



Build Rules

International Build Rules and Guidelines
Effective from January 1st 2011



Latest Version

The most up to date revision of this document can always be found at:
<http://www.fightingrobots.co.uk/>

Contact

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1. General

1.1 Participation

All participants build and operate Robots at their own risk. Combat Robotics is inherently dangerous. There are no amounts of regulations that can encompass all the dangers involved. Please take care to not hurt yourself or others when building, testing and competing.

1.2 Weapon Design

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 the Fighting Robot Association. 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 Event Rules

Compliance with all event rules is mandatory. It is expected that competitors stay within the rules and procedures of their own accord and do not require constant policing.

1.4 Safety Inspections

Each event has safety inspections [Tech checks]. It is at the inspector's 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 cardinal safety rules set out below by the Fighting Robot Association may result in expulsion from events or worse, injury and death.

1.5.1 Transmitters

Transmitters must not be turned on at, or near events for any purpose without obtaining the appropriate frequency clip or explicit permission from the event organiser.

1.5.2 Activation

Proper activation and deactivation of robots is critical. Robots should only be activated in the arena, testing areas, or with expressed consent of the event and its safety officials. All activation and deactivation of Robots must be completed from outside the arena barrier. You must never enter the arena with live robots without the express permission and supervision of the event organiser.

1.5.3 Weapon Restraints

All Robots not in an arena or official testing area should have secure safety covers over any sharp edges and restraints on any active weapons or pinch hazards.

1.5.4 Carrying Cradles

All robots not in an arena or official testing area should be raised on their carrying cradles in a manner so that their motive power cannot cause movement if the robot were turned on, or cannot roll or fall off a pit table. Runaway robots are VERY dangerous.

1.5.5 Restrictions

In some situations the safety inspection team may deem it necessary to place restrictions on your robots operation for safety purposes. It is entirely your responsibility that these restrictions are adhered to at all times.

1.5.6 Power Tools

The operation of power tools such as grinders or hand drills is not permitted in the pits area. Battery powered tools such as drills are permitted. It is expected that builders will follow all basic safety practices such as gloves and goggles when operating any machinery. Whether in the pits or dedicated workshop area, please take care.



2. Weight Classes

2.1 Weight Classification

- Antweight: 0 to 150 grams
- Beetleweight: 150 grams to 1.362kgs [3lbs]
- Featherweight: 1kg to 13.6kgs [30lbs]
- Lightweight: 12kgs to 27.5kgs [60lbs]
- Middleweight: 27.5kgs to 55kgs [120lbs]
- Heavyweight: 55kgs to 100kgs [220lbs]
- Super Heavyweight: 100kgs to 145kgs [320lbs]

Note: Please contact the event organiser before commencing build or arriving at an event with a Super Heavyweight.

2.2 Legged Robots

Legged Robots [Walkers] can weigh up to twice the specified weight in all classes. A walker must employ moveable legs to support its weight. Each leg must have at least 2 axis' of motion. Robots with rolling or sliding mechanisms will not be classified as walkers.

2.3 Consumables

Maximum weight includes all consumables.

2.4 Safety Equipment

Maximum weight does not include safety bars, straps, guards or similar equipment used to immobilize moving arms or weapons and that are removed during competition.

2.5 Interchangeable Panels

If interchangeable panels and/or weapons are used, the weight is measured with the heaviest set-up in place.



3. Mobility

3.1 Methods

All Robots must have (easily visible mobility) in order to compete. Methods of mobility include:

3.1.1 Rolling

Rolling on wheels or the whole robot rolling.

3.1.2 Walking

Walking such as linear actuator operated legs.

3.1.3 Shuffling

Shuffling mechanisms such as rotational cam operated legs.

3.1.4 Ground Effect

Ground effect air cushions such as a hovercraft

3.1.5 Jumping

Jumping and hopping (although the height may be limited by each event due to arena safety constraints)

3.1.6 Flying

Flying (helium balloons, ornithopters, etc.)(Currently flying robots are not allowed unless prior approval by the event has been granted.)

