, and then out? What if a shot hits the HUB, another ROBOT, and then out? Section 6.7 implies that G401's intent is to prevent "deliberate" ejection; are these rebound scenarios deliberate ejection?

A: Please note that !G401 does not apply to an ALLIANCE'S CARGO. A ROBOT that ejects opponent CARGO from the FIELD, regardless of intent, violates !G401.

(Asked by **100** answered Jan 18th 22)

Q46 Robot Height - After Start of Match

Q: G106 states the robot starting configuration cannot be more than 4ft 4in. Does this mean that after the start of the match the robot can change it's configuration to be greater than 4ft 4in?

A: Yes. Per !R104 & !G106, the ROBOT may not exceed 4 ft. 4in at the start of the MATCH. Per !G106, the ROBOT may only exceed the maximum STARTING CONFIGURATION height within the HANGAR ZONE but must not exceed 5 ft. 6in.

(Asked by **8793** answered Jan 18th 22)

Q47 Agitator Speed Inside Hub

Q: How fast does the 8" agitator wheel spin inside of the upper hub? Also, does it spin clockwise or counterclockwise looking from above? The Andy Mark one for sale uses a CIM motor with 12:1 gearbox which means it would spin around 800 RPM max speed but it would be helpful to know the official design speed/direction.

A: Specific speed is not specified, but please see [Team Update 04](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate04.pdf>) for additional details. For details on the gearbox used on official fields, please see the official [Field Drawings](<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>) on the [Playing Field page](<https://www.firstinspires.org/robotics/frc/playing-field>) (GE-22432). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6995** answered Jan 21st 22)

Q48 Cargo Surface Condition

Q: Similar to Q39 but with regards to the pilling on the surface of the CARGO: The surface of the CARGO seems prone to shedding/deterioration throughout a given competition. What (if any) level of shedding/deterioration of the surface piling on the Cargo can teams be expected to encounter before a game piece is removed from play by ARENA staff.

A: As mentioned in the [HUB Field Tour Video](https://youtu.be/OXkeAkWwex8?list=PLZT9pIgNOV6a_P3_HDTolvzprSdYB_zd3&t=28), fuzzy CARGO will be used in official game play but CARGO that has large gouges will be removed.

(Asked by **1757** answered Jan 19th 22)

Q49 Rev NEO Dust Cover Motor Removal

Q: In regards to rule R502 - In previous years via Q&A the removal of the dust cover from the Rev NEO brushless motors was an allowed modification as it is not an "integral mechanical or electrical system" Will removal of the dust covers from the Rev NEO brushless motors be an allowed exception under R502?

A: There are no rules that prohibit removal of the dust cover (such as to install a press-fit pinion), however !R502 requires that it must be in place for Inspection and MATCHES.

(Asked by **179** answered Jan 20th 22)

Q50 Clarification on rule G401

Q: Are objects above the field that are part of the venue (lights, ceiling, scoreboards, etc) considered to be in or out of bounds?

A: CARGO which contacts a venue element above the footprint of the FIELD would not be considered "ejected from the FIELD", unless it lands outside the FIELD. Note that ROBOTS that routinely launch CARGO into venue elements above the FIELD may be asked to stop to protect those elements.

(Asked by **2502** answered Jan 19th 22)

Q51 Clarification on 6.4.1

Q: In the rule it cites that cargo can be touched while climbing any rung, does this mean that no fouls will occur if a robot is holding cargo while climbing?

A: The modification to Section 6.4.1 allows a ROBOT touching CARGO to earn HANGAR points. It is still possible for a ROBOT to earn FOULS related to holding CARGO while climbing (e.g. if a ROBOT is holding 3 CARGO while climbing it will earn a FOUL per !G403).

(Asked by **2811** answered Jan 19th 22)

Q52 Will the fenders have the white logo panel pictured?

Q: The distinctive fender artwork, white with the game logo, makes an attractive vision target. will the game include the same artwork pictured in the game manual?

A: The purpose of this Q&A is to answer questions regarding the rules of RAPID REACT. Any measurements or materials information can be derived from the [official Field Drawings](<https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings>), or other tools available on the [Playing Field page](<https://www.firstinspires.org/robotics/frc/playing-field>). See drawing GE-22300 for the top level assembly of the HUB.

(Asked by **100** answered Jan 20th 22)

Q53 CARGO carrying

Q: 1. Is the robot allowed to carry and shoot opposing CARGO?

A: There are no rules that explicitly prohibit CONTROLLING or attempting to score opponent CARGO (as long as it's done in a way that doesn't violate any other CARGO related rules).

(Asked by 5515 answered Jan 20th 22)

Q54 human player interaction

Q: Is the human player allowed to prevent the opposing human player from putting CARGO into the field through the terminal?

A: Please see the blue box in !H101, specifically example b.

(Asked by 5515 answered Jan 20th 22)

Q55 human player shooting

Q: During which part of the game is a human player allowed to shoot CARGO to the hub?

A: Please see !H404 and !H504 (and for an informal interpretation, [this part of the Terminal Field Tour video](https://youtu.be/iUgd2TOYPmA?t=16)).

(Asked by 5515 answered Jan 20th 22)

Q56 human player interaction

Q: Is a human player allowed to block an opposing human player when trying to shoot CARGO to the hub?

A: Please see the blue box in !H101, specifically example b. Additionally, see the DRIVE TEAM staging locations in !H310 and !H401.

(Asked by 5515 answered Jan 20th 22)

Q57 What is the font used on the Rapid React logo for the words "Rapid React"?

Q: What is the font used on the Rapid React logo for the words "Rapid React"?

A: The scope of this Q&A system includes and is limited to questions about the [Game Manual](https://firstfrc.blob.core.windows.net/frc2022/Manual/2022FRCGameManual.pdf), [Awards](https://www.firstinspires.org/robotics/frc/awards), [Self-Inspection Checklist](https://firstfrc.blob.core.windows.net/frc2021/Manual/2021-inspection-checklist.pdf), [official Field drawings](https://www.firstinspires.org/robotics/frc/playing-field#FIRSTDrawings), and/or [Event Rules](https://www.firstinspires.org/sites/default/files/uploads/frc/EventRulesManual.pdf) are posted to the Q&A System. For questions about other topics, please contact Team Support at firstroboticscompetitionteams@firstinspires.org.

(Asked by 2877 answered Jan 20th 22)

Q58 Number of human players

Q: I am confused about the number of human players required. Section 6.6 says there are 5 drive team members, 1 coach, 3 driver/human players, 1 technician. We normally have 2 drivers and 1 human player. Section 6.1.3 says there is 1 human player in each Terminal Area, requiring 2 human players. Where does the second human player come from? Is it the person who is normally the Technician? If I read it correctly, there should be 6 on the drive team, 1 coach, 4 driver/human players, and 1 technician.

A: The 1 HUMAN PLAYER per TERMINAL AREA described in Section 6.1.3 and !H310 are per ****ALLIANCE****, they do not need to come from the same team.

(Asked by 1051 answered Jan 20th 22)

Q59 Change in Bumper Height.

Q: Is the height of the bumpers allowed to change with respect to the ground provided it remains inside the bumper zone? Robot frame will presumably change in height as well in order to satisfy R408, R410. For example, if our robot drive train has suspension, its motion will change the height of the bumpers throughout the entire match potentially. Will that be considered Bumper "Articulation?"

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. BUMPER height may change with respect to the ground, provided the change does not violate !R402 or !G103 and not in a way that violates !R403.

(Asked by 5205 answered Jan 21st 22)

Q60 R301 - *Individual item cost limit.

Q: I do not see a requirement for a Cost Accounting Worksheet in this year's Game Manual. What will be needed to demonstrate compliance to R301 - *Individual item cost limit rule?

A: Please see the first line of the blue box in !R301. There's no requirement for a specific type of documentation, but examples include screen shot of a product page, receipt, or quote.

(Asked by 2604 answered Jan 24th 22)

Q61 Extension below frame while hanging.

Q: Can a mechanism extend below the bottom wheels approximately 4 inches while hanging on a rung of the hangar.

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's no explicit prohibition on extending below the ROBOT, but depending on how it's done, it may or may not be permitted. Please pay particular attention to !R402, !G103, !G106, and the implications when all applied together. If any parts of those rules are unclear, please rephrase and resubmit your question.

(Asked by 5472 answered Jan 24th 22)

Q62 R617B and WPILib Control System diagram

Q: R617B states that the Radio must be powered by a VRM/RPM connected to a terminal on the PDH with a 10A fuse. The Control System diagram in the WPILib documentation (<https://docs.wpilib.org/en/stable/docs/controls-overviews/control-system-hardware.html#overview-of-control-system>) shows a 15A fuse used with the RPM. Can you clarify whether a 15A fuse is allowed to be used with the VRM/RPM powering the Radio? Is a 10A fuse required for that terminal on the PDH?

A: Good catch! The diagram is incorrect and we are working on updating it.

(Asked by 4669 answered Jan 24th 22)

Q63 R410 Clarification

Q: Bumpers are 5" tall. R410 dictates how the bumpers are required to be supported. Is there a requirement on how much of the 5" height needs to be supported?

A: No, there is no requirement for how much of the 5" BUMPER height must be supported to meet !R410.

(Asked by 5205 answered Jan 24th 22)

Q64 R410 1/4" Gap

Q: R410 says the bumper must be backed in the corners of the frame perimeter at least 1/2" (up to 1/4" gap). Does this 1/4" gap refer to the distance from the corner or does it refer to the maximum separation between the backing and the bumper? From the top right of figure 9-9, the 1/4" deep gap extends all the way to the corner of the frame perimeter and is marked OK. Does that mean any gap no deeper than 1/4" (which can be as wide as possible) doesn't need to end at least 1/2" before the corner?

