TEAM NUMBER:_____ **INSPECTOR:_____ _____**

INITIALS (after passing):_____ **DATE (after passing):_____/_____/_____**

REINSPECTION (initial) _____ **FINAL INSPECTION** (initial) _____

Initial Inspection

____ **Weight** -

Robot Weight (<= 120lbs excluding bumpers, and battery) <R03> _____ pounds

Bumper Weight (Bumpers must be <= 20 pounds) <R28.F.> + _____ pounds

____ **Size** - Fit within a 28"x38"x60" rectangular volume <R02> Total Finals Weight = _____pounds

____ **Excursion Beyond Frame Perimeter** No robot components can extend beyond the frame perimeter in the starting configuration. <R02 >

____ **Standard Bumpers** - must follow all specifications. (Note: bumper-like assemblies not on the frame perimeter are not 'bumpers' per the rules)

- ☐ Bumpers must provide protection of all Exterior Vertices. <R27>
- ☐ All segments on Frame Perimeter exterior vertices must be >= 8" as defined by backing <R27>. Backing on any segments may not extend >1" beyond robot frame. <R28.B.>
- ☐ No bumper segment may be unsupported by robot frame for a length greater than 8". <R33>
- ☐ Bumpers may have gaps between frame and bumper up to ¼".<R01, R33>
- ☐ All corners must be protected by bumpers >=8" on both sides and include pool noodles within corners. <R27 >
- ☐ Must use ¾" thick x 5" tall plywood 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). <R28.>
- ☐ Must use a durable fabric cover for the noodles. <R28.D.>
- ☐ Must be able to display red or blue Bumpers to match alliance color. <R34.>
- ☐ Team number displayed with 4" tall x ¾" stroke, on the bumpers, 4 locations at approximately 90 degree spacing, in white or outlined in white..<R35>
- ☐ Must be securely mounted when attached and be easily removable for inspection. <R32>
- ☐ When on a flat floor, bumpers must reside entirely in the region between 2" and 10" above floor. <R01-2>

____ **Source of Energy -** Electrical (one MK ES17-12 or one EnerSys NP 18-12 battery only), compressed air, change in robot center of gravity, or deformation of robot parts only <R36>

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 <R05, R08 >

____ **No Risk of Damage to Field** – e.g. metal cleats on traction devices or sharp points on frame. <R08>

____ **Decorations** - Cannot interfere with other robots' electronics and sensors (particularly via color distraction) and be in spirit of "Gracious Professionalism". <R05 & R08>

____ **BoM Cost** – Cost must not exceed $3500 of additional components with no single component > $400. <R13, R14, R16>

____ **Team Name** - Prominently and proudly display the team's school name and primary sponsor(s) name/logo <R04>

____ **Frame Perimeter** – Frame must be non-articulated. Introduction and<R01-2>

____ **Playing Configuration –** Robot may not extend beyond 84" high, or >14" beyond frame perimeter. <R02>

____ **Game Piece Retrieval –** Game pieces must be capable of removal from robot without power. <R07>

Electrical

____ **Components –** <u>None</u> may be modified, except for motor mounting, motor wires may be trimmed, window motor locking pins may be removed, connector housings on window motors may be modified, and certain devices may be repaired with parts identical in specification and performance to the originals. (Note: Cosmetic blemishes from use/removal/installation are not considered modification) <R49, R58.M, R70>

____ **Visibility** –PD and breakers must be easily visible. <R41>

____ **Main Breaker Accessibility** – the single 120A main breaker must be readily accessible with labeling preferred. <R40>

____ **Allowable PD Breakers** - Only 20, 30 and 40 Amp Snap-Action breakers may be installed in the PD for defined circuits. Breakers under 20Amp OK for circuits not defined in the rule <R43>

____ **Robot Radio** – the wireless adapter must be powered via the KOP +5 volt power convertor which must be powered by the dedicated +12 volt connector on the PD. Radio must be mounted so that it's LEDs are visible<R42.B, R56>

____ **Wire Size** - obey the wiring size conventions. Wires that are originally attached to legal devices are part of the device and by default legal as supplied.

