

# CANSAT

2019-2020 GUIDELINES



## → INTRODUCTION

The European Space Agency (ESA) endorses and supports a range of CanSat activities across its Member States (including Canada, Slovenia and Malta), all leading to a European final event – the European CanSat Competition. The CanSat project, aimed at secondary school students, mainly addresses Technology, Physics, and programming curricular subjects. By offering the practical experience of working on a small-scale space project, CanSat makes use of these subjects in an interdisciplinary manner, and promotes collaboration and teamwork.

### What is a CanSat?

A CanSat is a simulation of a real satellite, integrated within the volume and shape of a soft drinks can. The challenge for the students is to fit all the major subsystems found in a satellite, such as power, sensors and a communication system, into this minimal volume. The CanSat is then launched by a rocket up to an altitude of approximately one kilometre, or dropped from a platform, drone or captive balloon. Then its mission begins. This involves carrying out a scientific experiment and/or a technology demonstration, achieving a safe landing, and analysing the data collected.

### Educational value of the CanSat project

Through the CanSat project, the participating student teams experience all the phases of a real space project, from selecting the mission objectives, designing their CanSat, integrating the components, testing the system, preparing for launch, and analysing the scientific data obtained. Throughout this process the students:

- learn by doing,
- get acquainted with the inquiry-based methodology that is typical of real-life scientific and technical professions,
- acquire and/or reinforce fundamental Technology, Physics, and programming curricular concepts,
- understand the importance of coordination and teamwork,
- enhance their communication skills.

## Overview of the competition timeline

### Phase 1: Imagine your CanSat

Activity	Date
Competition announcement and ESA call for proposals for countries with no national competition	27 September 2019
Deadline for submission of proposals from countries with no national competition	2 December 2019
ESA announcement to the teams selected from countries with no national competition	16 December 2019

### Phase 2: Build your CanSat

Activity	Date
Student teams submit their Critical Design Review Report to ESA (only by teams from countries with no national competition)	31 March 2020
ESA sends feedback of Critical Design Review to teams from countries with no national competition	24 April 2020

### Phase 3: Launch your CanSat – National Competitions

Activity	Date
National competitions take place	March – 3 May 2020
Deadline for national competition organisers to communicate name of winning teams to ESA	4 May 2020

### Phase 4: Launch your CanSat – European CanSat Launch Campaign

Activity	Date
Student teams submit their Pre-launch Report to ESA	5 June 2020
Participants receive the Launch Campaign Manual	12 June 2020
European launch campaign	21-26 June 2020

### Phase 5: Write your final report

Activity	Date
Student teams submit their CanSat Final Report to ESA	31 July 2020

## → PROJECT PHASES

The phases of the European CanSat Competition reflect and take into account the set of national CanSat activities – mostly national competitions – which lead to the selection of one national team that will participate in the European competition. Only one team per participating country (ESA Member States<sup>1</sup>, Slovenia, Canada and any guest competitor) is admitted to the European competition.

The 2020 European CanSat Competition consists of five phases:

1. **Phase 1** – Imagine your CanSat
2. **Phase 2** – Build your CanSat
3. **Phase 3<sup>2</sup>** – Launch your CanSat: *National Launch Campaigns*
4. **Phase 4** – Launch your CanSat: *European CanSat Launch Campaign*
5. **Phase 5** – Write your final report

<sup>1</sup>ESA Member States in 2019: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, United Kingdom.

In the framework of the current collaboration agreement between ESA and the Republic of Malta, teams from Malta can also participate in the European CanSat Competition as guest competitors. Teams from other countries may also participate in the European CanSat Competition as guest competitors if approved by ESA (see Annex 1).

<sup>2</sup>Only for countries with National Competition



## → Phase 1 - Imagine your CanSat

### Primary and secondary CanSat missions

#### 1. Primary mission

The team must build a CanSat and program it to accomplish the following compulsory primary mission:

To measure, after release and during descent, the following parameters:

- Air temperature
- Air pressure

and transmit these data as telemetry to the ground station at least once every second

During the post-flight analysis, it must be possible for the team to analyse the data obtained (for example, make a calculation of altitude) and display it in graphs (for example, altitude vs. time and temperature vs. altitude).