A: The gap refers to the separation between the FRAME PERIMETER and BUMPER, similar to what is permitted per !R410-A. That's correct, any gap less than 1/4 in. is still considered "backed" and could run all the way to the corner as shown in Figure 9-9.

(Asked by 5987 answered Jan 24th 22)

Q65 Hangar Points

Q: In the hangar, if you are holding onto 2 bars at one time, which one do you get points for?

A: Per section 6.4.1 of the [Game Manual](<https://firstfrc.blob.core.windows.net/frc2022/Manual/2022FRCGameManual.pdf>), a ROBOT may only earn points for a single RUNG. If a ROBOT is contacting two RUNGS, the level is determined by the lowest RUNG which they are touching.

(Asked by 6665 answered Jan 25th 22)

Q66 Intake Redeployable

Q: Does intake that has been deployed past the edge of the bumper boundary have to be retractable? As in, does it have to go back up after going back down?

A: There are no rules that require a ROBOT return to its STARTING CONFIGURATION.

(Asked by 6665 answered Jan 25th 22)

Q67 Tolerance for Rung Spacing

Q: The field CAD shows that the Rungs are mounted to plates with slotted holes. This presumably allows the position of the Rungs to be adjusted during field setup, but also possibly move during an event. With that in mind: What is the tolerance for spacing between Rungs when setting up a field? What measuring tools will FTAs have to verify the spacing? Is there a torque spec for the mounting bolts once set to ensure the Rungs won't slip during an event? If they do, can they be re-adjusted?

A: Official tolerances are specified in the drawing package, but also please note the added description of how FIELDS are used at the beginning of [Section 5] (<https://firstfrc.blob.core.windows.net/frc2022/Manual/Sections/2022FRCGameManual-05.pdf>). There is not a specific tool or set of tools FTAs must use during setup, nor is there a torque spec. If any part of the FIELD gets dislodged, damaged, or otherwise modified such that it doesn't reflect the manual or drawings, the FIELD STAFF will work to bring it back in to compliance to the best of their ability.

(Asked by 5406 answered Jan 27th 22)

Q68 Can the battery leave the frame perimeter?

Q: Assuming that the mechanism supporting it fulfills R606 for securing the battery, is there any prohibition against the battery leaving the frame perimeter (for instance, if it is securely mounted to a slide-out tray that extends 10" beyond the frame perimeter)?

A: There are no rules that require that the battery remain within the FRAME PERIMETER of the ROBOT during the MATCH, however depending on how the battery is exposed, it could risk violation of !G101 and !R203 (e.g. the battery is positioned such that it's the first thing to strike another ROBOT or FIELD element).

(Asked by 4930 answered Jan 28th 22)

Q69 Can the main circuit breaker be on a movable part?

Q: Assuming the main circuit breaker remains accessible at all times per R612, may the circuit breaker be mounted to a moveable part of the robot?

A: There are no rules that require the 120A circuit breaker remain static relative to other parts of the ROBOT.

(Asked by **4930** answered Jan 31st 22)

Q70 Robot Height Limited By Software

Q: If a robot can mechanically extend beyond the G106, G107 rule but is prevented from doing so using programmed software limitations that can be proven through demonstration, does this meet the G106 and G107 requirements?

A: !G106 and !G107 are Game Rules assessed by REFEREES based on a what a ROBOT actually does during a MATCH. If a ROBOT does not exceed the limits specified in !G106 or !G107 during the MATCH, no penalty will be assessed. !R105 is the Robot Rules corollary to !G107 and its Blue Box elaborates that the constraint may be met with software or hardware.

(Asked by **5484** answered Jan 31st 22)

Q71 Question teams per alliance

Q: How many teams per alliance? Because in the manual in the topic 6 Match play it says 4 teams per alliance, but in the manual in the topic 5.6 Alliance walls it has a space of only 3 drive stations and in the video of the challenge presentation at minute 0:12 it also says 3 teams.

A: An ALLIANCE is a cooperative of up to 4 *FIRST* Robotics Competition teams. In most instances, an ALLIANCE will be composed of only three TEAMS. Exceptions are described in [Section 11.7.5](https://firstfrc.blob.core.windows.net/frc2022/Manual/HTML/2022FRCGameManual.htm#_Toc92292279) for Playoff BACKUP TEAMS, and in [Section 11.9.2](https://firstfrc.blob.core.windows.net/frc2022/Manual/HTML/2022FRCGameManual.htm#_Toc92292288) for *FIRST* Championship Playoff ALLIANCE composition.

(Asked by **7566** answered Jan 31st 22)

Q72 Question about a possible contact between the robot and the hub

Q: If the robot touches or hits the hub during the match, is a point deducted or given to another alliance?

A: Please see !G301 for a description of what types of interactions with ARENA elements (including the HUB) are not permitted.

(Asked by **7566** answered Jan 31st 22)

Q73 Question about mandatory completion of the challenges

Q: Is it mandatory for the team to perform both challenges, throw the ball and climb into the hangar, or can we choose just one of the tests?

A: There is no requirement (though strongly encouraged!) that ROBOTS accomplish any of the scoring actions.

(Asked by **7566** answered Jan 31st 22)

Q74 Question about teleoperated period

Q: During the teleoperated period, will the human player be able to try to throw the ball to the hub with his hands (in a kind of basketball) as well as in the autonomous period?

A: Per !H504, during TELEOP, CARGO may only be introduced to the FIELD by a HUMAN PLAYER and through the GUARD.

(Asked by **7566** answered Jan 31st 22)

Q75 Question about equipment allowed in the match

Q: In the teleoperated period, can we use devices such as limelight and PIXY to adjust the angulation and positioning of the robot/launcher? And in the autonomous period?

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 1.10](<https://firstfrc.blob.core.windows.net/frc2022/Manual/2022FRCGameManual.pdf>) and, if needed, resubmit a different question.

(Asked by **7566** answered Jan 31st 22)

Q76 Question about the positioning of the robot inside the tarmac at the beginning of the auto

Q: At the beginning of the autonomous period the robot MUST be inside the tarmac. In topic 6.1.2 of the manual it says that if there is a team that wants to change the robot's positioning for some reason, it must notify the judges. If two or more teams ask to choose or change the starting location, how will the robots be repositioned?

A: If a team wishes to modify their ROBOT'S position in its TARMAC before the MATCH, they must notify the Head REFEREE (however please note, the request may be denied based on timing and imminence of MATCH start). If additional teams also wish to reposition their ROBOTS within the TARMACS and the order of placement matters to either or both ALLIANCES, the order of placement detailed in [Section 6.1.2](<https://firstfrc.blob.core.windows.net/frc2022/Manual/Sections/2022FRCGameManual-06.pdf>) is followed.

(Asked by 7566 answered Jan 31st 22)

Q77 Driver Station PC

Q: We are building a custom driver station - we wanted to know if we are required to use a laptop or if it is acceptable to build a small PC and monitor into the driver station? Is it okay as long as we are running the normal FRC software?

A: There are no rules requiring a laptop computer be used provided the OPERATOR CONSOLE meets the display requirements in !R902 and the physical requirements in !R904 (also take note of the weight recommendation in the Blue Box).

(Asked by 5965 answered Jan 31st 22)

Q78 Qualification Match Sort Order

Q: Table 11.2 outlines the sort order for qualification ranking. 2nd Sort order is "Average MATCH points, not including FOULS". Are those the MATCH points for the ALLIANCE the ROBOT was a part of, or the total MATCH points of both ALLIANCES?

A: Please see [Team Update 07](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate07.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by 4967 answered Feb 2nd 22)

Q79 "Initiate Contact" Clarification for G205

Q: The Blue box under G204 states "For the purposes of G204, "initiate contact" requires movement towards an opponent ROBOT". G205 then proceeds to use the phrase "initiates contact" as criteria for its penalty. Does the definition of "initiates contact" still apply for rule G205? ie If a robot is stationary, or moving away from an opponent robot, or is perfectly still, and somehow makes inadvertent contact with something inside that opponent's frame perimeter, would this violate rule G205.

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. However, per the blue box in !G205-B, "initiate contact" has the same meaning for both rules. For example, a ROBOT driving away from an opponent ROBOT may extend an arm "backwards" in to the opponent's FRAME PERIMETER and cause damage - that arm extension is considered "movement toward the opponent ROBOT," even if the ROBOT itself is driving away from the opponent. This action is likely a violation of !G205 depending on the exact scenario.

(Asked by 4272 answered Feb 2nd 22)

Q80 Entering the Hangar

Q: Is it legal to enter the hangar from the side, therefore bypassing the low rung. Being that the low rung is lower than the max starting height of the robot, it would be beneficial to enter the hangar from the side so that the robot did not have to 'shrink' in height to enter the hangar from the front.

A: There are no restrictions that require a ROBOT to enter the HANGAR ZONE from a certain side.

(Asked by 8285 answered Feb 2nd 22)

Q81 Transitively contacting an opposing robot who is contacting their Launch Pad

Q: Rule G207 states: Let them shoot. A ROBOT may not contact (either directly or transitively through CARGO and regardless of who initiates contact) an opponent ROBOT whose BUMPERS are contacting their LAUNCH PAD. The question is, can a robot transitively contact an opposing robot that is touching their Launch Pad through another opposing robot? For example, a red alliance robot pushes a blue alliance robot into another blue alliance robot that is in contact with their Launch Pad.

