



Canadian Association of Rocketry

CAR High Power Rocketry Safety Code

Overview

This Safety Code sets out the proper code of conduct for the launch of High Power Rockets in Canada. All High Power Rockets must be flown in accordance with this Safety Code.

High Power Rocket

My high power rocket is equipped with authorized motor(s) with a total impulse between 160 Newton seconds and 40,960 Newton seconds. It is equipped with a parachute or other device capable of retarding its descent. It is made of lightweight materials capable of withstanding the anticipated stresses of flight.

Requirements

I will fly High Power Rockets only in compliance with all federal, provincial, municipal and local laws, rules, regulations, statutes and ordinances, and in accordance with an authorization issued by the Minister of Transport.

I will only fly High Power Rockets for which I am certified and will provide proof of such certification upon request.

Launch Site Requirements

I will launch my high power rocket in an open, outdoor area where overhead hazards such as trees, power lines and buildings will not impact the safety of the launch operation.

I will launch my high power rocket in an area where launch operations will not generate hazards to persons, property, and/or land, water or air traffic.

I will obtain permission of the landowner for all launch operations.

My launch site shall include sufficient area for the launch and recovery of all high power rockets to be launched according to Table 1.

| Expected Altitude (feet) | Minimum Dimension (km) |
|--------------------------|------------------------|
| 0 - 3000 | 500 m |
| 3001 - 6000 | 1 |
| 6001 - 10000 | 2 |
| 10001 - 12000 | 3 |
| 12001 and over | To be determined |

Table 1: Launch Site Dimensions

Rockets expecting to achieve an altitude of 12,001 feet or more will be evaluated on a case by case basis.

My launch site shall never have a minimum dimension of less than one half the estimated maximum altitude of the high power rocket, or have a dimension less than 500m.

Launcher Requirements

My launcher shall be positioned so as to ensure that recovery of the rocket is within the area authorized for the launch site. It shall be located more than 500m from any occupied building or public roadway on which traffic density exceeds 10 vehicles per hour. It shall be located in an area, with a radius of at least 5m, which is cleared of all loose objects and flammable materials, such as dead grass.

My launcher shall provide rigid guidance for the rocket on launch to ensure the rocket attains flight within its predicted flight safety envelope, within 20 degrees of vertical, and shall incorporate a blast deflector or alternative means of preventing rocket motor exhaust from directly striking the ground or any flammable materials.

My launch rod or rail will be raised above eye level or have a shield placed over the end of the rod between launches.

Launch Site Safety Requirements

No person shall be closer to the launch of the high power rocket than the person launching the rocket unless authorized by the Range Safety Officer.

No person shall be closer to the launch of a high power rocket than the minimum safe distances specified in Table 2.

| Motor Type | Total Impulse (NS) | Minimum Distance (m) | Minimum Distance Complex Rocket (m) |
|------------|--------------------|----------------------|-------------------------------------|
| H | >160 - 320 | 30 | 60 |
| I | >320 - 640 | 60 | 100 |
| J | >640 - 1280 | 60 | 100 |
| K | >1280 - 2560 | 60 | 100 |
| L | >2560 - 5120 | 100 | 150 |
| M | >5120 - 10240 | 200 | 300 |
| N | >10240 - 20480 | 300 | 500 |
| O | >20480 - 40960 | 300 | 500 |

Table 2: Minimum Safe Distances

A complex rocket has more than one motor either in a cluster or stages, or in the opinion of the RSO shall be considered a complex rocket.

All spectators shall remain in an area determined to be safe and designated for public viewing by the Range Safety Officer.

Launch Requirements and Restrictions

I shall use only high power rocket motors, motor reloading kits or components authorized by NRCan and/or Transport Canada.

I will use authorized Reloadable motors only in the manner directed by the manufacturer. I will not modify any component of said motor cases, end enclosures, or expendable materials including propellant grains, delay charge, nozzle, motor liner and/or pressure sealing rings. Unless specified by the manufacturer I will not reuse any component of the reloadable hardware that is not so intended.

My High Power Rocket shall be inspected and approved for stability and operation immediately prior to flight by an authorized Rocket Inspector (RI).

My High Power Rocket shall not exceed the maximum liftoff weight of the rocket motor(s) specified by the manufacturer.

I shall not launch my high power rocket while another high power rocket is in flight, unless the high power rocket in flight has safely deployed its recovery system and the RSO has determined that the remainder of the flight presents no hazard to persons or property.

I will not launch my high power rocket into a cloud, nor when the prevailing visibility is less than 5km, nor when the surface wind is greater than 30 km per hour.

I will not use rocket motors to propel any device horizontally nor at an angle that takes the rocket beyond the boundary of the launch site.

I will not launch my high power rocket as a weapon at a surface or air target.

I will not launch a high power rocket that creates a hazard to aircraft.

I will only launch my high power rocket under the oversight and with the approval of the Range Safety Officer or in accordance with the requirements specified in the Rocket (High Power) Launch Authorization.

My high power rocket will never carry explosive, incendiary or live vertebrate animal payloads.

I will not allow smoking or open flames in the launch area, prepping area or within 10m of any high power rocket motor, motor reloading kit or pyrotechnic module.

I will ensure a five-second countdown, audible to all persons in the launching, spectator and parking areas, prior to the launch of my high power rocket.

The system I use to launch my high power rocket shall be actuated by means of a remote controlled electrical firing system, and will contain a firing switch that returns to the "OFF" position when released and a safety interlock to prevent accidental ignition when released.

My firing system shall be located no closer to the launch pad than the minimum distance specified in Table 2.

A method of disconnecting all power to the launch pad will be located within 5 meters of said launch pad.

Ignition devices for my high power rocket motors shall only be installed at the launch pad, or in an area designated by the Range Safety Officer, and in all cases as close to the time of intended launch as practical. The rocket shall be pointed in a safe direction during and after installation of the ignition device(s). This also applies to removal of ignition devices if the launch is aborted.

If my high power rocket suffers a misfire, I will not let anyone approach it until I have made sure that the safety interlock has been removed or that the battery has been disconnected from the ignition system. I will wait five minutes after a misfire before allowing only one person to approach and inspect the rocket.

I will not attempt to catch a high power rocket as it approaches the ground.

If a high power rocket becomes entangled in a power line or other hazardous location, I will not attempt to retrieve it without approval of the appropriate authority.

I will use only flame resistant, biodegradable wadding if wadding is required by the design of the rocket.

All vehicles over 5 kg in loaded mass shall have a redundant deployment system activated independently and in addition to the rocket motors ejection charge(s). This system will provide safe recovery in the event of primary deployment system failure.

All my pyrotechnical systems shall be mechanically protected to prevent premature ignition from EMI or heat sources.

I will use only electrical igniters recommended by the rocket motor manufacturer that will ignite my rocket motor(s) within three seconds of actuation of the launch switch.

I will ensure that adequate fire control apparatus (class A fire extinguisher and/or a minimum of 20 L of water) is readily available.

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