CZECH ROCKET SOCIETY

Czech Rocket Challenge 2026 - Competition handbook

CRC organizational team

15. December 2025

CZECH ROCKET SOCIETY

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Contents

1 Introduction

The Czech Rocket Challenge (CRC) is a rocket competition bringing together students, professionals, and companies interested in the development of space exploration in the Czech Republic. It gives students the opportunity to try out the real work of rocket engineers, with all its responsibilities.

1.1 Aim

The aim of the Czech Rocket Challenge is to bring together people interested in rockets and space exploration in the Czech Republic, especially students, and give them the opportunity to build their own functional rocket. The competition should teach individuals how to work in a team on a new engineering project and provide them with a wealth of new experiences, from initial designs to rocket testing.

1.2 Overview of the competition

The competition is divided into 3 categories:

- High school - beginners
- High school - advanced
- University - advanced

Teams that do not win in their main category can compete for one of three secondary categories. Each team can win a maximum of one of these.

- Best report
- Special award of the jury
- Most accurately predicted altitude

The division between high school and university students is relatively clear. If the team is mixed and includes two or more university students, the team automatically falls into the university category. The categories differ in terms of rules, scoring, and challenges, which are described in more detail in the following chapters.

All university teams automatically participate in the *advanced* category. New high school teams start in the *beginners* category. Continuing teams from previous years that have submitted final reports will be placed in the *advanced* category. If a team is mixed and includes two or more students who submitted a final report in at least one of the previous years, it automatically falls into the *advanced* category.

The motor will be provided by the competition organizers. Its thrust characteristics, impulse, and other necessary data are in **Appendix A**. Each rocket must use—and therefore have space for—a calibrated standardized altimeter, which will also be provided by the organizers. For more information, see **Appendix C**. Teams will receive rough instructions for building their rockets, but independent work is largely expected. Individual members will thus have the opportunity to independently understand aspects of rocket design.

During the project, the teams will receive support from members of the Czech Rocket Society (CRS), whom they can turn to in case of difficulties. A series of workshops will also be organized for the teams during the spring.

The rockets of each team will be evaluated based on both their design and flight performance. The flight performance of the rockets will be evaluated on the final launch day, when the final scores and overall winners in each category will be announced.

2 Competition timeline

2.1 Registration

Registration is open until 15th February 2026 on the website czeroc.cz. czeroc.cz.

The registration fee of 300 CZK is payable by 16th February to the account: 42637800/2010.

Variable symbol: 20260216. Message to the recipient: Czech Rocket Challenge [team name]

Please contact the CRC organizational team if you need help with the payment.

2.2 Design

During February, March, April, and May, teams will have time to design, build, and test a functional rocket. To ensure a smooth start, **several workshops are planned for February and March, as well as several sessions dedicated to answering your questions**. The workshops will likely last 1-2 hours on one of the dates mentioned below and will be held online for better accessibility for all registered teams from different parts of the Czech Republic and abroad. We will provide more details later, but you can already count on the dates. The workshops should enable participants to better understand the main components of the rocket, how to start designing them, and how to divide roles within the team. The workshops will be recorded.

At the **first workshop (January 31–February 1)**, we will introduce the competition, explain the rules, go through the handbook, share experiences from previous year, and present the competition schedule. At the **second workshop (February 7–8)**, you will try out the OpenRocket rocket simulator and we will teach you how to use it. At the **third workshop (February 14-15)**, we will explain how to design avionics correctly and safely. The **fourth workshop (February 21-22)** will focus on the recovery system. During the **fifth workshop (February 28-March 1)**, competitors from previous years will describe their experiences, successes, and obstacles. At the **sixth workshop (April 4-5)**, we will explain the standardized tests that must be passed in order to be invited to the final day.

The rocket design should take approximately the first two months, after which the teams should move on to the initial construction and testing phase. Therefore, **March 8 for university teams and March 22 for high school teams** is the deadline for submitting the progress report and rocket design, known as the *Concept report*. All reports must be in PDF format. Attached files such as photos, presentations, simulations, or calculations must be included in the report. The Concept report will not be included in the final evaluation, but it is required to ensure greater rocket safety and to prevent teams from leaving their work to the last minute.

In **May**, teams should focus on building and testing individual components and systems. In **June**, they should then build and, if necessary, test the entire rocket.

For greater security and better evaluation in individual categories (see **chapter 4**), a *Final Report* (hereinafter referred to as *report*) is required. The *report* should clearly show that the team has performed certain calculations and simulations of individual components, the entire rocket, and its flight. Standardized tests, which each team will have to document and which are described in more detail in **chapter 5**, should also help with this. The *report* should also show that the rocket is airworthy, aerodynamically stable, and has a functional recovery system. Competitors will learn more practical details about the *report* during workshops. The *report* should serve as a critical review of the project by the competitors and at the same time better highlight the shortcomings or limitations of the rocket. Writing the *report* is challenging and may be a first experience for many, so a *Draft of the final report* is required by April 26 for university teams and May 17 for high school teams, to which we will then provide our comments. The *Draft* will not be included in the final evaluation. By submitting the *Draft*, you are indicating that you are truly planning to participate in the final day if you are selected.

The deadline for submitting the *final report* is June 21, 2026, for high school teams and May 31, 2026, for university teams. If the *report* is in order and the rocket is deemed airworthy, the team may be invited to the launch day based on the scoring ranking.

Finally, we also plan to meet with the participants in person in Prague and Brno during May. During these meetings, we can discuss your ideas, questions, or possible solutions, examine your rocket, or go through the *report* and any comments on the *draft*.