3.2 Restrictions

Robots are not permitted to use exposed rotating aerofoil, rocket or jet propulsion methods.

4. Radio control requirements

4.1 Frequencies

4.1.1 Regulation

Radio systems used at events MUST comply with restrictions put in place by local regulatory bodies and applicable laws. For the UK this is OFCOM. Where a special licence is required for operation of radio equipment the event organiser must be informed and the license must be available for viewing at the event.

4.1.2 Interference

Radio systems MUST NOT cause interference to other frequency users.

4.1.3 Digital Spread Spectrum

Digital Spread Spectrum 2.4GHz is recommended for combat robotics in all weight classes.

4.1.4 Allowed Frequencies

For use in robots, the following frequencies are allowed:

	AW	BW	FW	LW	MW	HW	SHW
IR	✓	✓	X	X	X	X	X
27MHz AM	✓	✓	X	X	X	X	X
40MHz AM	✓	✓	X	X	X	X	X
40MHz FM	✓	✓	X	X	X	X	X
40MHz FM Digital	✓	✓	✓	✓	✓	X	X
2.4GHz DSS	✓	✓	✓	✓	✓	✓	✓
459MHz Digital	✓	✓	✓	✓	✓	✓	X

Please note that events may have additional restrictions on allowable frequencies.

Symbols:

✓ = Allowed Frequency
 X = Disallowed frequency
 AW = Antweight
 BW = Beetleweight
 FW = Featherweight
 LW = Lightweight
 MW = Middleweight
 HW = Heavyweight
 SHW = Super heavyweight

IR = Infra-Red remote control systems – For use with Antweights Only

27MHz AM = AM PPM radio systems e.g. Futaba Skysports 2

40MHz FM = FM PPM radio systems e.g. Futaba Skysports 4

2.4GHz DSS = Digital Spread Spectrum radio systems e.g. Spektrum DX6

40MHz AM = AM PPM radio systems e.g. Futaba 2ER Attack

40MHz FM Digital = 40MHzPCM radio systems e.g. Futaba Fieldforce 6

459MHz Digital = Radio systems using 459MHz Modules

4.1.5 Special Exceptions

Use of disallowed frequencies may be allowed in limited circumstances for example if running an armoured radio control car or for older machines providing safe control can be demonstrated. This shall be limited to non-competition fights.

4.2 Failsafes

4.2.1 Dangerous Systems

All systems that are deemed to be 'dangerous' (normally the drive and weapons) must have a 'failsafe' device. This MUST bring the systems to a pre-set 'off' or 'zero' position if the transmitter signal experiences interference or is lost. These devices should also failsafe when the receiver battery is low or if power is completely lost.

4.2.2 Types of Devices

The failsafe(s) may take the form of plug-in commercial devices; electronic circuitry incorporated into some receivers e.g. PCM type; or other devices e.g. electronic speed controllers such as the Vantec. It could also consist of digital switches, which return to pre-set off position on loss of power. Care should be taken in the selection of devices to ensure they meet the requirements specified above.

4.2.3 Built-in Devices

Some receiver failsafes such as Futaba PCM do not store the pre-set positions and will take a few seconds from first turning on to receive these settings from the transmitter. This type of failsafe MUST be set correctly to ensure the safe operation of the robot.



4.2.4 Setting Failsafes

Care should be taken to ensure that the failsafe(s) are set correctly.

Particular attention should be taken with programmable failsafe(s) that may be overlooked when transferring receivers between robots or when altering the trim (zero position) on sticks that may affect the 'off' or 'zero' position. With newer receivers e.g. Spektrum BR6000 it may be necessary to 'bind' your receiver to program the pre-set failsafe positions.

4.2.5 Servo Control

It is not advised you use servo/ pot/ micro-switch interfaces, as these will remain in their last position with loss of power leaving the weapon active.

4.3 Failsafe Light (Advisory)

In addition to the main power light a separate light should also indicate if the robot is in "failsafe", "off" or "zero" position.

