



**ROCKET  
COMPETITION  
A4-INTERNATIONAL CATEGORY  
SPECIFICATIONS  
2025**

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| VERSIONS |            |                      |   |
|----------|------------|----------------------|---|
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| 1.2      | 13.03.2025 | Competition Calendar | PDR Results   |
| 1.3      | 30.05.2025 | Competition Calendar | CDR Results, Financial Support Processes                |
| 1.4      | 14.06.2025 | Competition Calendar | CDR Results, Financial Support Processes                |
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| 1.6      | 26.06.2025 | Competition Calendar | Financial Support Processes                             |

## 1. DEFINITIONS

- **APOGEE:** The highest altitude reached by the rocket during a flight.
- **CATEGORY:** The groups that describe the different tasks determined by the Competition Committee and the restrictions of the functions.
- **CHECKLIST:** The list created by the teams to check that they have all their materials with them in the firing test area and that all integration activities and final preparations before the launch have been carried out completely.
- **COMMERCIAL SYSTEM (COTS):** Ready-to-use off-the-shelf systems designed and manufactured by a commercial company.
- **COMMUNICATION COMPUTER:** This is the system that transmits telemetry data from the rocket to the ground station through the flight communication subsystem. It can be a standalone system or integrated with the Flight Control Computer.
- **CONTROL SURFACES:** Moving surfaces that provide the necessary aerodynamic forces/moments for the rocket to perform the targeted maneuvers.
- **EYE BOLT:** It is an eye-shaped intermediate element used within the rocket to connect the parachute and the rest of the rocket's systems.
- **FLIGHT COMPUTERS:** Electronic cards consisting of Flight Control and Communication Computers.
- **FLIGHT CONTROL COMPUTER:** A subsystem in which raw data from sensors is collected, stored, and managed to facilitate flight control. The separation and recovery systems found on the rocket are managed by the flight control computer.
- **GROUND STATION:** Stations developed by teams to receive the telemetry data produced by the rocket during the flight and to track the flight.
- **IGNITION WIRE:** A wire in the burner section that ignites the fuel and/or flammable material when an electric current is passed through its open end.
- **INTEGRATION FRAME:** The parts used to connect the two frames of the rocket to each other.
- **LAUNCH RAIL:** The launch rail from which the rocket will be launched is inclined at a set angle to the ground, in accordance with the competition arrangements.
- **MECHANICAL ASSEMBLY AND FASTENERS:** The body that holds the Control Section elements together as well as the screws, nuts, pins, washers, couplings, etc. used for fastening and bearings and mechanical elements used for bedding purposes.
- **MOTOR:** The section of the rocket that provides the thrust.
- **MOTOR CLASS:** The class in which the thrust level ranges are determined according to international standards.
- **OPEN ROCKET:** An open-source used for sounding rockets allowing the design and the flight simulation of the rockets (*more information can be found at <http://openrocket.info>*)
- **OPERATIONAL CONCEPT:** The concept describes the mission environment and the tasks to be performed from the launch of the rockets to the end of the flight.

- **OUT OF COMPETITION FLIGHT:** A non-scored flight by teams that have failed to obtain the necessary permits for a flight in accordance with the competition specifications despite having obtained the necessary security labels from the referees on the competition site.
- **PAYLOAD:** The systems that must be launched to a certain altitude along with the rocket and safely landed after stage or rocket component separation. They're designed to perform specific tasks when teams use scientific payloads.
- **PRIMARY PARACHUTE:** The parachute deployed at the apogee brings the rocket's velocity down to a certain level, ensuring a controlled and drift-free decrease in altitude until the secondary parachute is deployed.
- **RAIL BUTTON:** A manual component that is mechanically attached to the rocket's frame and that ensures the rocket is positioned linearly on the launch rail. When rockets are fired, they accelerate in a linear direction on the launch rail.
- **RECOVERED PAYLOAD:** The payload that lands with a parachute after separation from the rocket during flight, on which no damage is detected in the inspections made, and which is considered suitable for a new mission.
- **RECOVERED ROCKET:** A rocket on which no damage to its components (*frame, flight computer, etc.*) is detected in the inspections made after a flight, and which is considered suitable for a new mission.
- **RISK ANALYSIS:** An analysis that the participating teams must complete assessing certain aspects of their rocket designs.
- **ROCKET:** A vehicle designed to safely launch its payload at a certain altitude, which can use different motors for different categories as stated in the document, and move under thrust at the beginning of their trajectory but subsequently travel according to ballistic laws.
- **SECONDARY PARACHUTE:** The parachute that comes out of the rocket whose speed has been reduced to a certain level by opening the primary parachute and allowing the rocket to land on the ground at a safe speed so that it can be recovered.
- **STAGED ROCKET:** Rockets with two or more engines, with each stage having its own thrust components (*series or parallel*).
- **STATIC MARGIN:** Static margin (SM) is a dimensionless number obtained by dividing the distance between the center of pressure ( $X_{CP}$ ) and the center of gravity ( $X_{CG}$ ) of the rocket by the rocket body diameter ( $D_B$ )
 
$$\frac{X_{CP} - X_{CG}}{D_B} = SM$$
- **TEKNOFEST ROCKET COMPETITION COMMITTEE:** The authorized committee, composed of representatives of the Turkish Technology Team (T3) Foundation, ROKETSAN Inc., responsible for the planning, coordination and execution of the TEKNOFEST Rocket Competition.
- **TELEMETRY DATA:** The collective of meaningful data collected from sensors on the system during flight that is transmitted to the ground station.

## 2. INTRODUCTION

The main purpose of the TEKNOFEST Rocket Competition, organized by ROKETSAN Inc. under the coordination of the Turkish Technology Team (T3), is to increase the interest of the youth in the field of aviation and space, to support them interested in rockets and missiles, to encourage them to conduct research into future technologies, to familiarise them with professional design processes, to raise awareness in society about the technological achievements of young people and to increase the nation's confidence in the future. Participants with knowledge and experience in different disciplines carry out work in teams (design, production, integration, analysis/modeling, testing, etc.), gaining technical and scientific reporting competencies. In addition, by meeting and exchanging ideas with other teams with similar interests and with professionals working in these fields, the teams develop themselves with innovative ideas.

The TEKNOFEST Rocket Competition, which was first held in 2018, was Europe's first rocket competition and the second in the world, and, as can be seen from the team application data for subsequent years, the interest of young people is constantly increasing.

| YEARS          | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|----------------|------|------|------|------|------|------|------|
| APPLICANT TEAM | 156  | 570  | 516  | 544  | 455  | 473  | 1098 |

Allowing young people to produce and launch rockets of their own design will encourage them to make career choices focused on science, technology, and engineering in the future. Using their knowledge in various fields of science and engineering, young people engage successfully in the design, production, and integration of rockets through interdisciplinary thought and the planning of complex operations/processes. Additionally, students benefit from the experiences of other successful teams and gain valuable experience by examining different design examples. The achievements of the young people participating in this competition are summarized below:

- Transforming high-level (*system level*) requirements into more detailed (*subsystem and component levels*) requirements,
- Team members working in different disciplines (*Aerodynamics, Avionics, Structural Integrity, Payload, and Recovery Systems*) create a conceptual design and then produce a detailed design following a Systems Engineering approach,
- Utilizing optimization methods and applications in the design process,
- Carrying out production and supply processes for the productization of the design,
- Creation and implementation of assembly and integration plans,
- Creating a Testing Verification Plan for the verification and validation of the resulting product (*at the component/subsystem/system levels through analysis/demonstration/simulation/testing, considering all requirements*) and implementing the plan,
- Managing all processes from the outset (*receipt of specifications*) to the final stage (*launching the rocket*), in accordance with Project Management principles,
- Analyses and management of the risks.

The most important outcome of this competition is to encourage young people who like and care about their work, who can organize well with team spirit, who have sufficient technical knowledge and perceive engineering correctly, and who can foresee risks in sufficient time and

take the necessary proactive precautions.

Applications for the TEKNOFEST Rocket Competition, which will be held for the eighth time in 2025, are to be made through the official website of the Aviation, Space and Technology Festival TEKNOFEST Technology Competitions ([www.teknofest.org](http://www.teknofest.org)) before the deadline specified in the Competition Calendar. We wish success to all teams that apply to the competition.