For the safety of the participants, organizers, and public on the final day, the *concept report, draft final report*, and *final report* are **mandatory**. If teams fail to demonstrate their work to date, the organizer may disqualify them from the competition. Furthermore, on the day of the competition, the organizer may declare a rocket unairworthy and not allow the team onto the launch pad.

2.3 Launch day

The launch days are scheduled for Thursday and Friday, July 9-10, 2026, for **approximately 20 teams**, which will be invited based on the *final report*. All registered teams will be informed about the format of the launch day after registration closes (February 15, 2026). The launch date is subject to change depending on weather conditions.

Table 2.1: Timetable of the Czech Rocket Challenge 2026 competition

Competition timetable	
Registration	until 15th February
Workshop 1	31st January - 1st February
Workshop 2	7-8 February
Workshop 3	14-15 February
Workshop 4	21-22 February
Workshop 5	28th February - 1st March
Conceptual report for university teams	until 8 March
Conceptual report for high school teams	until 22 March
Workshop 6	4-5 April
Final report draft for university teams	until 26 April
Final report draft for high school teams	until 17 May
Personal meetings with participants	during May
Final report for university teams	until 31 May
Final report for high school teams	until 21 June
Launch Days	9.-10. July

3 Competition rules and requirements

This section describes the competition rules that apply to all rocket designs submitted by all teams. These rules have been compiled to ensure that the competition meets safety standards and that all teams have an equal opportunity to win.

Maximum altitude

The maximum altitude is limited to 800 m. If this altitude is exceeded, the team automatically receives 0 points for the flight performance. If this altitude is exceeded in simulations, the team is not allowed to start.

Motor

The motor will be the same for all teams and will be provided by the competition organizer for a deposit of CZK 1,000 upon registration on the final event. The motor must be returned to the organizer. The deposit is refundable upon return of the motor in proper condition on the day of the start. Competitors must ensure that the motor does not move axially or radially relative to the rocket and does not loosen or fall out during ignition and flight. The motor must be installed without the use of brute force. Specifications can be found in **Appendix A**.

Fuselage

The fuselage can be made from almost any material, with the exception of paper and cardboard. These can only be used in the form of special tubes designed for building rockets purchased from specialized online stores. The material must ensure sufficient rigidity and safety so that the rocket does not break. When using cardboard tubes, keep in mind that even though the rocket motor burns for only a short time, it radiates heat and the outside of the chamber can heat up to several tens of Celsius degrees. Therefore, sufficient insulation (and storage of the motor, etc.) must be ensured so that the immediate surrounding area of the motor is not damaged. The choice of size, tube strength, diameter, weight, and other parameters is up to the competitors according to the competition rules.

Rocket dimensions

In the *beginners* category, the rocket must have a minimum outer diameter of 60 mm along its entire length, except for the ends of the rocket where the stabilizers are attached and Nose cone, otherwise there is a risk of a penalty of up to 200 points, see chapter **Penalties**. This rule does not apply to the *advanced* category, where the diameter is arbitrary.

Nose cone

The shape, material, and other properties are not limited in any way. The nose cone can be used as free space. For the best possible range, it is essential to choose the ideal shape with the most suitable drag coefficient and aerodynamic properties. The nose cone must not fall in free fall.

Materials

The rocket must not use toxic or reactive materials, self-made cardboard or paper tubes, or components (see the section on **Fuselage**). It is always best to consult with the competition organizer.

Avionics

Electronic systems, such as recording devices, PCBs, Arduino, parachute release systems, or launch systems, must be securely fastened in the fuselage to prevent them from becoming loose and damaging the remaining parts of the rocket during flight. Each rocket must also use either an acoustic or other navigation indicator to locate the rocket after landing. It may happen that the wind carries the rocket far from the launch site or into less accessible areas during its descent, and it may never be found.

Groundstation

Long-distance communication with the rocket via ground station is permitted and welcome. However, teams must adhere to the following conditions. Failure to do so may result in the ground station not being allowed to be used on the final day. Transmission on the 2.4 GHz and 136-174 MHz frequencies is prohibited due to interference with the competition organizers' equipment. On the final day, only teams that are launching are permitted to transmit in the launch window in order to minimize the risk of interference.

Stability and stabilizers

The stability of the rocket must be ensured passively, without the use of active control systems. The use of paper or cardboard is prohibited in the construction of stabilizers. The strength of the stabilizers is verified by a standardized test **Stabilizer strength test**. In the case of controlled stabilizers, additional rules specified in **Appendix D** apply to the team. The center of pressure C_p must be behind the rocket's center of gravity C_g. The minimum aerodynamic stability must be greater than 1 at the moment of leaving the ramp (note: C_p should be at least the size of the rocket's diameter behind C_g). Stability is determined using the OpenRocket program. Stability when leaving the launch pad is given by the following parameters: Launch pad angle = 1°; launch pad length = 240 cm; wind speed 5 m/s.

Recovery system

For the *beginners* category, only parachutes or streamers are permitted as recovery systems. Parachutes or streamers must be red or orange in color for better visibility of the rocket. The *advanced* category has no restrictions, but other alternative methods will be carefully reviewed. The recovery system must ensure a controlled and non-ballistic descent of the rocket and all its parts and components after launch. If an ejection charge is used for ejection, it is mandatory to comply with **Appendix E**.

Initiating the recovery system

For safety reasons, all teams, regardless of category, must also have a secondary system for activating the recovery system, e.g., in the form of a simple timer. The recovery system, especially the parachute or ribbon, must be activated at a speed of less than 15 m/s. With alternative methods, the fall speed may vary.

