

# URRG Collegiate Rocketry Program Guidelines

## ( For Cooperative Builds )

General Policies, Rules & Requirements –

Please read the URRG Range Rules. They are there to help all.

All NAR or Tripoli certification requirements must be met.

Every individual attempting certification has a valid NAR or Tripoli membership

and has their ID with them on the day of the certification attempt.

Certification attempts are subject to assessment by URRG Range Safety Officer.

Arrangements for certification attempts must be made in advance with URRG BoD.

Rockets should be fully constructed and craftsmanship reviewed by college team leadership

before arriving at the field.

All flight safety calculations are completed and have been reviewed by the college team leadership

before arriving at the field.

Simulation of flight in OpenRocket or RockSim

Certification rockets are built entirely by the person being certified. Helping somebody is one thing,

building part or all their rocket for them is not OK.

### **Friday Field Reservations:**

For 2021, a new policy has been enacted where on the Friday before a scheduled club launch a college team may reserve the field for flight operations. This will allow team activities to not overlap with the weekend club launch activities, providing better access to the pads and closer support by URRG club leadership.

URRG club volunteers will provide all safety inspections and flight operations.

Friday field reservations are required in the following situations:

Teams intending to certify 6 or more flyers

Any team project or activity which is deemed by URRG club leadership to require additional levels of review and supervision.

Note 1 – Reservations are not available the month that URRF is hosted

Note 2 – A minimum of 4 weeks' notice is required to reserve the field

Note 3 – Teams are still required to be a member of URRG Collegiate Rocketry Program.

The annual fee for membership in the URRG Collegiate Rocketry Program is \$475. Additional fees may apply for any project that requires unusual levels of URRG club support in order to be safely conducted.

### **Certification Flights:**

All certification flights (NAR or Tripoli) will be conducted and witnessed by URRG club leadership

It is expressly prohibited for students or college affiliated personnel to conduct their own independent certification activities at URRG

All student L1 and L2 certification flights should refer to the URRG Student Certification Guidelines document for information on encouraged certification practices

All students intending to certify must provide a minimum of 4 weeks' notice to the club

### **L1 – Suggestions for Success:**

5 to 1 min, 10 to 1 preferred thrust-to-weight ratio.

Stability: 1 to 2 calibers. CG should be located with an actual measurement of the ready-to-fly rocket.

Target max altitude less than 2000ft.

Limit to H engine. Positive motor retention recommended.

### **L2 - Suggestions for Success:**

5 to 1 min, 15 to 1 preferred thrust-to-weight ratio.

Stability: 1 to 2 calibers. CG should be located with an actual measurement of the ready-to-fly rocket.

Target max altitude less than 3500 ft.

Limit to J engine. Positive motor retention mandatory.

### **Team Projects:**

The club requires 4 weeks' notice (8 weeks preferred) prior to team project flights

Teams are strongly encouraged to engage URRG club leadership several months before an anticipated team flight where all novel aspects of the rocket construction and flight characteristics can be discussed.

Most issues which might result in a denial to fly from the club can only be corrected long before construction of a rocket is begun.

### **Other General Guidance:**

Team leader(s) should be actively supporting team members getting certified. Team leader(s)

should NOT be focused on other team projects during certification attempts.

Each cert flyer has three ignitors (Primary plus two replacements).

Use Aerotech DMS single-use motors to avoid motor case shortages, or bring enough motor cases for all the certification flyers so that you do not need to share.

Use rail buttons for 10/10 rails. NO launch lugs. 3D printed rail guides are discouraged.

Target 25 to 30 ft/s descent rate (Potter soil is very soft).

Use trackers (URRG will have a few trackers to rent in 2021, but not enough for an entire college team).

### **3D Printed Parts:**

3D printed fins, fin cans, motor retainers and any 3D printed part which transfers motor thrust forces to the overall rocket are prohibited for all certification flights and are strongly discouraged for all other individual and team flights.

3D printed nosecones and rail guides are discouraged and will receive additional inspection.

All 3D printed parts will be thoroughly evaluated for structural integrity prior to being cleared for flight.

All 3D printed parts of any kind must be described to URRG personnel before arriving at the field,

This includes disclosure of the type of plastic used to make the printed part.