4.4 Remote Kill (Advisory)

Robots should incorporate a "remote kill" that should bring the robot's failsafe device(s) to the pre-set 'off' or 'zero' position via a switch on the transmitter. This is to allow for de-activation of robots from outside a fully enclosed arena and prevent accidental operation of controls.

4.5 Operation

All device(s) MUST operate to the tech checker's satisfaction before the robot will be allowed to compete.

4.6 Crystals

Where used, spare crystal pairs must be available for each Radio Control set involved in running the robot.

4.7 Changeable Frequencies

Frequencies must be easily changeable e.g. where crystals are used they must be accessible, particularly on the receiver, so that a change of frequency can easily take place.

4.8 Output Power

Transmitter output power must not exceed that specified by the local regulatory body or any applicable laws.

4.9 Home Built

If you are using a home built control system you must first clear it with the event organiser and declare it during 'Tech Check'.

4.10 Power Switch

The event may require a separate power switch for the receiver radio power.

4.11 Reserved Frequencies

The event may have reserved frequencies for testing, safety and arena effects that you may not use.

4.12 Telemetry

Radio telemetry is permitted on 433MHz and 2.4GHz. Please check with the event organiser if you are using radio telemetry.



5. Autonomous/ Semi-Autonomous Robots

Robots that do not require human input for one or more of their functions.

If you are bringing an autonomous robot or a robot with significant autonomous functions please contact your event organiser in advance.

5.1 Remote Operation

Any autonomous function of a robot, including drive and weapons, must have the capability of being remotely armed and disarmed.

5.2 Disarming

While disarmed, the robot is not allowed to function in an autonomous fashion.

5.3 Light

In addition to the required main power light, robots with autonomous functions must have an additional clearly visible light, which indicates whether or not it is in autonomous mode.

5.4 Deactivation

When deactivated the robot should have no autonomous functions enabled, and all autonomous functions should fail-safe to off if there is loss of power or radio signal.

5.5 Timeout

In case of damage to components that remotely disarm the robot, the robot will automatically deactivate 4 minutes after being activated.

6. Electrical Power

6.1 Deactivation

All Featherweight, Lightweight, Middleweight, Heavyweight and Super Heavyweight Robots must incorporate a way of removing all power to weapons and drive systems (systems that could cause potential human bodily injury) that can be activated easily without endangering the person turning it off.

6.1.1 Removable Link

The main power cut-off MUST be a removable link, which must NOT be in place unless the robot is in the arena or under the supervision of a technician. A key or switch is not allowed. If there is more than one link they must be positioned adjacent to each other.

6.1.2 Accessibility

The link must be positioned in a visible part of the robot's bodywork, fitted away from any operating weaponry or drive, and this position must be clearly marked.

6.1.3 Covers

The link may be fitted under a cover, but the cover must be able to be opened without the use of tools.

6.1.4 Kill Switch

If the robot uses an internal combustion engine(s), the "Power" cut-off must take the form of a clearly labelled "Kill" switch. See Section 7 for further details on engines.

6.1.5 Inverted Link

Robots in the heavyweight and super heavyweight class that are capable of being driven inverted, having a removable link fitted that is only accessible when the robot is the right way up, must have a duplicate link fitted in the opposing panel, so as to allow the robot to be disarmed when inverted.

6.2 Cabling

Cabling must be of sufficient grade and suitably insulated for maximum operational current.

6.3 Exposed Components

Current must not be carried through exposed components.

6.4 Power Light

All Featherweights, Lightweights, Middleweights, Heavyweights and Super Heavy Weights, must have at least one surface mounted non-filament power light that is illuminated when power is supplied to the robot (i.e. when the link is in). The power light can be any colour but must be non-flashing and be in contrast with it's surroundings.

6.5 Activation

The robot must be able to be activated and de-activated by way of the removable link from outside an arena. (e.g. in a "bullpen" over a low wall).

6.6 Voltages

Mean working voltage should not exceed 36V DC or 36V RMS AC except where prior approval from the event organisers has been confirmed. It is understood that a charged battery's initial voltage state is above their nominal rated value.