Launch detection

Launch detection is one of the most crucial components for a successful flight. Therefore, for safety reasons, each rocket must also contain a secondary launch detection system, such as a breakaway wire, which mechanically armed the flight computer during launch.

Descent speed

Rockets must descend at a speed of 5-9 m/s. Satellites (payloads) launched from rockets, except for parts that fall off immediately after leaving the launch pad, must descend at a speed of 10-15 m/s if the satellite weighs less than 150 g. For satellites heavier than 150 g, the descent speed must be between 6–9 m/s.

External thrust

The rocket must not use any additional propulsion system that would help it reach a higher apogee.

Altitude recording

The rocket must contain an altimeter provided by the competition organizers to record altitude. For more information, see **Appendix C**. The altimeter will be provided to competitors for a deposit of CZK 1,000 upon registration on the final event. The deposit is refundable upon return of the altimeter in good condition. Other measuring instruments and sensors are welcome.

Payload

The payload for competitors is specified in the challenge. A mandatory payload is the altimeter described above and in **Appendix C**. However, the rocket may carry additional payloads, instruments, or technology for which points may be awarded as part of the rocket design. The rocket payload, especially for the advanced category, must not contain living creatures, flammable materials, or explosives.

Rocket launch procedures

Each team must write its own procedures for the correct launch of its rocket. The procedures must include all information necessary to assemble the rocket, from screwing in the components, connecting the individual parts, and turning on the system, to installing the motor and placing it on the launch pad. The final report will require a minimum of 30 steps. The procedures are a mandatory part of the final report.

System uptime

Each team must provide evidence that its flight system can remain powered on for at least 120 minutes and then perform the required tasks. This requirement is due to the possibility that the prepared/powered-up rocket will remain on the launch pad for a longer period of time than the surrounding area is ready for launch, whether due to other teams launching, repairs to the launch equipment, or waiting for launch clearance from the airport control tower.

Launching ramp and guide element

All rockets will launch from the same launch pad, which will be secured and provided by the competition organizer. Technical details are provided in **Appendix B**. In order for the rocket to fly precisely along the ramp and for the ramp to fulfill its purpose, guide elements must be attached to the rocket. The elements must be sufficiently strong so that they do not break off during launch and cause the rocket to veer off course. The elements should move freely in the ramp groove to prevent them from jamming during launch. The rocket must have at least two guide elements placed along the length of the fuselage. Technical details are provided in **Appendix B**.

Keep in mind:

- The performance of rocket motors is never 100% consistent with the performance stated in the motor brochures.
- The drag coefficient used in calculations is also variable depending on the surrounding conditions. Each component, such as the nose cone, stabilizers, etc., affects the drag coefficient, as well as other current variable conditions.
- Wind strength is often much more important than a drag coefficient that is one hundredth better or an OpenRocket that is one meter better.
- If the rocket does not fly directly vertically upwards, its reach decreases.

Note: Violation of any of the above rules may result in the immediate disqualification of the offending team from the competition.

The organizer has the right to change the rules.

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4 Scoring

All categories have their own scoring system. In order to determine the winner of the competition, teams will be evaluated according to several different criteria, with the three main areas being **Rocket design**, **Flight performance** and **Challenge**. The maximum achievable score is 1000 points. *Report* mainly concerns the subcategories Design and & Innovation; Analysis, Simulation & Report. **Table 4.1.** provides an overview of the evaluation methodology.

Scoring will be handled by a team of judges from CRS, academia, and industry, who will evaluate each category of each team impartially and independently, and then average their results. Details will be presented in advance of the final report.

Table 4.1: Scoring Table

Criterion	Beginners	HS Advanced	UNI Advance
Rocket design			
Design and & Innovation	300	300	200
Analysis, Simulation & Report	150	150	150
PR Challenge	50	50	50
Flight performance			
Predicted altitude accuracy	200	100	100
Highest altitude reached	100	100	100
Challenge			
Pre-flight presentation	0	100	100
Design & payload	200	200	150
Presentation of results	0	0	150
Total	**1000**	**1000**	**1000**

Rocket design

As mentioned in **chapter 2**, teams will be required to submit a *report* on their rocket, which will be evaluated in this section. The report should describe the functioning and design of individual parts (structure, parachute, fins, etc.), show simulations and calculations for the rocket, and demonstrate that it has passed the prescribed tests. Teams can earn up to 400 points in the *Advanced University* category and up to 500 points in the *Beginners* and *Advanced High School* categories for the rocket design described in the *report*. This part is further divided into two smaller subgroups.

Design and & Innovation

Innovation is what sets some engineering companies apart from others. For example, SpaceX and NASA are constantly pushing the boundaries of science and rocket technology. That's why teams are motivated to come up with innovative solutions to problems and stand out from the crowd. Innovation can take many forms, from an interesting design that solves a complex problem to the application of new technology. Any section of the rocket can be innovated. *Innovation & Design* is the most highly valued category, with a maximum of 300/200 points in the *Beginners* and *High School Advanced/University Advanced* categories, which is roughly one-third/one-fifth of the total number of points.

Analysis, Simulation & Report

Analysis, simulation, and written reports are three key components of modern engineering. The use of technologies such as FEM or computer simulation allows engineers to model the effects of forces or the overall effects of individual components. Teams must demonstrate the strength and safety of their rockets by completing standardized tests see **Chapter 5)**. They can also use strength analyses, manual calculations, or software (MATLAB, Python, etc.) to help them. The report should be clear and not too long, but at the same time it should contain everything necessary and "sell"your work well. Competitors will be provided with sample reports and a list of items that must appear in the report. A maximum of 150 points is awarded for this section, evenly distributed between analysis, simulation, and report.

