



## 9 Inspection & Eligibility Rules

This section describes the rules governing MATCH participation. A Team has participated in a MATCH if any member of their DRIVE TEAM is in the ALLIANCE STATION, with or without the ROBOT on the FIELD, at the start of the MATCH.

At each event, the Lead Robot Inspector (LRI) has final authority on the legality of any COMPONENT, MECHANISM, or ROBOT. Inspectors may re-Inspect ROBOTS to ensure compliance with the rules.

ROBOTS are permitted to participate in scheduled Practice MATCHES prior to passing Inspection. However, the *FIRST* Technical Advisor (FTA), LRI, or Head REFEREE may determine at any time that the ROBOT is unsafe, per safety rules, and may prohibit further participation in Practice MATCHES until the condition is corrected and/or the ROBOT passes Inspection.

Prior to the start of a MATCH, any ROBOT which is unable or ineligible to participate in that MATCH as determined by the FTA, LRI, or Head REFEREE is declared to be BYPASSED and is DISABLED. A Team whose ROBOT is BYPASSED remains eligible to receive Qualification Ranking Points or Playoff MATCH points provided that its ROBOT has passed Inspection, per I02.

- I01. The ROBOT must be built by the Team and to play this year's game.** The ROBOT is an electromechanical assembly built by the *FIRST*® Robotics Competition Team to perform specific tasks when competing in *FIRST*® STEAMWORKS<sup>SM</sup>. The ROBOT must include all of the basic systems required to be an active participant in the game – power, communications, control, BUMPERS, and movement. The ROBOT implementation must obviously follow a design approach intended to play *FIRST* STEAMWORKS (e.g. a box of unassembled parts placed on the FIELD, or a ROBOT designed to play a different game does not satisfy this definition).

I01 requires that the ROBOT a Team uses in competition was built by that Team, but isn't intended to prohibit assistance from other Teams (e.g. fabricating elements, supporting construction, writing software, developing game strategy, contributing COMPONENTS and/or MECHANISMS, etc.).

- I02. Get inspected before playing a Qualification/Playoff MATCH.** A Team is only permitted to participate in a Qualification or Playoff MATCH and receive Ranking or MATCH Points respectively if their ROBOT has passed an initial, complete Inspection.

Violation: If prior to the start of the MATCH, the Team is not eligible to participate in the MATCH. If after the start of the MATCH, the entire ALLIANCE receives a RED CARD for that MATCH.

Please take note of this rule. It is important that *FIRST* Robotics Competition Teams ensure their ALLIANCE partners have passed Inspection. Allowing a partner that has not passed Inspection to play puts the ALLIANCE at risk of RED CARDS. Teams should check with their ALLIANCE partners early, and help them pass Inspection before competing.

- I03. Bring it all to Inspection.** At the time of Inspection, the ROBOT must be presented with all MECHANISMS (including all COMPONENTS of each MECHANISM), configurations, and decorations that will be used on the ROBOT during the competition event. It is acceptable, however, for a ROBOT to play MATCHES with a subset of the MECHANISMS that were present during Inspection. Only MECHANISMS that were present during the Inspection may be added,





removed or reconfigured between MATCHES. If MECHANISMS are changed between MATCHES, the reconfigured ROBOT must still meet all Inspection criteria.

**104. ROPES have to be inspected.** A Team must submit any ROPE they intend to use in a MATCH for Inspection. A ROPE must meet the following criteria (see Figure 9-2 for letter references):

- A. have a maximum width (W) of 1 in. (nominal) (e.g. exclusive of any knot widths)
- B. be designed/configured to be at least 5 ft. 3 in. (~160 cm) long measured from the side of the ROPE'S retaining feature (per I04-E) that abuts the DAVIT fingers (L), to the farthest point on the ROPE from this feature.
- C. be designed/configured to not exceed a length of 8 ft. (~244 cm) measured from the side of the ROPE'S retaining feature (per I04-E) that abuts the DAVIT fingers (L), to the farthest point on the ROPE from this feature.
- D. consist entirely of (except for dye or adhesive applied by the VENDOR as part of the normal manufacturing process for a COTS item and no longer tacky, e.g. a "binder coat") flexible, non-metallic fibers sewn, twisted, tied, woven, knitted, crocheted, intertwined, or braided together except for the last 4 in. (~10 cm) of any cut end (E) which may be whipped (with material that is flexible and non-metallic) or fused only to prevent fraying.

