2017 FRC Inspection Checklist Rev 1.2

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) <R04> _____pounds

____ Bumper Weight (Bumpers must be ≤ 20 pounds) <R28> Red Bumper _____ Blue Bumper _____ pounds

____ **Starting Configuration** - No parts may extend beyond the vertical projection of the FRAME PERIMETER. <R02>

____ **Max Robot Size –** Including bumpers is less than or equal to 36" x 40" x 24"H _____ or 30" x 32" x 36"H _____ <R03>

____ **Playing Configuration –** Robot attachments may not extend beyond the chosen volume. <R03>

____ **FRAME PERIMETER** – Frame must be non-articulated. <R01>

____ **Standard Bumpers** - must follow all specifications in Sec. 8.5 Bumper rules.

- ☐ Must cover at least 6" on both sides of **all** outside corners. If side is shorter than 6" the entire side must be covered. <R22>
- ☐ Hard bumper parts defined by bumper backing, may not extend more than 1" beyond robot frame. <R29B>
- ☐ No bumper segment may be unsupported by frame perimeter for a length greater than 8". Gaps may be ≤ ¼" deep. <R31>
- ☐ Bumpers must be supported by at least ½" of frame perimeter at each end. <R31>
- ☐ Corners must be filled with pool noodle such that no "hard parts" are exposed. <R30 & Fig 8-6>
- ☐ Must use ¾" thick x 5" tall plywood or solid, robust wood, backing, with no extraneous holes that may affect structural integrity. <R29A> (clearance pockets and/or access holes are acceptable).
- ☐ Must use 2 stacked 2.5" pool noodles. Noodles may be round, petal, or hex in profile, and solid or hollow, but all must be identical in shape and density in each set. <R29C>
- ☐ Bumpers must be covered in a rugged fabric. <R29D>
- ☐ Must be able to display red or blue Bumpers to match alliance color. < R26>
- ☐ Team number displayed with min. font 4" tall x ½" stroke, in white or outlined in white and be easily read when walking around the perimeter of the robot. No logos may be used for numerals. *FIRST* logo on bumpers is okay. <R26C & R27>
- ☐ Must be securely mounted when attached and be easily removable for inspection. <R25 & R29G>
- ☐ When on floor, bumpers must reside entirely between the floor and 7" above floor and may not be articulated. <R23 & R24>

Mechanical

____ **No Sharp Edges or Protrusions that pose a hazard for participants, robots, arena, or field.** <R06>

____ **No Prohibited Materials** – e.g. sound, lasers, noxious or toxic gases or inhalable particles or chemicals. <R07>

____ **No Unsafe Energy Storage Devices** - carefully consider safety of stored energy or pneumatic systems <R07 & R43>

____ **No Risk of Damage to Other Robots** - e.g. spearing, entangling, upending or adhering <G08, G09 & R07>

____ **No Risk of Damage to Field** – e.g. metal cleats on traction devices or sharp points on frame. <R05>

____ **Lubricants** – Lubricants must not contaminate the arena or other robots. <R09>

____ **Decorations** - Cannot interfere with other robots' electronics and sensors. <R07>

____ **CAW Cost** – Team must present worksheet with total cost ≤ $4000, and no single component > $400. <R10 thru R12>

____ **Servo Cost** – PWM COTS Servos may not cost more than $75.00. <R32>

____ **End Game –** Game pieces can be removed from robot and robot from field without power. <R08>

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, connectors on automotive motors may be modified and certain devices may be repaired with parts identical to the originals including PDP fuses. Servos may be modified per manufacturer's instructions. Please see listed rules for more details. <R33, R55 & R71>

____ **Battery** - A single 12 volt, 17-18 AH robot battery or listed equivalent, securely fastened inside robot. <R37, R40, R41>

____ **Visibility** –PDP and breakers must be easily visible for inspection. <R48>

____ **Main Breaker Accessibility** – the single 120A main breaker must be readily accessible with labeling preferred. <R47>

____ **Allowable PDP Breakers** - Only VB3-A Series or MX5-A Series, Snap-Action breakers may be installed in the PDP. <R54>

____ **Robot Radio** – A single OpenMesh OM5P-AN or OM5P-AC radio must be powered via the VRM +12 volt, 2 amp output and must be the only load connected to those terminals. VRM connected to dedicated +12 volt output on the PDP. Radio must be mounted so that LEDs are visible and the roboRIO Ethernet is connected to the 18-24 VPOE port. <R51, R52, R62, R63, R69>

____ **roboRIO Power** – Only the roboRIO must be connected to dedicated power terminals on PDP. <R50>

____ **Wire Size** - obey the wiring size conventions.

- All wire from battery to main breaker to PDP have min #6 AWG (4.11mm) wire <R44>
- 40 amp breakers have min #12 AWG (4 mm^2) wire <R57>
- 30 amp breakers have min #14 AWG (2.5 mm^2) wire <R57>
- 20 amp breakers have min #18 AWG (1 mm^2) wire <R57>

