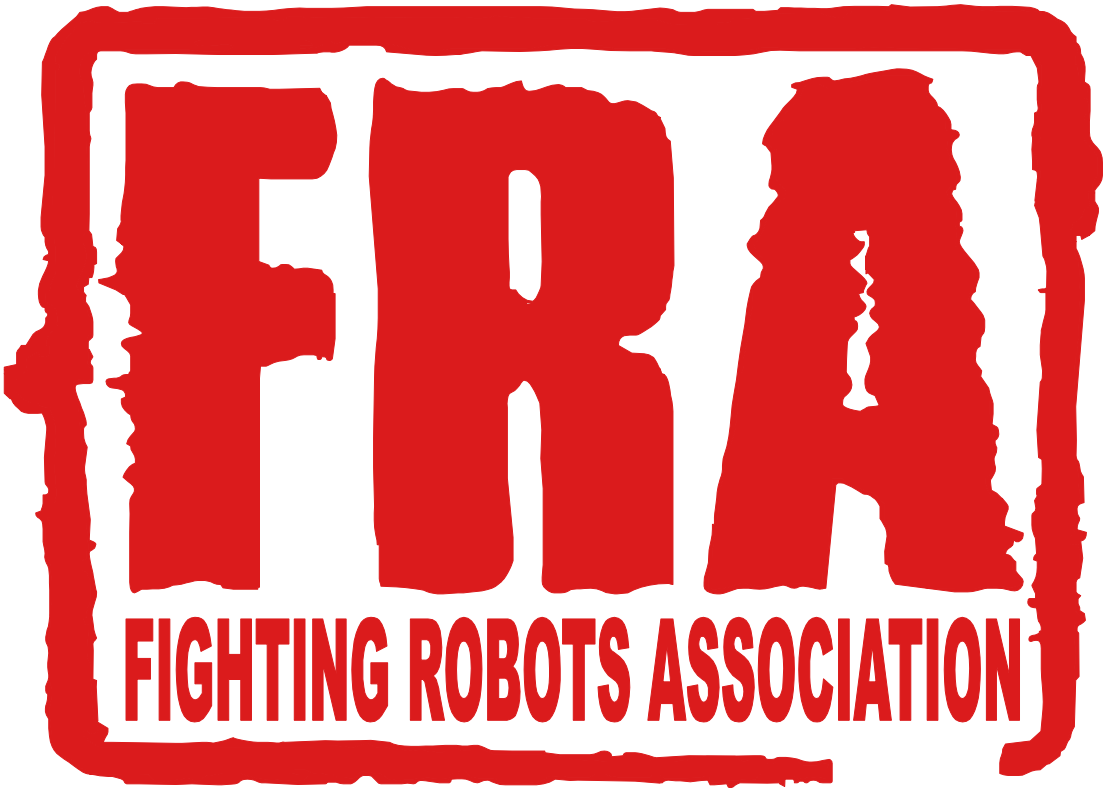

Build Rules

International Build Rules and Regulations

2024 Edition

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Contents

1. General

1.1 Participation
All participants build and operate Robots at their own risk. Fighting Robots is inherently dangerous. There is no amount of regulation that can encompass all of the dangers involved. Please take care to not hurt yourself or others when building, testing and competing. Compliance with all event rules and competition regulations is mandatory. It is expected that competitors stay within the rules and procedures of their own accord and do not require constant policing.

1.2 Loopholes
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 Robots 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 Safety Inspections
Each event has safety inspections known as 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.

1.4 Activation
Robots must only be activated in the arena, testing areas, or with expressed consent of the event organiser and the safety officials. All activation and de-activation of robots must be completed from outside the arena barrier or within specially designated areas. You must never enter the arena with live robots without the express permission and supervision of the event organiser.

1.5 Safety Covers
All Robots not in an arena or official testing area must have secure safety covers over any sharp edges and pinch hazards. Safety covers must be designed in such a way that they cannot be dislodged unintentionally.

1.6 Locking Bars
All weapons must be secured using a locking bar. The locking bar must be designed in such a way that it can quickly and easily be installed or removed without touching the weapon. The design must ensure that the weapon cannot be fired during the activation process.

1.7 Tethers
All high-speed weaponry with a single linkage, such as axes and flippers, must carry a suitable tether to ensure moving parts cannot break free from the chassis during operation.