### 3. REQUIREMENTS

#### 3.1. COMPETITION CATEGORIES

**3.1.1.**The categories in the competition are presented in **Table 3.1** below.

| GROUP | NO | MAIN MISSION   | CATEGORY   |
|-------|----|--|--|
| A     | 1  | Development of a Single-Stage Rocket with a COTS Solid Propellant Rocket Motor to Reach the Highest Altitude                               | High-School Category                                     |
|       | 2  |  | Medium-Altitude Category                                 |
|       | 3  |  | High-Altitude Category                                   |
|       | 4  |  | International Category                                   |
|       | 5  | Development of a Two-Stage Rocket with a COTS Solid Propellant Rocket Motor to Reach the Highest Altitude                                  | Challenging Task Category                                |
|       | 6  | Development of a Single-Stage Rocket with an SRAD (student-researched and Developed) Hybrid Propellant Motor to Reach the Highest Altitude | SRAD Hybrid Propellant Motor & Rocket Category           |
| B     | 1  | Development of Rocket Flight Control System  | SRAD Rocket Control Section Development Category         |
|       | 2  | Development of Rocket Propulsion System  | SRAD Hybrid Propellant Rocket Motor Development Category |
|       | 3  |  | SRAD Liquid Propellant Rocket Motor Development Category |

**Table 3.1** Competition Categories

**3.1.2.**The coding system of the categories is presented in **Table 3.2** below.

| NO | CATEGORY                                       |
|----|--|
| A1 | High School Category                           |
| A2 | Medium Altitude Category                       |
| A3 | High Altitude Category                         |
| A4 | International Category                         |
| A5 | Challenging Task Category                      |
| A6 | SRAD Hybrid Propellant Motor & Rocket Category |

|    |  |
|----|--|
| B1 | SRAD Rocket Control Section Development Category         |
| B2 | SRAD Hybrid Propellant Rocket Motor Development Category |
| B3 | SRAD Liquid Propellant Rocket Motor Development Category |

**Table 3.2** Competition Categories

## 3.2. GENERAL REQUIREMENTS FOR A4 CATEGORY

**3.2.1.** Applications submitted after the deadline will not be taken into consideration.

**3.2.2.** Participation as a team is mandatory.

**3.2.3.** Teams must consist of a minimum of six (6) members.

**3.2.4.** Teams may consist of both students or alumni.

**3.2.5.** At least half of the team members must be students.

**3.2.6.** The teams may bring a minimum of four (4) and a maximum of 6 (six) team members to the firing test range.

**3.2.7.** Applications of the teams in which Turkish Republic citizens take place (*including those with dual citizenship who are citizens of the Republic of Türkiye*) will not be accepted to Category A4.

**3.2.8.** The teams must design, produce, and launch rockets that will reach the highest altitude provided that the rockets exceed the minimum altitude given in **Table 3.3**. The flight performance of teams that do not meet the minimum altitude will not be considered successful;

| CATEGORY                  | MINIMUM ALTITUDE |
|---------------------------|------------------|
| A4 International Category | 8,000 ft         |

**Table 3.3** Minimum Altitude for Category A4

**3.2.9.** All teams will compete to reach both the highest altitude (*higher than the minimum altitudes in Table 3.3*) and the target altitude officially declared to the TEKNOFEST Rocket Competition Committee prior to the launch with a maximum tolerance of  $\pm 15\%$  (fifteen percent).

**3.2.10.** All teams must design and manufacture a rocket that fully meets all the indispensable requirements specified in the TEKNOFEST Rocket Competition Specification, shall perform ground tests at the assembly/integration of COTS/SRAD components/subsystems levels, and shall successfully launch the rocket (*in accordance with the concept of operation*) using the rocket motor to be provided by the TEKNOFEST Rocket Competition Committee (*the motors shall be handed over to the teams in the firing test range*).

**3.2.11.** The competition schedule is presented below;

| STAGE<br>CATEGORY | Application    | Preliminary Design Review (PDR) | Critical Design Review (CDR) | Launch Readiness Review (LRR) and Firing Tests |
|-------------------|----------------|---------------------------------|------------------------------|--|
| A4                | T <sub>0</sub> | T <sub>0</sub> + 2 Months       | T <sub>0</sub> + 4 Months    | T <sub>0</sub> + 7 Months                      |

**Table 3.4** Schedule for the A4 Category (*in terms of months*)

**3.2.12.** Students from different educational institutions can participate in the competition in mixed teams.

**3.2.13.** No member of a team competing in the A4 competition category can be part of another team competing in the same category.

**3.2.14.** Each team can participate in the competition with only one (1) rocket.

**3.2.15.** The deadlines for the submission of the reports to be prepared by all teams are presented below:

| REPORT<br>CATEGORY | Application    | Preliminary Design Review (PDR) Report | Critical Design Review (CDR) Report | Launch Readiness Review (LRR) Report |
|--------------------|----------------|--|-------------------------------------|--------------------------------------|
| A4                 | T <sub>0</sub> | T <sub>0</sub> + 9 Week                | T <sub>0</sub> + 17 Week            | T <sub>0</sub> + 31 Week             |

**Table 3.5** Report Delivery Schedule (*in terms of weeks*)

**3.2.16.** The deadlines for the submission of reports are as stated in the TEKNOFEST-2025 Rocket Competition Calendar. The teams' reports that do not comply with this schedule will not be taken into consideration.

**3.2.17.** The teams are responsible for preparing the relevant reports (*Preliminary Design Review-PDR, Critical Design Review-CDR, and Launch Readiness Review-LRR*) in accordance with the deadlines specified in the competition calendar and the standards provided by the TEKNOFEST Rocket Competition Committee. The teams' reports that do not comply with those conditions will not be taken into consideration.

**3.2.18.** The threshold score required to successfully complete each stage will be determined separately by the Competition Committee, and this threshold score will also be announced when the evaluation results are published, in accordance with the TEKNOFEST Rocket Competition Calendar. The threshold score in question will be determined separately by the Competition Committee for each year and each category.

**3.2.19.** The teams are responsible for listing all team members and team advisors who participated in the competition in their reports.

**3.2.20.** Each team must participate in the competition with one (1) advisor.

**3.2.21.** Teachers, academicians, instructors, and members of teams that have previously won the right to launch a rocket in any rocket competition (provided they are over 18 years of age) can participate as advisors.

**3.2.22.** For teachers, academicians, and trainers who are to serve as consultants, an officially approved electronic copy of the teacher/trainer/academician ID card given to the consultant by the educational institution in which she/he works (*photocopy of the ID card given by the institution in which she/he works will have the phrase “AS THE ORIGINAL” on it, and this document will be scanned and signed by the document manager*) must be uploaded to the system by the team during the CDR phase.

**3.2.23.** If members of teams that have previously won the right to launch rockets in any rocket competitions are to serve as consultants, documents proving the consultant's participation in the competition (*documents provided to the consultant by the competition organization and a photograph of the consultant taken in the competition, if exists*) must be uploaded to the system by the team during the CDR phase.

**3.2.24.** An electronic copy of a document indicating that the persons who will serve as consultants will fulfill their consultancy duties (*the submission document must be signed by the consultant and scanned to be entered into the system*) must be uploaded to the system by the team during the CDR phase.

**3.2.25.** Applications from the teams that do not comply with the restrictions regarding consultant-related issues will not be taken into consideration.

**3.2.26.** In the event of a change of advisor, the reason for the change and the new advisor information must be immediately declared in written form to the TEKNOFEST Rocket Competition Committee. Advisor changes must be made at least 24 hours before the start date of the TEKNOFEST Rocket Competition finals, otherwise, the advisor change will not be accepted.

**3.2.27.** If the team ranks and is entitled to receive an award, the consultant will also be rewarded. Consultants who do not come to the field will not be able to benefit from the mentioned award.

**3.2.28.** One person within the team, appointed as “**CAPTAIN**”, will carry out all communication and coordination processes with the TEKNOFEST Rocket Competition Committee.

**3.2.29.** During the competition, information will be provided by the TEKNOFEST Rocket Competition Committee only to the team captains.

**3.2.30.** The responsibility of the team captains for following the processes (*submitting an application, uploading the reports to the system before deadlines, filling out the forms, etc.*) will rest with the team captains, and the TEKNOFEST Rocket Competition Committee will not be responsible for any delay and/or disruption caused by them.

**3.2.31.** Applications must be made online through the [www.t3kys.com](http://www.t3kys.com) application system before the deadline specified in the Competition Calendar.

**3.2.32.** On the application dates, the team captain must first be registered in the system, followed by the advisor and the other team members. After the team captain sends an invitation to the e-mail addresses of the advisor and the team members, the people to whom an invitation was sent log in to the Application System and accept the invitation from the "My Team Information" section. Thus, the registration is completed. Otherwise, the registration will not be completed.

**3.2.33.** All processes under the TEKNOFEST Rocket Competition (*submitting applications,*

*submitting reports, submitting applications for travel financial support, submitting objections, adding/removing members, etc.) are carried out via the Corporate Management System.*

**3.2.34.** Within the scope of TEKNOFEST Rocket Competition, all processes (*Application, Report Retrieval, Travel Financial Support Application, Objection Processes, Member Addition/Removal Processes, etc.*) must be carried out by the team captains in coordination with the team advisor (*the signature of the team advisor indicating their approval must be included on all relevant documents*).

**3.2.35.** Members can be added and removed until the CDR delivery date.

**3.2.36.** Before applying, the contestant must read and approve all the provided details related to the competition, the conditions of participation (*the application will be considered as an indication that the contestant approves the rules*), and participation in the competition.

**3.2.37.** The first three teams in this category that meet the necessary conditions will be awarded cash prizes. The conditions for winning the prize and the prize amounts are explained in details in the relevant sections.

**3.2.38.** The TEKNOFEST Rocket Competition Committee has the authority to limit the number of team members to take place in the Aksaray Firing Test Range (*the test range where the competition finals are to be held*) for any reason. In the event of any restrictions, the necessary information will be provided by the TEKNOFEST Rocket Competition Committee.

