

# Health & Safety Guidelines

# Race To The Line 2.0 Bio: Health & Safety Guidelines

This document is intended for all personnel involved in the design, build and launching of model rocket cars. It draws references from the:

- HSE guidelines on COER, MSER and POMSTER UKRA safety code
- BMFA safety code
- NAR safety code
- Tripoli safety code
- And safe practice techniques

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### 1. Model Rocket Car Health and Safety Statement

*The design, construction and operation of a rocket car is exciting, but given the energy and speeds involved, it carries with it some risk.*

*Health & safety legislation does not exist to ban or stop activities; it's there to enable activities to be done without risk of injury or ill health. Therefore, when participating in any Race For Line 2.0 Competition, challenge or rocket car workshops, it is vital that a suitable risk assessment is undertaken that identifies the risks that exist and the measures that need to be taken to reduce those risks.*

*In particular:*

- *Recognise that the Rocket Cars are experimental and that they may not behave or perform as expected or intended. Adequate and appropriate procedures must be put in place to manage the safe use, handling, storage and transport of the of the Rocket cars, the pressurised CO2 cartridges and any other articles and substances that may be used.*
- *Ensure that all manufacturers' instructions are complied with in full, and that these instructions are incorporated into local procedures, and that everyone involved, participating or observing knows what they must and must not do, and that adequate and appropriate supervision is provided to ensure that the procedures are followed.*
- *That the location (and its access and egress) for the running of the rocket cars is safe and without risks to health for everyone involved, be they supervising, participating or observing.*

*All that is asked is that you:*

1. *Identify the Hazards – 'What could go wrong?'*
2. *Decide who could be harmed & how – 'Who would be harmed if things went wrong?'*
3. *Evaluate the risks and decide on precautions – 'What is the consequence of something going wrong, and what is the likelihood of something going wrong?' If the consequence or the likelihood is unacceptable then precautions must be taken to reduce the consequence and/or the likelihood of something going wrong.*
4. *Record your findings and implement them – ensure that everyone involved understands what precautions you have taken and why you have taken them.*
5. *Review your risk assessment and update if necessary.*

*It is vital that all School and Local Education Authority rules are also considered when drawing up the Risk Assessment, that adequate and appropriate employers and public liability insurance is provided, and if any doubts remain, to seek further competent advice.*

*The Learning Partnership.com trading Ltd cannot accept any responsibility for any injury, ill-health or other loss arising from an unplanned event associated with the design, construction, use, handling, storage, transport or any other aspect of the challenge over which they exercise no control. Nor can either organisation approve, comment or advise on the suitability or sufficiency of Risk Assessments.*

*The Learning Partnership.com Trading Ltd*

## 2. Roles and Responsibilities

Race events, whether held at a school or at a regional or national stage, must be managed and supervised by suitably trained individuals.

The Race For The Line competition for the UK includes an integrated CPD programme covering race management, safety and the competition rules and regulations. This allows schools to take responsibility to schedule and manage their own race days and maximise the competition within their own timetable and syllabus.

We recommend at least two staff members from each participating school should attend one of the CPD events. These staff members can be teachers and/or technicians.

At races, all aspects of launching cars using compressed CO2 cylinders (or rocket motors) MUST be managed by a trained individual.

Three core roles are required to ensure a safe race event.

### **Range Safety Officer:**

The Range Safety Officer (RSO) supervises the event and race area and their decisions on matters of safety and eligibility is final. They are ultimately responsible for the safety of everyone participating in the activity. They will appoint other members of the team to other positions as they deem suitable to control the area.

### **b. Launch Site Controller:**

The Launch Site Controller (LSC) controls the launching equipment. The LSC is also responsible for fitting and initiating the cartridges and ensuring energetic materials are not left unattended when accessible. The LSC will be appointed by the RSO and should have received training in the safety procedures.

### **c. Site Risk Assessor**

The Site Risk Assessor is responsible for assessing the hazards and risks at the chosen venue prior to holding the event. This person may also be the RSO or LSC.

The Site Risk Assessor is to:

- Identify an area suitable to build the vehicles and an outdoor track area suitable for firing the category of rocket motors being used.
- Complete and update a risk assessment (example of a risk assessment is at the end of this document)
- Agree equipment needs and identify any additional equipment. See Appendix 1 for equipment lists.

RSOs and LSCs must read and understand all the relevant information in this document and make themselves aware of any changes in the law and local policies relating the Health and Safety.