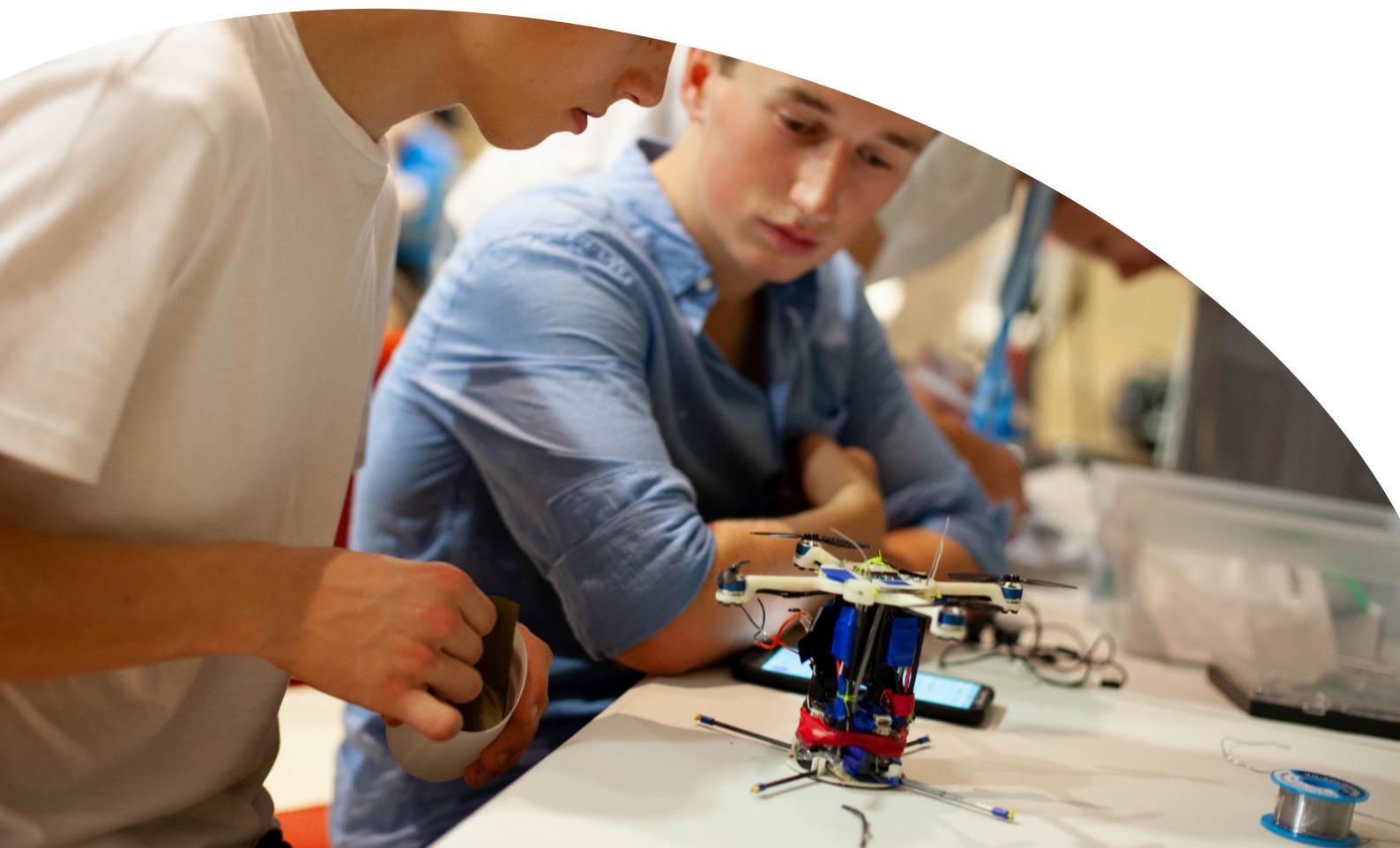


## 2. Secondary mission

The secondary mission of the CanSat must be selected by the team. Teams can take ideas from real satellite missions, or collect scientific data for a specific project, make a technology demonstration for a student-designed component, or any other mission that would fit inside the CanSat and show its capabilities.

Teams should brainstorm their own mission objectives, ideas and constraints in order to try to define their mission. The student teams are free to design a mission of their choice, as long as they can demonstrate to have some scientific, technological or innovative value. Teams should also keep in mind the limitations and requirements of the CanSat mission, and consider the feasibility (both technical and administrative in terms of time and budget) of their chosen mission.

Teams are invited to take inspiration from **ESA's missions** for designing their own secondary missions, which could form the basis of a real space mission!