**3.2.39.** Transportation and accommodation support to be provided to the finalist teams is limited. The number of people to be supported will be notified to the teams by the TEKNOFEST Rocket Competition Committee.

**3.2.40.** The TEKNOFEST Rocket Competition Committee is not responsible in any way for any damage caused by the teams to third parties throughout the competition.

**3.2.41.** The TEKNOFEST Rocket Competition Committee is not responsible in any way for any damage that the contestants suffer which are not caused by the TEKNOFEST Competition Committee throughout the competition.

**3.2.42.** The teams are responsible for designing, developing, producing, and ground testing their systems in accordance with the laws of their homeland and Republic of Türkiye. TEKNOFEST Rocket Competition Committee has no responsibility in the event of any violation in this regard.

**3.2.43.** TEKNOFEST Rocket Competition Committee reserves the right to make changes to those specifications in any time throughout the competition.

**3.2.44.** The applications of teams that do not meet the above conditions shall not be considered valid.

### **3.3. REQUIREMENTS FOR A4 INTERNATIONAL CATEGORY**

This section contains the essential requirements for the rockets to be developed by the teams competing in the A4 competition category.

#### **3.3.1. INDISPENSABLE REQUIREMENTS**

**3.3.1.1** The teams are responsible for recovering all components and the payload of the rocket in a reusable condition following the launch.

**3.3.1.2** All components and payload of the rocket must be recovered independently and in such a manner as to maintain their integrity.

**3.3.1.3** Teams must ensure recovery by means of a parachute.

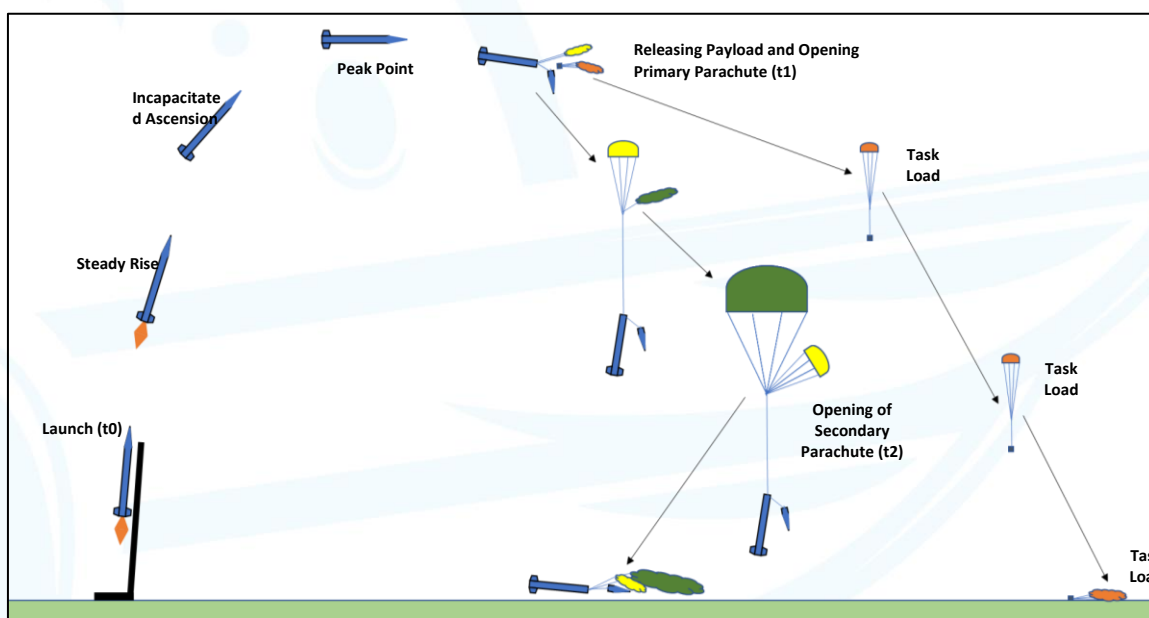
**3.3.1.4** The payloads must be separated from the rockets right after reaching the apogee of their flight trajectory.

**3.3.1.5** It is mandatory that the rocket's current location data is shared uninterruptedly with the team's ground station via the communication computers on the system.

**3.3.1.6** It is mandatory for the rockets to perform their flight mission in accordance with the operation concept in **Figure 3.1**.

**3.3.1.7** Rockets are to be recovered with two parachutes (in **Figure 3.1**, the yellow parachute is the "Primary Parachute" and the green parachute is the "Secondary Parachute"), while the payload must be recovered with a different parachute to that of the rocket (in **Figure 3.1**, the orange parachute).

**3.3.1.8** The primary parachutes must open immediately after the rocket reaches the apogee of its flight trajectory;



**Figure 3.1** Operation Concept for A4 Competition Category

**3.3.1.9** The main parachute (secondary parachute) must open **400–600** meters from the ground.

**3.3.1.10** The rocket motors that all finalist teams will use at the Aksaray Firing Range are solid-propellant COTS ones which are to be supplied by the TEKNOFEST Rocket Competition Committee (*Teams are prohibited from using different motors*).

**3.3.1.11** The motors to be delivered to the teams by the Competition Committee at the Aksaray Firing Range are standard, and only one motor will be handed over to each team.

**3.3.1.12** All teams must design their rockets for the motors provided by the TEKNOFEST Rocket Competition Committee.

**3.3.1.13** The solid propellant COTS motors to be provided to the teams by the Competition Committee are M1850-type which are designed and manufactured by Aerotech/USA.

**3.3.1.14** The Competition Committee has the right to change the motors provided to the teams if necessary, and when a motor change is made, the TEKNOFEST Competition Committee will notify the teams, accordingly.

**3.3.1.15** Technical information about the motor to be provided to the teams for the TEKNOFEST-2025 Rocket Competition can be accessed from [https://aerotech-rocketry.com/products/product\\_d6aabdf1-83ba-02d9-5359-98bfb8a2e171](https://aerotech-rocketry.com/products/product_d6aabdf1-83ba-02d9-5359-98bfb8a2e171).

**3.3.1.16** The rocket motors to be provided by the Competition Committee will be delivered to the teams that receive the necessary approvals from the referees during the assembly/integration activities of the finals at the Aksaray Firing Range. The motors shall be ready for assembly/integration with the rocket.

**3.3.1.17** The motors should be installed on the rockets after all other installation and integration activities related to the rocket have been successfully completed and approval has been received from the referees (*at the final stage of the installation/integration activities*).

**3.3.1.18** Teams are strictly prohibited from designing, manufacturing, and integrating into the rocket any components that will affect the performance of the motors (increasing or decreasing thrust, directing thrust, etc.).

**3.3.1.19** In the competition, no rocket design will make use of the Cluster concept involving multiple engine systems in a single body or in different stages.

**3.3.1.20** To record the maximum altitude to which the rockets fly, the teams will be provided with a referee altimeter (*technical details of the referee altimeter are provided in ANNEX-1*), which will be handed over to the teams that receive approval from the referees on the integration/assembly day at the Aksaray Firing Range by the TEKNOFEST Rocket Competition Committee.

**3.3.1.21** It is the responsibility of the teams to charge their altimeter devices and keep them in working order until the launch is completed. Teams that fail to do this will not be considered in the competition.

**3.3.1.22** Teams that complete the recovery operation must deliver the altimeters along with the recovered components of the rocket to the Competition Committee for evaluation. The altitude data must be readable without any additional action. Any failure in this regard will result in the team's altitude not being considered by the TEKNOFEST Rocket Competition Committee.

**3.3.1.23** The mission performance table according to the recovery results of the rocket components and payload indicated by the TEKNOFEST Rocket Competition Committee is presented below.

| COMPONENTS        | RECOVERY PERFORMANCE |                      |                      |
|-------------------|----------------------|----------------------|----------------------|
| Rocket Components | Successful           | Partially Successful | Successful           |
| Payload           | Successful           | Successful           | Partially Successful |
| MISSION RESULT    | COMPLETE SUCCESS     | PARTIAL SUCCESS      | PARTIAL SUCCESS      |

**Table 3.6** Mission Performance Table

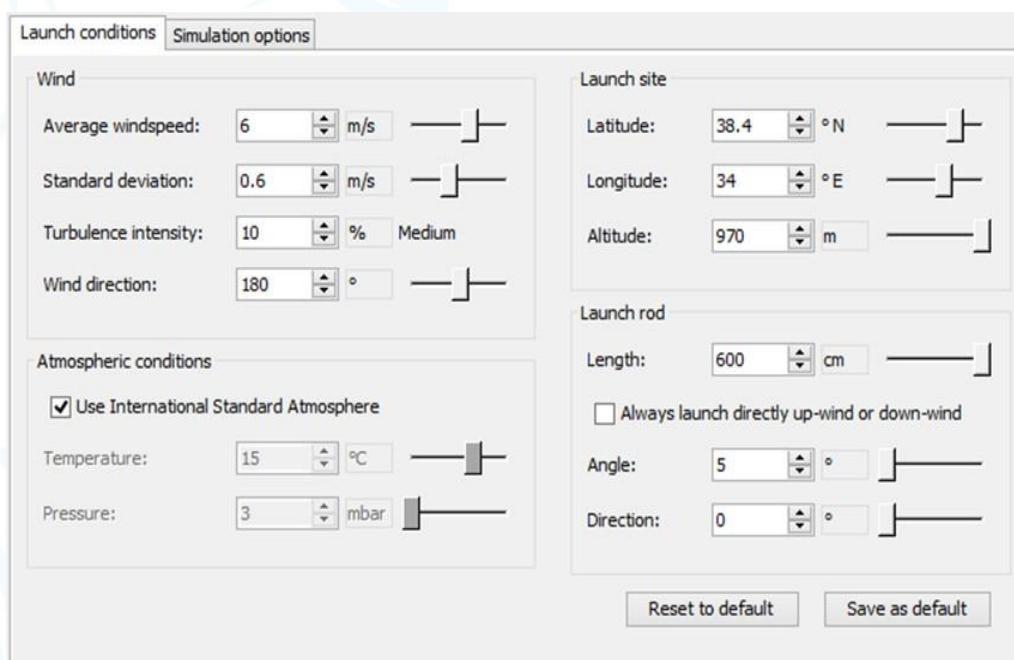
**3.3.1.24** For any recovery success other than that listed in **Table 3.6** (if any of the Rocket Components or Payload recovery fails), the mission will be considered to have FAILED.