PR Challenge

Communication of science and innovation is an important part of modern development. If we want to get money for a project, we have to present it. This is even more true for space missions, as they are often funded by public money, so it's important that people understand where their money is going. That's why it's part of the CRC PR Challenge, which will take place during the competition. Teams are tasked with sharing stories on Instagram during the competition and tagging @czechrocketchallenge. These "*stories*"will then be shared and evaluated by the organizers. The PR Challenge will be evaluated on a scale of up to 50 points.

Flight performance

The second area for which teams receive a score is the execution of the flight on launch day. A maximum of 300/200 points can be awarded for this part, which is divided into three smaller subgroups.

Predicted altitude accuracy

In this competition, predicting the apogee is a more important factor in rocket design than its maximum altitude. Accurate prediction is a good indication of quality modeling, simulation, and calculations. A parallel can be drawn with the idea of fulfilling a space mission with delivery to a specific orbit—the launch vehicle provider must be able to achieve the goal requested by the customer. Teams are therefore required to predict the apogee of their rocket before launch on the day of the competition. Software (OpenRocket) or manual calculations can be used for the prediction. Up to 200/100 points can be awarded for this category. Points will be distributed according to the following equation:

$$\text{Points} = \frac{P_{\text{pred,max}}}{1 + 0.0002 \times (Reality - Prediction)^2} \tag{4.1}$$

where:
$P_{\text{pred,max}}$ is the maximum score for prediction accuracy (200 or 100 pts),
$Reality$ is the actual altitude achieved (apogee) in meters,
$Prediction$ is the predicted altitude declared by the team in meters.

Highest altitude reached

Reaching the highest apogee is one of the most appealing goals for all beginning rocket engineers. However, rockets do not always fly in order to reach the highest altitude possible. Our goal is to motivate competitors to pay more attention to safety, airworthiness, and the mission of the rocket than just mindlessly breaking the X-meter barrier at the expense of a small, narrow, fast rocket. At the same time, however, we want to reward the altitude achieved fairly. All teams that exceed 500 meters above the launch pad will receive the full number of points. Points for teams that place third to second to last will be determined proportionally on the day of launch based on the current number of teams.

Points for predicting the apogee and highest apogee are only counted if the rocket returns safely to the ground and has flown at least 50 m above the ground. After landing, competitors show the altimeter reading to the judges.

Table 4.2: Methodology for scoring the highest apogee

Points awarded	Highest altitude
100	Apogee 500 m +
80	First highest apogee reached below 500 m
–	The remaining teams will be awarded points proportionally from 0 to 80 points.
0	Lowest apogee reached
disqualification	Unsuccessful flight

Challenge for beginners

The goal is to carry a classic chicken egg and bring it back to the ground without breaking it. Size M eggs will be provided by the organizer at the competition site. If the egg is intact, the team receives full points. If the egg is broken (the egg leaks out of the shell), the team receives 0 points. In the event of an egg cracking, the number of points will be determined by a team of ad hoc judges on site.

Challenge for advanced

This year's challenge in the advanced category is inspired by sounding rockets, which are used to study our atmosphere and the effects of microgravity. The goal of the teams is to design and launch a scientific experiment that will utilize these phenomena. Originality, execution, scientific contribution, and presentation before a scientific committee will be evaluated.

Assignment

Each team must design and carry out their own scientific experiment, which will:

- **feasible during the flight** (time constraints, environment, available energy sources)
- **use actual flight conditions** (height, acceleration, vibration, short periods of reduced overload)
- **based on an original idea** and clearly justified
- **documented** – the experiment must be described, the data recorded and evaluated

Evaluation

The evaluation consists of three parts:

1. **Experiment report**
   - description of the experiment, its objectives, and design solution
   - data collection methodology and evaluation plan
   - expected benefits
   - maximum length is 5 pages (excluding the cover page)
   - serves as a basis for the scientific committee
2. **Presentation to the scientific committee**
   - short introduction to the experiment and motivation
   - method of implementation and significance of results
   - clarity, conciseness, and ability to defend solutions
3. **Presentation of results to the scientific committee**
   - results are presented only by university teams
   - raw data collected during flight
   - their analysis and final summary
   - the exact format of the final presentation will be specified in advance

Scoring

Teams can earn up to **300 points** (high school advanced) or **400 points** (university advanced) for the experiment according to the following criteria:

- **Design quality**
- **Scientific value**
- **Originality**
- **Applicability and usability**
- **Presentation and documentation of results (university teams)**

Recovery system technology

In space travel, the recovery system is often just as important as the propulsion system. However, in the Czech Rocket Challenge, the recovery system is the most important. That is why we pay close attention to its quality and strive to minimize its failure during flight. If a rocket does not have a functional recovery system, it poses a serious safety risk to others and can potentially cause the destruction of the entire rocket.

Points will be awarded for the recovery system in the Design, Innovation & Cost category. In the *Beginners category*, only parachutes or streamers may be used as recovery systems. In the *Advanced category*, other types of recovery systems may also be used. However, it is always best to consult with the organizer..

The recovery system must function. If it does, you can earn points for prediction, altitude, or challenge. If not, the flight is unsuccessful and the team will be disqualified.

Penalization

In the event of a failure of the recovery system, the team is disqualified from the competition.

In the event of an unstable flight, the team will be penalized up to 200 points at the discretion of the judges.

If a team arrives on the final day with a different rocket than the one listed in the final report, the team will be automatically disqualified.