## How to apply

In this phase, the applicants will need to present their investigation plan by answering a series of questions in the registration form regarding their CanSat project. Teams will be judged according to the clarity and quality of their proposals. Student teams have two different ways to enrol in CanSat, either by applying to participate in their respective national competition or, in the case there is none, preparing to submit their CanSat project proposal directly to ESA.

### Case 1. Countries with a national CanSat competition which is recognised by ESA

Teams will automatically be granted participation in the European competition. The national competition organisers are requested to send ESA the name of their national winning teams via email ([cansat@esa.int](mailto:cansat@esa.int)) indicating “2020 European CanSat Competition National Winner” in the subject line, no later than 4 May 2020, 22:00 Central European Time (CET). Exceptions to this deadline may be authorised by ESA for specific situations and only after receiving a justified written request from the national organiser.

In the school year 2019-20, CanSat national competitions will take place in<sup>3</sup>: Austria, Belgium, Czech Republic, Denmark, Germany, Greece, Ireland, Italy, Malta, Nordic countries (Finland, Norway and Sweden), Portugal, Poland, Romania, The Netherlands, Spain, The UK. Click [here](#) to see a list of all the National Competitions taking place in 2019-20 and the contact person for each of them.

### Case 2. Countries where a national CanSat competition does not exist.

In this case student teams can apply directly and submit their CanSat proposal by completing the dedicated proposal form, and emailing it directly to ESA at [cansat@esa.int](mailto:cansat@esa.int) by **2 December 2019, 22:00 (CET)**. The teams that can apply directly to ESA must reside in: **Estonia, France, Hungary, Luxembourg, Switzerland, Canada or Slovenia**.

Based on the quality of the submitted proposals, one team per country will be selected by an Evaluation Committee nominated by ESA.

On 16 December 2019 ESA will let the selected teams know that they have been accepted to participate in the European competition.

<sup>3</sup>The list of countries hosting a national competition may be subject to change.

## → Phase 2 – Build your CanSat

Under the supervision of their teacher/mentor, all the teams participating in CanSat will have to carry out technical work on their CanSats, applying the procedures used in the typical lifecycle of a real space project, which are:

- Selection of mission objectives;
- Definition of technical requirements necessary to achieve these objectives;
- Design of hardware and software;
- Reporting;
- Design of ground station/ground telecommunication system;
- Integration and testing of the CanSat before the European launch campaign starts.

### CanSat Kit

Teams selected directly by ESA will receive a CanSat starter kit, with all the basic components they need to build a CanSat. Teams selected via their own National Competitions may receive a kit from their own national organisers.

### Support throughout the development phase

Teachers/Mentors participating in National Competitions may be offered support from their National Organisers, such as<sup>4</sup>:

- CanSat Teacher's workshop for mentors
- CanSat Webinars with space experts
- Supporting learning materials (e.g., the [ESA CanSat resources](#) or national resources)
- Individual recommendations/help throughout the project
- Reviewed versions of submitted documents

NEW! - ESA will organise a webinar in the school year 2019/20 in order to support all the teams that have been selected to participate, either by National Organisers or directly by ESA. More details will be published soon at <https://www.esa.int/Education/CanSat>.

### Reporting

Depending on whether a team is participating through their own National Competition, or directly with ESA, they will need to submit different reports to their national organisers for them to track the team's progress. These reports are typically:

- Preliminary Design Review (PLR)
- Critical Design Review (CDR)
- Final Design Review (FDR)

<sup>4</sup>This offer will vary depending on the National Organiser, please consult this with your contact point.

## **1. Teams participating in their own National Competition**

Please refer to your own national organiser in order to check the kind of documents you need to submit and the support you can get from them.

## **2. Teams participating directly with ESA**

In the case of teams participating directly with ESA, they will need to submit a ‘Critical Design Review’. The Critical Design Review Report, or CDR, is a technical document that ensures the design can meet the stated performance requirements, taking into account all the system constraints.

Compiling the CDR allows student teams to detail and evaluate the design effort, determine readiness for hardware fabrication and for software coding, and establish the final configuration of the secondary mission.

The CanSat CDR must contain:

- A demonstration that all the requirements stated in the guidelines for the European CanSat Competition have been fulfilled;
- The design specifications needed to fulfil the secondary mission;
- Results of the completed requirements verification tests;
- Overview of mission operations;
- Detailed budget.

The CDR must be submitted to ESA via email ([cansat@esa.int](mailto:cansat@esa.int)) no later than 31 March 2020, 22:00 CET, with the name of the team and name of the document submitted clearly written in the subject line (e.g. “Team X Critical Design Review”). The document should be attached as a PDF with the following file name format: TeamX\_CriticalDesignReview.pdf.

