



# Australian Universities Rocket Competition 2018/2019

## Rules, Standards, & Guidelines

## Revision History

Revision	Description	Date
Baseline	Document created	20/01/2018
AURC Director SA State Representative Operations/Projects Manager	Formatting, Proofreading & Fact Checking	17/03/2018 - 25/03/2018
Operations/Projects Manager	Updated Sections 2.3, 2.5, 2.6 and changed Appendix B to reflect the most current CASA documentation	26/03/2018
AURC Director	Updates to project deliverable penalties for late submissions  Updates to payload scoring and details  Updated Section 2.3 to remove restrictions on the use of lead within launch vehicles  Added in new sections regarding AMRS Group Membership	15/09/2018
AURC Director + Teams Coordinator Leader	Updates to links in Documentation/Resources; addition of a list of AMRS affiliated rocketry clubs  Addition of a late submission penalty details to Project Deliverables  Addition of a late entry section and associated penalties  Reduction from three to two progress reports; third progress report marks moved to the Project Technical Report  Addition of a new section on L3 documentation  Changes to the team composition and eligibility restrictions – teams are now free to enter multiple categories, but require a separate rocket for each category  Additional marking penalties added to the Payload section – teams will receive a minor marks reduction if certain payload criteria are not met  Minor phrasing changes to the High-Powered Rocket Compliance section and the Tracking Systems section – no technical changes  Official Altitude logging section added to reflect the development of the AURC Approved Components document  Additional details added to the disqualification section – explicit outline of the disqualification process and criteria added New section added outlining the AMRS Group Membership details  Minor phrasing changes to Appendix A regarding payload recovery – no major technical changes	19/10/2018

Teams Coordinator	Addition of a section detailing rocket equivalency between the launch day rocket and the rocket in the final technical report  Additional details in the Payload appendix, detailing further restricted payload matter/materials	19/12/18
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## 1 Introduction

The Australian Universities Rocket Competition is Australia's first national university rocketry competition hosted by the Australian Youth Aerospace Association. Commencing in 2018, the AURC was designed with the aim to provide graduate engineers and scientists with the skills required for the growing aerospace industry in Australia. It also aims to provide a practical competition for Australian students passionate about rocketry. The AURC was inspired by a number of rocket competitions around the world, with the intention is to integrate the best parts of other rocket competitions around the globe to design the greatest tertiary rocket competition in the world. Furthermore, the AURC aims to encourage student teams to be as multidisciplinary as possible to reflect complex, real life space projects that require a mix of engineers and scientists from different backgrounds. This event continues the AYAA's legacy of promoting education, awareness and involvement in the aerospace industry to young Australians.

### 1.1 Background

Australia is no stranger to space; the nation's involvement can be dated back as far as the 1940's when the Woomera Rocket Range was established in South Australia. This site eventually became a landmark in the west as the world's second largest launch and tracking facility. Paul Scully-Power, the first Australian to enter space as an Oceanographer in 1985, and Andy Thomas the first Professional Australian Astronaut acting as payload commander in 1996 are a few famous names in Australia's space adventures. Fast forwarding to recent times, in 2017, South Australia hosted the International Astronautical Congress, where the Australian Space Agency was announced. Exciting times are certainly ahead for Australians, and the AYAA hopes to strengthen this by fostering a greater interest in aerospace with a national rocketry competition. Additionally, this competition aims to increase the interest in STEM careers for Australian university students and provide them with a practical outlet to extend themselves beyond the lecture halls to design and build rockets themselves. The students that compete will develop their skills in a team environment, solving real-world problems under the same pressures they would experience in their future careers. This will be the inaugural AURC and the AYAA hope to continue this as an annual competition.

### 1.2 Purpose and Scope

This document defines the deliverables for teams with respect to scoring, as well as the guidelines involving what is and is not acceptable. If there are any further questions that are not answered by this document and all other subsequent resources, do not hesitate to contact an AURC representative whose details can be found on the AURC website.

General guidance for student teams entered in the AURC can be found on the Australian Model Rocketry Society (AMRS) webpage (<https://rocketry.org.au/>). The AMRS is Australia's premier representative body for rocketry, which advocates for its various member groups and exists to serve the broader rocketry community. Organisers of the AURC highly recommend joining a local AMRS club for mentorship in rocket building. Departures from this guidance may negatively impact a student team's rocket design and launch performance.