If an area with a diameter of less than 60 mm is found on the fuselage of a beginner category rocket (excluding the rear sections of the fuselage where the fins and nose cone are attached), the team will be penalized with a deduction of 200 points or, in the case of an extensive section with a smaller diameter, disqualified.

In case of late arrival for the pre-flight check, a penalty of up to 200 points may be imposed depending on the length of the delay. Details about the organization of the launch day can be found in **chapter 6**.

In the event of an excessive delay during preparations for the start in the ramp area (more than 10 minutes), the team may be deducted up to 100 points at the discretion of the ramp operators and judges. More about the format of the final day in **chapter 6**.

In the event of a late submission of the *final report*, points may be deducted or the team may be disqualified from the competition.

In the event of false parameters being reported in the final report, the team will be penalized 50-100 points for each parameter violated. If all parameters reported are false, the team will be disqualified.

If the height limit is exceeded, the team is penalized by not counting the points for the flight part.

Unsportsmanlike conduct during the design or construction of the rocket or on the day of the competition will result in the team's disqualification from the competition.

If a report is submitted in a format other than PDF or with an incorrect name, the team will be penalized up to 50 points for each report submitted in this manner.

Rocket science is a dangerous activity even at this level. Flammable substances and pyrotechnics are used, and a flying rocket can very easily damage property or injure people. It should therefore be taken seriously. Any unacceptable behavior at any time during the project that is considered dangerous and/or poses a potential threat to others will result in the exclusion of individuals or teams from the competition.

Note: Weather and wind conditions will be taken into account on the day of the start, and all teams will be evaluated relative to each other.

5 Standardized tests

As part of the *final report*, teams will also be required to submit reports from standardized tests. These tests are designed to ensure a basic level of safety for the rocket and, therefore, for the entire competition. During the workshops, teams will receive specific and precise requirements for the content, parameters, and form of the reports. The materials provided will also include a template for writing the test report. Teams must adhere to this template. The tests must be submitted as a single PDF file together with the final report. A general overview of the tests is provided below. A separate *Standardized Test Manual* with a more detailed description will be provided to teams accepted into the competition.

5.1 Stabilizer strength test

The purpose of this test is to verify that the stabilizers are strong enough not to break off in flight due to aerodynamic forces.

5.2 Strength test of guide elements

During rocket launch, in extreme cases, the rocket may get stuck in the launch track. The aim of the test is to verify that the guide elements do not break and deflect the rocket, which could endanger spectators, competitors, and surrounding property.

5.3 Functional test of the recovery system release

In this test, the team's goal is to demonstrate that their chosen system is capable of successfully and fully opening the recovery device. For systems using an ejection charge, the test will be extended to include an RBFP functionality test.

5.4 Recovery system drop test

As part of this test, the team must demonstrate that their chosen solution achieves the required descent speed. In the case of unconventional systems, the aim is also to demonstrate the basic functionality of this principle.

5.5 Testing the strength of the motor and recovery equipment mountings

The main purpose of this test is to stress the engine mounts and recovery equipment and demonstrate that no deformations will occur that could compromise flight safety.

5.6 Parachute strength test

When the recovery system is deployed, considerable forces are generated that act not only on its attachment points, but also on the braking device itself (parachute, streamers, etc.). It is therefore necessary to verify the strength of all components exposed to this load, such as ropes, parachute fabric, and harnesses.

5.7 Active control shutdown test

Teams using an active control system must demonstrate that they can return the system to a neutral position and switch it off if the rocket's tilt exceeds 30°.

6 The team's journey on the final day

More details about the final day will be announced to participants well in advance, but the philosophy behind the final day is as follows:

1. Invited university teams will arrive in Moravská Třebová on the afternoon of the first day of the competition (July 9, 2026). They will register here. They will then go through all three types of checks/committees. First, the team will visit the evaluation committee, which will ask them to present the challenge, the rocket, and the team as a whole. This committee awards the final points for the design and innovation category. The team will then move on to the challenge committee, composed of experts and scientists, which will evaluate the challenge design and the experiment that is part of it. Here, the team will have a presentation lasting approximately 15 minutes. Finally, the team will visit the technical pre-flight inspection. This will check the technical airworthiness of the rocket and grant permission for launch (the organizer reserves the right to confiscate the rocket until the team's launch wave).
2. The other teams will gather at the airport on the day of the launch (July 10, 2026). They will have all the necessary tools and the disassembled rocket with them.
3. Upon arrival, the team will register. They will pay a deposit for the motor and altimeter. In exchange for the deposit, they will receive the altimeter. They will receive the charged motor at the launch pad, but mock-up motors will be available at the pre-flight check and in the preparation tents for balancing the center of gravity, testing the thread, or test assembly of the rocket.
4. At 9:30 a.m., the technical pre-flight check will open, for which all teams in the advanced high school category must be prepared.
5. By 10:00, all advanced high school teams and by 13:00, all beginner high school teams must submit a slip of paper with the name of their team, which they will receive upon registration, to the board at the pre-flight check. Failure to do so will result in a penalty for the team. They will then be called by the coordinator from the organizing team for the pre-flight check. Therefore, there is no need for teams to wait in front of the pre-flight check tent.
6. After the technical check, the team moves to the scoring committee, which is in the adjacent tent. Here, the team will have to defend their rocket in front of the scoring committee, which is composed of experts and members of the association. The final report will be reviewed with the team and questions will be asked about the challenge, systems, and function of the rocket. For this check, the team will be awarded a final number of points in the *Design and Innovation* category .
7. From 10:00 to 11:30, the university teams will take off.
8. First, the team will be called for a technical pre-flight check, which consists of three parts. If the team is unable to attend the check at the time of the call, it will be penalized. In the first part, the technical condition of the rocket will be assessed, and its center of gravity, weight, and basic dimensions will be measured. Then, the flight simulation in OpenRocket will be reviewed according to the current weather and wind conditions. The third part is the evaluation of the rocket by a safety technician. In case of doubt, the judges may request a reconstruction of the test or a demonstration of the individual rocket systems on the spot. If a defect or a malfunctioning or dangerous system is found, the judge has the right to automatically disqualify the team on the spot. If everything is in order, the team will receive confirmation of the rocket's airworthiness.
9. After the technical pre-flight check, the team and the judges will assemble the rocket and take it to the backstage area, where they will wait to be called for launch. During this time, the team must not manipulate the rocket in any way or make any adjustments to it.
10. During this time, from 9:30 a.m. to 12:30 p.m., advanced high school teams will be called for a third discipline, which is a 15-minute presentation of the challenge and experiment in front of the audience and the scientific committee. Teams may be called for this discipline at any time during this period, unless the team is currently at one of the two checks.
11. Once the rocket has been checked, evaluated, and declared airworthy, the team can wait for their launch wave. For advanced high school students, this time window is from 12:30 p.m. to 2:00 p.m. For beginner high school teams, it is from 2:00 p.m. to 4:00 p.m.

