

RoboWars Australia Preliminary Rules version 1
Based on the Robot Fighting League 2004 Standard Rules

Technical Regulations for: SideTracked Dec 20 Event

1. General

- 1.1.**All participants build and operate robots at their own risk. Combat robotics is dangerous. Please take care to not hurt yourself or others when building, testing and competing.
- 1.2.**If you have a robot or weapon design that does not fit within the categories set forth in these rules or is in some way ambiguous or borderline, please contact this event. Safe innovation is always encouraged, but surprising the event staff with your brilliant exploitation of a loophole may cause your robot to be disqualified before it ever competes.
- 1.3.**Compliance with all event rules is mandatory. It is expected that competitors will comply with the rules and procedures of their own accord and not require constant policing.
- 1.4.**Each event has safety inspections. It is at their sole discretion that your robot is allowed to compete. As a builder you are obligated to disclose all operating principles and potential dangers to the inspection staff.
- 1.5.**Cardinal Safety Rules: Failure to comply with any of the following rules will result in instant expulsion from the event and possible barring from future competition.
- 1.5.1.** Radios may not be turned on at or near events for any purpose without obtaining the appropriate frequency clip or explicit permission from the event.
- 1.5.2.** Proper activation and deactivation of robots is critical. Robots must only be activated in the arena, testing areas, or with expressed consent of the safety officials.
- 1.5.3.** All robots must be able to be FULLY deactivated, which includes power to drive and weaponry, **in under 60 seconds by a manual disconnect.**
- 1.5.4.** All robots not in an arena or official testing area must be raised or blocked up in a manner so that their wheels or legs cannot cause movement if the robot is turned on.
- 1.5.5.** Locking devices: Moving weapons that can cause damage or injury must have a **clearly visible** locking device in place **at all times** when not in the arena. Locking devices must be painted in neon orange or another high-visibility color. Locking devices must be clearly capable to stopping, arresting or otherwise preventing harmful motion of the weapon.
- 1.5.6.** It is expected that all builders will follow basic safety practices during work on the robot at your pit station. Please be alert and aware of your pit neighbors and people passing by.

2. Weight Classes.

This event offers the listed weight classes in section 2.1. There is a 100% weight bonus for true walkers. There is no weight bonus for shufflers or other forms of locomotion other than walking - see 3.1.2 for a definition of a walker.)

2.1.

Rolling	Walking
6 Kg	12 Kg
12 Kg	25 Kg

Other weight class Robots **may** be permitted to operate as an exhibition-class demonstration only - at the discretion of the event operator based on arena safety, but no organized competition or prizes will be offered for classes other than listed at this first event. Higher weight classes will be included in the competition at later events.

RoboWars Australia Preliminary Rules version 1

Based on the Robot Fighting League 2004 Standard Rules

3. Mobility

3.1.All robots must have **easily visible and controlled mobility** in order to compete.

Methods of mobility include:

3.1.1. Rolling (wheels, tracks or the whole robot)

3.1.2. Walking (linear actuated legs with no rolling or cam operated motion). Robots are classified as "walker" at the sole discretion of the Event Organizer, and are not subject to appeal. Contact the Event Organizer if in doubt

3.1.3. Shuffling (rotational cam operated legs)

3.1.4. Ground effect air cushions (hovercrafts)

3.1.5. Jumping and hopping is allowed

3.1.6. Flying (airfoil using, helium balloons, ornithopters, etc.) is not allowed

4. Robot control requirements:

4.1. Tele-operated robots must be radio controlled by standard Hobby Radio Control Equipment, or use an approved custom system as described in 4.4.3.

4.2. Tethered control is not allowed.

4.3. Pre 1991 non-narrow band radio systems are not allowed.

4.4. Radio system restrictions for this event with weight and or weapon restrictions:

4.4.1. Radio systems that stop all motion in the robot (drive and weapons), when the transmitter loses power or signal, are **required** for all robots with active weapons or any robot over 6 Kg. (This may be inherent in the robots electrical system or be part of programmed fail-safes in the radio.)

4.4.2. All robot radio systems must have a way to change frequencies or coded channels to prevent radio conflicts. Having at least **two** frequencies or coded channels available is **recommended**. Lack of extra frequencies may result in a forfeit. Priority for frequency use will be allocated in order of Entry registration.

4.4.3. Non Standard or Home built control systems, must first be approved by this event.

4.4.4. [not applicable]

4.4.5. [deleted]

4.4.6. All robots that are either: Larger than 12 Kg's must use a radio systems on the FM band, or an approved custom control system.

4.5. This event recommends, but does not require a separate power switch for the radio.

4.6. [not applicable]

4.7. A Frequencies in Use/Channel List will be displayed at the event.

5. Autonomous/Semi-Autonomous Robots:

Any robot that moves, seeks a target, or activates weapons without human control is considered autonomous. If your robot has any autonomous features you are required to contact this event before registration.