Figure 9-1 ROPE examples



- E. be configured such that it engages securely with the FIELD with a Retaining Feature (RF) that does not extend more than 2 in. (~5 cm) below the DAVIT fingers.

To interface with the field a ROPE must have a retaining feature (e.g. a knot) greater than 1 in. (~25.4 mm) in diameter to interface with the DAVITS (RF).

The DAVIT's retaining pins are not designed to hold the weight of a ROBOT and therefore attachment to them would not be considered engaging "securely with the FIELD" per I04-D.





- F. if knotted, the top knot must be at least 29 in. (~74 cm) below the retaining knot/feature (K)
- G. if frayed, knotted or looped, the total diameter does not exceed 10 in. (~25 cm) (D)

If the ROPE has a loose loop such that, uncompressed it's 12 in. (~30 cm) in diameter, but it can be easily compressed by hand to less than 10 in., that ROPE has met the requirement of part I04-G.

- H. be designed/configured to not exceed a length of 5 in. (~12 cm) measured from the side of the ROPE'S retaining feature (per I04-E) that abuts the DAVIT fingers, to the closest end on the ROPE from this feature (S).

The intent of I04 is to allow Teams the convenience of bringing their own ROPE for reliability and predictability purposes, as well as accommodate some modifications to ease the challenge associated with accessing the TOUCHPAD (e.g. tying knots).

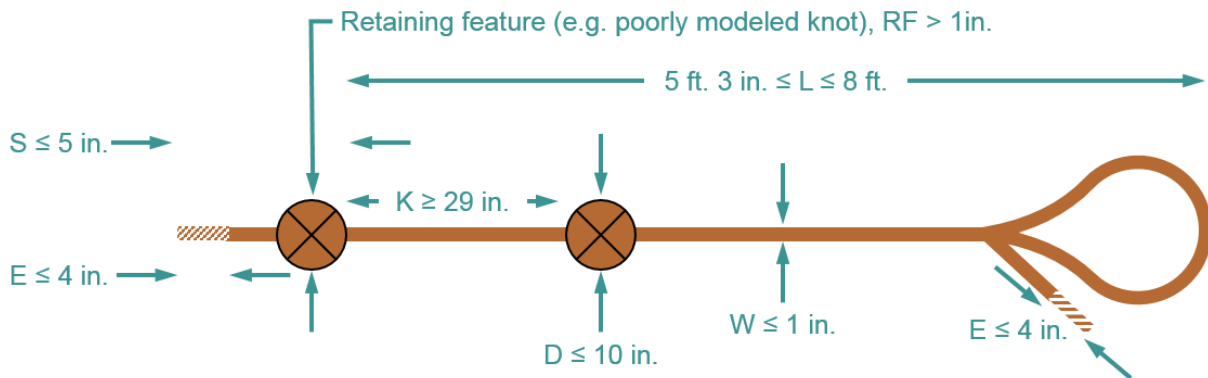
The modifications allowed are limited, however. For example, consider the limitation of the purpose of whipping or fusing to prevent fraying in I04-D and that *FIRST* Robotics Community members are innovative and may discover a way to fuse the end of the ROPE in a way that can be leveraged for competitive advantage. This "superfusion" extends the fusing's purpose beyond only preventing fraying.

We acknowledge that this could result in temptation to implement the superfusion method anyway and hope an Inspector doesn't notice, or that you will be able to convince them the superfusion method really is "only to prevent fraying." Please don't do this. It will likely lead to a bad experience both for you and the volunteer who really does want you to participate in the event, but with a 100% legal ROBOT.

- I. be flexible such that it's not capable of being pushed to activate the TOUCHPAD.

