

TEAM NUMBER: _____

INSPECTOR: _____

INITIALS (after passing): _____

DATE (after passing): ____/____/____

REINSPECTION (initial) _____

FINAL INSPECTION (initial) _____

Initial Inspection

- ___ **Weight** - Robot Weight (≤ 120 lbs. excluding bumpers and battery) <R05> _____ pounds
- ___ Bumper Weight (Bumpers must be ≤ 20 pounds) <R29> Red Bumper _____ Blue Bumper _____ pounds
- ___ **Starting Configuration** - Parts may not extend beyond the vertical projection of the FRAME PERIMETER. <R02>
- ___ **Starting Volume** - Less than 33 in. by 28 in. by 55 in. tall (~83 cm by ~71 cm by ~139 cm tall) <R03>
- ___ **Playing Configuration** - Robot attachments may extend beyond the Starting Configuration ≤ 16 " (~40 cm). <R04>
- ___ **Standard Bumpers** - must follow all specifications in Sec. 4.7 Bumper rules.
- Bumpers must provide protection of at least 6" on both sides of **all** outside corners. (Wood within $\frac{1}{4}$ " of corner) <R23>
 - Hard bumper parts defined by bumper backing, may not extend >1 " beyond robot frame. <R30-B>
 - No bumper segment may be unsupported by robot frame for a length greater than 8". Gaps may be less than $\frac{1}{4}$ " <R32>
 - Bumpers must be supported by at least $\frac{1}{2}$ " (12.7mm) of Robot Frame at each end ($< \frac{1}{4}$ " gap) <R32>
 - Corners must be filled with pool noodle such that no "hard parts" are exposed. <R31>
 - Must use $\frac{3}{4}$ " (~19mm) thick x 5" (~127 mm \pm 12.7 mm) tall plywood or solid robust wood backing with no extraneous holes that may affect structural integrity. (clearance pockets and/or access holes are acceptable). <R30-A>
 - Must use a pair of vertically-stacked 2.5" pool noodles. Pool noodles may be any shape cross section, solid or hollow, but both must be identical in shape and density. <R30-C>
 - Must use a durable fabric cover for the noodles secured as in Fig 8-5 cross section. <R30-D>
 - Must be able to display red or blue (color similar to FIRST Logo) Bumpers to match alliance color. <R27>
 - Team number displayed with min. font 4" tall x $\frac{1}{2}$ " stroke, in white or outlined in white and be easily read when walking around the robot. No logos may be used for numerals. *FIRST* Logos similar to 2017 KOP are OK. <R28>
 - Must be securely mounted when attached and be easily removable for inspection. <R30-G & R26>
 - When on flat floor, bumpers must reside entirely between the floor and 7-1/2" above floor (evaluated when sitting flat on floor) and may not be articulated. <R24 & R25>

Mechanical

- ___ **No Sharp Edges or Protrusions that pose a hazard for participants, robots, arena, or field.** <R06 & R07>
- ___ **No Prohibited Materials** - e.g. sound, lasers, noxious or toxic gases or inhalable particles or chemicals <R08>
- ___ **No Unsafe Energy Storage Devices** - carefully consider safety of stored energy or pneumatic systems <R08>
- ___ **No Risk of Damage to Other Robots** - e.g. spearing, entangling, upending or adhering <G10 & R08>
- ___ **No Risk of Damage to Field** - e.g. metal cleats on traction devices or sharp points on frame. <R06>
- ___ **Decorations** - Cannot interfere with other robots' electronics and sensors (particularly via color distraction) and be in spirit of "Gracious Professionalism". <R08>
- ___ **CAW Cost** - Team must present worksheet with total cost \leq \$4000, and no single component $>$ \$500. <R11 - R13>
- ___ **FRAME PERIMETER** - Frame must be non-articulated. <R01>
- ___ **End Game** - Game Objects can be removed from robot and robot from field without power. <R09>

Electrical

- ___ **Components** - **None** may be modified, except for motor mounting and output shaft, motor wires may be trimmed, window motor locking pins may be removed, and certain devices may be repaired with parts identical to the originals. PD fuses may be replaced with identical fuses only. Servos may be modified per manufacturer's instructions. <R34 & R72>
- ___ **Battery** - A single 12 volt, 17-18 AH robot battery (or listed equivalent), securely fastened inside robot. <R38, R42, R43>
- ___ **Other Batteries** - Integral to COTS computing device or camera or COTS USB < 100 Wh (20,000mAh) and used for COTS computing device and accessories only. <R39>
- ___ **Visibility** - The single PDP and PDP breakers must be easily visible for inspection. <R50>
- ___ **Main Breaker Accessibility** - the single 120A main breaker must be readily accessible with labeling preferred. <R49>
- ___ **Allowable PD Breakers** - Only VB3-A, MX5-A or MX5-L Series, Snap-Action breakers may be inserted in the PD <R56>
- ___ **Robot Radio** - A single OpenMesh OM5P-AN or OM5P-AC radio must be powered via the VRM +12 volt, 2 amp output. VRM must connect to the dedicated +12 volt output on the PDP. Radio LEDs must be visible. <R53, R54, R64>
- ___ **RoboRio Power** - Only the RoboRio must be connected to dedicated power terminals on PDP. <R52>
- ___ **Wire Size** - obey the wiring size conventions.
- ___ All wire from battery to main breaker to PDP must have min #6 AWG (4.11mm) wire <R46 & Fig.8-9>
 - ___ 40 amp breakers must have min #12 AWG (4 mm²) wire <R59>
 - ___ 30 amp breakers must have min #14 AWG (2.5 mm²) wire <R59>
 - ___ 20 amp breakers must have min #18 AWG (1 mm²) wire <R59>
- ___ **Wire Colors** - All power wire must be color coded - red, white, brown, yellow, or black w/stripes for +24, +12, +5 VDC supply wires and black/blue for supply return wires <R61>