5.1. Autonomous robots must have a clearly visible light for each autonomous subsystem that indicates whether or not it is in autonomous mode, e.g. if your robot has two autonomous weapons it should have two "autonomous mode" lights (this is separate from any power or radio indicator lights used).

5.2. [not applicable]

5.3. The autonomous functions of a robot must have the capability of being remotely armed and disarmed. (This does not include sensors, drive gyros, or closed loop motor controls.)

5.3.1. While disarmed, all autonomous functions must be disabled.

5.3.2. When first activated the robot must have no autonomous functions enabled, and all autonomous functions must failsafe to off if there is loss of power or radio signal.

5.3.3. In case of damage to components that remotely disarm the robot, the robots autonomous functions are required to automatically disarm **within one minute of the match length time** after being armed.

RoboWars Australia Preliminary Rules version 1

Based on the Robot Fighting League 2004 Standard Rules

6. Batteries and Power

- 6.1.** The only permitted batteries are ones that cannot spill or spray any of their contents when damaged or inverted. This means that standard automotive and motorcycle wet cell batteries are prohibited. Examples of batteries that are permitted: gel cells, Hawkers, NiCads, NiMh, dry cells, AGM, etc.
- 6.2.** All onboard voltages above **48 Volts** require prior approval from this event. (It is understood that a charged battery's initial voltage is above their nominal value)
- 6.3.** All electrical power to weapons and drive systems (systems that could cause potential human bodily injury) must have a manual disconnect that can be activated within **15 seconds** without endangering the person turning it off. (E.g. No body parts in the way of weapons or pinch points.) Shut down must include a **manually** operated mechanical method of disconnecting the main battery power, such as a suitable high current switch (Hella, Whyachi, etc) or removable link. Relays may be used to control power, but there must also be a mechanical disconnect. Please note that complete shut down time is specified in section 1.5.3.
- 6.4.** All efforts must be made to protect battery terminals from a direct short and causing a battery fire.
- 6.5.** If your robot uses a grounded chassis you must have a switch capable of disconnecting this ground. ICE robots are exempted from this rule if there is no practical way to isolate their grounding components.
- 6.6.** All Robots must have a light easily visible from the outside of the robot that shows its main power is activated.

7. Pneumatics

- 7.1.** Example diagrams of typical pneumatic systems in robots 12Kg or over:
- 7.1.1.** CO2 based systems
<http://www.botleague.com/pdf/GeneralPneumaticsCO2.pdf>
 - 7.1.2.** High Pressure Air (HPA) based systems
<http://www.botleague.com/pdf/GeneralPneumaticsHPA.pdf>
- 7.2.** Robots in the 6Kg class or lighter are exempt from the remaining rules in this section but must comply with the following:
- 7.2.1.** You must have a safe way of refilling the system and determining the pressure.
 - 7.2.2.** **Pressures in the 6Kg or less robots are limited to 250psi.**
 - 7.2.3.** *[not applicable]*
 - 7.2.4.** All components must be used within the specs provided by the manufacturer or supplier. If the specifications aren't available or reliable, then it will be up to the EO to decide if the component is being used in a sufficiently safe manner.
- 7.3.** You must have a safe and secure method of refilling your pneumatic system.
- 7.4.** Pneumatic systems on board the robot must only employ non-flammable, non-reactive gases (CO2, Nitrogen and air are most common). It is not permissible to use fiber wound pressure vessels with liquefied gasses like CO2 due to extreme temperature cycling.
- 7.5.** All pneumatic components on board a robot must be securely mounted. Particular attention must be made to pressure vessel mounting and armor to ensure that if ruptured it will not escape the robot. (The terms 'pressure vessel, bottle, and source tank' are used interchangeably)
- 7.6.** All pneumatic components within the robot must be rated or certified for AT LEAST the maximum pressure in that part of the system. You may be required to show rating or certification documentation on ANY component in your system.
- 7.7.** All pressure vessels must be rated for at least 120% of the pressure they are used at and have a current hydro test date. (This is to give them a margin of safety if damaged during a fight.) If large actuators, lines, or other components are used at pressures **above 250psi** these will also need to be over-rated and are required to be pre-approved for this event.
- 7.8.** All primary pressure vessels must have an over pressure device (burst/rupture disk or over pressure 'pop off') set to no more than 130% of that pressure vessels rating. (Most commercially available bottles come with the correct burst assemblies, use of these is encouraged)