**3.3.1.25** A separate locator system (*GPS, radio transmitter, etc.*) will be needed for the recovery of the payload and the rocket (*one locator on each*).

**3.3.1.26** It is mandatory for the teams to perform trajectory simulations in accordance with the “Open Rocket” simulation menu in **Figure 3.2**, and to attach the trajectory simulation output created with Open Rocket to the relevant report. Any failure in this regard will lead to the non-evaluation of the report.

**3.3.1.27** Teams shall not enter their Mission Payload as "Unspecified Mass". The payload will be named "PAYLOAD", and its mass will be entered as 4,000 grams (4 kg) minimum.

**3.3.1.28** The values on the “Launch Simulation” screen shown in **Figure 3.2** must be entered into the simulation. Reports of teams that have not performed a simulation with these values will not be evaluated.



**Figure 3.2** Open Rocket Simulation (*Launch Conditions Screen*)

**3.3.1.29** Rockets will be launched with an elevation angle of 85° from the ground and a firing direction angle determined by the TEKNOFEST Rocket Competition Committee based on the prevailing wind direction.

**3.3.1.30** Launchpad features are given in Annex 2.

**3.3.1.31** In addition to the requirements included in the competition specifications, the requirements included/to be included in the PDR, CDR, and LRR templates will also be considered as indispensable parts of the competition specifications.

**3.3.1.32** Communication cables are to be twisted (*there should be at least 10 twists/cm of cable*) and the twisting process should be done in pairs or triplets between the High, Low, and Earth lines.

**3.3.1.33** The thickness of the battery cables should be determined based on the total continuous and instantaneous current of the system, and AWG16-28-type cables should be used.

**3.3.1.34** The connections must be suitable for screw mounting, and care must be taken to ensure that other connections selected considering flight vibration are fixed at the end of the

assembly.

**3.3.1.35** After the wiring has been completed, each line must be verified with a continuity check (*circuit continuity resistance tests at a maximum of 1 ohm*).

**3.3.1.36** For connections containing PINs, PIN push and pull tests should be performed (*using manual force*).

**3.3.1.37** In connections containing PINs, fixing chemicals such as epoxy, silicone, etc. should be used behind the PINs.

**3.3.1.38** If there is a need to make additions to the cable bundles, the additions should not coincide with the bending points of the cabling and should be made gradually so as not to create thickness.

### **3.3.2. RECOVERY SYSTEM REQUIREMENTS**

**3.3.2.1** It is mandatory to use a parachute as a recovery system.

**3.3.2.2** The primary parachute used must prevent the rocket from tumbling.

**3.3.2.3** The descent speed of the rocket should be reduced by the primary parachute, but the descent speed should not be slower than 20 m/s.

**3.3.2.4** To avoid damage to the rocket and its components that need to be recovered with the secondary parachute, the descent speed must be between 5–9 m/s.

**3.3.2.5** The landing speed of the payload, to be recovered by parachute, must be between 9–20 m/s.

**3.3.2.6** The payload must be recovered separately with its own parachute and without any connection to the rocket's components (*without being connected to any point by any equipment such as a shock cord, etc.*).

**3.3.2.7** For the parachute recovery system, hot gas generators that make use of chemical reactions for the separation of the relevant components from the rocket (*gunpowder, etc.*), or pneumatic, mechanical, cold gas, or other systems developed by the team (*which are not harmful to the environment, and the risks of which can be managed*) can be used.

**3.3.2.8** Non-commercial pressure vessels (*pressurized tanks, tubes, etc.*) shall not be allowed in the parachute separation process for safety reasons.

**3.3.2.9** Teams will be allowed to use their own pyrotechnics as hot gas generators.

**3.3.2.10** A capsule-shaped pyrotechnic Hot Gas Generator (HGG) will be provided to the teams by the TEKNOFEST Rocket Competition Committee upon request (*to be handed over at Aksaray Firing Test Range*) and information about the HGG is provided in ANNEX-3.

**3.3.2.11** After the teams receive all the tags, they will receive their HGGs from the referees and hang the yellow flag on their workstation (*to indicate their receipt of the HGG*). They shall integrate the HGG into their rockets under the referee's control, and any failure in this regard will result in a 25-point penalty.

**3.3.2.12** The process of filling commercial pressure vessels that can be used in the competition must be carried out in the installation/integration area and under the supervision of the referee committee. Otherwise, the team will be eliminated.

**3.3.2.13** Each parachute must have different colour and they should be easily distinguishable

at a distance from the naked eye. If the parachutes are white and/or blue or different shades of these colors, the team will receive a 25-point penalty.

**3.3.2.14** Teams must prove the location of the payload and rocket components that need to be recovered to the referee with data downloaded to the referee ground station. Any failure in this regard will lead to a 50-point penalty.

### 3.3.3. PAYLOAD REQUIREMENTS

**3.3.3.1** The payload must have a mass of at least four (4) kilograms.

**3.3.3.2** The mass measurement of the payload will be carried out by the Competition Committee in the Integration area of the Aksaray Firing Range. To ensure the easy measurement of the payload weight, it must be designed and manufactured in such a way that it can be easily separated from the rocket.

**3.3.3.3** If the payload meets the scientific task(s) requirements (*definitions, requirements, and examples regarding scientific task loads are included in ANNEX-4*), the team will be awarded up to an additional 150 points.

**3.3.3.4** The additional points that can be awarded to the teams related to the scientific task load and the evaluation criteria are presented in **Table 3.7** below;

| DESIGN COMPLEXITY   | SIMPLE    |      | INTERMEDIATE |      | COMPLEX   |      |
|---|-----------|------|--------------|------|-----------|------|
| PERFORMANCE   | PARTIAL * | FULL | PARTIAL *    | FULL | PARTIAL * | FULL |
| EXTRA POINTS  | 0–49      | 50   | 51–99        | 100  | 101–149   | 150  |
| * When the performance of the Scientific Payload is decided as “PARTIAL” by the referees, the additional points will be offered to the Chief Referee based on the evaluation of the referee committee, and the final additional points will be decided upon by the Chief Referee. |           |      |              |      |           |      |

**Table 3.7** Scientific Payload Additional Point Table

**3.3.3.5** Regardless of the design category (Simple, Intermediate or Complex) of the Scientific Payload, no additional points will be given to teams whose missions are unsuccessful.

**3.3.3.6** The scientific payload must be separated from the rocket at the apogee of the flight (*the task to be performed by the scientific payload can be performed at any interval between the beginning and the end of the flight*) and the data to be acquired through the scientific mission(s) must be transmitted to the team's ground station at a frequency of at least 5 Hz. If data download cannot be provided at this frequency, even if the mission is fully successful, the performance of the payload will be considered partial.

**3.3.3.7** The payloads to be used for carrying out a scientific task(s) cannot contain living organisms, corrosive chemicals, or radioactive materials; they must not be harmful to the environment/living organisms, and must not have any operational risks that are uncontrollable.

### 3.3.4. AERODYNAMIC REQUIREMENTS

**3.3.4.1** There is no maximum flight speed restriction.

**3.3.4.2** The maximum outer diameters of all parts of the rocket must be the same value, otherwise, the design of the set will not be taken into consideration.

**3.3.4.3** Rocket stages with different diameters will not be allowed. The designs that

contravene this restriction will not be taken into consideration.

**3.3.4.4** There should not be no any gap larger than 0.1 mm between the airframe and its covers. Otherwise, the referees will not deem the rocket fit for launch until sealing measures are taken.

**3.3.4.5** The use of movable flight control surfaces (*movable fins in the tail area*) that will provide active flight control or “Boat Tail” (*base drag reducing design*) is prohibited in the rockets. The designs contravening these restrictions will not be taken into consideration.

**3.3.4.6** Rockets in the A4 category must have a stability value between 1.5 and 2.5 at Mach 0.3.

**3.3.4.7** The stability value for 0.3 Mach should be calculated on the Open Rocket main design page, and teams must submit this value for their rockets to the TEKNOFEST Rocket Competition Committee, otherwise, the team's design will not be taken into consideration.

