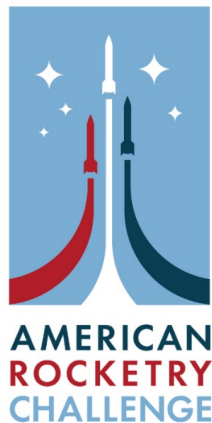


FED. SUPPLY CLASS

NONE

2027 RULES AMERICAN ROCKETRY CHALLENGE



THIRD ANGLE PROJECTION	
PROCUREMENT SPECIFICATION	NONE

CUSTODIAN NATIONAL ASSOCIATION OF ROCKETRY	TITLE 2027 RULES, AMERICAN ROCKETRY CHALLENGE
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CLASSIFICATION STANDARD PRACTICE ARC-1 SHEET 1 OF 8

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FOREWORD

The Aerospace Industries Association (AIA) develops and publishes standards using a consensus process that meets the approval requirements of the AIA procedures (SGC-1).

The National Aerospace Standards (NAS) are voluntary standards developed by the aerospace industry. Subject matter experts from AIA member companies and industry stakeholders participate in committees and working groups to develop and maintain the NAS library. These standards cover a wide variety of subject areas. For a description of AIA councils and committees, see <https://www.aia-aerospace.org/membership/committees/>.

For more information on the standards development process see <https://www.aia-aerospace.org/standards/>.

Regulations

Nothing in this document relieves any party from complying with applicable local, state, federal and/or host nation codes and laws.

Trade Names or Trademarks

NAS standards shall no longer document proprietary or trademarked items or features. When revising standards that contain trade names or trademarks, the established generic names shall be used instead and the trade name or trademark deleted from the standard.

Patent Numbers

Reference to patent numbers shall not be made.

Revision Information

This version includes the following significant changes compared to the previous version:

- Flight duration and target altitudes have been updated;
- Payload requirement has changed from 1 egg to 2;
- Rocket diameter requirements have been updated;
- Adult Team Advisors must be over the age of 21;
- The term "sponsoring organization" has been changed to Host Organization;
- Host Organizations must be broadly community-serving and support youth activities beyond American Rocketry Challenge;
- The "officially appointed representative" of a Host Organization has been renamed the Adult Representative;
- The Adult Representative may not be the same person as the Adult Team Advisor;
- Clarification has been added for Host Schools or Organizations that have more than two teams qualifying for the Top 100.

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1. INTRODUCTION

1.1 SCOPE

This document provides the rules for the 2027 American Rocketry Challenge (ARC).

2. REFERENCES

The following documents are referenced in this document. If the document revision is not specified, the latest revision applies. If a document revision number is referenced, only that version applies.

National Association of Rocketry (NAR) www.nar.org

Model Rocket Safety Code of the National Association of Rocketry

Aerospace Industries Association (AIA) www.aia-aerospace.org

American Rocketry Challenge Team Handbook

3. ACRONYMS

For the purposes of this document, the following acronyms apply.

AIA	Aerospace Industries Association
ARC	American Rocketry Challenge
FAR	Federal Aviation Regulations
NAR	National Association of Rocketry
NAS	National Aerospace Standards

4. COMPETITION RULES

4.1 SAFETY

All rockets must be built and flown in accordance with the [Model Rocket Safety Code of the National Association of Rocketry \(NAR\)](#), any applicable local fire regulations, and Federal Aviation Regulations (FAR). Rockets flown at the Finals must have previously flown safely and successfully. Rockets will be inspected before launch and observed during flight by a NAR official, whose judgment on their compliance with the Safety Code and with these rules will be final. Teams are encouraged to consult with designated NAR officials who are running this event well before the fly-off to resolve any questions about design, the Safety Code, or these rules.