RoboWars Australia Preliminary Rules version 1

Based on the Robot Fighting League 2004 Standard Rules

- 7.9.** If regulators or compressors are used anywhere in the pneumatic system there must be an (additional) over pressure device downstream of the regulator or compressor set for no more than 130% of the lowest rated component in that part of the pneumatic system.
- 7.10.** All pneumatic systems must have a manual main shut off valve to isolate the rest of the system from the source tank. This valve must be easily accessed for robot de activation and refilling.
- 7.11.** All pneumatic systems must have a manual bleed valve downstream of the main shut off valve to depressurize the system. This bleed valve must be easily accessed for deactivation. This valve must be left OPEN whenever the robot is not in the arena to ensure the system cannot operate accidentally.
- 7.11.1.** It is **required** to be able to easily bleed all pressure in the robot before exiting the arena. (You may be required to bleed the entire system if it is believed that you have any damaged components.)
- 7.12.** All pneumatic systems must have appropriate gauges scaled for maximum resolution of the pressures in that part of the system. (There must be gauges on both the high AND low-pressure sides of regulators.)
- 7.13.** If back check valves are used anywhere in the system you must ensure that any part of the system they isolate can be bled and has an over pressure device.
- 7.14.** Any pneumatic system that does not use a regulator, or employs heaters or pressure boosters, or pressures above 2500psi must be pre-qualified with this event
- 7.15.** Please note that some pneumatic systems with very low pressures (below 100 total PSI on board), small volumes (12-16g CO2 cartridges), single firing applications, or pneumatics used for internal actuation (as opposed to external weaponry) may not need to comply with all the rules above. You are required to contact this event if you would like an exception.

8. Hydraulics

- 8.1.** Robots in the 6Kg class or lighter are exempt from the remaining rules in this section, but good engineering and best practices must be used in all hydraulic systems. **However the pressure for 6 Kilogram or less robots is limited to 250psi and there must be an easy way to determine this pressure.**
- 8.2.** All hydraulic components onboard a robot must be securely mounted. Particular attention must be made to pump and accumulator mounting and armor to ensure that if ruptured direct fluid streams will not escape the robot.
- 8.3.** All hydraulic components within the robot must be rated or certified for AT LEAST the maximum pressure in that part of the system. You may be required to show rating or certification documentation on ANY component in your system.
- 8.4.** Any accumulators or large reservoir must be rated for at least 120% of the pressure they are used at. (This is to give them a margin of safety if damaged during a fight)
- 8.5.** All hydraulic systems must have an over pressure by pass device set to no more than 130% of the lowest component rating. It must be rated to bypass the full volume of the hydraulic pump.
- 8.6.** All hydraulic systems must have a(n) accessible manual by pass valve(s) to easily render the system harmless.
- 8.7.** All hydraulic systems must have appropriate gauges scaled for maximum resolution of the pressures in that part of the system.
- 8.8.** All hydraulic systems must use non-flammable, non-corrosive fluid and must be designed not to leak when inverted.
- 8.9.** Any hydraulic system using pressure boosters, or pressures above 5000psi (without accumulator) or pressures above 2000psi (with accumulator) must be pre qualified by this event
- 8.10.** Please note that some simple low pressure and volume hydraulic systems, like simple braking, may not need to adhere to all the rules above. You are required to contact this event if you would like an exception.

RoboWars Australia Preliminary Rules version 1

Based on the Robot Fighting League 2004 Standard Rules

9. Internal Combustion Engines (ICE) / liquid fuels. [are presently NOT allowed]

for the preliminary event, ICE engines are NOT permitted in the competition. This will change for later events as we upgrade the arena and familiarize ourselves with the fire and unique hazards that ICE engines present. For future reference, here are the applicable rules for ICE bots

9.1. Fuel and Fuel Lines

9.1.1. All commercially available grades of automobile or RC hobby fuel are allowed. Alcohol, Nitro-methane, jet fuel and other specialty fuels require prior approval by the Event.

9.1.2. Fuel lines and tanks must be made of high quality materials and all ends must be clamped securely.

9.1.3. All fuel tanks and lines must be well protected and armored from all sides including moving parts and heat sources inside the robot.

9.2. Fuel tank volume, on any robot, shall not be greater than the amount required to operate the engine for more than **1 minute longer than the match time** at combat power plus a reasonable pre-match warm-up period. This volume may not exceed **20 oz** unless prior approval is granted from this event.

9.3. The output of any engines connected to weapons or drive systems must be coupled through a clutch which will decouple the motor when it is at idle. (This does not include motors used for generators and hydraulic pumps.)

9.4. All engines must turn off or return to idle at loss of **radio signal** and turn off at loss of radio **receiver power**.

9.5. All engines must have a method of remotely shutting off.

9.6. Any robot with liquid fuel and oil must be designed not to leak when inverted. (Minor oil leakage may be tolerated, however if it affects the other robot or becomes a large cleanup issue you may be called and the leaking robot will forfeit.)