ESA will provide guidelines as well as templates for the required reports to each participating team.



## → Phase 3 – Launch your CanSat

### *National Launch Campaigns*

In order for a National CanSat Competition to be recognised by ESA (and, as a consequence, for the national winning team to be automatically accepted into the European competition):

- Student teams must comply with the European competition student team eligibility criteria stated above.
- The national organisers have to guarantee a fair geographical distribution and participation of teams from across their country.
- The national organisers must run their national competitions between March and 3 May 2020 to allow teams sufficient preparation time for the European final launch campaign. The deadline for national organisers to communicate the details of the winning team to ESA is 4 May 2020.
- The national organisers don't necessarily have to follow the exact same rules and conditions as the European CanSat Competition, but must make sure that the participating teams are aware of the European CanSat Competition technical requirements. ESA will not make exceptions if any requirement is not met at the European launch campaign, regardless of whether any exceptions were made in the National Competitions.
- The national organisers should have the intention of continuing the CanSat national activity in the future, and try to guarantee editions on a yearly basis.
- It is the obligation of the national organiser to make sure that the winning team (or, in case of unavailability for exceptional reasons, second ranked team) is able to attend the European launch campaign. The organisers must also ensure that any country-specific arrangements are made in good time to allow the winning team to travel to the European final launch campaign. For example, medical insurance and visas, if necessary.

## → Phase 4 - Launch your CanSat

### *European CanSat Launch Campaign*

The highlight of the European CanSat Competition is the launch campaign, taking place from 21 to 26 June 2020. All national teams' CanSats will be launched by a rocket up to an altitude of 1 km. The CanSats will then separate from the rocket, conduct their missions, and land safely on the ground to be recovered by the teams. The location of the European CanSat Competition finals will be known and announced at the beginning of 2020. The teams' CanSats must be flight-ready in time for the launch campaign.

A Jury of space experts will be nominated by ESA to evaluate the teams and their work. The Jury will select the winning teams based on the criteria listed below.

#### **Outline of the launch campaign (subject to change)**

Day 1 (Sunday 21 June)	Teams arrive Opening ceremony
Day 2 (Monday 22 June)	Presentation of projects to the jury at the working site First technical inspection of CanSats Drop tests of CanSats
Day 3 (Tuesday 23 June)	Launch of CanSats
Day 4 (Wednesday 24 June)	Teams work on their final presentation Presentation of results by CanSat teams
Day 5 (Thursday 25 June)	Presentation of results by CanSat teams Closing ceremony Social event
Day 6 (Friday 26 June)	Teams depart

## The Pre-Launch Report

All teams participating in the 2020 European CanSat Launch Campaign will need to submit the **Pre-Launch Report (PLR)**. This document is a **20 page document, including appendices\***, that summarises all the work done and the progress made. It should provide a full description of the CanSat mission, system and functionalities, and indicating the steps, rationale and trouble-shooting which was needed to achieve the CanSat refined design, as well as a detailed budget. This document should accurately record all the details of the completed CanSat prototype. This will be the main document provided to the Jury members before the European launch campaign, who will then be tasked with evaluating the quality of the report, as well as the work and performance of each team.

The PLR must be submitted to ESA in PDF by 5 June 2020, 22:00 CET, written in English in Verdana font, size 11 at [cansat@esa.int](mailto:cansat@esa.int) with the name of the team and name of the document submitted written in the subject line (e.g. "Team X Pre-Launch Report"). The document attached should have the following file name format: TeamX\_PreLaunchReport.pdf.

**If a team submits a PLR that exceeds the 20-page limit, ESA will request that the team re-submits the report to be within this limit, or else will disqualify the report from being judged.**

\*Appendices should only include extra information that helps the reader to understand the report, but that is too bulky to fit in the main report. For example: snippets of code, brief extracts of information from a manufacturer's data sheet, content and data from literature/research or any other information that would complement the main report. Teams do not need to write appendices but if they are used, they should be short.



## → Phase 5 - Write your final report

After the launch campaign, the teams will be requested to prepare and submit their **CanSat Final Report (CFR)**, written in English in Verdana font, size 11, which follows the standards of a scientific paper, including an abstract and details of the whole project. The report should be limited to a **maximum of 25 pages including any appendices** and must summarise the work done before, during, and after the launch campaign, with a special focus on the results obtained and the (scientific/engineering/technical) conclusions. Only after submission of the CFR will the members of the teams receive an ESA certificate recognising their participation in the 2020 European CanSat Competition.