A: Transitive contact through another ROBOT is not a violation of !G207.

(Asked by 5675 answered Feb 2nd 22)

Q82 Linear Servo Actuator

Q: Is a linear servo actuator like the AndyMark am-3517 through am-3514 considered a servo motor as far as the rules are concerned? Are these legal parts?
<https://www.andymark.com/products/actuator-116-r-140mm-stroke-35-1-6v?via=Z2lkOi8vYW5keW1hcmsvV29ya2FyZWE6OkNhdGFsb2c6OkNhdGVnb3J5LzVhZjZjZGRjYmM2ZjZkNWUzNmYyMzY5ZA>

A: We cannot comment on specific part/design legality. Generally a "servo" is any device marketed/sold by a manufacturer as a "servo".

(Asked by 5965 answered Feb 2nd 22)

Q83 Can we use a <5W 24v Electrical Solenoid Actuator controlled from the Pneumatic Hub?

Q: R504 states that we can control Electric Solenoids from the Pneumatics Controllers 1 per channel. The Pneumatic hub can supply 24V. R501 states that we can use "Electrical solenoid actuators, no greater than 1 in. (nominal) stroke and rated electrical input power no greater than 10 watts (W) continuous duty at 12 volts (VDC)" Does the rating imply operating voltage or only rated voltage? Would a <5w 24v Electrical Solenoid controlled from a Pneumatic Hub in 24v mode be allowed?

A: Please see [Team Update 08](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate08.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by 1745 answered Feb 7th 22)

Q84 Are flywheels allowed?

Q: G101 states that unsafe robot operation includes "uncontrolled motion that cannot be stopped by the DRIVE TEAM." Since flywheels should continue to spin after the robot is powered down or disabled, are they precluded under G101 or other robot construction rules?

A: There is no explicit prohibition of flywheels, however 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, ROBOT motion that persists long enough after a MATCH such that it happens during the ARENA reset period may put FIELD STAFF and other participants at risk and will invite scrutiny.

(Asked by **3407** answered Feb 3rd 22)

Q85 Motors in season?

Q: How many engines are allowed for this season?

A: There is no explicit limit on the number of motors used on the ROBOT.

(Asked by **7161** answered Feb 7th 22)

Q86 R408 Acceptable Noodle Tolerance

Q: R408-C states that pool noodles used in the construction of a robots bumpers must be a "nominal" 2.5 inches in diameter. What is the acceptable tolerance on this dimension? Despite constant searching, we can only seem to find pool noodles with an OD of 2.25" (even though the packaging advertises them all as 2.5" OD).

A: The Merriam-Webster definition of "nominal" that's intended is "of, being, or relating to a designated or theoretical size that may vary from the actual". A pool noodle that is sold as "2.5 in. OD" is 2.5 in. nominal and meets the requirement of !R408-C.

(Asked by **3739** answered Feb 7th 22)

Q87 REV mini power module (REV 11-1956)

Q: Can the REV mini power module, (REV 11-1956) be used on an FRC robot in conjunction with the REV PDH, (REV 11-1850)? If the REV mini power module is allowed, can channels be used for motor controllers expected to draw less than 15amps?

A: We cannot comment on specific part legality. The REV mini power module is is not a component listed in !R710 and is therefore a CUSTOM CIRCUIT and all rules relating to CUSTOM CIRCUITS apply including !R625 (which prohibits the specific scenario described).

(Asked by **2075** answered Feb 7th 22)

Q88 Can a 17 year old who has completed high school be a member of the DRIVE TEAM?

Q: Can a 17 year old who has completed high school (but participates with the team like a high school student) be a DRIVER or COACH? Section 6.6 indicates that they don't count as a STUDENT, so presumably they can't be a DRIVER. However, the criteria for COACH indicates that an "adult mentor" can fill the COACH role. However, "adult mentor" is not defined and it isn't clear whether a 17yo would count. It would be unfortunate if the rules disallowed such a student from filling any DRIVE TEAM role.

A: Having completed high school does not necessarily mean the individual no longer meets the definition of STUDENT. Additionally, please see [Team Update 09] (<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate09.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **199** answered Feb 8th 22)

Q89 Penalty for Hitting an Opposing Robot With a Human-Thrown Cargo

Q: What is th penalty, if any, for contact with or damage to a robot on the opposing team caused by an accidental or intentional hit by a cargo piece thrown by a human?

A: *Edited Feb. 11, 2022 per [Team Update 10](<http://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate10.pdf>).* ~~~There are no rules that prohibit a HUMAN PLAYER from hitting any ROBOT with CARGO so there are no penalties either.~~~ Please see !H101 as updated in [Team Update 10] (<http://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate10.pdf>).

(Asked by **8866** answered Feb 7th 22)

Q90 Selecting Regional for Woodie Flowers Award

Q: For the Woodie Flowers Award, the submission page has a dropdown to select which regional the mentor should be judged at. If the team is attending more than one Regional, is there a way to indicate that the team wants the mentor to be a candidate at both Regionals?

A: No, the mentor may only be nominated for and judged at one event.

(Asked by **6995** answered Feb 7th 22)

Q91 PWM Extension Cable Wire Gauge / Connector Rating

Q: Per R622, does the inclusion of a certain gauge of wire on a legal device constitute a de facto "recommendation" to utilize other wires of that same gauge on the branch circuit feeding that device? If not, R622 gives special allowance for 26AWG wire on the roboRIO PWM ports, despite the max 2.2A current. However, The REV Servo Power Module (explicitly-allowed per R505) is afforded no such allowance for its up-to 15A outputs, yet "PWM" connectors cannot fit 18AWG nor are rated for 15A.

A: Use of a particular wire gauge in a device is considered a recommendation to use that gauge wire when connecting the device to a circuit so servo wiring can be extended with the same gauge wire or larger as provided by the manufacturer on the servo.

(Asked by **548** answered Feb 9th 22)

Q92 Redundancy in Powering Radio

Q: The "Overview" wiring diagram located at <https://docs.wpilib.org/en/latest/docs/zero-to-robot/step-1/how-to-wire-a-robot.html> and referenced in the blue box accompanying R617 shows a radio redundantly supplied with power by both a PoE injector and a barrel connector connected to a VRM. R616 does not appear to provide for an option to redundantly power the radio in this manner. Is the published diagram incorrect? Can the radio be redundantly powered by a passive PoE injector and the barrel jac

A: Powering both the PoE port and the barrel connector is permitted by !R616-A provided power for both connections comes from a single VRM.

(Asked by **3688** answered Feb 7th 22)

Q93 Helping other teams comply with H305

Q: In past events, I've encountered situations where teams have trouble complying with rules like H305 (due to having very few team members at the event, or from being otherwise overwhelmed). Section 6.6 mentions that, for the purposes of gracious professionalism, teams can "loan out" their own members to other teams to act as part of their DRIVE TEAM. If the teams involved agree to it, can this "team-member-loaning" mechanism be used for the purposes of complying with H305?

A: A DRIVE TEAM member that is participating with the team due to extenuating circumstances (as described in the first Blue Box of Section 6.6) meets the definition of DRIVE TEAM and would satisfy !H305.

(Asked by **1700** answered Feb 9th 22)

Q94 Ballistic delivery of cargo to opponent

Q: A Human Player for the Red Alliance attempts to deliver Red Cargo to a Blue robot by throwing it over the Terminal during Auto. Is this a violation of H506?

A: Yes. Please also see [Team Update 10](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate10.pdf>).

(Asked by **2363** answered Feb 11th 22)

Q95 can you put air tanks on the low-pressure side of the regulator?

Q: can you put air tanks on the low-pressure side of the regulator?

A: There are no rules that prohibit storage of compressed air in the low-pressure pneumatic circuit downstream from the regulator.

(Asked by **8057** answered Feb 9th 22)

Q96 Is a vertical noodle allowed at the edge of a gap in the frame?

Q: Although R408-C states that noodles must be "stacked", figure 9-8 in R409 indicates that a vertical noodle is allowed in a "corner". Are vertical noodles allowed anywhere other than corners? Specifically, does the edge of a frame gap count as a "corner", such that a vertical noodle could be used at the end of a BUMPER segment which touches the gap? For clarity, if this is the top view of one edge of the robot: -----o <== frame gap ==> o----- Are vertical noodles allowed where the "o"s are?

A: !R408, part C, requires that, other than in corners, BUMPERS use stacked pool noodles and have a consistent cross section comparable to that illustrated in Figure 9-7. !R409 specifies that corner joints, where pool noodle fill is required, are between BUMPERS, not between a BUMPER and a gap.

(Asked by **199** answered Feb 9th 22)

Q97 Does a 17 year old who graduated from high school in June 2021 count as a STUDENT?

Q: Section 6.6 states "A STUDENT is a person who has not completed high-school...as of September 1 prior to Kickoff." The answer to Q88 states that "having completed high school does not necessarily mean the individual no longer meets the definition of STUDENT". Was that answer just intended to indicate that a person who completed high school after Sept 1 would still be considered a STUDENT? Or, is there, hopefully, some other way to count as a STUDENT (e.g. being under 18 years old).

A: The answer to !Q88 was intended to state that just graduating does not mean that they are no longer a STUDENT. The manual defines a STUDENT as a person who has not completed high-school, secondary school, or the comparable level as of September 1 prior to Kickoff (i.e. if a person graduated on September 2, 2021, that person has graduated from high school by the time they attend a 2022 event, but meet the definition of STUDENT). Age is not part of the criteria for STUDENT.