### 3. Safe use of compressed CO2 Cartridges

1. No one should ever use the launcher to pierce CO2 cartridges unless trained in and familiar with their safe operation, handling, storage and disposal.
2. Only TLP approved 12 Gram unthreaded CO2 cartridges should be used.
3. Once pierced the rapid change in pressure will cool the CO2 cylinder and freeze burns are a risk. Gloves should be worn and care taken picking up spent cartridges which may be very cold.
4. At no time when cars are in moving under CO2 propulsion, should students enter the safety area.
5. You must be familiar with the national laws and local by-laws relating to the use of miniature compressed gas cartridges within the country and area you intend to use the motor in.
6. Never use a cartridge of higher capacity than specified for the competition in a foam car.
7. Only the designated LSC or RSO will handle pressurised CO2 cartridges.
8. Cartridges must be stored and carried in a suitable container or box
9. RSO`s must observe and ensure everyone maintains safe distances from the motors for launching. (see appendix 3)

### 4. Launch Site Procedures

1. Obtain permission to use a flat, open area of at least 35 meters in length, with one end open and no crossing walkways or footpaths if outside.
2. RSOs must ensure that a trained adult is the LSC.
3. RSOs and LSCs must make sure that everyone present is aware of the safe standards of behaviour around model rocket cars and compressed gas cartridges.
4. The race track tether must be secured to suitable weights or heavy containers using approved methods.
5. RSOs and LSCs must inspect and approve that all vehicles meet design safety codes supplied before attaching them to the safety tether.
6. All vehicles must be threaded onto safety tether supplied by TLP which is of a suitable strength for the motor being launched.
7. Once cars are loaded onto the tether, the line should be tensioned to ensure cars do not veer off course.
8. Before each launch the RSO and LSC must confirm and communicate that the site is clear of personnel and that any spectators are in safe areas around the site.
9. If anyone enters the safe area while firing is happening, the RSO, or any others that become aware of an incursion, should immediately and loudly shout 'STOP!' and the launcher unit should be disarmed by the LSC until the area is confirmed to be clear again.
10. Before each launch, the LSC must give a clear countdown "Track Live - 3, 2, 1, Launch ". At the word "Launch", the launcher release can be withdrawn.
11. In the event of a misfire The RSO should take care to avoid cold, escaping gases or a partial puncture.
12. At the end of racing, the RSO and LSC must ensure that the area is cleared of all used cartridges and other debris. Spent CO2 cartridges can be sent to standard metal recycling.

### Appendix 1: Equipment Checklist: Race Track

- Hi-Vis Jackets for key roles
- 1 x tape measure / distance wheel
- 2 x containers filled with water to act as tether weights or similar (20kg as a minimum, e.g. bags of sand/stone, breeze blocks, etc.)
- 1 roll competition tether line of minimum breaking strain 70lb (32kg)
- 1 x roll of barrier tape or rope/cones to mark out no-go zones
- 2 x safety glasses
- 1 x first aid kit, including burn treatment
- CO2 Cartridges – enough for each car + some spares.
- Notepads or laptop/PC/Tablet/Smartphone to capture data

### Appendix 2: Suitable containers

- Metal Ammunition Boxes (recommended)
- Plywood Boxes with hinged lids
- Metal biscuit Tins
- Plastic Boxes

## Appendix 3: Track Specifications & Design Limits

### Race length & safe distance

At the designated race track area decide on suitable anchor points for the track start and finish. Measure out a track of MINIMUM length and allow an additional 5m-7.5m extra for anchor points/car storage:

The official tether cables are approx. **35m** long with loops at either end to secure the tether to water barrels, concrete blocks, sand bags, posts or other secure anchor points.

**Official Race Length** (between launch point and timing gate area) = **10-20m**

**NOTE: the race distance is adjustable based on surface and car performance.** The supervising team can decide. To ensure fairness, a competition/race, all cars must race the same distance.