12. After the team is called to the launch site, the entire team gathers at the departure point for transport to the launch site. Upon arrival of the transport, the team boards and is transported to the launch pads.
13. The team, with the rocket prepared and turned off, waits for instructions from the launch pad.
14. Once the team receives instructions from the team coordinator, it moves to the launch pad.
15. At the launch pad, the team receives a charged motor and prepares the rocket for launch (turns on the electronics, checks the altimeter, etc.). The team has 10 minutes to prepare. If the team significantly exceeds this limit, it will be penalized. Ideally, the team should handle the rocket as little as possible, as it will already be prepared from the previous check.
16. The team moves to a safe distance and waits for the other teams from the same launch wave. However, they may be delayed, so the rocket should remain operational for at least 120 minutes. [1]
17. All rockets from one wave will be launched one after the other. ONLY THEN will the teams be asked to find and collect their rockets. The altimeter with the measured altitude will be shown to the flight judge present. The altimeter and motor will be returned to the organizer.
18. Teams that have already launched can pass the time in the fun zone or by watching their opponents and their presentations.
19. From 1:00 p.m. to 3:00 p.m., there will be presentations of the results of the challenge and evaluation of data and findings from the university teams' experiments. University teams will be called to the presentations by the team coordinator or moderator.
20. The results will be announced together after the launch of all eligible rockets.

[1] If a team fails to comply with the 10-minute limit, including any extra time added, the organizer may exclude it from the wave and move it to another wave.

7 Additional information

7.1 What will be provided

Several workshops will be held during the rocket design phase. These should help teams divide roles within the team, begin designing individual components, and understand various aspects of the rocket, such as aerodynamics, flight simulation, and structural analysis. In addition, office hours will be provided, during which competitors will be able to ask questions or discuss problems with their specific rockets. Competitors will also be able to contact the organizers during the rocket design period on the CRC server on the Discord platform.

On the day of launch, a motor, altimeter, and launch pad will be provided on site, along with all necessary pyrotechnic equipment, such as launch devices, igniters, and detonators.

7.2 Contact information

All necessary public information is available on the website: **www.czeroc.cz**

The responsible person is Iuliia Kostiuk: **crc@czechrockets.com**

Address Polní 358
530 03 Pardubice
Phone +420 774 346 845
Email crc@czechrockets.com
Web czeroc.cz

A Motor Gragas

Motor parameters

Main parameters of the Gragas motor. (. indicates a decimal place)

Table A.1: Geometric parameters of the Gragas motor

Gragas motor parameters	
Outer diameter of the motor	43.4 mm
Motor length (without nozzle)	155.6 mm
Motor length (with nozzle)	167.7 mm
External motor temperature	TBD°C

The motor consists of three machined parts: a nozzle, a plug, and a chamber. For illustration purposes, the **figure A.1** below shows a drawing of the motor assembly and a drawing of the plug.