7. Batteries

7.1 Fitting

Batteries must be secured properly inside the robot.

7.2 Terminals

Battery terminals must be protected to prevent short circuits.

7.3 Permitted Types

The only permitted batteries are ones that cannot spill or spray any of their contents when damaged or inverted. Standard car and motorcycle wet cell batteries are prohibited. If your design uses a new type of battery, or one you are not sure about please contact the Fighting Robot Association.

For assistance in selecting batteries please contact the Fighting Robot Association.

7.4 Approved Battery Chemistry

	AW	BW	FW	LW	MW	HW	SHW
NiCd (Nickel-cadmium)	✓	✓	✓	✓	✓	✓	✓
NiMH (Nickel-metal Hydride)	✓	✓	✓	✓	✓	✓	✓
Pb (Sealed Lead Acid)	✓	✓	✓	✓	✓	✓	✓
LiFePo4 (Lithium Iron Phosphate)	✓	✓	✓	✓	✓	✓	✓
LiPo (Lithium Polymer)	✓	✓	✓	X	X	X	X

7.5 Maximum Cell Count (series) and voltage

	Number of Cells (series)	Vnom	Vmin	Vmax	Vtotal
NiCd (Nickel-cadmium)	30	1.2v	0.9v	1.9v	36v
NiMH (Nickel-metal Hydride)	30	1.2v	0.9v	1.9v	36v
Pb (Sealed Lead Acid)	18	2.0v	1.5v	2.4v	36v
LiFePo4 (Lithium Iron Phosphate)	10	3.3v	3.0v	4.2v	33v
LiPo (Lithium Polymer)	10	3.7v	3.0v	4.2v	37v

Vnom – Nominal cell voltage

Vmin – Minimum cell voltage

Vmax – Maximum cell voltage

Vtotal – Nominal pack voltage with number of cells connected in series

7.6 Parallel Cells

Batteries cells may be connected in parallel to increase capacity and discharge current. Caution must be taken with NiCd and NiMH as these cells may only be connected in parallel during discharge.

7.7 Charging

Improper charging may result in fire and/ or explosion.

7.7.1 Design

Only chargers specifically designed for the battery chemistry may be used.

7.7.2 Rate of Charge

The rate of charge must not exceed the manufacturer's specification.

7.8 Pb (SLA), NiCd, NiMH and LiFePo4

The following battery types can be used without any specific precautions although care must be taken when any battery particularly during charging.

- Pb (Sealed Lead Acid, SLA), non-spillable gel type. (e.g. Yuasa, Hawker)
- NiCd and NiMH
- LiFePo4 (Lithium Iron Phosphate)



7.8 LiPo

Lithium Polymer batteries have specific limitations and extra precautions which must be adhered to.

7.8.1 Balancers

Appropriate balancers must be provided if not part of the charger. They will be inspected during the Technical Check. LiPo batteries should be properly balanced to prevent damage occurring to the cells.

7.8.2 Voltage Cut-out (Advisory)

The robot should be fitted with an under voltage cut-out or alarm set at or higher than the battery manufacturer's recommendation to prevent the batteries from becoming damaged by over discharge.

7.8.3 Fusing

A fuse rated below the maximum burst discharge of the battery must be fitted.

7.8.4 Extra Equipment

Roboteers using LiPo batteries must provide a LiPo sack.

7.8.5 Inspection

LiPo batteries must be removed from the robot, inspected and placed into a LiPo sack prior to and during the charging process.

7.8.6 Charging

Lithium batteries must not be left unattended at any time during the charging process. Leaving batteries unattended while charging will be considered a serious breach of pit safety and may result in you and your robot being removed from the event.

7.8.7 Damage

LiPo batteries showing any evidence of damage or swelling must immediately be placed a LiPo sack and removed to a safe, well-ventilated area such as outdoors.



8. Internal Combustion Engines

Note: Please check that your event allows internal combustion engines.