4.2 TEAMS

The Challenge is open to teams that submit a completed application, including payment of \$195, between July 15 and December 6, 2026. Team members must be students who are currently enrolled in grades 6 through 12 in a U.S. school or homeschool. The application for a team must come from a single school or a single U.S. Host Organization. A non-school Host Organization can be a chapter of a national youth organization, a homeschool association, or a legally incorporated non-profit organization that is broadly community-serving and supports youth activities beyond ARC. It cannot be a chapter of the NAR, the Tripoli Rocketry Association, or any other rocketry organization. Teams must be supervised by an Adult Team Advisor, age 21 or older, who is not a member of the team and who has been officially approved by the principal of the Host School, or who has been officially approved by an Adult Representative of the Host Organization who is authorized to make legal commitments on that organization's behalf. This Adult Representative must be a different individual than the Adult Team Advisor. The Adult Team Advisor may supervise more than one team.

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There is no limit to the number of teams that may be entered from any single Host School or Host Organization, but no more than two teams containing students who attend the same Host School or who are members of the same Host Organization, regardless of whether the teams are sponsored by that school/organization or a different school/organization, can be invited to attend the National Finals. Teams may have members from other schools or other organizations and may obtain financing from any source approved by their school or Host Organization.

The minimum team size is three students and the maximum is ten students. No student may be on more than one team. Each student member of the team must make a significant contribution to the designing, building, and/or launching of the team's entry. No part of any of these activities for a rocket used in a qualification flight or at the Finals may be done by any adult, by a company (except by the sale of standard off-the-shelf components available to the general public, but not kits or designs for the event), or by any person not a student on that team. If custom 3-D printed parts are used in a rocket, these must be designed and fabricated by student team members only. Custom circuit boards must be designed by students but can be fabricated commercially.

4.3 ROCKET REQUIREMENTS

Rockets must not exceed 650 grams gross weight at liftoff. The overall length of the rocket must be no less than 650 millimeters (25.6 inches) as measured from the lowest to the highest points of the airframe structure (including fins) in launch configuration. It must use body tubes of at least two different diameters in its external structure, including one section of body tube that is at least 2.6 inches (66 millimeters) in outer diameter and at least 12 inches (300 millimeters) long. Other tube section(s) must be at least 0.35 inches (9 millimeters) different in external diameter (larger or smaller) from this tube section. They may be used in any order in the airframe, above or below this tube section. All parts of the rocket (other than disposable recovery wadding) must descend tethered together, and the rocket must use parachute recovery. Rockets may not be commercially-made kits designed for this event or kits designed to carry egg payloads with the only modification being the addition of an altimeter compartment. They must have only one stage. They must be powered only by commercially-made model rocket motors of "F" or lower power class that are listed on the ARC Certified Motor List posted on the ARC website and provided in the ARC Handbook, Appendix 7. Any number of motors may be used, but the motors used must not contain a combined total of more than 80 Newton-seconds of total impulse based on the total impulse ratings in the ARC list, and all must be ignited on the ground. They must be used only for flight upward propulsion and must be the only powered source for vertical propulsion. Motors must be retained in the rocket during flight and at ejection by a positive mechanical means (clip, hook, screw-on cap, etc.) and not retained simply by friction fit in the motor mounting tube, but they must be removable post-flight. Rockets must not contain any pyrotechnic charges except those provided as part of the basic commercially-made rocket motor used for the flight. Motors must be used only in the manner prescribed in the instructions for that motor. Rockets must have the team's official ARC entry number written on them. Rockets flown at the Finals will be required to have a paint or other decorative coating applied to any wood, paper, or fiber exterior surface of the rocket and will be assessed a 5-point flight score penalty on their first flight at the Finals if they do not.

4.4 PAYLOAD

Rockets must contain and completely enclose two raw hen's egg of 55 to 63 grams mass and a diameter of up to 45 millimeters. Both eggs must return from the flight without any cracks or other external damage. The eggs will be issued to the teams by event officials during the National Finals, but teams must provide their own eggs for their qualifying flights. The eggs and altimeter must be removed from the rocket at the end of a qualification or Finals flight in the presence of a designated NAR official and presented to that official, who will inspect the egg for damage after their removal and will read the altimeter score. All coatings, padding, or other materials used to protect the egg must be removed by the team prior to this inspection. Any external damage to the egg noted after its flight and removal from the rocket by the team is disqualifying.