- o All wire from battery to PD have min #6 AWG (4.11mm) wire <R39 & Fig.4-8>
- o 40 amp breakers have min #12 AWG (2.052mm) wire <R44>
- o 30 amp breakers have min #14 AWG 1.628mm) wire <R44>
- o 20 amp breakers have min #18 AWG (1.024mm) wire <R44>

____ **Wire Colors** - must be color coded - red/white/brown/black w/stripe for +24, +12, +5 VDC supply wires and black/blue for supply return wires <R45>

____ **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 <R42.D>

____ **Servos** – Must be a maximum power rating of 4 watts, wired to Digital Sidecar PWM outputs only. <R48.L, R50B>

____ **Motors** – No more than: __4 CIM, ___2 KOP window,__2 window lift, seat, windshield wiper or door motors obtained through the ARA partnership or a prior-year kit, __2 AM motors, ___2 AM gearmotors,___2 Denso throttle motors,___2 Vex motors, ___2 Fischer Price motors, combination of up to __4 BaneBots <R48>

____ **Actuators** – Electrical solenoid actuators, no greater than 1 in. stroke and no greater than 10 watts continuous duty, driven by Spike or Solenoid module only <R48.J>

____ **Motor/Actuator Power** – only one motor or load may be attached to each Spike, Victor or Jaguar (however multiple pneumatic valves may be driven by a single Spike). CIM and FP motors must be fed by speed controllers.<R50>

____ **Motor/Actuator Control** – Motors/actuators must be controlled by Spike, Victor or Jaguar and driven directly by PWM signals from a Digital Sidecar or by CAN bus.<R50, R51, R60, R61>

____ **Custom Circuits, Sensors and Additional Electronics** - may not connect to the cRIO's serial or Ethernet 2 ports (except in compliance with R53.B), cannot directly control speed controllers, relays, actuators or servos,.. <R47, R59-62, R65>

____ **Spike Fuse** – Spike must have 20 amp fuse installed. When used with compressor, fuse may be (recommended) replaced with 20 amp, snap action, breaker.<R58.E>

____ **Isolated Frame** – Must be electrically isolated from battery, cRIO and camera must be insulated. (>10k Ohm between either PD battery post and chassis) <R38>

Pneumatic System (n/a for robots that do not use pneumatics)

____ **No Modifications** - pneumatic parts may not be modified except actuator mounting pins may be removed. <R70>

____ **Compressor** - Only one KOP compressor (or equivalent, max 1.05 CFM flow rate) may be used (on or off robot). <R73>

____ **Compressor Power** - must use a Spike (recommend replacing Spike's 20A fuse with a 20A breaker) <R58.E>

____ **Compressor Control** – A Pressure Switch must be wired directly to a Digital Sidecar to control compressor. <R72,R76>

____ **Compressor Relief Valve** – set to 125 psi, attached to (or through suitable brass fittings) to compressor outlet.<R71, R75>

____ **Vent Plug Valve** – must include an easily-accessible manual vent plug valve to release system pressure.<R72, R77>

____ **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. High pressure gauge and regulator can be located off-board. <R73, R74.D>

____ **Tubing** – Equiv. to KOP with a maximum ID of 0.160" with printed rating or supporting documentation. <R71.E>

____ **Norgren Regulator** – Set to <= 60 psi providing all working pressure of specified bypass pressure. <R71.G, R74>

____ **Gauges -** must be present at both the high pressure side and Norgren regulator outlet and be readily visible. <R72, R74>

____ **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. <R69, R71.D>

____ **Valve Control** - pneumatic solenoid valves must have a max Cv of 0.32, be controlled by either Spike or NI 9472 and outputs from multiple valves may not be plumbed together in to the same input on a cylinder.<R71.C, R78>

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

____ **Unauthorized Wireless Communication** – no wireless communication to/from robot or operator console without *FIRST* permission. Laptop wireless (WiFi and Bluetooth) disabled. No radios allowed on the operator console or in the pit<R55, R84, Admin Section 4.3.1 >

____ **Operator Console** – Must not exceed 44" x 12", excluding any worn or held items <R81>

____ **Confirm Pneumatics Operation** – With no pressure in system, compressor should start when robot is enabled.

- Compressor should stop automatically at ~120 psi under cRIO control. < R72, R76>
- Main Pressure <= 125 psi <R72, R73, > and Working Pressure <= 60 psi <R74>

____ **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 one of the Digital Sidecars. Confirm that the RSL flashes in sync with DSC. <R57>.

____ **Battery Voltage Monitoring** – the DS must display a battery voltage. <R64>

____ **Verify Team Number on DS –** team has succeeded in setting DAP-1522 at kiosk for this event. <R54>

____ **Firmware Versions** - The cRIO image (v43) and DS software (Rev 01.07.12.00 or newer) must be up-to-date. <R52, R80>. If CAN is used, Jaguar firmware must be at least version 99 <R61.D>

____ **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.

Team Compliance Statement

We, the Team Mentor and Team Captain, attest by our signing below, that our team's robot was built after the 2011 Kickoff on January7, 2012 and in accordance with all of the 2012 FRC rules, including all Fabrication Schedule rules. We have conducted our own inspection and determined that our robot satisfies all of the 2012 FRC rules for robot design.

Team Captain:_____ Team Mentor:_____