9.7. Use of engines other than standard piston engines (i.e. turbines etc.) require prior approval at this event.

10. Rotational weapons or full body spinning robots

10.1. Spinning weapons that can contact the outer arena walls during normal operation must be pre-approved by the event. (Contact with an inner arena curb, or containment wall is allowed and does not require prior permission.)

10.2. Spinning weapons must come to a full stop within **60 seconds** of the power being removed using a self-contained braking system.

11. Springs and flywheels

11.1. Springs used in robots in the 6 Kg class or smaller are excepted from the rules in this section. However safe operation and good engineering are always required.

11.2. Any large springs used for drive or weapon power must have a way of loading and actuating the spring remotely under the robots power.

11.2.1. Under no circumstances must a large spring be loaded when the robot is out of the arena or testing area.

11.2.2. Small springs like those used within switches or other small internal operations are excepted from this rule.

11.3. Any flywheel or similar kinetic energy storing device must not be spinning or storing energy in any way unless inside the arena or testing area.

11.3.1. There must be a way of generating and dissipating the energy from the device remotely under the robots power.

11.4. All springs, flywheels, and similar kinetic energy storing devices must fail to a safe position on loss of radio contact or power. }

RoboWars Australia Preliminary Rules version 1

Based on the Robot Fighting League 2004 Standard Rules

12. Forbidden Weapons and Materials.

The following weapons and materials are absolutely forbidden from use:

- 12.1.** Weapons designed to cause invisible damage to the other robot.
This includes but is not limited to:
 - 12.1.1.** Electrical weapons not specifically allowed in the Special Weapons section 13.1
 - 12.1.2.** RF jamming equipment, etc.
 - 12.1.3.** RF noise generated by an IC engine. (use shielding around sparking components)
 - 12.1.4.** EMF fields from permanent or electro-magnets that affect another robots electronics.
 - 12.1.5.** Weapons or defenses that stop combat completely of both (or more) robots. This includes nets, tapes, strings, and entanglement devices not specifically allowed in the Special Weapons section 13.2.
- 12.2.** Weapons that require significant cleanup, or in some way damages the arena to require repair for further matches. This includes but is not limited to:
 - 12.2.1.** Liquid weapons not specifically allowed in the Special Weapons section 13.3. (Also, a bot may not have liquid that can spill out when the robot is superficially damaged.)
 - 12.2.2.** Foams and liquefied gasses
 - 12.2.3.** Any powders, sand, ball bearings and other dry chaff weapons not specifically allowed in the Special Weapons section 13.4
- 12.3.** Un-tethered Projectiles (see projectile description in Special Weapons section 13.5)
- 12.4.** Heat and fire are forbidden as weapons. This includes, but is not limited to the following:
 - 12.4.1.** Heat or fire weapons not specifically allowed in the Special Weapons section 13.6
 - 12.4.2.** Flammable liquids or gases
 - 12.4.3.** Explosives or flammable solids such as:
 - 12.4.3.1. DOT Class C devices
 - 12.4.3.2. Gunpowder / Cartridge Primers
 - 12.4.3.3. Military Explosives, etc.
- 12.5.** Light and smoke based weapons that impair the viewing of robots by an Entrant, Judge, Official or Viewer. (You are allowed to physically engulf your opponent with your robot however.) This includes, but is not limited to the following:
 - 12.5.1.** Smoke or dust weapons not specifically allowed in the Special Weapons section 13.7
 - 12.5.2.** Lights such as external lasers above 'class I' and bright strobe lights which may blind the opponent.
- 12.6.** Hazardous or dangerous materials are forbidden from use anywhere on a robot where they may contact humans, or by way of the robot being damaged (within reason) contact humans.

13. Special weapon descriptions allowed at this event:

- 13.1.** Electrical weapons are NOT allowed at this event.
- 13.2.** Entangling weapons are NOT allowed at this event.
- 13.3.** Liquid weapons are NOT allowed at this event.
- 13.4.** Powdered material or chaff weapons are NOT allowed at this event.
- 13.5.** Tethered Projectiles ARE allowed at this event.
Tethered projectiles must have a securely attached tether of sufficient strength to safely stop the projectile at a distance of no more than 8 feet from the robot.
- 13.6.** Heat and Fire are NOT allowed at this event.
 - 13.6.1.** If fire is allowed as an effect, the fuel must exit the robot and be ignited as a gas. It cannot leave the robot in a liquid or gelled form or use Oxidizers.
 - 13.6.2.** Fire Fuel types allowed are propane or butane. The maximum quantity allowed is 4oz
 - 13.6.3.** The Fuel tank must be as far from the outer armour of the robot as practicable and be protected from heat sources within the robot.
 - 13.6.4.** The Ignition system must have a remote operated shut-off that allows the operators to disable it using the radio control system.
- 13.7.** Small Smoke Effects are allowed at this event.
 - 13.7.1.** Small smoke effects may be used, please contact the Event for prior approval.