1.8 Carrying Cradles
All robots not in an arena or official testing area must 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.

1.9 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.

1.10 Power Tools

It is expected that builders will follow all basic safety practices such as gloves and goggles when operating any machinery. The use of welders, grinders and other equipment that may produce smoke, debris or other harmful substances is only permitted in dedicated workshop areas. Please take care of yourself and others around you.

2. Weight Classes

2.1 Weight Classification

- Antweight: Maximum 150g
- Beetleweight: Maximum 1.5kgs
- Featherweight: Maximum 13.6kgs
- Lightweight: Maximum 30kgs
- Middleweight: Maximum 55kgs
- Heavyweight: Maximum 110kgs

2.2 Bonus Weight
An event organiser may grant additional (bonus) weight allowance for some types of robot. For example “Walking” robots may be allowed to compete at a specified percentage above the weight classes maximum weight. Please check with the Event Organiser for specifics.

2.3 Consumables
Weight includes all consumables and any part of the robot that remains inside of the arena such as gas bottles, removable link(s), and safety tethers. Locking bars, transmitters, and tools required to activate the robot that are removed from the arena are not included.

2.4 Margin of Error
No allowance is given for any margin of error. It is recommended robots are designed in such a way that excess weight can be removed easily, since scale calibration may vary.

2.5 Interchangeable Panels and Weapons
If interchangeable panels or weapons are used, the weight is measured with the heaviest set-up in place. All configurations need to known prior to the competition starting and spot checks may be performed at any time.

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

3.2 Restrictions
Event organisers may impose additional restrictions on robots for the safety of the event.

4. Radio control requirements

4.1 Frequencies

4.1.1 Permission

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

4.1.2 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.

4.1.3 Interference

Radio systems MUST NOT cause interference to other frequency users.

4.1.4 Digital Spread Spectrum

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

4.1.5 Allowed Frequencies

For use in robots, the following frequencies are allowed:

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

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

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

27/ 40MHz AM/FM = PPM radio systems e.g. Futaba Skysports 4

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

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

459MHz Digital = Radio systems using 459MHz Modules

4.1.6 Special Exceptions

Use of disallowed frequencies may be permitted in limited circumstances for example if running an armoured radio control car or for older machines providing safe control can be demonstrated. This will 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 must 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 receivers, or other devices. It may also consist of digital switches, which return to pre-set off position on loss of power. Care must 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 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 and are strongly discouraged.

4.2.4 Setting Failsafes
Care must be taken to ensure that the failsafe(s) are set correctly.
Particular attention must 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 it may be necessary to 'bind' your receiver to program the pre-set failsafe positions.

4.2.5 Servo Control
Care must be taken when using servo/ pot/ micro-switch interfaces, as these will remain in their last position with loss of power leaving the weapon active. Additional precautions must be taken when these interfaces are in use.

4.3 Failsafe Light (Advisory)
In addition to the main power light a separate light may also indicate if the robot is in "failsafe", "off" or "zero" position.

4.4 Remote Kill (Advisory)
Robots may incorporate a "remote kill" that brings 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 remote control system, you must first clear it with the event organiser and declare it during ‘Tech Check’. Home built remote control systems are not recommended.

4.10 Power Switch
Radio equipment may be operated independently of the removable link, providing that no dangerous systems can be operated with the link removed.

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 must have no autonomous functions enabled, and all autonomous functions must failsafe 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
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 operated easily without endangering the person turning it off.

6.1.1 Removable Link
The main power cut-off MUST be an insulated, removable link, which must NOT be in place unless the robot is in the arena or under the supervision of a technician. The link must be removable without the use of tools. A key or switch is not allowed.

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 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 voltage and current.

6.3 Exposed Components
Current must not be carried through exposed components.

6.4 Power Light
Robots must have at least one surface mounted non-filament power light that is illuminated when the main link is fitted. The power light may be any colour but must be non-flashing and in contrast with the surroundings.

6.5 Activation
The robot must be capable of being 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

Voltage must not exceed 75V for direct current or 50V for alternating current except where prior approval from the event organisers has been confirmed. Note that batteries may have a higher voltage during charging and care must be taken not to exceed these limits.

7. Batteries

7.1 Protection
Batteries must be adequately protected within the body and securely fixed to minimise the chance of being punctured or coming loose during combat. In addition, packing such as high density foam is recommended to reduce the shock of impacts.