(Asked by **199** answered Feb 9th 22)

Q98 NavX Repair

Q: We had to replace the built-in voltage regulator of our navX gyro with an adjustable Arduino DC Voltage Regulator (LM2596). The game manual suggests that repairs are allowed but we want to make sure that we won't have a problem during inspection.

A: Please see [Team Update 10](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate10.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **6014** answered Feb 11th 22)

Q99 Minor frame perimeter protrusion

Q: In regards to R101. If a bearing is on the frame perimeter. Would the shaft the size of a bolt head projecting out from the frame perimeter less than 1/4 inch fall under the minor protrusion exception?

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, shafts of a small diameter and the flanges of most bearings are considered minor protrusions per !R101 and !R102.

(Asked by 2974 answered Feb 9th 22)

Q100 Can 2 HD Hex Motors be used on a single controller.

Q: Description: We know from documentation that the HD Hex motors from Rev is okay for FRC. NEO motors have 1 controller per motor. Automotive motors (Denso) can have 2 motors per controller. The HD Hex motor is essentially the same as the Denso. Therefore does that mean that we could have 2 HD Hex motors on the same controller?

A: We believe the third row of Table 9-2 (embedded in !R504) answers your question. If not, please rephrase and resubmit.

(Asked by 4905 answered Feb 9th 22)

Q101 How should the 2 nearly identical questions on the Dean's List Award form be answered?

Q: The only difference between the 3rd and 4th essay questions on the Dean's List Award form is that the 3rd question starts with the sentence "Describe the student's technical expertise, entrepreneurship and creativity." Should mentors be providing different answers to those 2 questions or is it a mistake and they should only be answering one? If the latter, does it matter which one?

A: Unfortunately, the third essay question was not updated in the portal and differs from what we published on our website. The third essay question in the portal and the one published on our website are similar, and answers for either will be accepted. Please continue to submit your nominations, answering all of the questions (including the fourth essay question) in the portal, before the deadline on Thursday, February 10, at 3 p.m. Eastern Time. We apologize for any confusion and will correct this issue for the 2023 season. Additionally, judges will be notified of this, and this will not impact any nomination. The third essay prompt listed on the website is: Describe the student's technical expertise, using specific examples in the areas of programming, electronics, design, fabrication, making, illustrating how these skills have contributed to the team's success. Please provide examples. The third essay prompt listed in the nomination portal is: Describe the student's technical expertise, entrepreneurship, and creativity. How does the student's individual contributions to the team benefit the team as a whole in areas of fundraising, outreach, robot build, programming, etc.? Please provide examples.

(Asked by 199 answered Feb 9th 22)

Q102 Wiring for Multiple VRMs

Q: We would like to use two VRMs, one to power the radio, another to power other low amperage electronics devices. Based on R618, can both VRMs be powered from the 20 amp PDP VRM/PCM power source (Figure 9-14 in the game manual)? If we are not using a PCM we would still need to appropriately splice the two sets of VRM leads into a single red/black connection set?

A: No, per !R617-A the VRM powering the radio must be powered off of the PDP VRM/PCM fused connection and "with the exception of a single CTR Electronics Pneumatics Control Module (PCM, P/N am-2858) or REV Robotics Pneumatic Hub (PH, P/N REV-11-1852), no other electrical load shall be connected to these PDP terminals."

(Asked by 3310 answered Feb 10th 22)

Q103 Is 3 years = 36 months or prior 3 "Season Years"

Q: Chairman's award directs teams to focus on "accomplishments within the last 3 years". Is that intended to be the last 3 seasons or 36 months prior to submitting the award. Example: If an event occurred during the pre-season of the 2019 season (9/2018 or 40 months prior to submission) should it be considered in accomplishments in the last "3 years"

A: There is no hard limit on time frame for what should be included in the information submitted or presented to the judges for the Chairman's Award. As noted in some of the questions on the [Submitted Awards Webpage](<https://www.firstinspires.org/resource-library/frc/submitted-awards>), many suggest to focus on events and activities that have happened within the past 3 years. It's up to your team to decide what components are most relevant for your Chairman's Submission.

(Asked by 3786 answered Feb 10th 22)

Q104 Can a robot climb on two alliance partners

Q: G209 disallows a robot from being fully supported by one alliance partner, however, being partially supported supported by two partner robots is not mentioned. If two robots are climbed on a rung, a third robot which is partially supported by both those robots and nothing else fits the criteria outlines in section 6.4.1 and is not fully supported by either robot. Is this a legal climb?

A: Provided that the supported ROBOT is not fully supported by a single partner at any point during the MATCH, there is no violation of !G209.

(Asked by 4089 answered Feb 14th 22)

Q105 HUMAN PLAYER scoring after the MATCH ends.

Q: In 6.4.B it says "assessment of CARGO scored in the HUB continues for up to 10 seconds after the ARENA timer displays 0 following TELEOP." H504 and H404 only apply during TELEOP and AUTO respectively. Would it violate any other rules if a human player entered a CARGO into the FIELD after the MATCH has ended, in hopes of it getting scored within the 10 seconds from the end of TELEOP.

A: Please see [Team Update 11](https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate11.pdf). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **8513** answered Feb 15th 22)

Q106 Cable Protector Dimensions

Q: Section 5.1 describes the cable protector as: "The floor segments are 7/8 in. tall... It is secured to the carpet using hook fastener which increases the height to approximately 7/8 in." I don't believe this makes sense, as it seems to suggest that the hook fastener has zero height. Looking at the field CAD, I wonder if this should actually say that the floor segments are 3/4" tall, and the hook fastener makes it 7/8" high. Is that the case?

A: Good catch! Please see [Team Update 11](https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate11.pdf). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **3419** answered Feb 15th 22)

Q107 Is G108 assessed immediately, or at the end of the match?

Q: G108 says that if a ROBOT positions itself such that any part of its BUMPERS is higher than the HIGH RUNG, that ROBOT is ineligible for any HANGAR points. However, it is not clear when this rule is assessed. If a robot momentarily violates G108, but corrects the issue before time expires and HANGAR points are assessed, is the robot still eligible for HANGAR points? Or will any violation of this rule, even momentary, make the robot ineligible for HANGAR points for the remainder of the match?

A: The rule is assessed, and penalized if applicable in real time. If a ROBOT violates the rule during the MATCH and then comes back in to compliance, the ROBOT is ineligible for HANGAR points.

(Asked by **2175** answered Feb 14th 22)

Q108 NavX Repair

Q: In my previous question about the NavX repair, I received a general answer about the usage of NavX but I specifically want to know whether replacing the voltage regulation component of the MXP with an external Arduino DC Voltage Regulator (LM2596) that's connected to the NavX with cables and is put on the RoboRIO is allowed per inspection regulations. R710 suggests repairs are permitted at the team's own risk, we want to know does this remain within the allowed modification range.

A: We will neither comment on specific part/design legality nor pre-approve any specific part, modification, or repair as legal or illegal. This platform is meant to help provide clarity on existing rules and their meaning. If the device is covered by !R710 and the work on the devices is considered a repair and the performance and specifications of the device after the repair are identical to those before the repair, !R710, part M, applies. If the device is covered by !R710 and the work is not covered by any of the bulleted items listed in !R710, it's not permitted. If the device is not covered by !R710 or !R803 there are no specific restrictions on repairs provided all other rules are met. Please consult [Section 1.10](https://firstfrc.blob.core.windows.net/frc2022/Manual/2022FRCGameManual.pdf) and, if needed, resubmit a different question.

(Asked by **6014** answered Feb 14th 22)

Q109 Bill of materials

Q: Our team would like to know if the bill of materials is required this season and where can we find more information about it. Thanks in advance!

A: There are no requirements for a Bill of Materials in order for a ROBOT to pass inspection.

(Asked by **7039** answered Feb 14th 22)

Q110 Sharing Common Wires on Pneumatics Hub

Q: When using multiple solenoids with a Pneumatics Hub, can we connect each solenoid's switching side to the switching output of the hub, but connect all common wires together? R504 states we can have 1 solenoid per channel, but it does not define if the channel is the pair of red & black (+/-) terminals, or if the channel is just the switching side of each pair (ex. the switching ground - terminal for each output) and allows all commons to be shared (ex. all +12V wires connected together)

A: No. A single channel includes the pair of red/black terminals and is denoted with numbers 0-15 on the Pneumatic Hub.

(Asked by **930** answered Feb 14th 22)

Q111 Can teams replace stripped housing screws in Falcon motors?

Q: R502 would seem to imply this is not legal, as it's not listed as an approved change. However, Vex has recently released a notice that Falcon motors may be missing loctite and a required spacer. In order for teams to remedy this, the motor housing screws need to be removed, and in doing so the screws may become stripped and require replacing, either with identical screws provided by Vex or functionally equivalent screws if Vex is out of stock.

A: Please see [Team Update 11](https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate11.pdf). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **2177** answered Feb 15th 22)

Q112 Can we re-use a radio from within the last two years?

Q: I don't know what we did with the radio in our KOP... We've misplaced it somehow. I'm wondering – can we use our radio from 2020? It is a 4701A-OM5P-AC, so I think the same as in the KOP.

A: Yes, per !R702 a radio with P/N:OM5P-AN or OM5P-AC are permitted

(Asked by **7104** answered Feb 16th 22)

Q113 What are cargo rings?

Q: What are the cargo rings mentioned in the manual section 5-1. Also was the update from 12 to 14 because of a mistake or was the field updated?