- ___ **Copper Wire Only** – All wire used on robot must be copper <R59>
- ___ **1 Wire per WAGO** - only 1 wire may be inserted in each WAGO, splices and/or terminal blocks, may be used to distribute power to multiple branch circuits but all wires in the splice are subject to the Wire Size rules <R55>
- ___ **Motors** –Unlimited automotive motors or other legal motors per table 8-1 <R33>
- ___ **Actuators** – Electrical solenoid actuators, max. 1 in. stroke and no greater than 10 watts@12V continuous duty. <R33>
- ___ **Motor/Actuator Power** –Each motor controller may have up to two (2) motors connected to the load terminals depending on motor type. (Table 8-2), and single specified motors may be connected to Spike (however multiple pneumatic valves may be driven by a single Spike). CIMs and specified other motors must be fed by speed controllers only. Two PWM controllers can be connected by a PWM “Y” cable. <R35, R36 & Table 8-2>
- ___ **Motor/Actuator Control** – Motors/actuators must be controlled by legal motor controllers and driven directly by PWM signals from RoboRio or through legal MXP board or by CAN bus. <R74-R76>
- ___ **Custom Circuits, Sensors and Additional Electronics** - cannot directly control speed controllers, relays, actuators or servos. May not produce > 24V <R51 & R62>
- ___ **Pneumatic Control Module (PCM)** - PCM modules must be connected to RoboRio via CAN bus. <R77>
- ___ **Spike Fuse** – Spike must have 20 amp fuse installed. When used for compressor control only, the Spike fuse may be replaced with 20 amp, snap action, breaker. <R72-D>
- ___ **Isolated Frame** – Frame must be electrically isolated from battery (>3k Ohm between PDP input posts and chassis) <R48>

Pneumatic System W/ On Board or Off Board Compressors(n/a for robots that do not use pneumatics)

- ___ **No Modifications** - pneumatic parts may not be modified except actuator mounting pins may be removed. <R82>
- ___ **Compressor** - Only one KOP compressor (or equivalent, max 1.1 CFM flow rate) may be used (on or off robot). <R85>
- ___ **Compressor Power** - must use the PCM or Spike <R86 & Table 8-2>
- ___ **Compressor Control** – A Pressure Switch must be wired directly to the PCM or RoboRio to control compressor. <R94>
- ___ **Compressor Relief Valve** – set to 125 psi, attached to (or through legal fittings) to compressor outlet port. <R93>
- ___ **Vent Plug Valve** – must include an easily-accessible manual vent plug valve to release system pressure. <R95>
- ___ **Off-Robot Compressor (if used)** – must include an additional vent plug valve. The on-robot control system must be used to control and power the compressor. The High Pressure Switch, gauge, and regulator can be located off-board. <R86-R93>
- ___ **Tubing** – Equiv. to KOP with a maximum OD of ¼” (6.35mm) with screen printed rating or supporting documentation. <R83-E>
- ___ **Relieving Pressure Regulator** – Set to <= 60 psi, providing all working pressure. Norgren R07-100-RNEA or Monnier P/N: 101-3002-1 or equivalent. <R88>
- ___ **Gauges** - must be present at both the high pressure side and low pressure regulator outlet(s) and be readily visible. <R90>
- ___ **Pressure Rating** - all pneumatic components at working pressure, must be rated for at least 70 psi (~483 kPa) working pressure. All components at stored pressure must be rated for at least 125 psi (~862 kPa) working pressure. <R81>
- ___ **Valve Control** - pneumatic solenoid valves must have a max 1/8” NPT, BSPP, or BSPT port diameter, be controlled by either a PCM or Spike and valve outputs may not be plumbed together. <R83-D & R96>

Power On Check (Driver Station must be tethered to the Robot)

- ___ **Unauthorized Wireless Communication** – no wireless communication to/from ROBOT or OPERATOR CONSOLE without prior FIRST written permission. No radios allowed on the OPERATOR CONSOLE or in the pit<R69, R101>
- ___ **Confirm Pneumatics Operation** – With no pressure in system, compressor should start when robot is enabled.
 - ___ Compressor should stop automatically at ~120 psi under RoboRio control. <R87>
 - ___ Main Pressure <= 120 psi <R87> and Working Pressure <= 60 psi <R88>
- ___ **Robot Signal Light(s)** - The Robot Signal Light (two max.) from the KOP must be visible from 3’ in front of the robot, and be plugged into the RSL port on RoboRio. Confirm that the RSL flashes in sync with RoboRio. <R71>
- ___ **Verify Team Number on DS** – team has programmed the OpenMesh Wireless Bridge at kiosk for this event. <R67>
- ___ **Software Versions** - The RoboRio image (FRC_2018_v16 or later) and DS (18.0 or later) must be up-to-date. <R63, R97>
- ___ **Power Off** – Open Main Breaker to remove power from the robot, confirm all LEDs are off, actuate pneumatic vent plug valve and confirm that all pressure is vented to atmosphere and all gauges read 0 psi pressure.
- ___ **Driver Console is less than 60” x 14” x 6’6” above floor (approx.)**. May have velcro to secure to Driver’s Station shelf. <R100>

Team Compliance Statement

We, the Team Mentor and Team Captain, attest by our signing below, that our team’s robot was built after the 2018 Kickoff on January 6, 2018 and in accordance with all of the 2018 FRC rules, including all Fabrication Schedule rules. We have conducted our own inspection and determined that our robot satisfies all of the 2018 FRC rules for robot design.

Team Captain: _____

Team Mentor: _____