8.1 Fuel Capacity

Fuel capacity is limited to 500ml (17floz).

8.2 Fuel Tanks

8.2.1 Plastic

Fuel tanks separate to the engine must be made of an acceptable type of plastic (e.g. nylon).

8.2.2 Metal

If the tank is integral to the engine assembly and is metal, the cap must be plastic or a plastic "pop off" seal fitted.

8.2.3 Protection

The tank must be adequately protected from puncture.

8.3 Fuel Lines

All fuel lines must be of the correct type and held with the correct type of fittings. They must be routed to minimise the chances of being cut.

8.4 Return Spring

A return spring must be fitted to the throttle of all internal combustion engines to return the throttle to "idle" or "off" in the case of servo breakage or failure. This is in conjunction to any failsafe device.

8.5 Clutch

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

8.6 Remote Shut-off

All engines must have a method of remotely shutting off.

8.7 Leaks

Any robot with liquid fuel and oil should be designed not to leak when inverted. Minor leakage may be tolerated, however if it affects other robots or becomes a large clean-up issue you will be banned.

8.8 Non-standard Types

Use of internal combustion engines other than standard piston type (e.g. turbines etc.) must be pre-approved by the Fighting Robot Association.



9. Pneumatics

9.1 Allowed Gases

Pneumatic systems must use Carbon Dioxide [CO₂] or Air.

9.2 Maximum Pressure

The maximum pressure at any point within a pneumatics system must not exceed 1000psi (68bar).

9.3 Cylinders

The compressed gas shall be stored in a commercially manufactured gas cylinder of appropriate design, specification and certification. Except where the maximum storage pressure is less than 50psi (3.4bar). Some events may have further restrictions on bottle sizes/ weights used, please contact the event organiser for clarification.

9.4 Burst Disc

The gas cylinder must incorporate a burst disc rated below the maximum test pressure of the bottle. Except where the manufacturer or manufacturer's agent fills the gas cylinder and applies an integrity seal or wrapping, or the storage pressure is less than 50psi (3.4bar). Event organisers may wish to check integrity seals prior to their use.

9.5 Isolation Valve

Gas cylinders charged to pressures of greater than 50psi must incorporate an isolation valve that can be operated from outside of the robot.

9.6 Remote Isolation Valve

Gas cylinders that do not incorporate a valve (for example: the gas is released as soon as the cylinder is screwed into it's mating pneumatic connection) such as found on disposable welding bottles and 'fizzy drinks' machines must have an additional remote isolation valve accessible from outside of the robot.

9.6.1 Position

Any remote isolation valve shall be positioned so as to minimize the pipe length between it and the cylinder. This pipe length must fully vent before the cylinder is fully unscrewed from the pneumatic connection.

9.7 Rating

All pneumatic components used with pressures greater than 50psi (3.4bar) must be rated/ tested to at least the maximum pressure available in that part of the system. You may be required to provide documentation/ certification to support this.

9.7.1 Custom Components

Custom made components, or parts operating above the suppliers maximum working pressure, must be independently tested and certified at 120% of the maximum system pressure available at that point.

9.7.2 Hydraulic Components

Components originally designed for hydraulics use will be de-rated by 50% for pneumatics use.

9.8 Pressure Relief Device

A certified pressure relief device must be installed in each part of the pneumatics system where a different operating pressure is used (operating pressures separated by a pressure regulating device).

9.8.1 Rating

Pressure relief devices must have a rating of 1000psi (68bar) or 110% of the pneumatic component with the lowest 'maximum working pressure' rating protected by that particular pressure relief device, whichever is the lower.

9.8.2 Low Pressure Systems

Pneumatic systems employing pressures less than 50psi or systems employing air compressors that have a maximum output pressure lower than the pneumatic component with the lowest 'maximum working pressure' do not require a pressure relief device.

The pressure relief device(s) dictate the maximum pressure available in that part of the pneumatics system. The pressure relief device(s) must have a flow rate capacity that exceeds the maximum flow rate that can be expected under 'over pressure' conditions. Any attempt to falsify the pressure settings of pressure relief device(s) will be considered as gross misconduct by the FRA and may result in expulsion.