## 1.3 Documentation/Resources

### 1.3.1 Useful Documentation

The following documents include standards, guidelines, schedules, or required standard forms. The documents listed in Table 1 are either applicable to the extent specified in this document, or contain reference information useful in the application of this document.

Table 1: Document File Locations

Document	Location
AURC Master Schedule	AURC Website ( <a href="http://aurc.ayaa.com.au/">http://aurc.ayaa.com.au/</a> )
AURC Scoring	AURC Website ( <a href="http://aurc.ayaa.com.au/">http://aurc.ayaa.com.au/</a> )
AURC Entry Forms	AURC Website ( <a href="http://aurc.ayaa.com.au/">http://aurc.ayaa.com.au/</a> )
AURC Progress Update	AURC Website ( <a href="http://aurc.ayaa.com.au/">http://aurc.ayaa.com.au/</a> )
AURC Project Technical Report Template	AURC Website ( <a href="http://aurc.ayaa.com.au/">http://aurc.ayaa.com.au/</a> )
Civil Aviation Safety Regulations 1998: Part 101—Unmanned aircraft and rockets	CASA Website ( <a href="https://www.legislation.gov.au/Details/F2017C00742/Html/Volume%203#_Toc493165511">https://www.legislation.gov.au/Details/F2017C00742/Html/Volume 3# Toc493165511</a> )
AMRS Safety Information	AMRS Website ( <a href="https://rocketry.org.au/safety-information/">https://rocketry.org.au/safety-information/</a> )
AMRS Affiliated Organisations	AMRS Website ( <a href="https://rocketry.org.au/organisations">https://rocketry.org.au/organisations</a> )
AURC Approved Components	AURC Website ( <a href="http://aurc.ayaa.com.au/">http://aurc.ayaa.com.au/</a> )
AMRS HPR Certification Levels	AMRS Website ( <a href="https://rocketry.org.au/wp-content/uploads/2015/02/AINFO-001-AMRS-HPR-Certification-Levels-rev1_2-20150818.pdf">https://rocketry.org.au/wp-content/uploads/2015/02/AINFO-001-AMRS-HPR-Certification-Levels-rev1_2-20150818.pdf</a> )

### 1.3.2 List of AMRS Affiliated Rocketry Clubs

Table 2 presents a list of all AMRS affiliated rocketry clubs across Australia and their corresponding websites.

Table 2: AMRS Affiliated Clubs

Club Name	Website
Melbourne Amateur Rocket Society Inc. (MARS)	<a href="https://rocket.org.au/">https://rocket.org.au/</a>
Queensland Rocketry Society (QRS)	<a href="https://qldrocketry.com/">https://qldrocketry.com/</a>
NSW Rocketry Association Inc.	<a href="https://www.nswrocketry.org.au/">https://www.nswrocketry.org.au/</a>
Western Australian Rocketry Society (WARS)	<a href="https://wars.org.au/">https://wars.org.au/</a>

## 1.4 Australian Universities Rocket Competition Overview

Student teams competing in the AURC must design, build, and launch a single-staged rocket with a commercial-off-the-shelf (COTS) solid rocket motor. This rocket must carry a 4 kg payload to a target height of either 10,000 ft or 30,000 ft above-ground-level (AGL). Student teams will need to submit several progress updates and a project technical report throughout the duration of the competition to the AURC organising committee. Teams are strongly encouraged to work with local AMRS rocketry clubs for mentoring and safety input.

The AURC reserves the right to change the category in which a project is initially entered based on the design presented. Teams are permitted to switch categories as necessary prior to submitting their final Project Technical Report.

## 1.5 Project Deliverables

The Project Deliverables outline what is required to be submitted by the participating teams for marking. Failure to meet the deadlines for these deliverables will result in a penalty and potential disqualification, thus it is imperative that all deliverables are met. As per the AURC Awards and Scoring document, should a report be submitted late, a 5% per day reduction in your mark for this piece of assessment will apply. In addition, the AURC reserves the right to disqualify teams who consistently do not meet project deliverables or provide un-satisfactory documentation.