A: Please see [Section 5.2 Zones and Markings](<https://firstfrc.blob.core.windows.net/frc2022/Manual/Sections/2022FRCGameManual-05.pdf>) for the description of CARGO RINGS. The edit in [Team Update 11](<http://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate11.pdf>) was to correct an error.

(Asked by **6768** answered Feb 16th 22)

Q114 Frame perimeter side and corner definition

Q: R401 states that "If a FRAME PERIMETER side is shorter than 12 in. (~31 cm), that entire FRAME PERIMETER side must be protected by a BUMPER" If one side of the robot has an 8 inch solid piece, then a 12 inch gap, then another 8 inch solid piece in a straight line, is that all one "FRAME PERIMETER side" or is each solid piece a separate "FRAME PERIMETER side"? Does each 8 inch piece need to be fully covered, or only 6 inches from the outside corners?

A: Please see the blue box under !R101 for a description of how to determine FRAME PERIMETER sides, as well as Figure 9-1, Figure 9-2, and Figure 9-3 for some FRAME PERIMETER examples. !R401 requires that at least 6 in. of the FRAME PERIMETER, from each corner be covered by BUMPER.

(Asked by **4043** answered Feb 16th 22)

Q115 Allowed cameras

Q: Our team was curious about allowed cameras. Specifically, we are wondering about the intel real sense d435/d435i/d455 cameras. if any of the cameras are not legal for use, please elaborate on why. We found on the questionnaire for this year that the d435i and 455 cameras are not legal because of their integrated IMU. Would this make the normal d435 legal for use since it does not contain an integrated IMU? Thank you for your time, FRC team 3695

A: We cannot comment on specific part/design legality. There are no explicit prohibitions on cameras or IMUs, however there may be cameras with integrated devices that are not permitted in the *FIRST* Robotics Competition. We're unsure of the questionnaire you reference.

(Asked by **3695** answered Feb 17th 22)

Q116 Frame size limits

Q: We finished building our robot drive kit/frame that was provided on Kick-Off day. I just measured the perimeter and it was 126", the frame being 31" x 32". However, I read this year's manual and it says the perimeter cannot exceed 120". Is this an error? Please advise, and thank you.

A: In order to allow for teams to configure the drivetrain in a variety of ways, the AM14U5 components provided in the Kickoff Kit do assemble to a total frame size which violates !R104 if no pieces are cut before assembly. While there are many ways to configure the drivetrain legally, some recommended configurations from AndyMark are shown on page 8 of the [AM14U5 User Guide](<https://andymark-webinc.netdna-ssl.com/media/W1siZiIsIjIwMjIvMDEvMDYvMDkvNDYvMTQvMzE5NTA3ZG9tZDFiOS00MwYzLWJiODEtYzZmMDJjYTFjM2YwL0FNMTRVNV9Vc2VyR3VpZCsha=778f29ff5a4ccf8d>).

(Asked by **3110** answered Feb 17th 22)

Q117 G405 application of REPEATEDLY

Q: Regarding G405, does REPEATEDLY (defined as more than once in a MATCH) apply to "score" or to both "score or gain control?" Scoring once is OK, but is gaining control once also OK?

A: "REPEATEDLY" applies to both concepts. A ROBOT may either score a single CARGO or gain control of a single CARGO directly from an UPPER EXIT during a MATCH before being subject to violation of !G405. A ROBOT that both scores a single CARGO directly from an UPPER EXIT and gains control of a separate single CARGO directly from an UPPER EXIT has violated !G405.

(Asked by **9999** answered Feb 18th 22)

Q118 Consistency of Bumper Compliance

Q: Assuming all other rules in section 9.4 are followed pertaining to bumper rules, would there be allowed to be a section of bumper that does not follow all of the rules in R408? For example, bumpers cover the entire frame perimeter and are properly constructed and supported, would a section of bumper be allowed to be constructed with 1 pool noodle instead of a stacked pair, as long as, not including that section, there are 6" of fully rule compliant bumpers from each corner?

A: No, per !R102, only BUMPERS and minor protrusions may be located outside the FRAME PERIMETER. An assembly that does not follow all parts of !R408 is not a BUMPER.

(Asked by **1405** answered Feb 21st 22)

Q119 Are motor controllers without motors considered custom circuits?

Q: Is it considered a custom circuit to have 4 Talon SRX motor controllers wired in parallel to a single breaker without anything attached to the output side of the motor? Our team would like to use these motor controllers to host CTRE SRX Mag Encoders in place of the CTRE CANcoder which is out of stock. The motor controllers are purely for data acquisition, thus, will never draw any substantial current.

A: Provided the device is not connected to an actuator, it is part of a CUSTOM CIRCUIT, and all applicable CUSTOM CIRCUIT rules apply.

(Asked by 4774 answered Feb 21st 22)

Q120 Cables in DRIVER STATION

Q: Is it allowed to connect a data cable from a team's DRIVER STATION to cable in 2nd team's DRIVER STATION assuming the following: Each cable is in its DRIVER STATION area not crossing more than couple of inches (H307), The cable is secured and not hazardous, The cable is not connected at either end to the FMS components, The cable is a USB data cable powered through low voltage, The cable deployment/disconnect process is very quick and timely.

A: We cannot rule absolutely on hypothetical designs, and the final decision as to legality of a particular design lies with the Lead ROBOT Inspector (LRI) at each event. However, there are no rules specifically prohibiting connecting to an ALLIANCE partner's OPERATOR CONSOLE.

(Asked by 1574 answered Feb 21st 22)

Q121 Directing solenoid valve exhaust for cooling

Q: Is it legal to direct the exhaust from one or more pneumatic solenoid valves into or across one or more components on the robot for in-match cooling? For example, connecting a pneumatic tube from a solenoid manifold exhaust port into the cooling port on one or more Falcon 500 motors.

A: Items open to atmosphere (i.e. not capable of holding pressure) may be connected to the exhausts of pneumatic systems provided flow is not significantly impeded (i.e. no significant back pressure builds up). An unsealed system that is not capable of maintaining pressure is not a pneumatic device.

(Asked by 2491 answered Feb 21st 22)

Q122 Directing vent plug output for cooling

Q: Provided that all stored pressure is still relieved in a reasonable amount of time so as to be compliant with R813A, is it legal to direct the output of the vent plug into or across one or more components on the robot for cooling purposes? For example, connecting a pneumatic tube from the vent plug into the cooling port of one or more Falcon 500 motors.

A: Items open to atmosphere (i.e. not capable of holding pressure) may be connected to the exhausts of pneumatic systems provided flow is not significantly impeded (i.e. no significant back pressure builds up). An unsealed system that is not capable of maintaining pressure is not a pneumatic device.

(Asked by 2491 answered Feb 22nd 22)

Q126 Relays in robot

Q: Within the electronic relays, is there one that is not allowed in the competition? or you can use any

A: !R503-B describes the legal relays which may be used for controlling motors or other actuators, other relays may be allowed as part of non-actuator CUSTOM CIRCUITS provided all applicable rules are followed.

(Asked by 7161 answered Feb 23rd 22)

Q127 Transistor in robot

Q: Can transistors be used in the electrical system as a complement?

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 1.10](<https://firstfrc.blob.core.windows.net/frc2022/Manual/2022FRCGameManual.pdf>) and, if needed, resubmit a different question.

(Asked by 7161 answered Feb 22nd 22)

Q128 Chairman's Documentation Form for Virtual Judging

Q: In light of the switch to virtual judging for the Chairman's Award in certain regions, how will the Chairman's documentation form be submitted for those regions?

A: Per the [Remote Judging Plan](https://www.firstinspires.org/sites/default/files/uploads/resource_library/frc/game-and-season-info/awards/2022/frc_2022_remote_judging_guidelines.pdf), teams eligible for the Chairman's Award will be able to submit up to 2 pages of additional information to the Judge Advisor. As the Chairman's Documentation Form is not a required document, it will count as part of the 2 page limit. Judge Advisors will provide instructions on how to provide this information closer to the event. If you do not hear from your Judge Advisor, please reach out to [frcteamadvocate@firstinspires.org] ([<mailto:frcteamadvocate@firstinspires.org>]).

(Asked by 135 answered Feb 22nd 22)

Q129 R602 Clarification

Q: R602 states that USB battery packs may be used to power a COTS computing device using unmodified COTS cables. 1. Is a COTS Limelight (internally a Pi with LEDs) considered a COTS computing device? 2. Would an off-the-shelf cable, including those with active components that modify voltage or have one non-USB connector, be considered an unmodified COTS cable? 3. Does R602-B apply only to cables connected directly to the USB battery, or to all connections between computing device and peripheral?

A: 1. We are unable to rule directly on specific components. Generally a device with a microprocessor or CPU, programmed or configured by the team to perform computing tasks, and not otherwise specifically named and covered by the rules may be considered a computing device. 2. Yes, however note that other rules such as !R614 still apply. 3. !R602-b applies to the cabling between the battery and the COTS computing device, non-COTS cabling may be used downstream of the COTS computing device.

(Asked by **5827** answered Feb 23rd 22)

Q130 Can you attach a custom circuit and a motor to the same pdp port?

Q: Can you attach a custom circuit and a motor to the same pdp port?

A: No, this is prohibited by !R625.

(Asked by **5494** answered Feb 23rd 22)

Q131 Bumper Access holes clarification

Q: In R408A, It says that small "Access holes" and "Clearance Pockets" are allowed in bumper plywood as long as they do not significantly affect the structural integrity of the bumper. Would small, unused mounting holes fall under the definition of "access holes" or "clearance pockets" as long as they do not affect the structural integrity of the bumpers?