9.8.3 Full Pressure Systems

Non-regulated pneumatic systems or pneumatic systems where the regulator is not directly attached to the gas cylinder require that a 1000psi pressure relief device is fitted.

9.8.4 Regulated Systems

Regulated pneumatic systems that operate at less than 235psi (16bar) and where the regulator is directly attached to the gas cylinder do not require a 1000psi pressure relief device before the regulator. The regulator must be rated to 120% of the gas bottle burst disc pressure. A pressure relief device is required down-stream of the regulator rated at 110% of the component with the lowest 'maximum working pressure' rating.

9.9 Pressure Relief Devices

Pressure relief devices should be readily accessible and must be removable for testing purposes.

9.10 Mounting

All pneumatic components must be securely mounted and adequately protected within the body shell. Any component storing gas (i.e. gas cylinders, buffer tanks etc.) must be secured in such a way as it cannot escape the robot even if suffering a rupture.

9.11 Gauges

Pneumatic pressure gauges and pressure test points are not a requirement but may be requested by some event organisers.

9.12 Dump Valve

All pneumatic systems must incorporate a pressure dump valve accessible from outside of the robot. This dump valve shall quickly and reliably exhaust all gas downstream of the gas cylinder isolation (or remote isolation) valve including systems with a maximum operating pressure of less than 50psi (3.4bar).

9.12.1 Normally Open

The dump valve shall be left open at all times when the robot is not in the arena or testing areas. Particular attention should be made that where non-return valves are used, no part of the system is left pressurized.

9.13 Removable Cylinders

Gas cylinders must be readily removable for inspection and refilling. You should ensure that your gas cylinder connection is compatible with the event organiser's filling stations, or that you have suitable adapters available.

9.14 Heaters and Boosters

Pneumatic systems using heaters or pressure boosters are not permitted.

9.15 Pressure Equipment Directive

Pneumatic components manufactured from 1 June 2002 shall carry a CE mark. Pneumatic components 'custom made' since 30 May 2002 shall carry a label indicating their non-conformity with the 'Pressure Equipment Directive' and their non-availability for sale. Components manufactured prior to 30 May 2002 are not necessarily required to carry a CE mark.



10. Hydraulics

10.1 Pressure

Hydraulic system pressure (In the actuator or cylinder) must be limited to 10,000psi by way of a maximum pressure relief valve.

10.2 Test Point

A hydraulic test point is a mandatory fitment to allow verification of a robots maximum system pressure. A team will need its own test gauge and hose.

10.3 Storage Tanks

Hydraulic fluid storage tanks must be of a suitable material and adequately guarded against rupture.

10.4 Standards

Hydraulic fluid lines and fittings must be to British Standard (BS) and/ or to European DIN specifications.

10.5 Ratings

Hydraulic fluid lines and fittings must be capable of withstanding the maximum working pressures used within the robot.

10.6 Protection

Hydraulic fluid lines must be routed to minimise the chances of being cut or damaged.

10.7 Accumulators

Hydraulic accumulators (pressurised oil storage devices) are banned in whatever form they may take.

10.8 Bleeding (Advisory only)

Care needs to be taken when building a hydraulic system that consideration is given to bleeding the system of air. Trapped air in the hydraulic system will degrade the performance of the system and may make a robot run foul of rule 10.7

10.9 Power Sources

For power sources (other than electric motors/ petrol engines) please consult the Fighting Robot Association for advice as to suitability.



11. Rotational weapons or full body spinning robots

Full body spinning robots with an eccentric mass or 'twackbots', are excepted from this section unless they spin over 500 revolution per minute.

11.1 Stopping Time

The spinning element of any rotational weapon must spin down to a full stop in under 60 seconds.

11.2 Limits

Rotational weapons exceeding any TWO of the three limits below must be submitted for review and be pre-approved by the event organiser.