All deliverables, unless otherwise noted, must be submitted to the AURC via the AURC website. Each time a deliverable is due, a submission portal will be made available on the AURC website. The scheduled due dates of all required deliverables are recorded in the AURC Master Schedule, maintained on the AURC website (<http://aurc.ayaa.com.au/>). Note: Due to the importance of the Project Deliverables, the AURC has decided to retain most of the current information, and release them in their complete form in the weeks to come.

### 1.5.1a Entry Form

Each student team intending to compete in the AURC is required to fill out a registration form available on the AURC website (<http://aurc.ayaa.com.au/>). After a team has submitted an entry form, the AURC will issue the respective team with a numeric Team ID which is used to identify the student team and their rocket throughout the duration of the AURC. Any official correspondence between the student team and the AURC organising committee must contain the Team ID to ensure a reliable and punctual response.

### **1.5.1b Late Entry**

Should a team wish to enter the AURC after the team application deadline has passed the team's application will be subject to the review and approval of the AURC committee. The AURC committee reserves the right to accept or reject late entry applications from teams at their discretion. If the AURC committee accepts the team's late entry application, a 50% increase in the initial entry deposit will be required to be paid. This raises the initial entry deposit to a total of \$450.

The team application deadline for the 2018/2019 competition is 17<sup>th</sup> August 2018.

### **1.5.2 Progress Updates**

Each team is required to submit two progress updates throughout the duration of the AURC. Refer to the 2018/2019 Competition Schedule document found on the AURC website (<http://aurc.ayaa.com.au/>) for dates on progress update submissions. Each progress update will be used to ensure the teams are on track and following the correct safety procedures whilst working with high powered rockets. Progress updates will be scored on engineering professionalism, punctuation, grammar, spelling, technicality and adherences to safety codes. Specific criteria and mandatory content for each progress update will be released in advance of the deadline. However, each progress report will require the submission of your team's competition rocket OpenRocket file.

### **1.5.3 Project Technical Report**

One month before the launch event is scheduled to occur, each team must submit their Project Technical Report to the AURC organising committee. The Project Technical Report serves as an overview of the respective team's project to the judging panel and other competition officials. Further information on the scoring criteria of the project technical report is contained in the AURC Awards and Scoring document, maintained on the AURC website (<http://aurc.ayaa.com.au/>).

Note that the Project Technical Report submission will also be required to include the Virtual Vehicle Design and the Analytical Simulation results as these items will be marked concurrently.

### **1.5.4 School Participation Letter**

Teams are required to have a participation letter that is signed by an academic institution, acknowledging the teams' participation in the event. A sufficient signature is one that is provided by either a faculty member or other paid, non-student staff representative. The purpose of this signature is to confirm that the team is representing that academic institution. Regardless of the number of teams from an academic institution, only one participation letter is needed, as long as each participating team is clearly identified. If multiple academic institutions are contributing to a singular team then each of the representing institutions must provide a signed letter for that particular team.

Note that this is not a replacement for the Entry Form, but rather a requirement from the AURC.

### **1.5.5 L3 Documentation**

For teams that are intending to undertake their L3 certification as part of their competition launch the team will need to ensure it meets all AMRS L3 certification requirements in addition to any AURC competition requirements. Note that it is the team's responsibility to find their own ACOs to sign off on their L3 certification paperwork.

Please contact your local rocketry club as soon as possible to organise your team's ACOs and to start the L3 certification process. Additional information regarding the AMRS L3 certification process can be found on the AMRS website ( <https://rocketry.org.au/>).

Furthermore, any team undertaking their L3 certification as part of their competition launch will be required to provide the AURC committee with a copy of their approved L3 paperwork one (1) month prior to the launch event at Thunda Down Under 2019.

Note that a team's L3 documentation will not be marked. However, it is required to be supplied to the AURC for safety purposes.

## **1.6 Revision**

AURC withholds the right to revise the AURC Rules, Standards & Guidelines. Minor revisions which do not impact the design goals of the teams competing may be made throughout the year. Major revisions which affect the design goals of competing teams will only be made during the transition between competition years. It is the responsibility of the participating team to ensure that they are correctly using the most recently revised document, available on the AURC website (<http://aurc.ayaa.com.au/>). Student teams will be made aware of revisions (both minor and major) through email to the people listed on the registration submission.