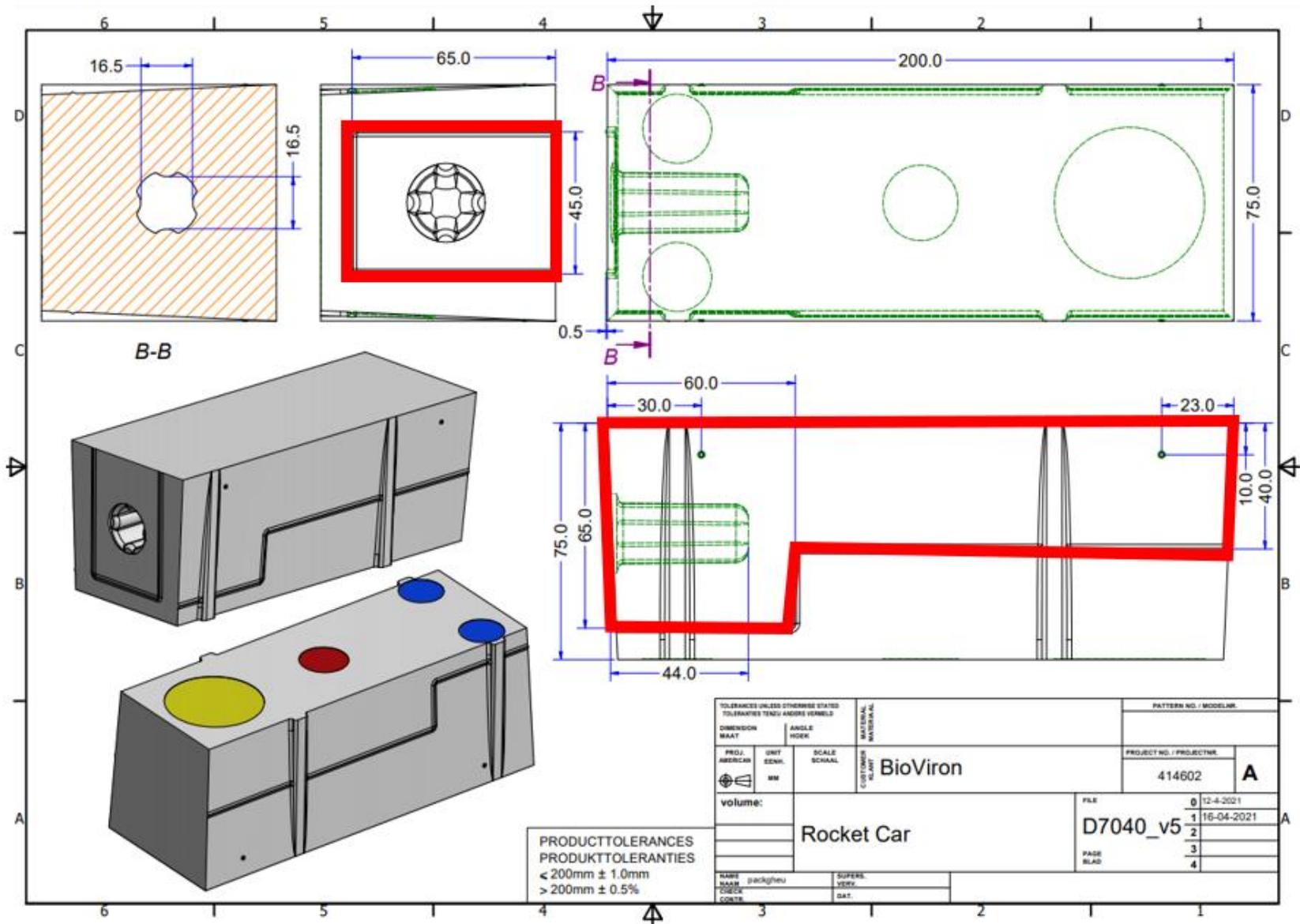
**Safe Distance** (between spectators and cars under power = **3m**)

### Motor performance and compatibility

12 Gram, unthreaded compressed CO2 cartridges should be used. While larger capacity cartridges and pyrotechnic rocket motors fit, these are not tested and recommended with the new Composta© Bloc material.