____ **Wire Colors** - must be color coded - red, white, brown, yellow, or black w/stripe for +24, +12, +5 VDC supply wires and black/blue for supply return wires. <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 R57. <R53 & R58>

____ **Motors** – No more than 6 CIMs Qty: ___unlimited automotive motors or other legal motors per table 8-1. <R32>

____ **Actuators** – Electrical solenoid actuators, max. 1 in. stroke and no greater than 10 watts at 12V continuous duty. <R32>
____ **Motor/Actuator Power** – Each motor controller may have up to two motors connected to the load terminals depending on motor type, (Table 8-2), and single specified motors may be connected to an approved relay module. (multiple pneumatic valves may be driven by a single Spike). CIMs and specified other motors must be fed by only one speed controllers. <R35>
____ **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 the CAN bus. <R34, R73-R75>
____ **Custom Circuits, Sensors and Additional Electronics** – cannot directly control speed controllers, Spike relays, actuators or servos and may not produce voltage in excess of 24 volts. <R35, R49 & R60>
____ **Branch Circuits** – Each branch circuit must be protected by one and only one breaker per Table 8-3. <R56>
____ **Pneumatic Control Module (PCM) -** PCM modules must be connected to roboRIO via CAN bus. <R76>
____ **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 (recommended). <R71D>
____ **Servo** – Servos must be connected to the PWM ports on the roboRIO, WCP Spartan Board or REV Servo Module. <R36>
____ **Isolated Frame** – Frame must be electrically isolated from battery, roboRIO must be insulated from frame. (>3k Ohm between either PDP battery post and chassis) <R46>
____ **Terminals** – Each terminal on the battery, main breaker and connectors must be fully isolated. <R42>
____ **CAN** – PDP CAN bus must be wired to the roboRIO CAN bus. The CAN-bus must be connected to the roboRIO. <R77, R78>

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 those listed in R81. <R81>
____ **Compressor** - Only one KOP compressor (or equivalent, max 1.1 CFM flow rate) may be used (on or off robot). <R84>
____ **Compressor Power** - must use the PCM or Spike to power the compressor. <R35 & R85>
____ **Compressor Control** – A Nason P/N SM-2B-115R/443 must be wired directly to the PCM or roboRIO. <R93>
____ **Compressor Relief Valve** – attached to (or through legal fittings) to compressor outlet port. < R82, R83, R92>
____ **Vent Plug Valve** – must include an easily-accessible manual vent plug valve to release system pressure. <R82, R83, R94>
____ **Off-Robot Compressor (if used)** – must include an additional vent valve. The on-robot control system must be used to control and power the compressor. The stored pressure switch & gauge can be located off-board. <R85-R92>
____ **Components** – All must be COTS or KOP items, rated for 125 psi (~862 kPa) minimum burst pressure. <R80>
____ **Tubing** – Equiv. to KOP with a maximum ID of 0.165" with screen printed rating or supporting documentation. <R82E>
____ **Relieving Pressure Regulator** – Set to ≤ 60 psi, providing all working pressure. Norgren R07-100-RNEA or Monnier P/N: 101-3002-1 or equivalent. <R87>
____ **Gauges -** must be present at both the high pressure side and low pressure regulator(s) outlet and be readily visible. <R89>
____ **Valve Control** - pneumatic solenoid valves must have a max 1/8" NPT, BSPP, or BSPT ID, be controlled by either a PCM or Spike and only one valve per pneumatic actuator. <R35, R82D, R95>

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 <R68, R100>
____ **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. <R86>
- Main Pressure ≤ 120 psi <R86 > and Working Pressure ≤ 60 psi. <R87>
- Compressor Relief Valve – set to 125 psi. <R92>

____ **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. <R70>
____ **Verify Team Number on DS –** team has programmed the OpenMesh Wireless Bridge at kiosk for this event. <R62, R66>
____ **Firmware Versions** – Software/firmware for devices is at or above listed versions below:
- Driver Station – 17.0.1 or newer <R96>
- roboRIO – FRC_2017_v8 <R61>
- Talon SRX – v1.01. <R75>
- Jaguars – v109 <R75>
- PCM – 1.62 <R71>

____ **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 and all gauges read 0 psi pressure. <R94>
____ **Driver Console is less than 60" x 14" x 6'6" above floor.** May have hook tape to secure to Driver's Station shelf**.** <R99>

Rope Inspection

____ **Rope –** Max width = 1", 5'-3" ≤ Length ≤ 8'. Has a RF to engage davit & fully complies with all sub-paragraphs of I04
Serial Tag#_____ Serial Tag#_____ Serial Tag#_____ Serial Tag#_____ Serial Tag#_____ Serial Tag#_____

Team Compliance Statement

We, the Team Mentor and Team Captain, attest by our signing below, that our team's robot was built after the 2017 Kickoff on January 7, 2017 and in accordance with all of the 2017 FRC rules, including all Fabrication Schedule rules. We have conducted our own inspection and determined that our robot satisfies all of the 2017 FRC rules for robot design.

Team Captain:_____ Team Mentor:_____