## **2.0 Team and Competition Specifications**

### **2.1 Team Composition and Eligibility**

Teams are encouraged to diversify their educational background when selecting or recruiting new team members. The AURC is designed to be as multidisciplinary as possible, by encouraging students from all programs to take part in the project and work alongside each other. Real world complex projects, like launching rockets with a scientific payload, require efficient teamwork by people from different educational backgrounds and experiences. Every team entered into the AURC is required to abide by the rules and guidelines outlined in the following section.

#### **2.1.1 Student Team Members**

AURC teams shall consist of members who are current undergraduate or graduate students (including Masters or PhD students) during the current academic year from one or more academic institutions (e.g. "joint teams" are eligible). Students who graduate throughout the course of a competition (e.g. are enrolled at the time of registration opening but have graduated by the time of competition) remain eligible to compete in the AURC. There is no limit on the overall number of students per team, or on the number of graduate students per team. Students are free to participate in multiple teams, so long as each team is led by a different individual.

#### **2.1.2 One Rocket Per Category**

AURC teams are free to enter both altitude categories, so long as each category has a dedicated team leader (as per Section 2.1.1). However, teams may only enter one rocket per altitude category. This is to prevent a single team from saturating a category with a large number of similar rockets. Note that AURC competition fees are required to be paid for each category entered by a team. For example, should a team wish to enter both the 10,000 ft and 30,000 ft categories, the team would be required to pay two sets of AURC competition fees. Note also, that it is permissible to change categories prior to the submission of the Project Technical Report. Please advise the AURC via email should your team wish to change category.

#### **2.1.3 Rockets and Documentation**

On the day of competition launch for any AURC team, the rocket which is to be launched will need to undergo an examination process prior to launch. An examination will be conducted by AURC personnel who will assess and compare the equivalency of the rocket presented on launch day, to the rocket presented within the submitted "Project Technical Report". Essentially the physical rocket being demonstrated must be the same as the one presented in the technical paper. Whether the equivalency is met will be subject to the discretion of the AURC personnel on the day of the examination.

The AURC will potentially accept changes that a team has had to make to their rocket which makes it differ to that which is found in the technical report. However these changes need to have been made due to safety concerns, with documented evidence of how these safety concerns arose. Furthermore, sufficient justification documentation needs to be provided for these changes, detailing all changes made. Approval of the changes will be subject to the discretion of the AURC, as such it is advised that all possible changes be implemented before the deadline of the "Project Technical Report".

The rocket submitted for launch will also have to comply with any documentation submitted for L3 certification. More details on L3 certification documentation are supplied in section 1.5.5 L3

Documentation. Furthermore, the rocket will also have to undergo an inspection by a Range Safety Officer (RSO) to ensure compliance with all safety requirements on the day of launch.

## 2.2 Payload

The payload challenge for student teams is to design, build, and launch a four kilogram (4 kg) payload to one of the two height categories of the AURC. The objective of the payload is to encourage student teams to design and develop payloads that achieve a meaningful function and provide a learning outcome. Whilst the AURC recognises that teams will more than likely be composed of engineering students, teams are encouraged to engage with and invite science students (graduate or postgraduate) to develop and manage the scientific aspect of the payload. Student teams are also encouraged to invite electrical, software, and computer science students to develop the flight controllers, communications, and other associated electronics. The payload has no specific scoring criteria, but a deduction system has been implemented which will be based on technical/scientific objectives, construction, readiness, safety and deployment. Additionally, teams are encouraged to engage non-technical students to help with strategic planning, marketing, media, sponsorship or otherwise. Further information regarding the payload can be viewed in Appendix A: Payload Specifications.

## 2.3 High-Powered Rocket Compliance

Launch vehicles entered in the AURC are considered rockets of the high-power type and will be treated as such in compliance with Civil Aviation Safety Authority (CASA) Regulations and all other federal, state, and local laws, rules and regulations. High Power Rocketry (HPR) involves rockets that weigh greater than 1.5kg Gross Lift-Off Weight (GLOW) and/or have greater than 62.5 grams in an individual motor and/or produce more than 160 Ns in an individual motor ('H' impulse motor). Refer to Part 101 of the Civil Aviation Safety Regulations 1998 ([https://www.legislation.gov.au/Details/F2017C00742/Html/Volume\\_3#\\_Toc493165511](https://www.legislation.gov.au/Details/F2017C00742/Html/Volume_3#_Toc493165511)). For the relevant heights to be achieved in the AURC a significantly higher-powered motor than the H class is expected to be used. An acceptable range of total impulse for the AURC is between 160 and 40,960 N.s.