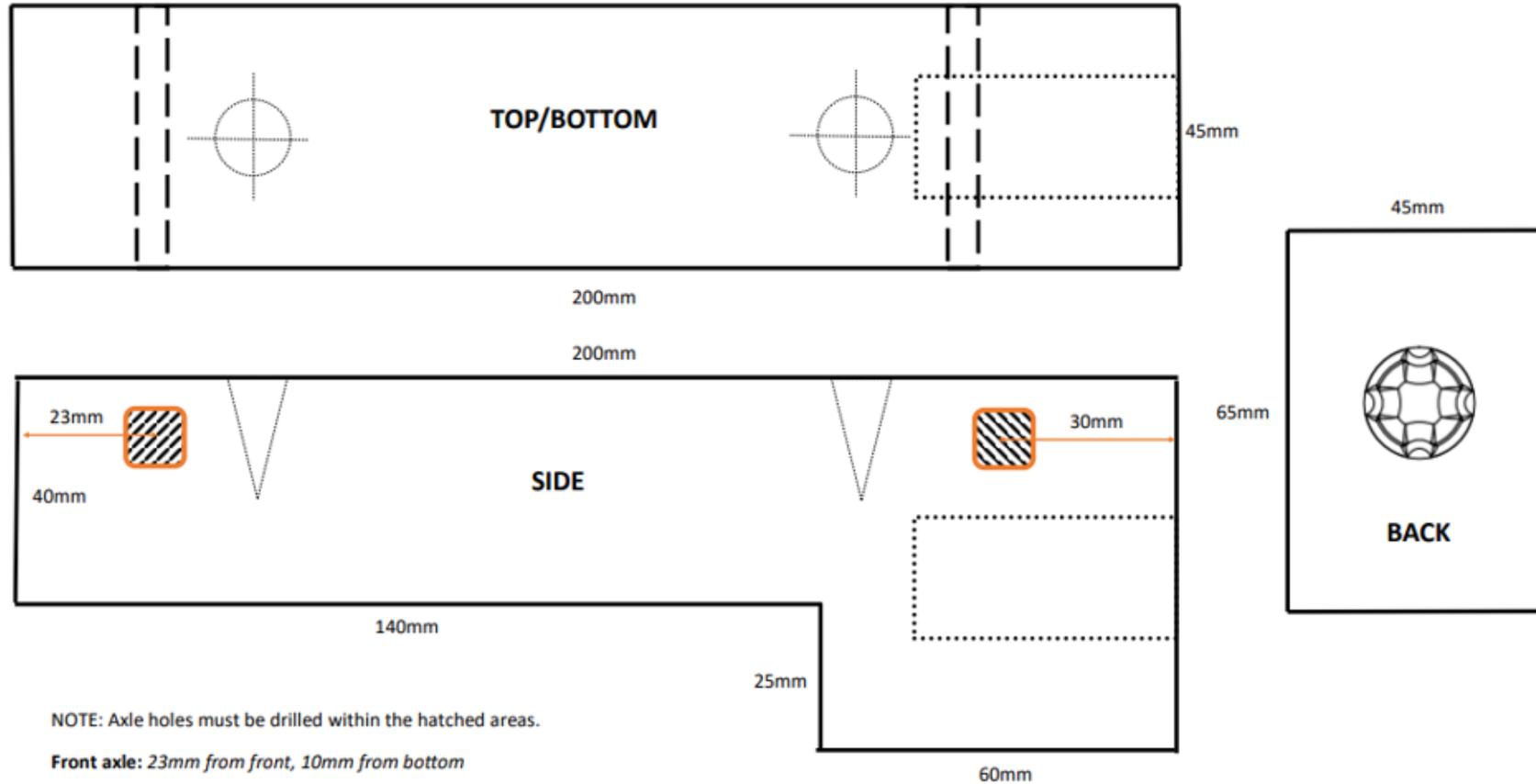
## Appendix 4: Minimum block sizes & No Cut Zone templates





## NO CUT ZONES: COMPOSTA<sup>®</sup> BLOCK

To ensure the safety and integrity of the car, no cuts must be made within these areas other than for the drilling of axles holes. Axles holes must be drilled within the marked zones (*max. 6mm*)