4.5 DURATION SCORING

The duration score for each flight shall be measured from first motion at liftoff from the launch pad until the moment that the first piece of the rocket touches the ground (or a tree) or until it can no longer be seen due to distance or to an obstacle. Times must be measured independently by two people not on the team, one of whom is the official NAR-member adult observer, using separate electronic stopwatches that are accurate to 0.01 seconds. The official duration will be the average of the two times, rounded to the nearest 0.01 second, with .005 seconds being rounded

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up to the next highest 0.01 seconds. If one stopwatch malfunctions, the remaining single time will be used. The flight duration goal is a range of 37 to 40 seconds. Flights with duration in the range of 37 to 40 seconds get a perfect duration score of zero. Duration scores for flights with duration below 37 seconds will be computed by taking the absolute difference between 37 seconds and the measured average flight duration to the nearest 1/100 second and multiplying this by 4. Duration scores for flights with durations above 40 seconds will be computed by taking the absolute difference between 40 seconds and the measured average flight duration to the nearest 1/100 second and multiplying this by 4. These duration scores are always a positive number or zero. The target duration range for flights at the Finals will be the same regardless of the altitude target.

4.6 ALTITUDE SCORING

Rockets must contain one electronic altimeter of the specific commercial types approved for use in the ARC that will be the sole basis for the altitude score. These approved types are the Perfectflite Pnut or Firefly or the Jolly Logic Altimeter One or Altimeter Two. The altimeter must be inspected by an NAR official both before and after the flight and may not be modified in any manner. The altimeter must be confirmed by this official before flight to not have been triggered and to be ready for flight. The Jolly Logic altimeters must have all previous flights erased before a scored flight. The peak altitude of the rocket as recorded by this altimeter and sounded or flashed out on its audible or visible light transmission or displayed on its screen post-flight will be the sole basis for judging the altitude score and this altimeter may be used for no other purpose. Other altimeters of other types may be used for flight control or other purposes. The altitude performance goal for qualification flights is 800 feet (244 meters). The altitude score will be the absolute difference in feet between the altitude performance goal in feet and the altimeter-reported actual flight altitude in feet (always a positive number or zero). The altitude performance goal for flights at the National Finals will not be 800 feet; it will be a different altitude that will be between 775 feet and 825 feet, with first and second flights having different altitude targets in this range. These two altitude target numbers will be determined at the Welcome and Safety Briefing at the National Finals.

4.7 FLIGHTS

Team members cannot be changed after the first qualification flight, with one exception as noted below for the National Finals. Only team members on record at AIA with valid parent consent forms are eligible to receive awards or associated funds. To be eligible for the National Finals, a registered team is required to fly and submit the results from at least two qualifying flights observed in person by an adult member of the NAR (unrelated to any team members or to the Adult Team Advisor and not a paid employee of, or student at, their Host school or member of their Host Organization) between July 15, 2026 and Monday, April 4, 2027. Each team may conduct a maximum of three qualification flights and will be ranked based on the sum of the best two qualified flights. More than two qualification flights are not required if the team is satisfied with the results of their best two flights. A qualification flight attempt must be declared to the NAR observer before the rocket's motor(s) are ignited. Once an attempt is declared, the results of that flight must be recorded and submitted to AIA, even if the flight is unsuccessful. A rocket that departs the launch rail or rod under rocket power is considered to have made a flight, even if all motors do not ignite. If a rocket experiences a rare "catastrophic" malfunction of a rocket motor (as determined by the NAR official observer), a replacement flight may be made without penalty, with a replacement vehicle if necessary. Catastrophic malfunctions for this event are defined as ejection of propellant grain, loss or rupture of an end closure, rupture of casing, or failure of ejection charge to fire at all. Flights which are otherwise fully safe and qualified, but which result in no altimeter reading despite correct usage of the altimeter by the team, will be counted as "no flight" and may be re-flown without penalty. The results from qualification flight attempts must be entered into an online score reporting portal by 11:59 PM Eastern time on Monday, April 4, 2027. Based on these qualification scores 100 teams (with a limit of no more than the best two made up of students from any single school or organization) will be selected on the basis of lowest combined scores for their best two flights.