During testing, teams must launch from a CASA approved area (see CASR 101.425) in order to operate high power rockets. It is best to speak with your local rocketry club to discuss what size motors you can fly at their relevant launch sites.

The CASA High Power Safety Code is attached as Appendix B: High Power Rocket Safety Code.

## 2.4 Tracking Systems

Launch vehicles, and any deployable payload(s), shall carry a radio beacon or similar transmitter aboard each independently recovered assembly to aid in locating them after launch. Live telemetry implementation is highly encouraged; however, all tracking systems must abide by the Australian Communications and Media Authority (ACMA) Australian Radiofrequency Spectrum Plan. Local AMRS clubs can provide guidance on which products to use and where to purchase them. Purchasing equipment from overseas is acceptable, however care must be taken to ensure the radio frequency used by the overseas products abide by the ACMA's requirements. The AURC is not liable for any federal offences that teams may receive during testing.

## 2.5 Official Altitude Logging

The AURC organising committee will provide a list of approved altimeters to record the official data log of height for scoring purposes at a later date. For the official altimeter list please refer to the *AURC Approved Components* document. Should a team find themselves unable to use an approved altimeter, they will be required to justify the reason for this to the AURC committee. If a deployable payload is used, the altimeter shall be integrated into the launch vehicle and not the payload. Officials will review each altimeter before launch, and extract altitude data upon successful recovery of the rocket before handing the recovered rocket back to the team.

## 2.6 Disqualification

Teams can be disqualified from the competition if any of the following criteria are met:

- The mission rules, standards and guidelines as set out in the *AURC Rules, Standards & Guidelines* document are not met;
- The team is found guilty of cheating or plagiarism in any way (If the team is found guilty of cheating or plagiarism, the team will also come under the scrutiny of the competition officials, with the additional potential for the team to be banned from entry to future competitions);
- Consistent failure to meet progress/technical report deadlines or required quality (refer to the *AURC 2018/2019 Competition Schedule*); and
- Breaching of any critical safety protocols established by rocket launch site operators during the launch event.

Note that all teams that are disqualified from the competition are ineligible for any refunds.

In general, teams will not be immediately disqualified should they fail to meet the aforementioned criteria. Instead, teams will be given three warnings prior to the AURC committee disqualifying them from the committee. The general process for disqualification is as follows:

1. First Warning Issued – Formal warning delivered via email to team lead/s.
2. Second Warning Issued – Formal warning delivered via email to team lead/s with specific actions and deadlines detailed within.
3. Final Warning Issued – Phone call with team lead/s to discuss the immediate action plan required to keep the team within the AURC.
4. Disqualification – Failure to comply with the final warning, or the acquisition of an additional warning will result in disqualification. Team lead/s will be notified of their team's disqualification via email.

The disqualification process presented above applied for most disqualification criteria. However, if a team endangers themselves, other competitors or the general public by breaking any critical safety protocols at the launch event, or are found to be guilty of cheating or plagiarism they can be immediately disqualified from the competition at the discretion of the AURC committee.

## 2.7 AMRS Group Membership

Upon payment and processing of the initial entry deposit, each team within the AURC will be provided with an AMRS group membership. This initial entry deposit is to be paid to the AURC. The AURC will then organise a team's AMRS group membership and pay AMRS the required fee.

The AMRS group membership allows teams to construct and fly their rockets with any AMRS club across Australia as well as having any certifications achieved during the AURC recognised for a nominated individual. By flying your rockets with AMRS clubs this provides your team will access to AMRS's public liability insurance (up to \$20 million) as well as their flight facilities and launch equipment.

Typically, an AMRS membership requires an individual to be the sole designer and manufacturer of the launch vehicle they intend to certify on. However, the AMRS group membership allows teams to nominate one team member to accept all certifications achieved throughout the competition. These certifications will be retained by said team member after the AURC competition has finish. Apart from this difference, the AMRS group membership functions exactly the same as a normal individual AMRS membership allowing your team to take full advantage of the services and facilities AMRS has to offer.

