

Team Update 02

GENERAL

- A link to the [soft copy of the 2019 Virtual Kit Catalog](#) (printed copies were distributed in the Kickoff Kit) is posted in the [Virtual Kit section](#) of the [Kit of Parts page](#).
- GE-19126, GE-19127, GE-19165, GE-19166, and GE-19217 have been updated to include the information added to the gam manual's [Section 4.3](#), detailed below, and added to the [Field Drawings – season specific drawing package](#).

MANUAL

SECTION 4.3

Each ROCKET HATCH is flanked by two (2) 10 in. (~25 cm) tall, 2 in. (~ 5 cm) wide pieces of black hook tape (3M part number SJ3572), positioned as shown below.

SECTION 5.1.1

Twenty-four (24) of each GAME PIECES are staged on each side of the FIELD for each MATCH as follows:

SECTION 7

C8.

C8 does not apply for strategies consistent with standard gameplay, for example:

- a. causing an opponent ROBOT to contact your ROCKET during the last few seconds of a MATCH while in the process of trying to place a HATCH PANEL.
- b. contacting an opponent ROBOT while in your HAB ZONE while trying to retrieve CARGO from your DEPOT.

C8 requires an intentional act with limited or no opportunity for the TEAM being acted on to avoid the penalty, such as:

- c. placing a HATCH PANEL on/in an opponent who's already controlling a GAME PIECE such that they cannot help but violate G4.
- d. pushing an opponent ROBOT against your ROCKET during the final twenty (20) seconds of the MATCH for the sole purpose of making them violate ~~G9~~ G16.

SECTION 8.2.2

G6. No throwing HATCH PANELS. ROBOTS may not shoot HATCH PANELS into the air in a way that's prohibited in R6, kick them across the floor using an active MECHANISM, or eject them across the floor in a forceful way (i.e. HATCH PANEL is propelled a significant distance).

Violation: RED CARD.

SECTION 8.2.3

G14. Don't climb on each other unless in the HAB ZONE. A ROBOT may not be fully supported by a partner ROBOT unless the supporting ROBOT is at least partially in contact with its HAB ZONE.

SECTION 8.2.4

G15. Be careful about what you interact with. DRIVE TEAMS, ROBOTS, and OPERATOR CONSOLES are prohibited from the following actions with regards to interaction with ARENA elements. Items A-D exclude GAME PIECES and the HAB PLATFORM.

- A. Grabbing (excluding DRIVE TEAM interaction with FIELD elements in their areas)
- B. Grasping (excluding DRIVE TEAM interaction with FIELD elements in their areas)



- C. Attaching (including the use of hook tape to anchor to the FIELD carpet and excluding use of the PLAYER STATION hook-and-loop tape, plugging in to the provided power outlet, and plugging the provided Ethernet cable in to the OPERATOR CONSOLE)
- D. Hanging
- E. Deforming
- F. Becoming entangled
- G. Damaging

Violation: If prior to MATCH, and situation can be corrected quickly, it must be remedied before the MATCH will start. If during a MATCH, FOUL. If during a MATCH and extended or repeated, YELLOW CARD. If offense is via a ROBOT and the Head REFEREE determines that further damage is likely to occur, offending ROBOT will be DISABLED. Corrective action (such as eliminating sharp edges, removing the damaging MECHANISM, and/or re-Inspection) may be required before the ROBOT will be allowed to compete in subsequent MATCHES.

GAME PIECES are expected to undergo a reasonable amount of wear and tear as they are handled by ROBOTS, such as scratching or marking. Gouging, tearing off pieces, popping, or routinely marking GAME PIECES are violations of this rule. Materials that aggressively wear or leave behind residue or debris on the HATCH PANEL'S loop tape may hinder the natural behavior of the loop tape and thus violate G15. Humans causing GAME PIECE wear and tear, e.g. deforming a CARGO, are subject to a CARD per C1.

There are no rules that prohibit contact with the SANDSTORM'S black out material, however contact that prevents the SANDSTORM from working properly (e.g. retracting at T-minus 135s) is considered damaging and a violation of G15.

SECTION 10.2

- R1. The ROBOT (excluding BUMPERS) must have a FRAME PERIMETER, contained within the BUMPER ZONE and established in the ROBOT'S STARTING CONFIGURATION, that is comprised of fixed, non-articulated structural elements of the ROBOT. Minor protrusions no greater than ¼ in. (~6 mm) such as bolt heads, fastener ends, weld beads, and rivets are not considered part of the FRAME PERIMETER.

SECTION 10.3

- R6. A ROBOT may not be designed to launch shoot a HATCH PANEL such that it travels more than 2 3 horizontal ft. (~60 91 cm) beyond its FRAME PERIMETER (reference G6).