### **Required Flight Progressions and Establishing Team Credibility:**

When a team project is first flown at URRG there will be a 10K altitude limit imposed

Highly novel rockets will have a lower altitude ceiling imposed for initial flights

Depending on the level of complexity and novelty for a student project, more than one demonstration flight below 10K may be required in order for the URRG leadership to establish the abilities of the team in question

Only after a team has established credibility with URRG leadership with regard to their team leadership, organization, coordination, safety philosophy, design and construction capabilities and overall level of responsibility will they be allowed to fly to the URRG waiver of 18K

Team flights performed at other club facilities or with "similar" rockets do not apply to fulfilling these requirements

### **Experimental or Nonstandard Construction:**

In pushing the bounds of amateur rocketry, many individuals and team projects are using non-traditional building materials, designs and methodologies. URRG certainly encourages research in rocketry. However, until a team establishes credibility and a successful track record for flights at URRG, teams are advised to minimize anything "unusual" in their rockets. URRG staff will always defer to the safest choice when deciding if a rocket will be allowed to fly. Teams are required to fully disclose all unusual or non-standard components

and construction techniques before scheduling a team flight. If you are uncertain what “experimental or nonstandard” means, please ask !

### **Flight Simulations:**

All student and team launches must provide a RockSim or OpenRocket simulation of the flight at least 4 weeks prior to the planned launch date. Only by special exception will other simulation software be allowed.

### **Recovery Electronics:**

Commercial Off the Shelf (COTS) recovery electronics must be used as the primary and backup recovery control systems when using Level 3 (M and larger) motors

For Level 2 (J, K and L) flights, electronic recovery is highly recommended. If electronic recovery is chosen for these flights, the electronics must be COTS.

Only conventional black powder ejection charges or COTS CO2 systems are allowed to accomplish separation of rocket body parts in flight.

However, a commercially manufactured altimeter user assembled kit is allowed.

### **Custom and/or Student Built Electronics:**

Custom flight telemetry, data logging and GPS or radio beacon tracking electronics are allowed

Custom staging, air start, motor ignition or tilt detection electronics are not permitted.

Again, any altimeters used for deployment of recovery hardware must be COTS

### **Multi-Stage and Air-start Flights (adapted from Kloudbusters rules):**

When everything works as designed, a multi-stage or air-start high power flight is spectacular. However, when something goes wrong, things can get ugly really quickly. There is no doubt that a multi-staged rocket flight anomaly presents a higher risk of injury or property damage than a conventional single stage rocket. There are several failure modes present in multi-stage rockets not present in single stage flights including sustainer motors firing when they are not supposed to (on the ground or in flight) as well as sustainers firing after the booster has failed for one reason or another. These failure modes directly impact safety of both the flyers and spectators as the result can be the flight of a rocket under thrust in a non-vertical trajectory. In an effort to minimize risk, all multi-stage or air-start high power flights at URRG must comply with the following requirements:

The ignition of the sustainer motor must be controlled by one of two types of COTS electronics:

- (A) An altimeter capable of inhibiting the ignition of the sustainer unless a specific time/altitude threshold is met
- (B) An altimeter that checks for vertical trajectory of flight prior to sustainer ignition

Flights for all high-power multi-stage or air-start rockets will be required to provide a full description of the COTS electronic controls design and motor ignition sequencing and lockout plan prior to scheduling a flight.

### **URRG Independent Flight Electronics:**

If URRG leadership deems it necessary or prudent, a student or team flight may be required to carry a small altitude data logging system (e.g. FlightSketch Mini) provided by URRG. This system will provide URRG leadership with actual flight data to help better understand how the student-provided altitude predictions actually compared with the final flight trajectory.

### **Trackers:**

It is strongly recommended that all student and team projects exceeding 3K in altitude carry a tracking device so that the rocket can be easily located should it land in crops or wooded areas. URRG trackers are available for rent. If a tracker rental is desired, the student or team should notify URRG leadership in advance. URRG trackers will not fit all rockets. A security deposit is required for rental.

### Suggested Website Resources

<https://www.nar.org/high-power-rocketry-info/level-1-hpr-certification/>

<https://www.nar.org/wp-content/uploads/2019/03/NAR-High-Power-Certification-Application-Level-1.pdf>

<https://www.nar.org/high-power-rocketry-info/level-2-hpr-certification/>

[https:// http://www.tripoli.org/Portals/1/Documents/Safety%20Code/HighPowerSafetyCode%20-%202017.pdf](https://http://www.tripoli.org/Portals/1/Documents/Safety%20Code/HighPowerSafetyCode%20-%202017.pdf)

<http://www.tripoli.org/Portals/1/Documents/Certification/Advanced%20Study%20Guide%202012-update.pdf>  
[http://www.tripoli.org/Portals/1/Documents/Certification/Universal\\_Certification\\_Form.pdf](http://www.tripoli.org/Portals/1/Documents/Certification/Universal_Certification_Form.pdf)

[www.nar.org/wp-content/uploads/2014/08/HP-question-pool.pdf](http://www.nar.org/wp-content/uploads/2014/08/HP-question-pool.pdf)