The CFR has to be submitted to ESA at [cansat@esa.int](mailto:cansat@esa.int) by **31 July 2020, 22:00 CET**, stating the name of the team and name of the document submitted in the subject line (e.g. “Team X Cansat Final Report”). The document should be sent as a PDF, using the following file name format: TeamX\_CansatFinalReport.pdf.

ESA will provide guidelines as well as templates for the required reports to each participating team. The template for the CFR will be provided to each team as a Word document but teams may choose a different text editor if they wish e.g LaTeX. However, please consider that the formatting requirements must still be adhered to: the font, font size and page limits specified above. The final version must be sent to ESA in PDF.



## → ELIGIBILITY CONDITIONS

In order for a student team to be accepted into the European competition, the following conditions have to be fulfilled:

1. Each student team must comprise a minimum of <sup>4</sup><sup>5</sup> up to a maximum of 6 students (aged 14 – 20 years old) resident in an ESA Member State<sup>6</sup>, Slovenia or Canada, respecting one of the following conditions:
  - Team of students enrolled full-time in a secondary school;
  - Team of students in home schooling condition (certified by the National Ministry of Education or delegated authority);
  - Team of members of a social club enrolled full-time in secondary schools;
2. At least 50% of the students included in a team must be nationals of an ESA Member State, Slovenia or Canada.
3. University/higher education students cannot participate in this competition.
4. Each team needs to be supervised by a teacher or mentor responsible for monitoring the team's technical progress, offering help and advice, and acting as the team's point of contact with ESA's Education Office. The Mentor must be available to accompany the team to the competition launch campaign.
5. If your national legislation stipulates a compulsory requirement that one extra teacher/mentor accompanies the students, the team must submit official evidence of this. In this case, the extra mentor will need to cover their own travel and accommodation expenses (while points b, c and d in the 'Funding & sponsorship' section will be covered by ESA).
6. It is forbidden for a team to participate in the European CanSat Competition more than once, with the exception of the teacher/mentor and up to one student from any former team.
7. At least one member of the student team should have a working knowledge of English, in order to write reports and give oral presentations in English. It is advantageous that the whole team, including the mentor has a sufficient level of English.
8. It is forbidden for an unregistered person to attend the competition.

<sup>5</sup>A minimum of 4 students per team is required in order to guarantee proper team interaction and collaboration.

<sup>6</sup>ESA Member States in 2019: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, United Kingdom.

In the framework of the current collaboration agreement between ESA and the Republic of Malta, teams from Malta can also participate in the European CanSat Competition as guest competitors. Teams from other countries may also participate in the European CanSat Competition as guest competitors if approved by ESA (see Annex 1).

## → FUNDING & SPONSORSHIP

For the competition launch campaign, ESA will sponsor the accommodation, meals and local transportation expenses for up to 6 students and 1 teacher per national team, as described in the 'eligibility conditions' listed above, as well as all costs for the rocket launches and related flight activities.

This includes:

1. Accommodation for the team members (Double or quadruple rooms) and for the mentor(s) (single room) for the total duration of the launch campaign
2. Local transport for the duration of the event, including transport from the closest international airport or from the closest train station to the launch campaign location.
3. Meals
  - Dinner on day 1
  - Breakfast, lunch and dinner on days 2, 3, 4 and 5
  - Breakfast on day 6
  - Some snacks and water throughout the campaign
4. Costs of any launch-related and leisure activities.

All teams are responsible for arranging their own travel bookings and covering expenses to/from their hometowns and the main airport/train station of the launch campaign location, as well as the costs of their CanSat hardware and tools.

# → TECHNICAL REQUIREMENTS

The CanSat competition is designed to simulate all aspects of a real satellite mission including design, development, testing, launch, operations, and data analysis, by means of teamwork.