Note that the person who is nominated to accept the certifications as part of your group membership will need to be present at the competition launch event as well as holding all relevant explosives licences required for the state in which the launch event occurs (Queensland).

Finally, if other team members wish to fly their own rockets or achieve their own certifications they will need to purchase an individual AMRS membership.

## **2.8 Withdrawal from the AURC**

Teams may withdraw from the AURC at any time by sending a formal email to the AURC organising committee with their Team ID in the subject title. Withdrawal may forfeit the competition entry deposit, as stipulated in the competition schedule.

# Appendix A: Payload Specifications

## A.1 Payload Mass and Physical Dimensions

The minimum capacity for the payload shall be no less than four kilograms (4kg). The definition of a payload is being defined as: *“replaceable with a dead weight of the same mass, with no change to the launch vehicle trajectory in reaching the target apogee, or its’ successful recovery.”* The weight of the avionics package is not included in the payload.

This payload will be assumed present when calculating the launch vehicle's stability. In other words, launch vehicles entered in the AURC need not be stable *without* the required payload mass on-board.

On competition day, the payload will be weighed and a tolerance of 5% will be accepted. Thus, an acceptable payload weight on the competition scales will be at least 3,800 grams due to the potential calibration errors between the participant scales and the competitions. Note, the payload weight can exceed 4,000 grams as this is a minimum requirement and not a target.

The payload does not have any physical dimension restrictions, but it is required to be fully enclosed in the rocket before launch and must always be either secured inside the rocket or autonomously stable outside with the capability of returning home safely. If the payload will operate autonomously to the rocket and return home safely, evidence of the payload’s capability to do this must be provided prior to the launch day.

## A.2 Payload Functionality

Whilst the payload is not required to be functional, if they are used in a scientific experiment or technology demonstration and have been entered in the AURC, they can be evaluated for awards by sponsors as part of a payload challenge. This challenge will still follow the AURC rules and guidelines for unique and innovative payloads, however a sponsor will select a winning payload based on criteria which may include scientific or technical objectives, construction, turnkey operation, and execution.

## A.3 Non-functional Payloads

If a team has elected to not design a functional payload that is in accordance to the payload rules, standards and guidelines, then the team must provide a four kilogram (4kg) ballast to be in place of the functional payload.

## A.4 Payload Location and Interface

Whilst the location and integration mechanism of each team’s payload is not specified in the AURC documentation, competition officials will be required to weigh the payload, independent of the launch vehicle structure and associated flight systems. Thus, it is imperative that the payload is designed to be easily removed from the launch vehicle to be weighed. If the launch vehicle design prevents removal of the payload to be weighed on the competition day, competition officials will impose a point penalty on the respective team.

## A.5 Restricted Payload Materials

Due to CASA regulations, there is a restriction on the type of materials that can and cannot be used with a payload. It is imperative that the payload will never carry live animals (except insects) or any material that is intended to be flammable, explosive or harmful. Likewise, there shall be no

usage of radioactive materials unless otherwise permitted by a competition official and signed off.

Furthermore the AURC is enforcing a ban on any payloads which purposely contain bacterial or viral organics, unless these payloads have been approved by the AURC beforehand. Please contact the AURC if you suspect your payload may be in violation of this ban.

In order to comply with these restrictions, the payload presented on the day will be subject to inspection and approval by the AURC, AMRS and the launch site landowner. Should any of the three parties deem the payload to be unsuitable to launch due to a legitimate reason, the payload will not be allowed to fly.