Flexible means that if the ROPE is held at any point, it should not extend more than 12 in. (~30 cm) above the point where it is held. ROPES are meant to be pulled, not pushed.

Figure 9-2 ROPE anatomy



- 105. Unless the change is listed below, any change to a ROBOT must get re-inspected.** If a ROBOT is modified after it has passed its most recent Inspection, that ROBOT must be re-Inspected before the ROBOT is eligible to participate in a MATCH. Exceptions are listed in A





through F (unless they result in a significant change to the ROBOT'S size, weight, legality, or safety).

- A. addition, relocation, or removal of fasteners (e.g. cable ties, tape, and rivets)
- B. addition, relocation, or removal of labeling or marking
- C. revision of ROBOT code
- D. replacement of a COTS COMPONENT with an identical COTS COMPONENT
- E. replacement of a MECHANISM with an identical MECHANISM (size, weight, material)
- F. additions, removals, or reconfiguration of ROBOT with a subset of MECHANISMS already inspected per I02.

When in doubt, the Team should ask to be re-Inspected.

Inspectors prioritize ROBOTS that have not yet completed initial inspection over ROBOT changes and ROPES.

While every effort will be made to re-inspect Teams in a timely manner, Teams need to consider that they may need to play with the previously inspected configuration if re-inspection cannot be completed before a MATCH. Teams should work with Inspectors when making changes to minimize the chance of this occurring.

Example 1: Team A's ROBOT has passed Inspection, but burns out a motor controller during a MATCH. Team A replaces it with an identical motor controller. Team A does not have to get their ROBOT re-Inspected per exception I05-D.

Example 2: Team B would like to add weight to their ROBOT to lower their center of gravity. Team B adds a large amount of fasteners to their ROBOT as ballast. Team B must get their ROBOT re-Inspected because they have significantly changed their weight per I05.

Example 3: Team D has decided to move their motor controller to a different location on their ROBOT, and must use a different length wire to make the proper connections. Team D must get their ROBOT re-Inspected because rewiring is not an exception in I05.

Example 4: Team E decides to relocate their battery on their ROBOT to change their center of gravity. Team E must be re-Inspected as the relocation of COMPONENTS or MECHANISMS is not an exception I05.

Example 5: Team F realizes they can gain necessary functionality by building a new MECHANISM at an event and adding it to their ROBOT. Their ROBOT must be re-Inspected.

If an observation is made that another Team's ROBOT may be in violation of the ROBOT rules, please approach *FIRST* officials to review the matter in question. This is an area where Gracious Professionalism® is very important.

- 106. Changes to a ROPE need re-inspection.** If a ROPE is modified after it has passed its most recent Inspection, that ROPE must be re-Inspected before the ROPE is eligible for a MATCH.







- 107. Document your costs.** A Cost Accounting Worksheet (CAW), listing all items on the ROBOT except those listed in R10 and their relevant costs per [Section 8.4 Budget Constraints & Fabrication Schedule](#), must be presented at the time of Inspection.

Teams are encouraged to use the [CAW Template](#) posted on the *FIRST* website. Please note that while CAWs must be shown to Inspectors, Teams are not required to submit their CAWs to the Inspectors.

- 108. ROBOTS are off for Inspection, mostly.** For the safety of all those involved, Inspections must take place with the ROBOT powered off, pneumatics unpressurized, and springs or other stored energy devices in their lowest potential energy states (e.g. battery removed).

Power and air pressure should only be enabled on the ROBOT during those portions of the Inspection process where it is absolutely required to validate certain system functionality and compliance with specific rules (firmware check, etc.). Inspectors may allow the ROBOT to be powered up beyond the parameters above if both criteria below are met.

- A. The ROBOT design requires power or a charged stored energy device in order to confirm that the ROBOT meets volume requirements, and
- B. The Team has included safety interlocks that mitigate unexpected release of such stored energy.

The Team may be asked to demonstrate these interlocks during the inspection process.

- 109. No student, no Inspection.** At least one student Team member must accompany the ROBOT for any Inspection efforts.

Exceptions may be made for major conflicts, e.g. religious holidays, major testing, transportation issues, etc.