## 1. Rocket specifications

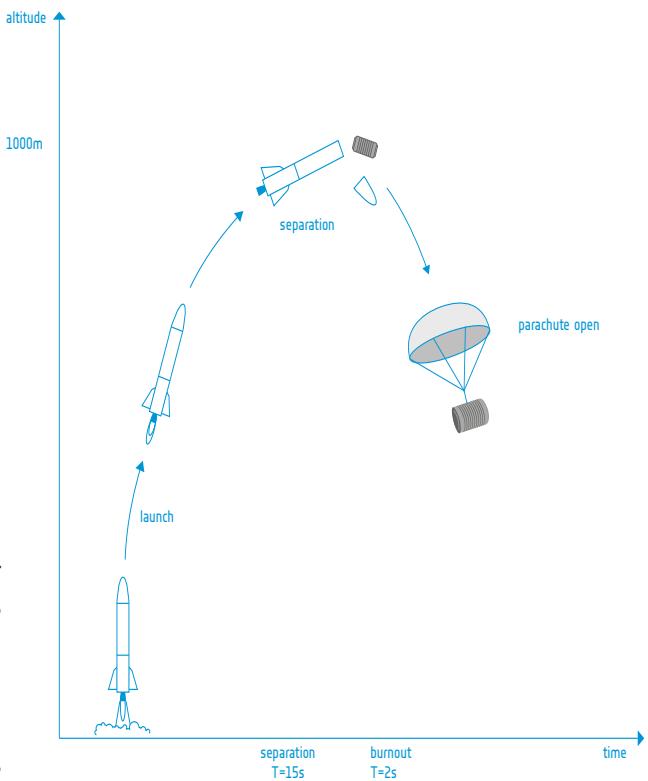
An example of a rocket launch is given below and could differ from the one used in the final launch campaign.

Rockets used for CanSat launches can vary in capacity and specifications. Some of these rockets can launch up to 20 CanSats at a time.

An example of a commercial model rocket kit typically used is the Intruder, or modified versions of this model rocket. Each Intruder rocket can normally host 2 or 3 CanSats with the following characteristics:

<b>Mass:</b>	3 kg
<b>Length:</b>	1.5 m
<b>Diameter:</b>	79.4 mm
<b>Span:</b>	232 mm
<b>Apogee:</b>	approx. 1000 m
<b>Flight time:</b>	approx. 140 s
<b>Propellant mass:</b>	280 g

The rocket would deploy its parachute at apogee, which is reached at around 15 seconds after take-off, together with the two/three CanSats. Just after the apogee (0 – 2 seconds later), the CanSats would separate from the rocket and descend individually with their own parachutes. The CanSats are usually found within 1 km of the launch site. However, recovery of the CanSats cannot be guaranteed.



## 2. CanSat requirements

The CanSat hardware and mission must be designed following these requirements and constraints:

1. All the components of the CanSat must fit inside a standard soft drinks can (115 mm height and 66 mm diameter), with the exception of the parachute. Radio antennas and GPS antennas can be mounted externally on the top or bottom of the can, depending on the design, but not on the sides.  
**Note:** The rocket payload area usually has 4.5 cm of space per CanSat available, along the can's axial dimension (i.e. height), which must accommodate all external elements including: parachute, parachute attachment hardware, and any antennas.
2. The antennas, transducers and other elements of the CanSat cannot extend beyond the can's diameter until it has left the launch vehicle.
3. The mass of the CanSat must be between a minimum of 300 grams and a maximum of 350 grams. CanSats that are lighter must take additional ballast with them to reach the 300 grams minimum mass limit required.
4. Explosives, detonators, pyrotechnics, and inflammable or dangerous materials are strictly forbidden. All materials used must be safe for the personnel, the equipment, and the environment. In case of doubt by ESA, Material Safety Data Sheets (MSDS) may be requested from the teams.
5. The CanSat must be powered by a battery and/or solar panels. It must be possible for the systems to remain switched on for four continuous hours.
6. The battery must be easily accessible in case it has to be replaced/recharged.
7. The CanSat must have an easily accessible master power switch.
8. Inclusion of a positioning system for retrieval (beeper, radio beacon, GPS, etc.) is recommended.
9. The CanSat should have a recovery system, such as a parachute, capable of being reused after launch. It is recommended to use bright coloured fabric, which will facilitate recovery of the CanSat after landing.
10. The parachute connection must be able to withstand up to 500 N of force. The strength of the parachute must be tested to ensure that the system will operate nominally.
11. For recovery reasons, a maximum flight time of 120 seconds is recommended. If attempting a directed landing, then a maximum of 170 seconds flight time is recommended.

