

## 2013 FRC Inspection Checklist

**TEAM NUMBER:** \_\_\_\_\_

**INSPECTOR:** \_\_\_\_\_

**INITIALS (after passing):** \_\_\_\_\_

**DATE (after passing):** \_\_\_\_/\_\_\_\_/\_\_\_\_

**REINSPECTION (initial)** \_\_\_\_\_

**FINAL INSPECTION (initial)** \_\_\_\_\_

### Initial Inspection

\_\_\_\_\_ **Weight -**

ROBOT Weight (<= 120lbs excluding BUMPERS, and battery) <R05> \_\_\_\_\_ pounds

BUMPER Weight (Bumpers must be <= 20 pounds) <R23> \_\_\_\_\_ pounds

Total Finals Weight = \_\_\_\_\_ pounds

\_\_\_\_\_ **Size** – Total FRAME PERIMETER length may not exceed 112”, nor exceed a 54” diameter, vertical cylinder. <R03>

\_\_\_\_\_ **Standard BUMPERS** - must follow all specifications

- BUMPERS must provide protection of all outside corners. <R22>
- All segments as defined by backing may not extend >1” beyond robot frame. <R24,b.>
- No BUMPER segment may be unsupported by ROBOT frame for a length greater than 8”. <R29,c>
- BUMPERS may have gaps between frame and BUMPER up to ¼”.<R29,B >
- All corners must be protected by BUMPERS >=8” on both sides and include pool noodles within corners. <R22>
- Must use ¾” thick x 5” tall plywood or solid, robust wood, backing and a pair of vertically-stacked 2.5” pool noodles with no extraneous holes that may affect structural integrity. (clearance pockets and/or access holes are acceptable). Pool noodles may be any shape cross section, solid or hollow.<R24.>
- Must use a durable fabric cover for the noodles secured as in Fig 4-4 cross section. <R24,d>
- Must be able to display red or blue (color similar to *FIRST* Logo) BUMPERS to match ALLIANCE color. <R30>
- Team number displayed with 4” tall x ½” stroke, on the BUMPERS, in white or outlined in white and be easily determined when walking around the perimeter of the ROBOT.<R31>
- Must be securely mounted when attached and be easily removable for Inspection. <R28>
- When on flat floor, BUMPERS must reside entirely in region between 2” and 10” above floor. <R25>

### Mechanical

\_\_\_\_\_ **No Sharp Edges, or Protrusions that pose a hazard for participants, robots, arena, or field.** <R08 & R09>

\_\_\_\_\_ **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 any springs or pneumatic systems <R08>

\_\_\_\_\_ **No Risk of Damage to Other Robots** - e.g. spearing, entangling, upending or adhering <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>

\_\_\_\_\_ **BoM Cost** – Cost must not exceed \$4000 of additional components with no single component > \$400. <R11 thru R15>

\_\_\_\_\_ **FRAME PERIMETER** – Frame must be non-articulated. <R02>

\_\_\_\_\_ **Playing Configuration** – Robot may not extend beyond a 54” diameter vertical cylinder, 84” high.<R03 & G23>

\_\_\_\_\_ **End Game** – DISCS and ROBOT can be removed from FIELD without power <R07>

\_\_\_\_\_ **Belay Points** – ROBOT has 2 accessible, rigid belay attachment points near ROBOT center of gravity <R10>

### Electrical

\_\_\_\_\_ **Components** – None may be modified, except for motor mounting, output shaft can be modified, motor wires may be trimmed, window motor locking pins may be removed, and certain devices may be repaired with parts identical in specification and performance to the originals. <R33, R65-M, R77>

\_\_\_\_\_ **Battery** - A single MK ES17-12 battery or a single EnerSys NP18-12 must be securely fastened to robot. <R34 & R35 >

\_\_\_\_\_ **Visibility** – PD and breakers must be easily visible. <R42>

\_\_\_\_\_ **Main Breaker Accessibility** – the single 120A main breaker must be readily accessible with labeling preferred. <R41>

\_\_\_\_\_ **Allowable PD Breakers** - Only Snap-Action breakers up to 40 Amps may be installed in the PD <R46 & R47>

\_\_\_\_\_ **Robot Radio** – the DAP-1522 Rev B wireless adapter must be powered via the KOP +5 volt power convertor connected to the dedicated +12 volt connector on the PD. Radio must be mounted so that its LEDs are visible. <R44, R56 & R63>

\_\_\_\_\_ **Wire Size** - obey the wiring size conventions.