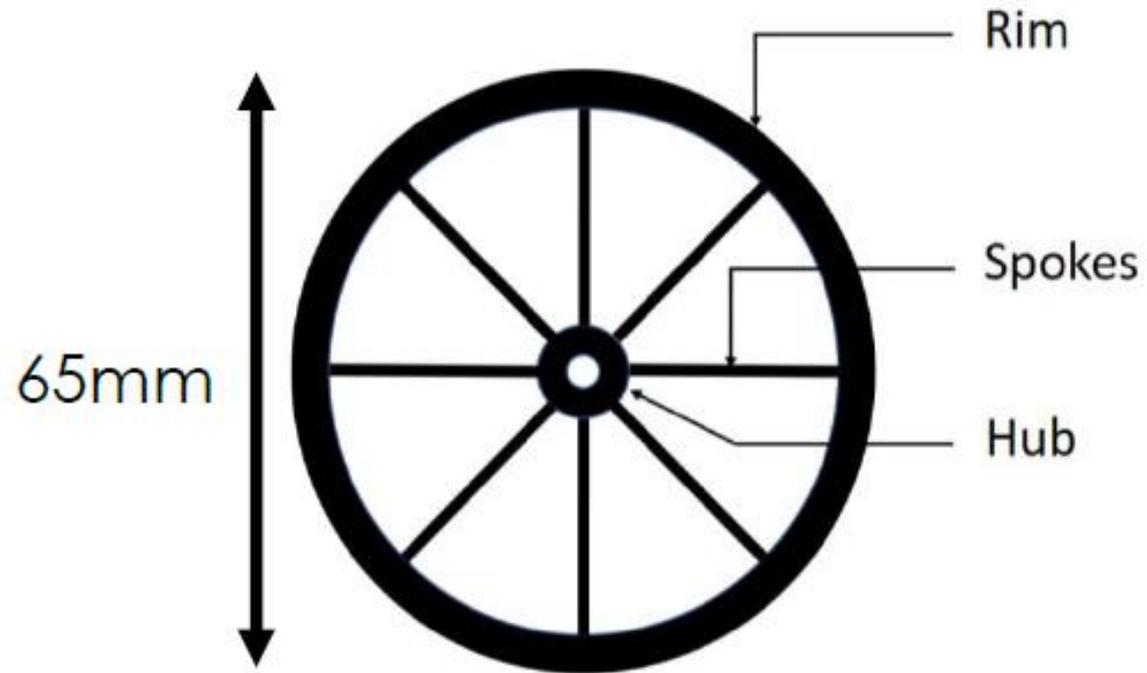
NOTE: Axle holes must be drilled within the hatched areas.

Front axle: 23mm from front, 10mm from bottom

Rear axle: 30mm from front, 10mm from bottom

Wheel diameter = **65mm** minimum

Axle holes may be drilled out to **6mm** and axles can be free spinning or glued to the body with a safe, non-toxic adhesive



## Appendix 5: Example Risk Assessment: Race To The Line 2.0 Bio: Racing

ACTIVITY	PERSON AT RISK	SIGNIFICANT HAZARDS	RISK*			RISK CONTROL MEASURES	RISK*		
			L	S	DR		L	S	DR
Setting up	Team members and others in the vicinity	Slips, trips and falls	2	1	<u>2</u>	<ul style="list-style-type: none"> <li>- Ensure demonstration and tether area is sealed off from unauthorised personnel</li> <li>- Use correct manual handling techniques when moving bricks etc.</li> <li>- Maintain a clear work area</li> <li>- Ensure the area is kept tidy &amp; the CO2 launch system is always supervised</li> </ul>	1	1	<u>1</u>
Making rocket cars	Participants	Hot wire cutter and tool injuries	2	2	<u>4</u>	<ul style="list-style-type: none"> <li>- Ensure any wires do not present a trip hazard.</li> <li>- Supervise or manage cutting using the hotwire cutter</li> <li>- Use hot wire cutters in open rooms/areas and at minimum practicable heat setting to prevent any smoke</li> <li>- Provide hammers and tools for cutting wheels &amp; axles</li> <li>- Keep area clean of dust, cut off foam, etc.</li> </ul>	1	1	<u>1</u>
Operating the rocket cars	Participants and team members	Freeze burns and flying object impact injuries	2	2	<u>4</u>	<ul style="list-style-type: none"> <li>- Ensure the steel tether wire is secured &amp; cable tensioned to avoid the car 'veering off course'</li> <li>- Ensure spectators stand clear of the finish area to avoid potential flying objects</li> <li>- Keep hands away from rapidly escaping gas, gloves and safety glasses should be worn.</li> <li>- Take care handling expended cartridges which may be extremely cold</li> <li>- Give clear instruction not to approach the track by anyone other than a team member</li> <li>- Tidy area before observers can use the area for normal activity</li> </ul>	1	1	<u>1</u>

\* Numbers used are for illustrative purposes only, \*\* Residual risk is the level of risk that remains after suitable and sufficient control measures are introduced.

LIKELIHOOD (L) = Frequent (5) – Probable (4) – Occasional (3) – Improbable (2) – Remote (1) SEVERITY (S) = Catastrophic (5) – Major (4) – Reportable (3) – Serious (2) – Minor (1) Degree of Risk (DR) = LIKELIHOOD x SEVERITY

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