The minimum exit speed of the rockets at the launch ramp in A4 category is given in **Table 3.8**;

| CATEGORY              | A4       |
|-----------------------|----------|
| Minimum Liftoff Speed | 25 m/sec |

**Table 3.8** Minimum Ramp Exit Speed for Category A4

**3.3.4.8** Teams must prove to the TEKNOFEST Rocket Competition Committee in the relevant reports (*PDR and CDR*) and during the integration activities at the Aksaray Firing Test Range, that they meet the criteria in **Table 3.8**, otherwise the team's report will not be taken into consideration.

### 3.3.5.STRUCTURAL INTEGRITY REQUIREMENTS

**3.3.5.1** To ensure the internal and external pressures of the rockets are balanced, there must be at least three (3) holes with a diameter of 3.0-4.5 mm on the rockets. If no such holes are present, the TEKNOFEST Rocket Competition Committee will refuse to grant airworthiness approval to the rocket at the Aksaray Firing Range.

**3.3.5.2** The first hole must be in the front area of the rocket (*between the rocket nose and the front area of the airframe*), the second one in the middle area (*the area where the avionics are located*), and the third one in the area between the rear portion of the airframe and the motor. Failure in this regard will lead to the refusal to grant airworthiness approval to the rocket by the Competition Committee at the Aksaray Firing Test Range.

**3.3.5.3** Rockets must be resistant to both the structural loads they will be exposed to during the flight and the loads they will be exposed to during transportation/placing on the pad. Failure in this regard will lead to the refusal to grant airworthiness approval to the rocket by the Competition Committee at the Aksaray Firing Test Range.

**3.3.5.4** It is forbidden to use PVC, compressed paper/kraft, or PLA materials on the surfaces of rockets that are exposed to aerodynamic forces (*airframe, fins, nose*). Otherwise, the team will be eliminated.

**3.3.5.5** In cases where the necessary analyses are not presented in the relevant reports (*PDR and CDR*) on the surfaces of the rockets exposed to aerodynamic forces (*body, fins and nose*) or in places within the rocket that require durability (strength), or if positive results of the durability

tests (*tensile, compression and torsion tests*) are not shown in the relevant report (LRR), the team will be eliminated.

**3.3.5.6** It must be proven in the relevant reports (*PDR, CDR, and LRR*) through analyses and test results (*tensile, compression, and torsion tests*) that all sub-components of the rockets are resistant (rigid) to the loads that may be imposed on the structural (*fin, engine block, centering ring, etc.*) connection points.

**3.3.5.7** Single-part cast steel eye bolts must be used. Any failure in this regard will lead to a 25-point penalty.

**3.3.5.8** The use of twist eyebolts, alternative parts to eyebolts, or parts that can be exposed to similar forces as eyebolts will not be allowed. Failure in this regard will lead to the refusal to grant airworthiness approval to the rocket by the Competition Committee at the Aksaray Firing Test Range.

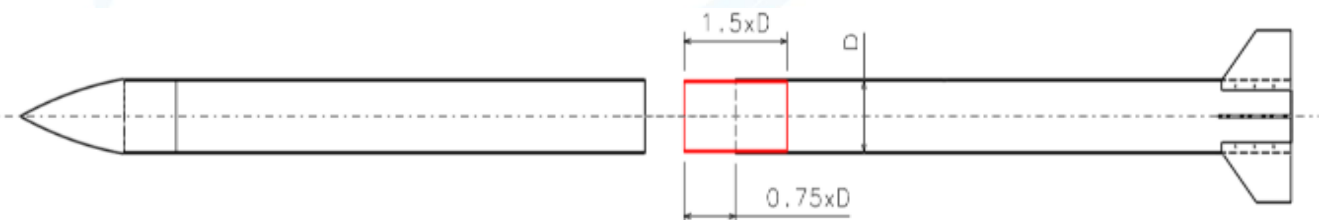
**3.3.5.9** The part of the nose cone that will enter the other airframe must be at least one and a half (1.5) times the outer diameter of the airframe. Failure in this regard will lead to the refusal to grant airworthiness approval to the rocket by the Competition Committee at the Aksaray Firing Test Range.

**3.3.5.10** The integration blocks that will be integrated into the airframes must enter both of them by at least zero point seventy-five (0.75) times the outer diameter of the airframe. Failure in this regard will lead to the refusal to grant airworthiness approval to the rocket by the Competition Committee at the Aksaray Firing Test Range.

**3.3.5.11** A sample nose cone base is provided in **Figure 3.3**, and sample integration frames are in **Figure 3.4**.



**Figure 3.3** Nose Cone



**Figure 3.4** Integration Frame

**3.3.5.12** The rail buttons will be hand-delivered to the teams by the TEKNOFEST Rocket Competition Committee after the payload is weighed during the integration activities in the Aksaray Firing Test Range.

**3.3.5.13** A technical drawing of the rail buttons to be handed over by the Competition Committee at Aksaray Firing Test Range can be found in ANNEX-2.

**3.3.5.14** The rail buttons must be attached to the airframe of the rocket where it is structurally strengthened. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.15** A rocket must have at least two (2) rail buttons. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.16** The rocket's center of gravity must be between the two rail buttons. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.17** The position of one of the rail buttons in the motor area (*between the center of gravity of the motor and the end of the fuselage*) is mandatory. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.18** When attaching the rail buttons, it is mandatory to use fiber nuts, spring washers, and serrated washers, which create preload and prevent inadvertent loosening. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.19** Parts protruding from the rocket's cross-sectional area (*sensors, antennas, and cameras*) must be attached to the rocket. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.20** Parts that protrude into the rocket's cross-sectional area must be beyond the new center of mass of the rocket that emerges after the rocket has finished its burn. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.21** It is mandatory for all switches related to the Flight Control Computer (FCC) and the payload to be at a maximum distance of 2.5 m from the rocket nozzle. Failure in this regard will lead to a 50-point penalty.

**3.3.5.22** Activation of all switches on the rockets will be allowed when the rocket is on the launch ramp at a raised position for launching the rocket.

**3.3.5.23** The design and production must not require any screw loosening/tightening or cover opening/closing while activating all keys. Failure in this regard will lead to a 50-point penalty.

**3.3.5.24** The rocket must not suffer any structural deformation, the linearity of the rocket must be maintained, and the rocket airframe and nose cone connections must not open/loosen when lifted from the tip of the nose cone and the fins at the same time. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.25** The lids on the rocket must be fixed mechanically. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.5.26** Fixing the covers on the rocket using methods that carry the risk of opening during flight (*due to the low pressures and vibrations experienced by the body during flight*) is prohibited. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

### **3.3.6.AVIONICS REQUIREMENTS**

**3.3.6.1** It is mandatory for all recovery systems on the rocket to be managed by the rocket's Flight Control Computer (FCC).

**3.3.6.2** The use of at least two (2) FCCs is mandatory, one being the main FCC and the other being the backup FCC. The designs contravening these restrictions will not be taken into consideration.

**3.3.6.3** The main FCC must be an originally developed product and the backup FCC must be a commercial product. The designs contravening these restrictions will not be taken into consideration.

**3.3.6.4** The commercial FCCs to be used by the teams must be selected from among the products listed in ANNEX-5 (*products approved by the TEKNOFEST Rocket Competition Committee*). The designs contravening these restrictions will not be taken into consideration.

**3.3.6.5** The tests to which the original FCCs to be used by the teams will be subjected by the Competition Committee during the integration activities at the Aksaray Firing Test Range and the obligatory features of the original FCCs are noted in ANNEX-6. The Competition Committee will not grant airworthiness approval to rockets containing FCCs that fail these tests.

**3.3.6.6** The communication system, which can be used to transfer telemetry data of the rockets to the team's ground station without interruption throughout the flight, can function independently or integrated with the FCC.

**3.3.6.7** It is mandatory for any of the FCCs to have a location determination and communication system. The designs contravening these restrictions will not be taken into consideration.

**3.3.6.8** The flight algorithm in the original FCC must be indigenously designed by the team members. The designs contravening these restrictions will not be taken into consideration.

**3.3.6.9** Team member(s) who can technically answer the questions asked by the expert referees about the details of the indigenously designed flight algorithm must be present in the Aksaray Firing Test Range.

**3.3.6.10** Teams whose original FCCs make use of unoriginal flight algorithms will be eliminated from the competition.

**3.3.6.11** The originally developed and commercial FCCs must operate completely independently of each other. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.12** The originally developed and commercial FCCs must have their own special processors, sensors, power supplies, and cabling. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.13** The originally developed and commercial FCCs must be connected to the separation system actuator with independent lines. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.14** If either the originally developed or commercial FCC fails partially or completely, the other must be able to fulfill the recovery functions of the rocket completely, without interruption.