12. A descent rate between 8 and 11 m/s is recommended for recovery reasons. However, the CanSat's descent speed must not be lower than 5 m/s or higher than 12 m/s for safety reasons. Additionally, the airfield or weather conditions might determine additional mandatory restrictions on the velocity.
13. The CanSat must be able to withstand an acceleration of up to 20 g.
14. The total budget of the final CanSat model should not exceed 500€. Ground Stations (GS) and any related non-flying item will not be considered in the budget. More information regarding the penalties in case the teams exceed the stated budget can be found in the next section.
15. In the case of sponsorship, all sponsored items should be specified in the budget with the actual corresponding costs on the market.
16. The assigned frequency must be respected by all teams in the Launch Campaign. The range of allowed frequencies changes depending on the country where the event is hosted and will be communicated in due time. It is recommended that teams pay attention to the design of the CanSat in terms of hardware integration and interconnection, so the radio frequency can be easily modified if necessary.
17. The CanSat must be flight-ready upon arrival at the launch campaign.

### 3. Meeting the requirements for the European Launch Campaign

To verify that the CanSats are suitable for launch, a technical inspection and a drop test will take place at the beginning of 2020 European CanSat launch campaign. The way the requirements are evaluated is as follows:

- Requirements 1, 2, 3, 7, 12 and 16 will be evaluated on site by a specially appointed CanSat technical team. Teams that don't pass any of the tests at the first attempt will only be permitted one second chance to amend the issues, in order to meet all the requirements. In case of failing at the second attempt, the team will be considered not to have achieved flight status and their CanSat won't be approved for launch.
- Requirements 10 and 13 refer to tests that should be carried out prior to the 2019 European CanSat launch campaign and the proof of these tests being successful should be stated in the PLR.
- A statement of confirmation that the rest of the requirements are met should be included in the Pre-Launch Report, paying special attention to requirement 14, which must be stated in the document

## → EVALUATION AND SCORING

### 1. The jury

The Jury, appointed by ESA, will be comprised of CanSat experts, education experts, or engineers and scientists who will evaluate the teams' performances during 'Phase 4: European CanSat Competition launch campaign', taking into account the CanSat Pre-launch Report. The jury members will score the teams during the launch campaign and announce the results from their scoring in the Closing Ceremony.

The jury will typically have 4-6 members, and their fields of expertise can vary from science to engineering or education. The jury board is usually comprised of:

- Space science/engineering expert(s)
- IT/Electronics expert(s)
- Education expert(s)
- Radio communication expert(s)

CanSat National organisers are encouraged to indicate/recommend to ESA experts who can be part of the jury for the 2019 European CanSat Competition. These nominations must be received by email at [cansat@esa.int](mailto:cansat@esa.int) no later than 1 March 2020. ESA will ultimately decide on the final composition of the jury and the appointment of its members.

### 2. Scoring

Performance in the following areas will be evaluated:

#### A. Technical achievement

The Jury will take into account how the teams obtained the results, how reliable and robust the CanSat was, and how the CanSat performed. Innovative aspects of the project will be judged (e.g. the tools selected and the hardware/software used).

The aspects evaluated will be:

- **Mission's technical complexity:** The CanSat's technical level, understanding of the technical concepts and the originality of the engineering aspects of the mission.
- **Performance of the Primary mission:** The CanSat's technical performance in terms of deployment and data collection for the Primary Mission.
- **Performance of the Secondary mission:** The CanSat's technical performance in terms of deployment and data collection for the Secondary Mission.

## B. Scientific value

The scientific value of the teams' missions and the teams' scientific skills will be evaluated. This includes the scientific relevance of the mission, the quality of the technical reporting (both written and oral) and the team's scientific understanding that will be assessed from the team's ability to analyse and interpret results appropriately.

The aspects evaluated will be:

- **Scientific relevance:** Assessment of whether measurements are done with a clear and well-founded scientific purpose, the extent to which the CanSat is used in an original way and if the data collection is appropriate for reaching the objective.
- **Scientific understanding:** Level of understanding of the scientific principles that underlie the project.
- **Technical reporting:** Ability to summarise with clarity and provide a readable and complete Pre-Launch report, the proper labelling of the graphs and use of the correct units and the ability to present scientifically sound data and interpretations during the launch campaign.

## C. Professional competencies

The Jury will assess the team's collaboration and coordination, adaptability and communication skills.

The aspects evaluated will be:

- **Teamwork:** Collaborative effort of the team in order to complete the tasks in the most effective and efficient way.
- **Adaptability:** Attitude towards continual improvement and ability to adapt to new conditions, both from the national competition towards the European Competition (if applicable) and/or as far as ideas for improvement after the European Competition are concerned.
- **Communication:** Oral presentation skills, the ability to provide a captivating presentation involving confident speaking skills and a visually appealing presentation.

## D. Outreach

The team will be awarded points on how the project is communicated to the school and the local community, taking into account web pages, blogs, presentations, promotional material, media coverage etc.