11.2.1 Weight

The spinning element is more than 20% of the robots total weight. (This includes any directly coupled motor components rotating on the same axis).

11.2.2 Speed

The spinning element spins above 500 RPM.

11.2.3 Size

The spinning element is greater than 24 inches in diameter.



12. Springs and flywheels

12.1 Springs

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

12.1.1 Deactivation

Under no circumstances should a large spring be loaded when the robot is out of the arena or testing area. These devices must be made safe before removing the robot from the arena or testing area.

12.1.2 Small springs

Small springs like those used within switches or other small internal operations are excluded from this rule. In addition springs used in robots less than 5 kilos may be excepted from this rule. Please contact the Fighting Robot Association for clarification.

12.2 Flywheels

Flywheels or similar kinetic energy storing devices must not be spinning or storing energy in any way, unless inside the arena or testing area. These devices must be made safe before removing the robot from the arena or testing area.

12.2.1 Remote Deactivation

There must be a way of generating and dissipating the energy from the device remotely under the robots power to allow safe activation and deactivation of the robot.

12.3 Failsafe

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

12. Weapon Restrictions

The following weapons and materials are forbidden from use: Note: Some of the listed items may be allowed for effects but not as weapons. If you have an application of these items which you feel should be allowed, please contact the Fighting Robot Association.

12.1 Invisible Damage

Weapons designed to cause invisible damage to the other robot. This includes but is not limited to:

12.1.1 Electricity

Electricity as a weapon such as Tesla coils, Van-der-Graaf generators, stun guns, or cattle prods.

12.1.2 Radio Frequency

Radio Frequency jamming equipment or similar devices.

12.1.3 Radio Frequency Noise

Radio Frequency noise generated by an IC engine. Use shielding around sparking components.

12.1.4 Electromagnetic Fields

Electromagnetic fields from permanent or electromagnets, which affect another robots electronics.

12.2 Stopping Combat

Weapons or defences, which tend to stop combat completely, of both (or more) robots. This includes, but is not limited to the following:

12.2.1 Entanglement

Entanglement devices such as nets, fishing line, cables, string, glues or tapes, which require the match to be stopped and the robots separated. (If this occurs the 'entangler' forfeits the match)

12.3 Rotating Weapons

The speed of any rotating weapons - e.g. circular saws, carbon or steel cutting discs - must not exceed the manufacturer's specification. The manufacturer's specification must be available for inspection.

12.4 Hardened Blades

Commercially manufactured, hardened steel blades that may shatter are not allowed.

12.5 Blade Length

Commercial blades - e.g. bayonets - must not exceed 20cm in length.

12.6 Untethered Projectiles

Projectiles must have a tether capable of stopping the projectile at full speed and be no longer than 2.5m.

12.7 Heat and Fire

Heat and fire are forbidden as weapons, (however some events may allow limited fire effects). This includes, but is not limited to the following:

12.7.1 Generated

Heat specifically generated to damage an opponent

12.7.2 Flammables

Flammable liquids or gases

12.7.3 Explosives

Explosives or flammable solids such as DOT Class C devices, Gunpowder, Cartridge Primers or Military Explosives, etc.



12.8 Smoke and Light

Smoke and light based weapons, which 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:

12.6.1 Smoke or Dust

Large quantities of smoke or dust. Limited smoke effects may be allowed by some events.

12.6.2 Lights

Lights such as external lasers above Class 2 (1mw) output and bright strobe lights, which may blind the opponent.

12.9 Hazardous Materials

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. Note: If you have a question please contact the Fighting Robot Association.

12.10 Tethers

All high-speed weaponry, such as axes and flippers, must carry a suitable tether to ensure all moving parts cannot break free from the chassis during operation. There is no weight penalty for this tether. If unsure please contact the Fighting Robot Association.

12.11 Weapon Restraints

All weapons must incorporate a secure restraint that locks the weapon in a safe position. The restraint may incorporate locking pins, straps and bars but must be secured in such a way that it cannot be removed inadvertently. The design should ensure that the weapon cannot be fired during the activation process.



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