**3.3.6.15** There must be a minimum of two (2) different sensors connected to the originally developed FCC, while there is no minimum connection limit to the commercial FCC (*sensors connected to different FCCs can be the same*). The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.16** At least one of the sensors connected to the originally developed or commercial FCC

must be a pressure sensor. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.17** If two (2) pressure sensor data connected to originally developed or commercial FCCs are used, the sensors must be different from each other. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.18** In the originally developed or commercial FCCs, the embedded flight control algorithm must make use of data from at least two (2) different sensors. Data from at least two (2) different sensors. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.19** At least two (2) independent criteria that will trigger separation sequences in the flight algorithms must be used.

**3.3.6.20** Decision-making parameters must be based on the data read from the sensors.

**3.3.6.21** The data read from the sensors must not be used directly, and any incorrect reading or sensor error must be taken into account.

**3.3.6.22** Precautions to be taken for erroneous data from sensors (*filtering, etc.*) should be explained in details in the relevant design reports (*PDR and CDR*).

**3.3.6.23** The team member in charge of the avionics must be competent to revise the flight algorithms in the Aksaray Firing Test Range.

**3.3.6.24** Teams that do not use digital signals to activate the recovery system can use the digital ignition output and the intermediate electronics component with actuator drive capability in order to use a commercial FCC in their systems.

**3.3.6.25** The intermediate electronics component capable of driving the actuator should only evaluate the signals coming from the commercial FCC and should not evaluate the situation using any sensor data.

**3.3.6.26** If the actuator is single, it must be controlled by both the main and the backup FCC.

**3.3.6.27** If a single actuator is used, the uncontrolled activation of the system should be prevented.

**3.3.6.28** There cannot be any electrical or wireless connection between the FCCs in the system.

**3.3.6.29** The separation process should not be triggered by GPS data within the FCC algorithm.

**3.3.6.30** The actuators connected to separation systems do not have to be redundant (spring in a spring system, DC motor in a DC motor system, etc.).

**3.3.6.31** Recovery systems should not be activated unintentionally and in an uncontrolled manner.

**3.3.6.32** All teams are required to have a ground station that can receive instant and continuous data from their rockets and payloads. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.33** The uninterrupted real-time transfer of data on the location of the rocket to the Referee Ground Station (technical details are provided in ANNEX-7) via the competitor ground station is mandatory. The Competition Committee will refuse to grant airworthiness approval to any rocket

that fails in this regard.

**3.3.6.34** On launch day, the teams have a maximum of two (2) minutes to communicate with the ground station after the rocket avionics are activated. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.35** If a team is unable to establish a healthy connection with the ground station at the end of the time allowed, the Competition Committee may grant the team the right to fly outside the competition upon request (*a risk assessment will be carried out by the Competition Committee with the final decision made by the Chief Referee*).

**3.3.6.36** The fact that rocket parts will land far away from the ground station should be considered, and the range of the transceiver antennae should be chosen taking the flight trajectory of the rocket into account.

**3.3.6.37** The link bandwidth must be budgeted by assessing the power of the RF module, and this must be presented in the relevant design reports.

**3.3.6.38** The avionics and sensors on the rocket must be able to operate easily under such conditions as vibration, pressure, and shock during the flight.

**3.3.6.39** The necessary protective measures must be taken against vibration, pressure, and shock. Appropriate tests must be carried out during the design verification phase, and the results must be presented in the relevant design reports.

**3.3.6.40** The FCCs on the rocket should be checked by turning on the switches while the rocket is on the launch rail.

**3.3.6.41** A mechanical ON/OFF key switch must be fitted between the power supply to the system (*battery, supercapacitor, etc.*) and the first circuits to be fed by the system. The TEKNOFEST Rocket Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.42** Turning OFF the mechanical switch should prevent power from being fed to any system component (*including LED indicators, power converters, and regulators*).

**3.3.6.43** The mechanical key switch to be used to cut power to the FCCs and the scientific payload (*electronics circuits within the scientific payload*) must be easily accessible during ramp operations, the light connected to the key must be on and/or audible warning heard when power is applied and it must be embedded (*taking into account its potential aerodynamic effects*). The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.44** The energizing of the FCCs using such tools as ropes, shunts, screwdrivers, etc. is forbidden. The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.45** If any other system connected to the rocket becomes active when the FCCs are energized, the Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard.

**3.3.6.46** Teams that use Li-Po or similar batteries in the system must use a "Li-Po Safe Bag".

**3.3.6.47** The team shall be responsible for the safety of the battery.

**3.3.6.48** The responsibility for making sure that the batteries to be used are sufficiently charged

and capable of meeting the needs of the rocket will rest with the teams.

### **3.3.7.SAFETY REQUIREMENTS FOR DESIGN AND PRODUCTION STAGES**

**3.3.7.1** The materials, equipment, and processes used in design and manufacturing stages must not cause any harm to human health or the environment.

**3.3.7.2** Necessary security risk analyses and studies to reduce risks must be carried out within the scope of the design, production, and testing processes. It must be proven in the relevant design (*PDR, CDR, and LRR*) reports that these studies have been carried out.

**3.3.7.3** Elements that may contribute to security risks in the design, production, integration, and firing activities must be determined in advance, the necessary precautions must be fully planned and proven to be implemented. Failure in this regard will lead to the elimination of the team from the competition.

### **3.3.8.COMPETITION AREA REQUIREMENTS**

**3.3.8.1** Teams can take place at the Aksaray Firing Test Range for a maximum of two (2) days. The first day is set aside for integration activities, while the second day is the dedicated to launch and recovery activities.

**3.3.8.2** The activities to be carried out by the teams at the Aksaray Firing Test Range and the rules to be followed while in the field are presented in detail in ANNEX-8.

**3.3.8.3** Competitors in teams must bring steel-toed work shoes when coming to the Aksaray Firing Test Range and wear them during the activities in this range. Competitors who do not comply with this rule will not be allowed into the range

**3.3.8.4** The teams are responsible for the safe delivery of their rockets to the Aksaray Firing Test Range.

**3.3.8.5** The competing teams will be given a standard eight (8) hour period to carry out their integration activities. The Competition Committee has the authority to extend this period taking into account factors affecting the activities during the day.

**3.3.8.6** Teams that cannot complete their integration activities on time and/or that fail to receive approval from the referees following inspections will not be allowed to launch as part of the competition (*it is strongly recommended that the rockets have a modular design and that the subsystems can be quickly integrated within 8-hour period*).

**3.3.8.7** At the end of the integration day, the motors of the teams that pass the conformity checks by the referees will be installed on their rockets, which will be stored in a completely passive state (*when delivered to the Competition Committee the avionics systems must be off*) in the warehouse in the site by the Competition Committee until the rocket to be launched the next day.

**3.3.8.8** Teams are allowed to use rotary tools and electric screwdrivers in integration operations at the Aksaray Firing Test Range.

**3.3.8.9** Teams are forbidden from performing dangerous operations involving the attachment of disk cutting tips, etc. to dremels or cordless screwdrivers during integration activities at the Aksaray Firing Test Range. Failure in this regard will lead to the refusal of the Competition Committee to grant flight permission.

**3.3.8.10** The use of the tools and equipment listed below by competitors in the integration area

is forbidden. If any of the listed tools/equipment are found in this area during checks, they will be collected from the teams by the Competition Committee and returned to the team upon the departure of the team from the area (*It is important that teams come to the competition area ready, meaning that such equipment will not be needed*).

- Grinders, such as grinding motors, angle grinders, etc.
- Drills, such as drills connecting directly to a power source, etc.
- Milling cutter, hand milling machine, etc.
- Soldering equipment, such as soldering irons, etc.
- Staple and nail guns
- Buzzsaws and jigsaws

**3.3.8.11** If the teams need to access tools and equipment that are not allowed in the Aksaray Firing Test Range, they will be able to benefit from the workshop set up in the range by the Competition Committee.

**3.3.8.12** Teams that receive or attempt to receive support for production or integration activities from a source other than the workshop established on-site by the Competition Committee will be eliminated from the competition.

**3.3.8.13** Penalty points will be deducted from teams that have to use the workshop set up by the Competition Committee in the integration area (*deducted points depending on the duration of use of the workshop*).

**3.3.8.14** Penalty points are given as listed in **Table 3.9**.

| WORKSHOP USE TIME                        | PENALTY POINTS |
|--|----------------|
| <b>1–15 Minutes</b> (Small Scale Jobs)   | 10             |
| <b>16–30 Minutes</b> (Medium Scale Jobs) | 20             |
| <b>31–45 Minutes</b> (Large Scale Work)  | 30             |

**Table 3.9** Penalty Points to be Given In Case of Workshop Use

**3.3.8.15** The works requested by the teams from the workshop will be evaluated by the authorized referee(s), the scale of the work to be done (*small-medium-large scale works*) will be evaluated, and penalty points will be applied by the Competition Committee.

**3.3.8.16** For works that exceed 45 (forty-five) minutes and/or that cannot be achieved in the workshop facilities, no support will be received from the workshop established by the Competition Committee in the integration area.

**3.3.8.17** A team can receive support a maximum of three (3) times from the workshop established in the integration area by the Competition Committee.

**3.3.8.18** The maximum total support time a team will receive from the workshop established in the installation/integration area by the Competition Committee cannot exceed 45 (forty-five) minutes.

**3.3.8.19** Teams will benefit from additional points if they complete their integration before the specified time and become eligible to launch.