## Appendix B: High Power Rocket Safety Code

1. **Certification.** I will only fly high power rockets or possess high power rocket motors that are within the scope of my user certification and required licensing.
2. **Materials.** I will use only lightweight materials such as paper, wood, rubber, plastic, fiberglass, or when necessary ductile metal, for the construction of my rocket.
3. **Motors.** I will use only certified, commercially made rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer. I will not allow smoking, open flames, nor heat sources within 8 metres feet of these motors.
4. **Ignition System.** I will launch my rockets with an electrical launch system, and with electrical motor igniters that are installed in the motor only after my rocket is at the launch pad or in a designated prepping area. My launch system will have a safety interlock that is in series with the launch switch that is not installed until my rocket is ready for launch, and will use a launch switch that returns to the "off" position when released. The function of onboard energetics and firing circuits will be inhibited except when my rocket is in the launching position.
5. **Misfires.** If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher's safety interlock or disconnect its battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.
6. **Launch Safety.** I will use a 5-second countdown before launch. I will ensure that a means is available to warn participants and spectators in the event of a problem. I will ensure that no person is closer to the launch pad than allowed by the accompanying Minimum Distance Table, shown in Table 1. When arming onboard energetics and firing circuits I will ensure that no person is at the pad except safety personnel and those required for arming and disarming operations. I will check the stability of my rocket before flight and will not fly it if it cannot be determined to be stable. When conducting a simultaneous launch of more than one high power rocket I will observe the additional requirements of AMRS Safe Launch Practices.
7. **Launcher.** I will launch my rocket from a stable device that provides rigid guidance until the rocket has attained a speed that ensures a stable flight, and that is pointed to within 20 degrees of vertical. If the wind speed exceeds 8 km (5 miles) per hour. I will use a launcher length that permits the rocket to attain a safe velocity before separation from the launcher. I will use a blast deflector to prevent the motor's exhaust from hitting the ground. I will ensure that dry grass is cleared around each launch pad in accordance with the accompanying Minimum Distance table, and will increase this distance by a factor of 1.5 and clear that area of all combustible material if the rocket motor being launched uses titanium sponge in the propellant.
8. **Size.** My rocket will not contain any combination of motors that total more than 40,960 N-sec (9208 pound-seconds) of total impulse. My rocket will not weigh more at lift-off than one-third of the certified average thrust of the high-power rocket motor(s) intended to be ignited at launch.

9. **Flight Safety.** I will not launch my rocket at targets, into clouds, near airplanes, nor on trajectories that take it directly over the heads of spectators or beyond the boundaries of the launch site, and will not put any flammable or explosive payload in my rocket. I will not launch my rockets if wind speeds exceed 32 km (20 miles) per hour. I will comply with the Civil Aviation Safety Authority airspace regulations when flying, and will ensure that my rocket will not exceed any applicable altitude limit in effect at that launch site.
10. **Launch Site.** I will launch my rocket outdoors, in an open area where trees, power lines, occupied buildings, and persons not involved in the launch do not present a hazard, and that is at least as large on its smallest dimension as one-half of the maximum altitude to which rockets are allowed to be flown at that site.
11. **Launcher Location.** My launcher will be 450 metre (1500 feet) from any occupied building or from any public highway on which traffic flow exceeds 10 vehicles per hour, not including traffic flow related to the launch. It will also be no closer than the appropriate Minimum Personnel Distance from the accompanying table from any boundary of the launch site.
12. **Recovery System.** I will use a recovery system such as a parachute in my rocket so that all parts of my rocket return safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rocket.
13. **Recovery Safety.** I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places, fly it under conditions where it is likely to recover in spectator areas or outside the launch site, nor attempt to catch it as it approaches the ground.

Table 3: Minimum Distance Table

Installed Total Impulse (Newton-Seconds)	Equivalent High Power Motor Type	Minimum Diameter of Cleared Area (m / ft.)	Minimum Personnel Distance (m / ft.)	Minimum Personnel Distance (Complex Rocket) (m / ft.)
160.01 -- 320.00	H	15 / 50	30 / 100	61 / 200
320.01 -- 640.00	I	15 / 50	30 / 100	61 / 200
640.01 -- 1,280.00	J	15 / 50	30 / 100	61 / 200
1,280.01 -- 2,560.00	K	23 / 75	61 / 200	91 / 300
2,560.01 -- 5,120.00	L	30 / 100	91 / 300	152 / 500
5,120.01 -- 10,240.00	M	38 / 125	152 / 500	305 / 1000
10,240.01 -- 20,480.00	N	38 / 125	305 / 1000	457 / 1500
20,480.01 -- 40,960.00	O	38 / 125	457 / 1500	610 / 2000

**Note: A 'complex' rocket is one that is multi-staged or that is propelled by two or more rocket motors**