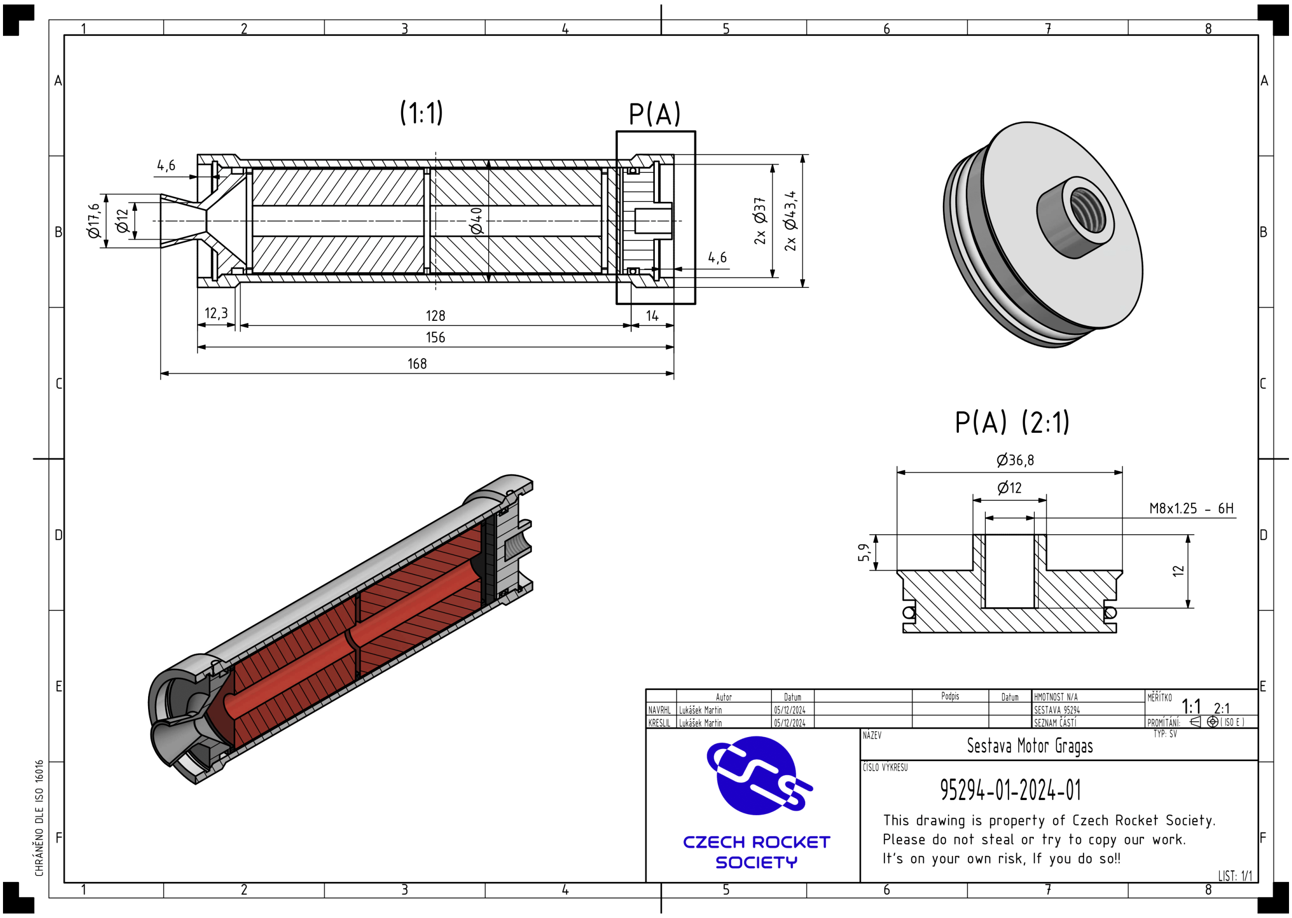


Figure A.1: Gragas motor drawing 2024

The technical drawings of the motor are the property of the Czech Rocket Society and may not be distributed without the permission of the Czech Rocket Society.

Motor characteristics

Detailed motor specifications will be provided by January 18, 2026.

Table A.2: Expected performance parameters of the Gragas 2026 motor

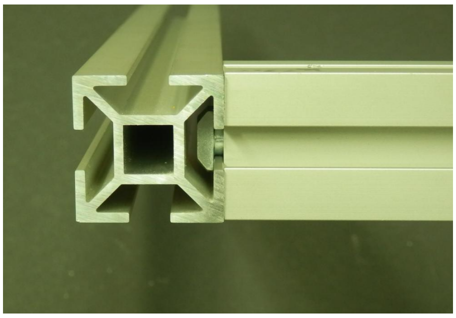
Gragas motor performance parameter	Value
Total impulse	TBD [N.s]
Burn time	TBD [s]
Highest thrust	TBD [N]
Fuel weight	TBD [g]
Empty motor weight	209 [g]

The organizer reserves the right to change the motor parameters.

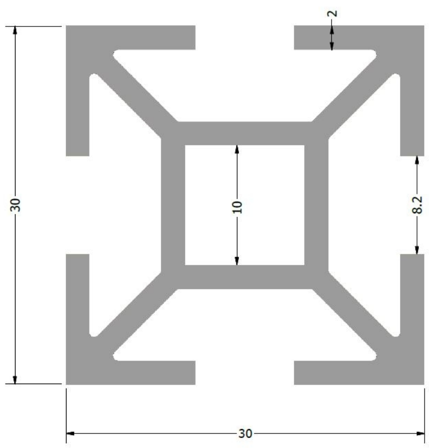
B Launch pad

The length of the launch pad is 2.4 meters.

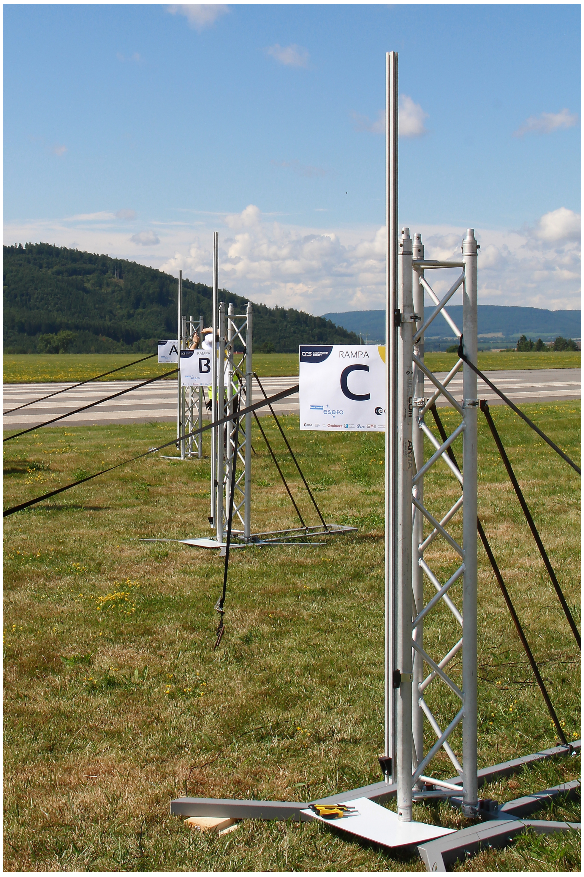
The launch ramp profile is "Alutec,"specifically the *Kombi 30x30 system*, as shown in **figure B.1b** below. A photograph of the profile can be seen in **figure B.1c** below. At the end of the profile, there is a 3D-printed stopper that holds the rocket in place. The profiles are designed to eliminate any possible contact with the rocket. A photo of the launch pad with the rocket inserted can be seen in **figure B.1a**.