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 inverted. Standard car and motorcycle wet cell batteries are not permitted.

7.4 Approved Battery Chemistry
The following battery chemistry may be used. Other battery chemistry may be suitable however prior approval must be sought from both the FRA and the Event Organiser.

NiCd (Nickel-cadmium), NiMH (Nickel-metal Hydride), Pb (Sealed Lead Acid), LiFePo4 (Lithium Iron Phosphate), LiPo (Lithium Polymer)

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)	14	3.3v	2.8v	3.6v	46.2v
LiPo (Lithium Polymer)	14	3.7v	3.0v	4.2v	51.8v

Vnom – Nominal cell voltage during discharge
Vmin – Minimum cell voltage
Vmax – Peek cell voltage during charging
Vtotal – Nominal pack voltage during discharge

These values are taken as an approximation. Always check the manufacturers specification.

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. Chargers will be inspected during the Tech Check to ensure correct operation.

7.7.2 Rate of Charge
The rate of charge must not exceed the manufacturer's specification. Note that high charge rates will decrease battery life and performance.

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.
- 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 Charging
LiPo batteries MUST be balance charged to prevent damage occurring to the cells. Chargers that do not incorporate an integrated balancing circuitry are not permitted.

7.8.2 Voltage Cut-out (Advisory)
The robot may 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. The maximum burst discharge current is calculated by multiplying the C rating by the capacity. E.g. 25C 2200mAh = 55 Amp

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. Event organisers may provide a dedicated area for charging.

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. Note that LiPo fires occur rapidly and there is a serious risk of personal injury. Use extreme care when handling any battery that shows signs of damage.

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 must 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 [CO_2] 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 must 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).

9.4 Burst Disc
The gas cylinder must incorporate a burst disc rated below the maximum test pressure of the bottle. Except where the storage pressure is less than 50psi (3.4bar).

9.5 Manual Isolation Valve
Gas cylinders charged to pressures of greater than 50psi must incorporate a manual isolation valve that can be operated from outside of the robot.

9.6 Remote Isolation Valve
Where the manual isolation valve is not integral to the gas cylinder (for example: the gas is normally released as soon as the cylinder is screwed into the mating pneumatic connection) must have an additional remote isolation valve accessible from outside of the robot.

9.6.1 Position
Any remote isolation valve must be positioned to minimise 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 or tested to at least the maximum pressure available in that part of the system. You may be required to provide documentation or 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 pressure relief device must be installed in each part of the pneumatics system where a different operating pressure is used.

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 must 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 (Advisory)
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 will 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 must be left open at all times when the robot is not in the arena or testing areas. Where non-return or quick exhaust valves are used, pay particular attention to ensure no part of the system is left pressurised.

9.13 Removable Cylinders

Gas cylinders must be readily removable for inspection and refilling. You must 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.

9.14.1 For the avoidance of doubt this includes the use of external devices such as heaters, thermal blankets, liquids, or other methods to heat components including, but not limited to, gas storage bottles, regulators, and buffer tanks.

9.15 Pressure Equipment Directive
Pneumatic components manufactured from 1 June 2002 must carry a CE mark. Pneumatic components 'custom made' since 30 May 2002 must 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 robot's 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 afoul of rule 10.7.

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

11. Rotational weapons or full body spinning robots

11.1 Limits
Event organisers will impose specific limits for rotational weapons.
Rotational weapons exceeding any the limits below must be submitted for review and be pre-approved by the event organiser.

11.1.1 Weight
The spinning element is more than 10% of the robots total weight. (This includes any directly coupled motor components rotating on the same axis).

11.1.2 Speed
The spinning element spins above 500 RPM.

11.1.3 Size
The spinning element is greater than 500mm in diameter.

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

11.3 Full body spinning robots
Full body spinning robots with an eccentric mass, are excluded from this section unless they spin over 500 revolutions per minute.

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 robot's power.

12.1.1 Deactivation
Under no circumstances must 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 robot's power to allow safe activation and deactivation of the robot.

12.3 Failsafe
All springs, flywheels, and similar kinetic energy storing devices must 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 may 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 barbs, hooks, spikes, nets, fishing line, cables, string, glues or tapes, which require the match to be stopped and the robots separated.

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. If unsure please contact the Fighting Robot Association.