A: Yes.

(Asked by **4272** answered Feb 23rd 22)

Q132 Section 6.4 part C

Q: Section 6.4 part C states that "C. assessment of HANGAR points is made 5 seconds after the ARENA timer displays 0, or when all ROBOTS have come to rest following the conclusion of the MATCH, whichever happens first." If our robot climbs as high as possible on a rung and then begins to slowly "descend" after the timer displays 0, will we still be awarded the climb points if we have not yet reached the ground after 5 seconds?

A: Provided that the ROBOT hasn't done anything to make it ineligible for HANGAR points (i.e. the ROBOT is in contact with something other than items listed in [Section 6.4.1](<https://firstfrc.blob.core.windows.net/frc2022/Manual/Sections/2022FRCGameManual-06.pdf>)), yes.

(Asked by **1279** answered Feb 24th 22)

Q133 HUMAN PLAYER in the TERMINAL closest to their ALLIANCE AREA

Q: Is the HUMAN PLAYER in the TERMINAL closest to their ALLIANCE AREA allowed to start, and remain, in front of the TERMINAL STARTING LINE? H310 infers that the HP in the TERMINAL AREA closest to their ALLIANCE AREA has no restriction to where they start. H311 infers that the only way to get that CARGO during AUTO is to already be in that area since they can not take the CARGO out before the match. H401 only talks about DRIVE TEAM members "staged behind a STARTING LINE or TERMINAL STARTING LINE"

A: Yes, the HUMAN PLAYER in the TERMINAL closest to their ALLIANCE AREA may start and remain in front of the TERMINAL STARTING LINE.

(Asked by **3310** answered Feb 28th 22)

Q134 Post Match height limit

Q: If the robot extends past the height limit after the match ends will it be penalized for exceeding the height limit or is it only during the match that it can be penalized.

A: Penalties are not assigned for ROBOT actions outside a MATCH.

(Asked by **4994** answered Feb 28th 22)

Q135 How long is the Disabled Period between Auto and Teleop?

Q: Table 5-1 does not mention this disabled period present in past games. I believe this time has varied between games in the past but it would be ideal to have it codified in the manual. If no precise time is to be provided can you provide an estimate? Is the transition between Auto and Teleop automatically done by the FMS?

A: ROBOTS are briefly disabled between the AUTO and TELEOP periods. The duration of the transition is not a published spec, but is not expected to take more than a few seconds. This transition between modes is handled automatically by FMS and relayed to the ROBOTS via the Driver Station software.

(Asked by **6391** answered Mar 1st 22)

Q136 Is the Human Player allowed to leave the Terminal Area during a match

Q: H502 states that the DRIVERS, COACHES, and HUMAN PLAYERS may not contact anything outside the area in which they started the MATCH (i.e. the ALLIANCE AREA or the TERMINAL AREA). For the purposes of this question, lets assume my team is on the Red Alliance. If our Human Player starts in the Terminal Area next to the Red Alliance Area, H502 seems to state that said Human Player can not move from the Terminal Area to the Red Alliance Area. Is that a correct interpretation of that rule?

A: Yes, the stated interpretation is correct.

(Asked by **1410** answered Mar 2nd 22)

Q137 Scoring In The Opponent Hangar

Q: In "Quarterfinal 3" of the week 0 competition, the 2713 team robot hung in the red hangar and appeared to earn hangar points for it. There seem to be no rules saying you can't do this but it seems like an odd thing to allow.

A: We cannot comment on specific scenarios at events, and unofficial events should not be used as precedence for official events. Per the start of [Section 6.4]() (emphasis added), "ALLIANCES are rewarded for accomplishing various actions through the course of a MATCH, including TAXIING, scoring CARGO in the HUB, engaging with ***their*** HANGAR, and winning or tying MATCHES."

(Asked by 5683 answered Mar 2nd 22)

Q138 Clarification on "unable to drive"

Q: What constitutes "unable to drive" for violations of G205 and G206? If a violation causes a 30-45 second outage in the victim ROBOT but they are able to then drive again does that constitute "unable to drive? What about damaging the victim ROBOT's drivetrain to the point of dramatically reduced but non-zero operability (such as being unable to control turning movement, omnidirectional drivetrains losing some but not all directions of motion, etc.)?

A: "Unable to drive" means that that because of the incident, the DRIVER can no longer control the ROBOT'S movement around the field. If the ROBOT can still drive, even with reduced capability then the violation does not escalate to a RED CARD.

(Asked by 9999 answered Mar 2nd 22)

Q139 Legality of Wago 221 Inline Splice Connectors

Q: Can Wago 221-2401 Inline splicing connectors be used on 40 Amp circuits? They are specified that they can be utilized on circuits with up to 12 AWG wire. The Wago documentation shows that these have IEC approval for 450 nominal Volts and 32 A as well as UL approvals for 600 V and 20 A. These are much more stringent requirements than a typical robot environment. Rev Robotics has performed and documented successful testing on these connections at 80 A. Are these legal on 40A circuits?

A: Yes, the REV Robotics rating of "Rated for robot circuits up to 12 AWG" is sufficient to qualify these connectors for use anywhere a 12 AWG wire may be used.

(Asked by 2582 answered Mar 3rd 22)

Q140 Movement Before Autonomous

Q: Are we allowed to move parts of our robot prior to the start of the match and before the autonomous phase?

A: On-FIELD configuration prior to the MATCH is not prohibited as long as it does not cause delays (violating !H301). Also note that per !H309-C the ROBOT must be in STARTING CONFIGURATION at the start of the MATCH and per !H302 ROBOTS may not be enabled on the FIELD outside of a MATCH without express permission.

(Asked by 135 answered Mar 7th 22)

Q141 How long is Momentary control?

Q: In the rule G403 it states, ROBOTS may not have greater-than-MOMENTARY CONTROL of more than 2 CARGO at a time, either directly or transitively through other objects. How long is momentary?

A: The definition for terms in ALL CAPS can be found in the Glossary.

(Asked by 6072 answered Mar 7th 22)

Q142 R813 Question

Q: For R813, Any pressure vent plug must be: A. connected to the pneumatic circuit such that, when manually operated, it will vent to the atmosphere to relieve all stored pressure. Does this rule allow having separate pressure circuits that can each be fully released by their own vent plugs?

A: No, operation of **any** vent plug must relieve **all** stored pressure.

(Asked by 6995 answered Mar 7th 22)

Q143 Right Angle Battery Connections on PDP and Plastic Cover

Q: In past years (2020 and before), we were able to use Right Angle Connectors on the PDP main input connection (6 AWG or larger) (R609) still attached with the M6 screws and tape over the Battery input connections since the plastic cover would not work (interferre) and we were not allowed to modify the battery cover. This is still acceptable, correct?

A: Per !R710-P the input cover on the PDP may be omitted. Any connector may be used to connect to the PDP provided it complies with !R623.

(Asked by 4256 answered Mar 8th 22)

Q144 Repeated 3 Cargo Momentary Control

Q: G403 states that a Robot may not have more than MOMENTARY CONTROL of 2 CARGO and specifically describes an egregious example of frequent CONTROL of 3 or more CARGO more than 3 times in a match (approximately). Would a team that had momentary control of 3 cargo twice in AUTONOMOUS for all of their matches as part of a strategy be considered for egregious rule violation?

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, the list in the Blue Box of !G403 is not exhaustive and there may be additional scenarios that may be considered egregious.

(Asked by **4188** answered Mar 9th 22)

Q145 Clarification on initiate for g204

Q: If a red robot with an extended intake is driving in a direction at high speed, and a blue robot crosses the path such that the red robot is unable to stop and avoid contact inside the blue robot's frame perimeter, would the red or blue robot be considered initiating this contact. If a blue robot is repeatedly doing this to intentionally draw G204 fouls, would this action be a violation of G201 or H202

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. Per the Blue Box in !G204, more than one ROBOT may have initiated contact. If the Referee perceives a strategy "clearly aimed at forcing the opponent ALLIANCE to violate a rule" in a way that the Robot with its extension out has "limited or no opportunity... to avoid the penalty," G201 may be applied.

(Asked by **4089** answered Mar 14th 22)

Q146 Bumper Compliance

Q: Bumpers are removed during the weighing phase of inspection. Assuming it can be attached and detached with sufficient expediency, can the AM14U4 End Plate from the AndyMark Chassis Base Kit be attached to the inside of the bumper such that the plate is removed with the bumper during weigh-in?

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, per the Blue Box below !R407, anything permanently attached to the BUMPERS is considered part of the BUMPERS and must meet all relevant BUMPER rules, and the ROBOT must meet all relevant ROBOT rules (such as !R101 and !R410) with the BUMPERS, including any permanently attached elements, removed.

(Asked by **6962** answered Mar 9th 22)

Q147 G204:Is motion toward opponent a NECESSARY or a SUFFICIENT condition to "initiate contact"

Q: Rule G204 says initiating contact requires movement towards an opponent robot. Is movement toward an opponent robot a NECESSARY or a SUFFICIENT condition to "initiate contact"? At events it was called as a SUFFICIENT condition (contact by a robot moving forward is initiated by that robot) but as written, it implies that moving forward is only a NECESSARY condition (an example: motion toward a defensive opponent robot that is restricting motion in all other directions might not be initiating)

A: Movement towards an opponent ROBOT is a requirement to be considered initiating contact (per the Blue Box) but any movement towards an opponent ROBOT is not necessarily initiating contact (e.g. a ROBOT moving very slowly in a direction likely has not initiated contact with an opponent that moves towards them very quickly).