(a) Photo of the "Alutec"profile



(b) Launch pad profile



(c) Photo of the launch pad

Figure B.1: Overview of the launch pad and its profiles

The images are taken from the website of the manufacturer Alupa s.r.o., **here** a **here**.

https://www.ehlinik.cz/al-profil-kombi-stojka-30x30/pro-CBU0000101.html
https://www.alupa.cz/hlinik/system-kombi-30x30/kat-JX74000101.html

The rocket must be guided by the groove. It is not recommended to produce a precise shape that copies the shape of the profile groove, otherwise there is a risk of the elements getting stuck in the profile during launch, or the elements may not fit into the groove at all.

The organizer reserves the right to change the parameters of the launch pad.

C Altimeter

The altimeter has maximum dimensions of 62x25x19 mm. It has an eyelet on one side. It features a position switch which, when activated, turns on the altimeter measurement. The altimeter works by sensing barometric pressure, so it needs air to flow freely around it. The altimeter lasts for one hour when switched on. It is also advisable for the altimeter to be easily accessible after the rocket has landed, without having to disassemble the rocket. It is also advisable to attach the altimeter to a fixed part of the rocket so that it is not lost if the rocket is damaged by impact.

The organizer reserves the right to change the altimeter within the specified parameters.

D Active flight control

Definition

Active flight control systems are defined as controlled systems whose primary purpose is to influence the direction and stability of a rocket before it reaches apogee. The main categories include controlled ailerons, reaction wheels, and others.

Requirements

This chapter lists all requirements relating to active control:

1. Active flight control systems are only permitted in the *advanced category*.
2. Active flight control systems may only be used to steer the rocket as close to vertical as possible. It is prohibited to deliberately aim for a ballistic trajectory. This is for the safety of competitors and spectators.
3. Stabilizers that ensure the stability of the rocket must not be controlled.
4. A rocket with the system switched off in a neutral position must still meet the stability conditions. This applies in particular to controllable ailerons.
5. Active elements may only be activated after the motor has burned out. This can be achieved either by detecting burnout or by a timer from the moment of launch.
6. Active elements must be mechanically lockable in a neutral position in case permission for active flight is not granted. A possible alternative is to remove the system.
7. Active control systems must be described in detail in the final report, including the control principle, planned control authority, and flight trajectory. Organizers have the right to request additional information and impose additional restrictions.
8. The maximum permitted deviation from the vertical is 30°. The maximum permitted rotation speed around the longitudinal axis is 360°/s. If one of these values is reached, the active flight control system must be automatically set to neutral and turned off until the end of the flight. This is to prevent the control system from oscillating around the shutdown value.
9. Active control systems must have physical barriers that limit their maximum deflection.
10. The final report of teams with rockets that use this system must include a simulation of the impact area at the maximum possible deflection of the control surfaces and in the event of a failure of the recovery system. The impact area must not exceed 500 m. The organizers have the right to specify the conditions of this simulation in more detail and impose additional restrictions.

Standardized tests

Rockets using active guidance systems will be subject to an additional standardized test. Details can be found in the Standardized Tests Manual.

E Ejection charge

Definition

An ejection charge, also known as a propellant charge or igniter, is a small charge of gunpowder used to eject recovery equipment.

Requirements

This chapter lists all requirements relating to ejection charges:

1. The total charge must not exceed 0.5 g of gunpowder.
2. The recommended method for determining the amount of powder is given at https://rocketrycalculator.com/rocketry-calculator/bp-estimator/ . It is possible to use your own calculation method. However, this must be thoroughly documented in the *final report*.
3. The ejection charge must be transported in a short-circuited state.
4. When working with the ejection charge, all persons present must wear protective goggles or shields. Pay attention to personal safety.
5. It is prohibited to use homemade gunpowder.
6. It is necessary to install an RBFP (remove before flight pin) in the igniter circuit. When inserted, it physically separates the igniter from the battery. This ensures that there will be no premature ignition in the event of an erroneous signal from the avionics.
7. The RBFP must be inserted at all times while the igniter is connected until the moment of departure from the launch pad.
8. When the RBFP is pulled out, a unique audible signal lasting at least 2 seconds must sound. The *Unlocked* status should then be continuously indicated by a light signal.
9. Parachutes and other vulnerable systems must be protected against hot exhaust gases from echarge activation.
10. The ejection charge must be described in detail in the final report. The amount of powder, the design of the entire ejection charge, the method of connection to the RBFP, and the protection of the recovery device against exhaust gases must be documented.

Standardized tests

Rockets using ejection charges will undergo an additional step in the standardized test to check the functionality of the recovery system launch. Details can be found in the Standardized Tests Manual. The test will be carried out by the test team at the launch site. The test will be carried out by the test team at the launch site.