



IPSC IT FEST 2026

Robot Specification

Half-Life

The Doon School

DEHRADUN

This document is part of the Half-Life document pack. It sets out the limits that apply to the robot. Run structure and definitions are set out in the Rulebook, the arena in the Arena Specification, scoring in the Judging Rubric and the inspection procedure in Inspection and Safety. They are not repeated here. Terms used here are defined in the Rulebook, Terminology.

1. Dimensions

1.1 The robot must not exceed 250 mm × 250 mm × 250 mm (length × width × height) at the starting position. A measured value of up to 250.5 mm in any direction passes. Cables and any camera arm or extension permitted under §4.1 must be included within these dimensions while the robot is in standby mode.

1.2 The robot's dimensions are not restricted once a run has started. The robot, including any deployed camera arm, extension or manipulator, may exceed 250 mm × 250 mm × 250 mm after the run begins.

1.3 The robot is measured at the starting position, powered on, in standby mode (§6.4), with all arms, extensions and manipulators fully retracted and all cables connected and stowed.

2. Mass

2.1 The robot, including its battery, must not exceed 1500 g (1.5 kg) in total mass, with a tolerance of +10%. A measured mass of up to 1650 g passes.

3. Power

3.1 The robot must run only on an on-board rechargeable battery. No mains connection, tether or remote power source is permitted during a run.

3.2 The voltage across all electric and electronic components must not exceed 14 V.

3.3 The battery's maximum energy storage must not exceed 84 Wh, which is equivalent to a 6,000 mAh pack at the 14 V limit set at §3.2 (6 Ah × 14 V = 84 Wh). Batteries must be used and charged strictly according to the manufacturer's specifications. Damaged or swollen cells are not permitted on campus (IPSC IT Fest 2026 Charter, Global Rule 8).

3.4 The robot's main power line must include a fuse rated at no more than 4 A, limiting the continuous current through the robot's electrical system. The fuse is inspected under Inspection and Safety §1.

4. Actuators

4.1 Teams may use any type of microcontroller and any type of motor, subject to the following limits:

- the robot must use exactly one (1) DC motor for driving and exactly one (1) servo motor for steering, and no additional motor may perform a driving or steering function;
- teams may use additional motors or servos for sorting, gripping or positioning a camera;
- a camera arm or extension used to position a camera must not exceed two (2) degrees of freedom (DoF) (see §5.1);
- pullback motors are permitted but must be wound up by the robot itself, not by hand, and must not perform a driving or steering function.

4.2 No actuator type other than the motors and servos permitted at §4.1 may be used, with the following exceptions:

- electromagnets, permitted only to attach parts by magnetism, and not counted as a motor;
- solenoids, permitted up to a maximum force of 20 N and a maximum motion range of 20 mm, and counted as an additional motor under §4.1.

5. Sensors

5.1 Teams may use any number and any type of camera. A camera may be mounted on an arm or extension with a maximum of two (2) degrees of freedom (DoF). Teams may use any other sensor type without a limit on count, for example IR sensors, ultrasonic sensors, time-of-flight sensors, accelerometers and encoders, subject to §7 and §8. LIDAR sensors are not permitted (§8.5).

5.2 No sensor type is prohibited, other than a sensor that depends on an off-board wireless link to function (§7) and a LIDAR sensor (§8.5).

6. Control

6.1 All robots must be completely autonomous. No tele-operation or manual driving is permitted once a run has begun.

6.2 This event is autonomous-only. Mixed control is not permitted.

6.3 All processing must happen on board the robot. Off-board computation is not permitted, because no wireless communication link of any kind is permitted under §7.

6.4 The robot must follow this start and standby procedure:

- the robot must have one (1) physical button, labelled "START/STOP", that starts and stops the robot, and the same button must perform both functions;
- the button must sit on the outer surface of the robot, not underneath, and must be accessible;

- the robot must enter and remain in standby mode, with all actuators inactive, when it is placed in the starting position at the start of a run, until the button is pressed;
- a single press of the button must move the robot from standby mode into an active run;
- if the button is pressed again during a run, every movement of the robot must stop immediately.

7. Communication

7.1 The robot must use wired connections only. No wireless connection of any kind, including Wi-Fi, Bluetooth or other RF, is permitted on the microcontroller or on any other on-board component.

7.2 No wireless transmission at any frequency is permitted. Any wireless radio built into a multi-purpose microcontroller must be disabled in code for the entire duration of the run. Teams must not physically remove or hardware-disable the radio, since this could permanently damage the microcontroller. This is checked before each round.

7.3 The robot must operate without any external communication link at any point during a run.

7.4 Any communication between two or more microcontrollers, or between a microcontroller and any other on-board component, must run over a wired cable connection.

8. Prohibited materials and mechanisms

8.1 Teams must not use pneumatic systems of any kind.

8.2 Teams must not use hydraulic systems of any kind.

8.3 Teams must not use any free or dispensable liquid on the robot, including from a spray or aerosol bottle. Sealed lubrication fully contained within a mechanism, such as grease inside a sealed bearing or gearbox, is permitted.

8.4 Teams must not use destructive mechanisms capable of damaging the arena, the objects or the bins (IPSC IT Fest 2026 Charter, Global Rule 9).

8.5 Lasers are limited to Class 1 lasers, including a laser that forms part of a commercial time-of-flight sensor. Any standalone Class 1 laser must be accompanied by a valid safety certificate. LIDAR sensors are strictly prohibited.

8.6 3D-printed materials and parts are permitted.

9. Between rounds

9.1 Between rounds, teams may replace or recharge the battery, carry out physical repairs that restore the robot to its inspected configuration, and recalibrate sensors.

9.2 Between rounds, the robot must still meet §1 and §2, and its actuator configuration under §4.1 (one driving DC motor, one steering servo motor, the additional motors and servos fitted at

inspection, and any camera arm or extension at no more than two DoF) must not change.

9.3 Reprogramming is permitted between runs and between rounds, provided the robot still meets §1, §2 and §4.1.

10. Inspection

10.1 A robot that fails inspection against this specification must not compete in any round until it passes inspection. See Inspection and Safety for the inspection procedure.