The distance is measured with a stationary ROBOT relative to the ground and from the ROBOT'S FRAME PERIMETER to where the HATCH PANEL first contacts the ground.



SECTION 10.6

R34. The only motors and actuators permitted on 2019 ROBOTS include the following (in any quantity):

Table 10-1 Motor allowances

Motor Name	Part Numbers Available	
CIM	FR801-001 M4-R0062-12 AM802-001A 217-2000 PM25R-44F-1005	PM25R-45F-1004 PM25R-45F-1003 PMR25R-45F-1003 PMR25R-44F-1005 am-0255
West Coast Products RS775 Pro	217-4347	
Banebots	am-3830 M7-RS775-18 RS775WC-8514	M5 – RS550-12 RS550VC-7527 RS550
AndyMark 9015	am-0912	
VEX BAG	217-3351	
VEX mini-CIM	217-3371	
AndyMark PG	am-2161 (alt. PN am-2765)	am-2194 (alt. PN am-2766)
KOP Automotive motors	Denso AE235100-0160 Denso 5-163800-RC1 Denso 262100-3030	Denso 262100-3040 Bosch 6 004 RA3 194-06
Snow Blower Motor	am-2235	
AndyMark NeveRest	am-3104	
AndyMark RedLine Motor	am-3775	am-3775a
Nidec Dynamo BLDC Motor	am-3740	DM3012-1063
REV Robotics NEO Brushless	REV-21-1650	
Electrical solenoid actuators, no greater than 1 in. (nominal) stroke and rated electrical input power no greater than 10 watts (W) continuous duty at 12 volts (VDC)		
Hard drive motors or fans that are: included in any Kickoff Kit, distributed via FIRST Choice, part of a legal motor controller (including manufacturer provided accessories), or part of a legal COTS computing device		
Factory installed vibration and autofocus motors resident in COTS computing devices (e.g. rumble motor in a smartphone).		
PWM COTS servos with a retail cost < \$75.		
Motors integral to a COTS sensor (e.g. LIDAR, scanning sonar, etc.), provided the device is not modified except to facilitate mounting		
One (1) compressor compliant with R86 and used to compress air for the ROBOT'S pneumatic system		

SECTION 10.9

R84. The only pneumatic system items permitted on ROBOTS include the items listed below.

A. Pneumatic pressure vent plug valves functionally equivalent to those provided in the KOP,

Parker valves PV609-2 or MV709-2 are recommended.

B. Pressure relief valves functionally equivalent to those provided in the KOP,

Norgren 16-004-011, 16-004-003 or McMaster-Carr 48435K714 recommended.

To be considered functionally equivalent the valve must be preset or adjustable to 125 psi (~862 kPA) and capable of relieving at least 1 scfm (~472 cm³/s).

C. Solenoid valves with a maximum 1/8 in. (nominal, ~3 mm) NPT, BSPP, or BSPT port diameter or integrated quick connect 1/4 in. (nominal, ~6mm) outside diameter tubing connection,

D. Additional pneumatic tubing, with a maximum 1/4 in. (nominal, ~6 mm) outside diameter,



- E. Pressure transducers, pressure gauges, passive flow control valves (specifically “needle valve”), manifolds, and connecting fittings (including COTS pneumatic U-tubes),
- F. Check and quick exhaust valves, provided that the requirements of **Error! Reference source not found.** are still met.
- G. Shutoff valves which relieve downstream pressure to atmosphere when closed (may also be known as 3-way or 3-way exhausting valves).
- H. Pressure regulators with the maximum outlet pressure adjusted to no more than 60 psi (~413 kPa),
- I. Pneumatic cylinders, pneumatic linear actuators, and rotary actuators,
- J. Pneumatic storage tanks (with the exception of White Clippard tanks P/N: AVT-PP-41),
- K. One (1) compressor that is compliant with R86, ~~and~~
- L. Debris or coalescing (water) filters, ~~and~~
- M. Venturi valves (note: the high-pressure side of a Venturi valve is considered a pneumatic device and must follow all pneumatic rules. The vacuum side of a Venturi valve is exempt from the pneumatic rules per “a” in the Blue Box below).

The following devices are not considered pneumatic devices and are not subject to pneumatic rules (though they must satisfy all other rules):

- a. a device that creates a vacuum
- b. closed-loop COTS pneumatic (gas) shocks
- c. air-filled (pneumatic) wheels
- d. pneumatic devices not used as part of a pneumatic system (i.e. used in a way that does not allow them to contain pressurized air)

SECTION 12.2.1

During the Playoff MATCHES, if a team receives a YELLOW or RED CARD, it results in for the their entire ALLIANCE receiving the YELLOW or RED CARD for that MATCH. If different teams on the same two (2) YELLOW CARDS are accrued by an ALLIANCE are issued YELLOW CARDS, the entire ALLIANCE is issued a RED CARD.