**3.3.8.20** The additional reward points that can be earned by the teams based on their total integration times are given in **Table 3.10**.

| TOTAL INSTALLATION/INTEGRATION TIME | REWARD POINTS |
|-------------------------------------|---------------|
| Category A4                         |               |
| < 180 minutes                       | 100           |
| 181–240 minutes                     | 50            |
| 241–300 minutes                     | 20            |

**Table 3.10** Additional Points

**3.3.8.21** Situations that result in the elimination of teams in the area where integration activities are to be carried out include the following:

- Failure to comply with Occupational Health & Safety (OHS) rules;
- In cases where the requirement at the end of the relevant requirement article in the competition specifications which states “**The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard**”, is not met, the deficiency/glitch is not corrected in the field or the requirement, which states “**otherwise, the team will be eliminated**”, is not met properly,
- Failure to comply with the guidance and instructions of the integration area referees;
- Bringing prohibited materials/hand tools into the integration area and/or working with hand tools that may create sparks,
- Receiving or attempting to receive production or integration support from a source other than the workshop established on-site by the Competition Committee,
- The presence of more team members in the integration area than the maximum number defined in the competition specifications.
- Failure to obtain a label from the referees within the specified period, indicating that the team is entitled to launch their rocket;
- Failure to deliver the rocket to the Competition Committee within the specified time after receiving the label from the referees indicating that it is eligible to launch,
- The rocket must be delivered to the Competition Committee with any power source and/or electrical components active.
- Determination by the Competition Committee that the rocket does not meet the minimum strength requirements while on the launch rail.
- Behaviour by team member(s) that violates the ethical rules of the Rocket Competition,

**3.3.8.22** Situations that result in the elimination of teams on the launch day include the following:

- Failure to comply with Occupational Health & Safety (OHS) rules;
- In cases where the requirement at the end of the relevant requirement article in

the competition specifications which states “**The Competition Committee will refuse to grant airworthiness approval to any rocket that fails in this regard**”, is not met, the deficiency/glitch is not corrected in the field or the requirement, which states “**otherwise, the team will be eliminated**”, is not met properly,

- Failure to follow the directions and instructions of the referees who is responsible for launching rockets;
- Loss of the team card (*with green labels*) and the labels received from the referees in the integration area indicating that the rocket can be launched;
- Exceeding the maximum 10 (ten) minutes preparation time given to the teams,
- Damage given to the rocket by the team that would prevent its launch within the time allowed during the preparation period in the launching area;
- Changes/repairs/corrections, etc. on the systems during the operations carried out within the time allowed for launching the rocket;
- Powering up the avionics system on the rocket or the payload avionics without the permission of the authorised referee,
- Activating the separation system for any reason at any stage prior to launch;
- Compromising the structural integrity of the rocket during its transportation to the rail or during loading onto the rail (*e.g. separation of the nose or frame*);
- Failure of the team to communicate with the ground station within two (2) minutes of the activation of the FCC(s) on the ramp,
- Team member(s) exhibiting behaviours that violate the ethical rules of the Rocket Competition.

## 4. CRITERIAS AND EXPECTATIONS

### 4.1. COMMON REQUIREMENTS REGARDING REPORT CONTENTS

**4.1.1.** It is forbidden for the competitor teams to copy the current or past reports of other teams, or to collaborate with them in activities/tests/analyses when preparing the design reports.

**4.1.2.** If it is understood that competitors have cheated and used the reports of other teams and/or their own teams from previous years, or if it is determined that the teams are engaged in collaborative activities/tests/analysis (*even though the competition is over*), the teams in question will be eliminated.

**4.1.3.** The teams are required to provide references to the original sources of any tables, images, equations and similar content that they did not produce in the report content. When any violation of this rule is detected, the team will be disqualified from the competition.

**4.1.4.** The teams are required to use the American Psychological Association-APA reference style for their content references.

(reference <https://apastyle.apa.org/products/publication-manual-7th-edition>).

**4.1.5.** The checklists included in the Annex to the relevant reports (*PDR and CDR*) will be filled out by the teams and submitted to the Competition Committee (*a sample checklist is given in Annex 9*).

**4.1.6.** Failure criteria are presented in **Table 4.1** and **Table 4.2**. They are to be updated throughout the competition calendar (*The most accurate elimination criteria will be included in*

the current report template of the relevant design reports).

**4.1.7.** In each reporting stage, the elimination criteria from the previous reporting stage will apply.

**4.1.8.** The teams are prohibited from providing references to each other's reports and work. Otherwise, the team will be eliminated.

| NO. | FAILURE CRITERIA   |
|-----|--|
| 1.  | Diameter variations along the airframe of the rocket   |
| 2.  | In the design phase, using a motor different from the one to be provided by the Competition Committee  |
| 3.  | Lack of compliance between the mission profile specified in the report and the competition specifications.   |
| 4.  | In the design phase, not releasing the payload right after reaching the apogee   |
| 5.  | In the design phase, recovery parachutes not opening right after the apogee  |
| 6.  | The secondary (main) parachute not opening 400–600 meters above the ground.  |
| 7.  | Designing an active control system for the rocket  |
| 8.  | Payload mass being less than the value (4 kg) given in the specifications  |
| 9.  | Failure of payload to meet the requirements given in the specifications  |
| 10. | Lack of GPS in one or more components to be recovered separately and/or GPS not specified in the desired location of the report                          |
| 11. | Integration frames and nose shoulder not meeting the competition specifications  |
| 12. | FCCs do not have any system that indicates location and/or this data cannot be transmitted to the team ground station and/or the Referee Ground Station. |
| 13. | No trade-off analysis made for the motor connection, and/or the design is not made in such a way that the motor can be installed last                    |
| 14. | Parachute landing speeds not in accordance with the values given in the competition specifications   |
| 15. | Static margin value at Mach 0.3 is not within the specified range  |
| 16. | Lack of redundant avionics on the rocket   |
| 17. | Lack of indigenously developed FCC on the rocket   |

**Table 4.1** PDR Failure Criteria

## 4.2. REPORTING

During the evaluation process, the teams will be asked to submit reports describing the status of their designs. These reports are:

- Preliminary Design Report (PDR)
- Critical Design Report (CDR)

- Launch Readiness Report (LRR)

#### **4.2.1. PRELIMINARY DESIGN REPORT (PDR)**

**4.2.1.1** The PDR template may be accessed via the TEKNOFEST website.

**4.2.1.2** Unsolicited information in the report will not be evaluated.

**4.2.1.3** The reasons for the elimination of the teams competing in Category A4 at the PDR phase are given in **Table 4.1**.

**4.2.1.4** Teams are required to submit all the information requested in the PDR completely and in the relevant sections, and if the information that should be in the relevant section of the report is not presented as required, it will not be evaluated (*Reports are not evaluated as a whole by the Competition Committee. Rather, each expert evaluates the relevant section in the PDR. When teams do not present what is required of them in the relevant section, the risk of elimination of the team arises if the referees cannot see the information and analyses they want to see in that section. It is the team's responsibility to fully comply with the report template*).

**4.2.1.5** Teams are obliged to deliver the PDR to the Competition Committee observing the deadlines in the competition schedule.

**4.2.1.6** Teams are obliged to prove that the basic designs they made in the PDR fully meet the requirements of the Competition Specifications.

**4.2.1.7** Teams must submit Open Rocket files with the “.ork” extension along with the PDR. Otherwise, they will be eliminated.

**4.2.1.8** To prove that the technical requirements have been met, a Compliance Matrix must be created by the teams (a sample matrix will be included in the templates) and submitted as part of the relevant design reports (*PDR and CDR*).

**4.2.1.9** During the design activities carried out at the conceptual level during the PDR phase, teams are responsible for running optimization processes, performing cost-benefit analyses, making the most rational choices, and performing and sharing all necessary engineering analyses for the achievement of the objective function.

**4.2.1.10** The trade-off analysis to be carried out by the teams should include a list of the indispensable and optional criteria followed to steer their decisions, and the choices made, together with their reasons and outcomes, should be presented in the PDR.

**4.2.1.11** Study results for Failure Mode and Effects Analysis (FMEA) must be presented in the PDR (*Template documents will be shared on TEKNOFEST website so that the teams can carry out their FMEA studies*).

**4.2.1.12** The teams are required to present the PDR with the general CAD design of the rocket they plan to produce, explaining their systems and design in a detailed manner.

**4.2.1.13** The material selection criteria and the compatibility of these selections with the system are also required to be included in the report.

**4.2.1.14** Preliminary analyses (*effects such as pressure, temperature, etc.*) that will constitute the basis for the HGG to be provided to the teams by the Competition Committee must be submitted in the PDR.

**4.2.1.15** The information, analyses and evaluations requested to be included in the PDR by the Competition Committee must be presented in accordance with grammar rules, and in a manner that can be easily understood and followed. Teams that fail to meet this requirement will be

subject to a deduction of points of up to 20% (twenty percent) of the relevant section of the report, if necessary.

**4.2.1.16** At the PDR phase, a threshold score may be applied in the evaluations to be made by the Competition Committee. The threshold score will be announced on the TEKNOFEST website.