(Asked by **1923** answered Mar 14th 22)

Q148 Arena carpet damage mitigation

Q: Beyond the requirement in R201 to eliminate certain damaging surface features from traction wheels, what other mechanical or software features must teams implement to mitigate damage to arena carpet caused by normal operation of their robot during a match, and/or to pass initial inspection at their event? What mechanical/software features are recommended to implement, but not required?

A: Beyond the requirements in the ROBOT rules (such as !R201, !R202, and !R205), there are no specific features to avoid damaging the arena carpet required to pass initial inspection. If a ROBOT is damaging the ARENA, per !G301 the HEAD REFEREE may require "Corrective action ... before the Robot will be allowed to compete in subsequent Matches." *FIRST* does not have any specific recommended hardware or software features to prevent damage to ARENA carpet.

(Asked by **2363** answered Mar 14th 22)

Q149 Can you plug a Limelight into a 20A VRM port on the PDP?

Q: All of the large 16 ports on the PDP are currently occupied and we are unable to delegate a port for the Limelight there. However, we are not using a VRM this year and are wondering if you can use the VRM port for the Limelight power.

A: No, per !R617-A only the device supplying power to the wireless radio and a single PCM or PH may be connected to the VRM/PCM terminals on the PDP.

(Asked by **334** answered Mar 14th 22)

Q150 Ruling on extension beyond perimeter...

Q: Regarding the limit on how far beyond the perimeter is allowed to protrude, what would be the ruling if part of the robot extends further than 16 inches beyond the perimeter while it is being deployed?

A: !R105 and !G107 do not have any exception for MOMENTARY over-extension. Any extension beyond 16" from the FRAME PERIMETER will prevent a ROBOT from passing inspection per !R105, or if it occurs during a MATCH, violate !G107.

(Asked by **3397** answered Mar 14th 22)

Q151 Can teams bring objects onto the FIELD to get the bot off the HANGAR?

Q: Our team requires support to get our bot down from the traversal rung, but we aren't sure if we can bring objects like that onto the FIELD. Would we be able to take a stepstool or small ladder (around 4ft) onto the FIELD and briefly set it up in or around the HANGAR to get our bot down?

A: There are no specific rules against bringing items onto the FIELD to assist in removal of the ROBOT provided it does not cause significant delay, per !H301. We cannot comment absolutely on any particular device or procedure, the ultimate decision on whether a method of removing a ROBOT from the HANGAR is safe would be determined by FIELD STAFF at your event. Generally, supporting the weight of a ROBOT while on a ladder or stepstool is not likely to be safe.

(Asked by **3663** answered Mar 14th 22)

Q152 Bumper Backer

Q: As per R408-A, bumpers must be "backed" by 3/4 in. thick plywood. Does the word "backed" mean 'structurally supported by' or 'physically on the back of the bumper'? For example, could a bumper have structural material permanently attached to the wooden portion of the bumper facing the inside of the robot?

A: The use of "backed" in !R408-A is closer to "structurally supported by". Elements of the rigid fastening system per !R408-G may be physically behind the plywood.

(Asked by **6962** answered Mar 14th 22)

Q153 Neo encoder wire replacements

Q: Per R502 J it says "Repairs, provided the performance and specifications are unchanged." One of our NEOS had the encoder wires trimmed too short and we would like to solder new, functionally identical wires to the board inside of the NEO. Would this be allowed assuming nothing about the motor was modified besides the repair and the repair was done with functionally identical wires?

A: Yes, replacing damaged wires with functionally identical wires (i.e. same gauge and length as factory) would be a repair permitted by !R502-J.

(Asked by **5468** answered Mar 15th 22)

Q154 G106 and what equates to an over-extension leading to HANGAR points

Q: A violation of G106 states "If the over-extension enables HANGAR points, the ROBOT is no longer eligible for HANGAR points." Can the following situations be clarified for if HANGAR points are awarded? 1. A robot over-extends, then retracts the over-extension, re-extends legally in the HANGAR and climbs. 2. A robot over-extends vertically, keeps the over-extension out, but then legally extends and successfully climbs using a different extension. If yes, what constitutes a different extension?

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. If an overextension was not used to accomplish HANGAR points, the HANGAR points are not impacted.

(Asked by **125** answered Mar 16th 22)

Q155 G204, G205: Is it possible in a collision of two robots that neither initiated contact?

Q: The blue boxes of rules G204 and G205 state that "In a collision, it's possible for both robots to initiate contact." Is it possible that in a collision of two robots, (potentially damaging inside frame perimeter, potentially not), neither robot initiated contact?

A: Yes, it is possible that neither ROBOT initiates contact if the moving ROBOT(s) are pushed into the collision. If both ROBOTS are moving under their own power, one or both initiated the contact.

(Asked by **1923** answered Mar 15th 22)

Q156 Human Player during Auton

Q: During auton, is the human player allowed to try to toss a cargo into their alliance's robot instead of shooting into the hub?

A: There are no rules that prohibit delivery of a CARGO to an ALLIANCE ROBOT at any point in the MATCH provided they are following !H404 during AUTO and !H504 during TELEOP

(Asked by **272** answered Mar 16th 22)

Q157 Starting a match with pneumatics fully charged

Q: While at a Week 2 competition, a robot inspector made a comment that robots could not start matches with the pneumatics system fully charged. However, R608 seems to imply (even state) that a robot can start a match with the pneumatics system fully charged with compressed air as long as the robot complies with R806 and R807. Is that the correct interpretation of R608?

A: We cannot comment on previous calls of Head REFEREES or LRIs here in the Q&A. Please consult [Section 1.10] (<https://firstfrc.blob.core.windows.net/frc2022/Manual/2022FRCGameManual.pdf>). If you have questions about anything related to your ROBOT inspection, please seek assistance from the Lead ROBOT Inspector at your event. If you have concerns about an incident at your event, please report that specific incident using the *FIRST* Reporting Portal described in [this recent blog](<https://www.firstinspires.org/robotics/frc/blog/2022-the-first-reporting-portal-is-live>).

(Asked by **1410** answered Mar 21st 22)

Q158 Can you use the 5V 2A/500mA and 12V 500mA on the VRM for non-radio electrical loads?

Q: In R616-A, "The wireless bridge (radio) power must be supplied by ... the 12V 2A output of a VRM ..., and must be the only load connected to those terminals". Does "those terminals" refer to: - The 12V 2A terminal - Any terminals of the VRM - The fused terminals of the PDH/PDP¹ ¹ R617-A specifies "... the designated supply terminals at the end of the PDP, aside from PCM, RPH ... no other electrical load shall be connected to these PDP terminals."

A: "Those terminals" refers specifically to the 12V 2A output on the VRM.

(Asked by **4739** answered Mar 21st 22)

Q159 Clarification on I101

Q: Currently in I101, it is stated that "assembling pieces of a MAJOR MECHANISM provided by another team, except COTS kit" is an example of violation. Does this mean that a team can supply a robot in their alliance a COTS kit like AndyMark's Everybot 2022 Passive Hanger Structure and Hangar Hook Kit for them to assemble and install on their robot for playoffs.

A: Yes, assembling a COTS kit provided by another team does not violate !I101.

(Asked by **3986** answered Mar 21st 22)

Q160 Double sided bumper question change from 2021

Q: R405 says that "narrow areas of underlying fabric exposed at seams, CORNERS, or folds" are allowed. Does this compare to R21 in 2021 that was accepted that the corners of the bumpers could stay a different color so that we could easily do double sided bumpers. IE can we change the supported parts of the bumper to alliance colors but leave the corners a neutral color?

A: No, allowing the entire corner to remain a neutral color was a change made for 2021 only. The entire corner of a BUMPER would not be a "narrow area" permitted per !R405.

(Asked by **3753** answered Mar 21st 22)

Q161 Can wire connectors be different colors?

Q: Can connectors coming off of the wires both directly from the motor controller side and the motor side be different colors from the ones listed in R624 (ie. pink, green, orange, etc.)? The wire lengths themselves would be completely red or black according to their polarity however the connectors would be different colors.

A: There are no rules requiring specific colors for wire connectors. !R624 only requires specific colors on wire.

(Asked by **4575** answered Mar 21st 22)

Q162 Cameras used by DRIVE TEAMS pre and post match

Q: Per H303, Line Item F, DRIVE TEAMS are allowed to bring devices used solely to record gameplay to a match. Provided a DRIVE TEAM is in compliance with H301 and is not causing significant delay, is there any prohibition on a DRIVE TEAM photographing the field with a camera prior to the start of a match or at the end of the match when retrieving the robot from the field?

A: There are no rules that explicitly prohibit photography of the FIELD.

(Asked by **900** answered Mar 21st 22)

Q163 Starting a match with pneumatics fully charged

Q: Does R608 allow a robot to draw energy during a match from compressed air which has been pre-stored in the pneumatic system prior to the match in compliance with R806 and R807? Following up on Q157.

A: Yes, per R608-A "compressed air stored in the pneumatic system" is a legal source of energy "stored at the start of a MATCH," provided the air was stored in compliance with !R806.

(Asked by **2363** answered Mar 21st 22)

Q164 Robot setup

Q: Section 6.1.2 provides direction for how to facilitate placement order if it is requested. During playoffs, what is the latest time this request can be made? Does it matter if robots have already been placed on the field?

A: The request needs to be made "during setup for that MATCH" which is up until the scoring table stack light goes green. Until then, an ALLIANCE may notify the Head REFEREE that they need this process in place.