- All wire from battery to PD have min #6 AWG (4.11mm) wire <R38 & Fig.4-7>
- 40 amp breakers have min #12 AWG (2.052mm) wire <R48>
- 30 amp breakers have min #14 AWG (1.628mm) wire <R48>
- 20 amp breakers have min #18 AWG (1.024mm) wire <R48>

\_\_\_\_\_ **Wire Colors** - must be color coded - red/white/brown/black w/stripes for +24, +12, +5 VDC supply wires and black/blue for supply return wires <R50>

\_\_\_\_\_ **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 Breakouts and Sidecars but all wires in the splice are subjected to the Wire Size rules <R45>

\_\_\_\_\_ **Servos** – Must be a maximum power rating of 4 watts, wired to Digital Sidecar PWM outputs only. <R32>

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- \_\_\_ **Motors** – Limited to motors in Table 4-1. <R32>
- \_\_\_ **Actuators** – Electrical solenoid actuators, no greater than 1 in. stroke and no greater than 10 watts continuous duty, <R32>
- \_\_\_ **Motor/Actuator Power** – As listed in Table 4-4. <R52>
- \_\_\_ **Motor/Actuator Control** – Motors/actuators must be controlled by Spike, Talon, Victor or Jaguar and driven directly by PWM signals from a Digital Sidecar or by CAN bus.<R51, R52, R66-R70>
- \_\_\_ **Custom Circuits, Sensors and Additional Electronics** - may not connect to the cRIO's serial or Ethernet 2 ports (except in compliance with R69), cannot directly control speed controllers, relays, actuators or servos. <R72>
- \_\_\_ **Solenoid Breakout** –Outputs from each Solenoid Breakout shall not cumulatively exceed 16W for the cRIO-FRC (8-slot) and 21W for the cRIO-FRC II (4-slot)<R70>
- \_\_\_ **Spike Fuse** – Spike must have 20 amp fuse installed. When used with compressor, fuse may be (recommended) replaced with 20 amp, snap action, breaker. <R65.E>
- \_\_\_ **Isolated Frame** – Must be electrically isolated from battery, cRIO and Axis 206 camera must be insulated from frame. (>10k Ohm between either PD battery post and chassis) <R40>

### **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. <R77>
- \_\_\_ **Compressor** - Only one KOP compressor (or equivalent, max 1.05 CFM flow rate) may be used (on or off robot). <R80>
- \_\_\_ **Compressor Power** - must use a Spike (recommend replacing Spike's 20A fuse with a 20A breaker) <R65E & Table 4-4>
- \_\_\_ **Compressor Control** – A Pressure Switch must be wired directly to a Digital Sidecar to control compressor. <R79,R87>
- \_\_\_ **Compressor Relief Valve** – set to 125 psi, attached to (or through legal fittings) to compressor outlet port.<R86, R78D>
- \_\_\_ **Vent Plug Valve** – must include an easily-accessible manual vent plug valve to release all system pressure.<R88>
- \_\_\_ **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. Pressure switch, high pressure gauge and regulator can be located off-board.<R80-88>
- \_\_\_ **Components** – All must be COTS or KOP items, rated for 125 psi working pressure. <R76 & R78>
- \_\_\_ **Tubing** – Equiv. to KOP with a maximum ID of 0.160” with screen printed rating or supporting documentation. <R78.E>
- \_\_\_ **Pressure Regulator** – Set to <= 60 psi, providing all working pressure. Norgren R07-100-RNEA Recommended.<R81>
- \_\_\_ **Gauges** - must be present at both the high pressure side and low pressure regulator(s) outlet and be readily visible. <R83>
- \_\_\_ **Pressure Rating** - all pneumatic components must be rated for at least 125 psi working pressure except solenoid valves. If valves are rated for less than 125 psi, another relief valve must be installed on working pressure side to vent at the lower pressure. <R76 & R78.D>
- \_\_\_ **Valve Control** - pneumatic solenoid valves must have a max Cv of 0.32 and max 1/8” NPT ID, be controlled by either Spike or NI 9472 and only one valve per pneumatic actuator. <R78.C, R89>

### **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<R62, R94 >
- \_\_\_ **Confirm Pneumatics Operation** – With no pressure in system, compressor should start when robot is enabled.
  - o Compressor should stop automatically at ~120 psi under cRIO control. < R79-80, R87>
  - o Main Pressure <= 125 psi <R72, R73> and Working Pressure <= 60 psi <R81>
- \_\_\_ **Robot Signal Light** - The Robot Signal Light from the KOP must be visible from 3' in front of the robot, and be plugged into the RSL port on Digital Sidecar connected to Slot 2. Confirm that the RSL flashes in sync with DSC. <R64>
- \_\_\_ **Battery Voltage Monitoring** – the DS must display a battery voltage as monitored by analog module in slot 1. <R71>
- \_\_\_ **Verify Team Number Configuration** – team has configured DS, cRIO, & DAP-1522 at kiosk for this event. <R60>
- \_\_\_ **Firmware Versions** - The cRIO image and DS firmware must be up-to-date. <R55, R90>
- \_\_\_ **Power Off** – 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.
- \_\_\_ **OPERATOR CONSOLE** – is less than 60 in x 12 in. <R93>

### **Team Compliance Statement**

We, the Team Mentor and Team Captain, attest by our signing below, that our team's robot was built after the 2013 Kickoff on January 7, 2013 and in accordance with all of the 2013 FRC rules, including all Fabrication Schedule rules. We have conducted our own inspection and determined that our robot satisfies all of the 2013 FRC rules for robot design.

Team Captain: \_\_\_\_\_

Team Mentor: \_\_\_\_\_