If a school has three or more teams whose flight score is better than the cutoff score for Finals selection, they may transfer students from other teams with scores that met the National Finals cutoff to the two best teams invited to attend the National Finals to include up to a limit of ten students on any single team. Original team members may not switch between teams. Original team members who do not attend National Finals are still on the team, are eligible for awards, and cannot be replaced. Schools/organizations who do not have 3 or more teams who met the cutoff score may not change the composition of their teams. Teams will be notified no later than 5 PM EST on Tuesday, April 13, 2027, and will be invited to participate in the National Finals to be held on May 15, 2027 (alternate date in case of

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inclement weather will be May 16, 2027). Teams must confirm their attendance at Finals by April 24, 2027, including a \$395 registration payment.

4.8 SAFE RECOVERY

The rocket must return to earth safely and at a velocity that presents no hazard. An entry which has any heavy structural part or an expended motor casing separate from the rest and fall to earth without any form of recovery device will be disqualified. An entry whose parachute does not come out of the rocket body at all will be disqualified. The rocket must be allowed to land at the end of flight without human intervention (catching) and the flight will be disqualified if there is such intervention.

4.9 RETURNS

Return of the entire rocket is required by the deadline time on that same day that was established at the beginning of the day's flying. If the rocket cannot be returned after an otherwise safe and stable flight because it cannot be located or because it landed in a spot from which recovery would be hazardous (as determined by an NAR official), a replacement vehicle may be substituted for a replacement flight without penalty. Once the NAR official has declared that a rocket has landed in a place from which recovery would be hazardous, the results from that rocket's flight may not subsequently be used even if it is recovered.

4.10 LAUNCH SYSTEMS

Teams may use the electrical launch system and the launch pads (with six-foot long, 1-inch rails) provided by the event officials at the National Finals or may provide their own rail or tower system as long as it provides at least six feet of rigid guidance and a blast deflector; launch rods will not be permitted to be used at the National Finals. Launch systems used locally for qualification flights prior to the National Finals must provide the rocket with at least six feet of rigid guidance, with a rail or with use of a rod diameter of at least 1/4 inch, if a rod is used. All launches will be controlled by the event Range Safety Officer and must occur from the ground.

4.11 FLIGHT CONTROL

Rockets may not use an externally generated signal such as radio or computer control (except GPS navigation satellite signals) for any purpose after liftoff. They may use autonomous onboard control systems or altimeters separate from the official scoring altimeter to control any aspect of flight as long as these do not involve the use of pyrotechnic charges or rocket motors.

4.12 PLACES

Places in the National Finals of the competition will be determined on the basis of the sum of the altitude and duration scores. At the National Finals, at least 24 teams will be invited to make a second flight based on the results of their first flights. In these second flights, rockets which have issues which would otherwise rate a replacement flight under ARC rules in Sections 4.7 or 4.9 will not receive a replacement flight. Prizes awarded to the top places will be awarded only to those teams that make a second flight. The top final places will be ranked on the basis of the sum of the scores from the two qualified flights made at the National Finals. Remaining places will be awarded based on the scores from the first flight. Ties will result in pooling and equal splitting of the prizes for the affected place(s).

EXAMPLE: A two-way tie for 4th place would result in a merger and even division of the award funds for 4th and 5th places.

If there is a tie for one of the top three places, the teams involved in the tie will be required to make a third flight to determine final places. AIA reserves the right to make all last and final competition determinations.

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AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.
1000 WILSON BLVD.
ARLINGTON, VA 22209

THIS DRAWING SUPERSEDES ALL ANTECEDENT STANDARD DRAWINGS FOR THE SAME
PRODUCT AND SHALL BECOME EFFECTIVE NO LATER THAN SIX MONTHS FROM THE LAST
REVISION DATE.

FORM 26-01

5. AIA’S NATIONAL AEROSPACE STANDARDS

This document is an example of what a voluntary consensus standard might look like within the Aerospace industry. AIA organizes and facilitates groups of subject matter experts to write, approve, and publish NAS that contain requirements and best practices, which are adopted by companies and governments around the world. Standards help to reduce costs and improve safety in design, manufacturing, and operations. AIA’s NAS program is a vast collection of technical information and requirements that have been developed and maintained by the industry since 1941. For more information on AIA’s NAS go to: www.aia-nas.org.

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