## Marking scheme

The overall balance between the items to be evaluated is as follows:

Technical achievement	35%
Scientific value	35%
Professional competencies	20%
Outreach	10%
<b>TOTAL</b>	100%

## Penalties

Teams' final scores will be penalised with 1% per day of late submission of the CanSat Pre-Launch Report. Similarly, 1% of the final score will be subtracted per 10 euros extra spent over the maximum CanSat budget of 500 euros.

## 3. Prizes

Similarly to the previous edition of the European CanSat Competition in 2019, the award scheme is designed to acknowledge teams' strengths in as fair a way as possible. At the 2020 European CanSat Competition, the prizes will be awarded according to the following categories:

- **Best CanSat Project:** This prize will be awarded to the team with the best overall score.
- **Highest Technical Achievement:** This prize will be awarded to the team with the best score in the 'Technical Achievement' field.
- **Outstanding Science Mission:** This prize will be awarded to the team with the best score in the 'Scientific value' field.
- **Most Professional Team:** This prize will be awarded to the team with the best score in the 'Professional competencies' field.
- **Best Outreach prize:** This prize will be awarded to the team with the best score in the 'Outreach' field.

**\*Honorary Prize/Special Mention (optional):** The jury may award an 'honorary prize' in any of the two following scenarios:

- When a guest competitor team has achieved an outstanding performance, by ranking top in one or more of the fields mentioned above (see Annex 1)
- When a team goes 'above and beyond' in a particular area not covered by one of the official prizes.

The following rules will also apply:

- A team can't receive more than one prize.
- The European CanSat 2020 prize will always be awarded to the team with the highest overall score.
- If a team is ranked the highest in several categories, priority will be given to the highest weighting prizes (Outstanding Science Mission (35%) or Highest Technical Achievement (35%)); in case a team is ranked the highest both in the Scientific value and Technical Achievement fields, the prize awarded will be for the category in which the team has the highest score margin, ahead of the 2nd ranked team in that field.

For example, if one team has the best scores in both Technical Achievement (scoring 8.5 out of 10) and Outreach (scoring 9.5). They will then be granted the Highest Technical Achievement prize because this category has a higher weighting, and the Best Outreach prize will be granted to the second best score in that field.

In a different scenario, where a team has both the best overall score (scoring 8.5) and the best score in Outreach (scoring 9.5), this team will be awarded the European CanSat 2020 prize instead, as this prize needs to be awarded to the best overall score, and the 2nd ranked team in the 'Outreach' field would receive the respective prize.



## → ANNEX

### **Guest Competitors scheme (applies to all countries other than ESA Member States, Slovenia and Canada)**

The participation of your CanSat team and your role as guest competitors is accepted as follows:

- The guest team must be the winner of the National or regional CanSat competition of the country.
- The guest team must be endorsed by the country's Space Agency or equivalent entity. For this, an email or letter of endorsement should be sent to [cansat@esa.int](mailto:cansat@esa.int) no later than 1 March 2020. ESA will assess a guest team's participation on a case by case basis.
- The guest team must fulfil the eligibility criteria stated in the Phase 1 section this document.
- The guest team's CanSat must fulfil the technical requirements stated in section 1.3 in this document.
- The guest team will be allowed to participate in the European launch campaign with the other officially competing teams and will be evaluated by the European CanSat Jury. However, as only the officially competing teams can receive one of the official prizes stated in section 2.3, the guest team will receive an 'honorary prize' should they rank at any of these levels.
- The guest team will be able to use the same accommodation and local transportation means and have access to the meals and facilities provided by the competition organiser as per the other teams, but will have to cover all the expenses except: local transport, the meals, and the use of the technical facilities and the launch costs, which will be covered by ESA.
- The guest team will be exempt from submitting to ESA the requested reports (such as the Pre-Launch Report or the CanSat Final Report), as they are guest competitors. Submission to ESA of these documents is therefore optional. Guest teams will receive the participation certificate as guest competitors regardless of this.
- The guest team will provide ESA with a description of their CanSat mission/experiments in advance, to be passed to the Jury by a deadline that will be communicated to them in due time.



## → CONTACT

All questions and expressions of interest should be directed to:

Email: [cansat@esa.int](mailto:cansat@esa.int)

**More information:**

CanSats in Europe Portal [www.esa.int/Education/CanSat](http://www.esa.int/Education/CanSat)

CanSat in Europe Facebook page [www.facebook.com/cansatsineurope/](https://www.facebook.com/cansatsineurope/)