(Asked by **9999** answered Mar 24th 22)

Q165 Can we call a medical time out during playoffs?

Q: We have a student on our drive team that is diabetic. She has an insulin pump that is set to active. At our first competition during the playoffs her sugar spiked to a level that she needed an insulin injection due high adrenaline from playing back to back matches. Can we call a medical time out to give her an injection and a few minutes for her sugar level to come down? We would have our alliance place their robots on the field so no one would be working on them during this time period.

A: The concept of a "medical timeout" doesn't exist in the 2022 rules, however the [District & Regional Events webpage](<https://www.firstinspires.org/resource-library/frc/event-experience>) (*Event Tips* > *How do I Get Help at an Event?* > *Accommodation Request*) states that "**FIRST* is committed to [Equity, Diversity, and Inclusion](<https://www.firstinspires.org/about/diversityinclusion>) and as such, *FIRST* makes reasonable accommodations for persons with disabilities that request accommodation. If a participant needs an accommodation for an event, please talk to a volunteer at the event or contact your [local leadership](<https://www.firstinspires.org/find-local-support>) before the event so they can help ensure the accommodation is provided. Accommodations are determined reasonable

given they do not create an undue hardship or cause safety concerns." Occasionally needing limited pauses in Playoff Tournament progression to attend to a medical need is considered a reasonable accommodation.

(Asked by **4381** answered Mar 25th 22)

Q166 G106 HANGAR eligibility after MATCH

Q: Q134 States that a ROBOT that extends past the height limit after a MATCH ends will it be not penalized for exceeding the height limit. Does this also mean that over-extension within 5 seconds after a match does not affect eligibility for HANGAR points?

A: Yes, the answer to !Q134 applies globally.

(Asked by **2412** answered Mar 30th 22)

Q167 G106 while hanging

Q: If a ROBOT violates rule G106 height limit after the match and remains so when HANGAR points are assessed 5 seconds later, is that ROBOT eligible for HANGAR points if the extension is enabling HANGAR points?

A: We believe !Q154 is a comparable question and so the response applies here as well. If not, please rephrase and resubmit.

(Asked by **180** answered Mar 30th 22)

Q168 Pit Crew during Playoffs Limitations?

Q: This section of the manual explicitly allows 3 additional pit crew members during the Playoffs. What does this mean? May those 3 team members accompany the team to the queuing area to be able to maintain the robot between playoff matches? Can the FTA/HR put limitations on this? Can they change the number of allowed pit crew members? Can they change when the pit crew is allowed to join the drive team (QF, SF, Finals)? if limitations/exceptions exist can they please be added to the manual?

A: Yes, pit crew members may accompany the DRIVE TEAM to the queue and are expected to help DRIVE TEAM members to service the ROBOT as needed (safely). There are no provisions for exceptions where FIELD STAFF can eliminate or modify this allowance.

(Asked by **3847** answered Mar 30th 22)

Q169 Can robots be rolled onto the field through the field gate?

Q: For context in last weekend's regional we had a student carrying a robot through the field gate trip on the edge of the gate and the robot fell on top of the student. For safety sake we would like to change how we get our robot to the field and roll it through the gate (our robot is narrow enough to fit the 3 ft 2 in opening even with bumpers). We understand not all robots would be able to do this however since ours can we would like to do that to be safer.

A: There are no rules requiring a ROBOT be carried onto the FIELD.

(Asked by **1967** answered Mar 30th 22)

Q170 Is multiple teams defending a single robot a violation of G203?

Q: Would multiple robots coordinating together to defend a single opposing robot (and keep it to a specific portion of the field without pinning it) be a violation of G203? In this scenario, the other two robots on the opposing alliance are not isolated from any elements of game play.

A: No, isolating a single ROBOT from major elements of MATCH play is not a violation of !G203.

(Asked by **1712** answered Mar 30th 22)

Q171 H301 - Post Timeout Conditions?

Q: The Blue Box under H301 states, "At the conclusion of a TIMEOUT, ROBOTS are expected to be staged on the FIELD prior to the timer displaying 0 and ready for the MATCH to start." Does this mean robots must be on the field, powered on, and connected when the timeout timer hits zero, or is there other guidance given to field staff to determine when these conditions are met and other general H301 conditions are met after a timeout?

A: "Staged on the FIELD...and ready for the MATCH to start" is intending to indicate that the ROBOTS have been placed in their starting location and powered on. The ROBOTS are not required to be fully linked. This expectation sets the starting point for delay, but does not mean that a ROBOT not staged at T=0 is immediately causing a "significant" delay.

(Asked by **3847** answered Apr 4th 22)

Q172 When does a ROBOT come to rest?

Q: Is there an accepted definition of a ROBOT "coming to rest" as it pertains to Section 6.4 point C? Do any of the following scenarios describe a ROBOT that has "come to rest"? - A ROBOT rolling across the floor after T=0 - A ROBOT that is rising or falling relative to the floor after T=0 - A ROBOT that is swinging on a RUNG of the HANGAR after T=0 - A wheel or mechanism inside a ROBOT that still has kinetic energy after T=0 Thanks!

A: A ROBOT "hav[ing] come to rest" generally refers to it's movement relative the FIELD. Any significant movement relative to the FIELD including rolling, swinging, raising, or lowering, indicates that a ROBOT has not "come to rest". REFEREES are not expected to assess whether MECHANISMS inside ROBOTS are still moving.

(Asked by **3940** answered Apr 4th 22)

Q173 Pinning clearing question

Q: If red robot begins pinning a blue robot, and backs away 6 feet with 2 seconds on the pin count, then immediately re enters within 6 feet, but does not re pin the same robot, does the pin count continue at 3 or was that pin over when they were separated by 6 feet.

A: Please see [Team Update 20](<https://firstfrc.blob.core.windows.net/frc2022/Manual/TeamUpdates/TeamUpdate20.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by 8513 answered Apr 7th 22)

Q174 G404 - Observability of Inaccessible Cargo

Q: The blue box for G404 lists several examples of hoarding cargo. For the purposes of understanding more about how cargo is made inaccessible within the hangar zone, what have the referees been instructed to observe? Is it sufficient that cargo merely be in the hangar zone to be inaccessible? Is cargo that is just over the line of the hangar zone inaccessible if, prior to the final 30s, a robot is contacting the center of one of the rungs and cargo can be collected without probable 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. The position of a CARGO in or on the edge of a HANGAR ZONE does not automatically render it accessible or not accessible. Generally, a CARGO in the HANGAR ZONE that can be reached by an opponent without violating !G208 is accessible.

(Asked by 900 answered Apr 7th 22)

Q175 G404 and unintentionally violating G201

Q: Alliance colors are used for clarity only. If there are 3 blue cargo towards the rear of the red hangar, and a blue robot pushes a 4th blue cargo into the hangar of the red alliance while a red alliance robot is climbing, would this be considered a G404 violation and a penalty assessed against the red alliance? Though this is an illustrative situation, we are attempting to seek clarity on how G404 is assessed by the referees when cargo is pushed into the hangar by an opposing alliance per G201.

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. !G404 makes no exception for nor any consideration of how CARGO was positioned such that it was inaccessible. If a REFEREE infers that an ALLIANCE is causing their CARGO to be inaccessible as a matter of strategy to force penalties on their opponents, !G201 is likely to be invoked.

(Asked by 900 answered Apr 7th 22)

Q176 G204/Q147 Clarity

Q: If red robot initiated legal bumper to bumper contact with blue robot, and then blue robot, while getting pushed backwards, deploys an intake outside its frame perimeter which contacts red robot within its frame perimeter, has blue robot violated G204? It seems like blue bot initiated the contact by deploying its intake, but it is getting pushed backwards so according to the G204 blue box its no foul.

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. If a ROBOT is moving away from another ROBOT, but an extension is deployed that reaches into that other ROBOT'S FRAME PERIMETER, that extension has moved toward the other ROBOT and has initiated the contact.

(Asked by 8513 answered Apr 7th 22)

Q177 Integral Hoses on Compressors

Q: R804 D requires that pneumatic tubing have a maximum OD of 1/4 inch. The Viair 250C-IG compressor includes a 3/8 inch OD stainless steel hose that is required by the manufacturer to be attached to the compressor for its operation. Is using the included steel hose legal? Also, R811 requires the relief valve to be attached to the compressor's output port by hard fittings. If the steel hose is legal, is attaching the relief valve at the end of the steel hose legal?

A: If a fitting or hose is required by a manufacturer (note that a recommended accessory is not a required component), it's considered part of the compressor. In that case, !R804-D does not apply to the hose as it is part of the compressor (allowed per !R804-K), not pneumatic tubing. !R811 requires the relief valve to be connected to the end of the hose directly or via legal hard fittings.

(Asked by 3414 answered Apr 14th 22)

Q178 Driver Station. Two Computers.

Q: Can we use two computers for our Driver Station? Only one will be running the NI Driver Station software and the other will purely be to view our Dashboard (Shuffleboard).

A: There are no rules that limit the number of computers included a team's OPERATOR CONSOLE (provided they're used in ways that don't conflict with any rules, particularly those in Section 9.9).

(Asked by 5422 answered Apr 14th 22)

Q182 CARGO Destaging

Q: Can CARGO staged on the opponents side of the field be un-staged by CARGO that began the match on your alliance's side of the field?

A: There are no rules that explicitly prohibit this, and we think !Q8 may also address this question.

(Asked by 1771 answered Apr 19th 22)