**4.2.1.17** Teams that pass the threshold score and are successful in the PDR phase will move on to the Critical Design Report (CDR) preparation phase.

## **4.2.2. CRITICAL DESIGN REPORT (CDR)**

**4.2.2.1** All teams participating in the TEKNOFEST Rocket Competition are required to prepare their Critical Design Reports (CDR) in a scientific article format. The report format will be shared by the Competition Committee.

**4.2.2.2** The CDR format and template will be shared with the competitors via TEKNOFEST website.

**4.2.2.3** As part of their work for CDR, the teams will be responsible for making a detailed design, freezing the design, creating design outputs, fully meeting the requirements and task performance criteria given in the specifications, carrying out Project Management activities indicating that they are ready to move on to the production, integration and ground testing stages, and presenting the necessary evidence regarding their work to the Competition Committee.

**4.2.2.4** The teams are responsible for finalising their analysis for the Failure Mode and Effects Analysis (FMEA), the first version of which will be presented in the PDR, and presenting it as part of the CDR.

**4.2.2.5** As part of the analyses carried out during the CDR phase, all matters related to the rocket, including structural, fluid dynamics, flight algorithm proficiency etc., must be analysed and the outputs must be presented in the CDR.

**4.2.2.6** Thus, the selected materials, production methods, flight resistance of the rocket and its components and the suitability of the flight algorithm must be proven in the CDR.

**4.2.2.7** Structural and aerodynamic analyses must be performed and submitted in the CDR.

**4.2.2.8** Modelling and simulation processes are iterative, and the stages of rocket design should be presented in the CDR along with cause-effect relationships.

**4.2.2.9** Teams must submit detailed information in the CDR on where, how and with what materials the relevant rocket subsystems and components (*body, nose, electronic card, etc.*) will be produced.

**4.2.2.10** The teams should create a system integration diagram and explain it in detail (*The integration of all systems should be explained in details and supporting visuals taken from the CAD program should be presented in the report, answering such questions as: "How is the nose connected to the fuselage?", "How is the parachute connected to the fuselage?", "How is the engine fixed inside the fuselage so that it can be removed again?"*).

**4.2.2.11** Images prepared with a Computer-aided Design (CAD) program should be used in the relevant sections of the CDR.

**4.2.2.12** All mechanical details for the rocket and its components must be shown and explained in CAD images, even if they are not shown in the relevant sections of the CDR.

**4.2.2.13** Production and ground testing activities should be planned and presented with their schedules in the CDR (*The content of the plans should include detailed information such as which production operations will be carried out in which weeks, on which dates the components will be tested, etc.*).

**4.2.2.14** As part of the Project Management Plan, it must be proven in the CDR that the design is producible.

**4.2.2.15** The fulfilment of each criterion in the competition specifications in the design resulting from the CDR phase (*at component/subsystem/system levels*) must be proven to the Competition Committee by the teams with a Compliance Matrix (*the matrix used in the PDR phase will be used in the CDR*).

**4.2.2.16** All electronic components on the system powered by batteries must be specified in the CDR, which must include switching circuit schematics.

**4.2.2.17** The Open Rocket file (file with \*.ork extension) must be submitted with CDR. Otherwise, the team will be eliminated.

**4.2.2.18** The teams are required to present in full all the information requested in the CDR and in the relevant sections. If information to be included in a particular section of the report is missing, it will not be evaluated (*Reports are not evaluated as a whole by the Competition Committee. Rather, each expert evaluates the relevant section in the PDR. When teams do not present what is required of them in the relevant section, the risk of elimination of the team arises if the referees cannot see the information and analyses they want to see in that section. It is the team's responsibility to fully comply with the report template*).

**4.2.2.19** The teams that qualify for the final and receive financial support based on the CDR evaluation results will be announced by the Competition Committee on the date specified on the Competition Schedule.

**4.2.2.20** The information, analyses and evaluations requested by the Competition Committee to be included in the PDR should be presented in accordance with grammar rules, and in a manner that can be easily understood and followed. Teams that fail to meet this requirement will be subject to a deduction of points of up to 20% (twenty percent) of the relevant section of the report, if necessary.

**4.2.2.21** In addition to the CDR, the data set of the design report and technical drawings for each sub-system must be submitted to the Competition Committee.

**4.2.2.22** In addition to the CDR, technical drawings explaining and illustrating the integration of the rocket must also be submitted to the Competition Committee.

**4.2.2.23** The components, materials and integration strategies used in the drawing set must be easy to understand.

**4.2.2.24** It is mandatory for teams to prepare detailed integration instructions.

**4.2.2.25** Design details and analyses (*strength, thermal and fluid dynamics analyses, etc.*) must be presented in details in the sub-system design reports (e.g. *the fluid dynamics analysis must contain details of the solution network used, boundary conditions, convergence details, fluid properties, results and interpretation of the results. Similarly, detailed information and evaluations must be included for other analyses.*)

**4.2.2.26** The Competition Committee may request additional information/documents from the teams, in addition to those stated above.

**4.2.2.27** The CDR stage failure criteria are listed in **Table 4.2**;

| NO. | FAILURE CRITERIA   |
|-----|--|
| 1   | In the final design, the rocket has not been designed to allow the motor to be integrated last or easily removable when required   |
| 2   | Requested prototype test videos not delivered  |
| 3   | The presence of components in the rocket that have no function or role, but that protrude into the cross-sectional area and disrupt the structural/aerodynamic integrity of the rocket ( <i>essential elements such as sensors, antennas and cameras will be allowed</i> ) |
| 4   | Failure to design for the activation of the rocket on the ramp ( <i>inability to activate the FCC and/or payload on the ramp</i> )   |
| 5   | Failure to perform the mandatory structural and aerodynamic analyses in the A4 Category and/or not submitting them in the CDR.   |

**Table 4.2** CDR Stage Failure Criteria

### **4.2.3. LAUNCH READINESS REPORT (LRR)**

**4.2.3.1** All teams must prepare a Launch Readiness Report (LRR).

**4.2.3.2** LRR must include the results of all analyses, simulations and ground tests necessary for the rockets to successfully lift off from the launch rail and perform flight missions (*including payload*) after the rockets are launched from the Aksaray Firing Test Range.

**4.2.3.3** The LRR must include a list of the team's distribution of tasks in the launch site, the safety measures that the team must take in the site, and the checks that the team will perform in the integration and launching areas.

**4.2.3.4** In the LRR phase, it is mandatory that the entire (100%) system design and production be completed, and the teams that are successful in the LRR phase will come to the Aksaray Firing Test Range for the sole purpose of integrating and flying all rocket components (*Aksaray Firing Test Range is not the component manufacturing site for the teams*).

**4.2.3.5** It is also necessary to prove in this report by means of a video footage that the rocket, after integration has been completed, can be made ready for launch within 10 (ten) minutes.

**4.2.3.6** Considering the total mass of the completed rocket, a flight simulation of the rocket should be performed (*using Open Rocket and/or flight simulation and modelling software developed by the teams*) and the ramp exit speed should be calculated.

**4.2.3.7** It must be proven that the launch rail lift off speed values obtained by the teams from the flight simulation performed with actual rocket data (*using data of the completed rocket, such as mass, Thrust/Weight, etc.*) are compatible with the relevant criteria in the Competition specifications (*speed exceeding the minimum speed for lifting off from the launch rail*).

**4.2.3.8** When the launch rail lift off speed values obtained by the teams from the flight simulation performed with actual rocket data (*using data of the completed rocket, such as mass, Thrust/Weight, etc.*) and the values presented in the CDR are compared, it must be proven that the two values are equal (*if possible*) or similar (*teams will get higher points as they get closer to equality*).

**4.2.3.9** All simulation data regarding the proofs to be presented in the LRR must also be

included in the LRR (*The simulated Open Rocket file will be delivered with the LRR.*)

**4.2.3.10** Failure criteria at the LRR phase are listed in **Table 4.3** below;

| NO. | FAILURE CRITERIA  |
|-----|---|
| 1   | Missing and/or insufficient results of at least one of the requested ground tests |
| 2   | Lack of video footage of the rocket's integration                                 |

**Table 4.3** LRR Stage Failure Criteria

## 5. EVALUATION PRINCIPLES OF THE COMPETITION

### 5.1. OVERALL SCORE

**5.1.1.** Within the scope of Rocket Competition, teams in the A4 competition category will be evaluated over a total of 1000 (one thousand) points;

| STAGE                           | Category A4 |
|---------------------------------|-------------|
| Preliminary Design Report (PDR) | 150         |
| Critical Design Report (CDR)    | 200         |
| Launch Readiness Report (LRR)   | 150         |
| Integration                     | 200         |
| Flight                          | 200         |
| Recovery (Rocket and Payload)   | 100         |
| <b>Total</b>                    | <b>1000</b> |

**Table 5.1** Scoring Details of Teams Competing in the A4 Competition Category

### 5.2. INTEGRATION EVALUATION

**5.2.1.** Teams will be evaluated in four (4) different categories: "Payload and Recovery", "Avionics", "Structural Integrity" and "Aerodynamics" during the installation/integration operations in the Aksaray Firing Test Range.

**5.2.2.** After this evaluation, those who first receive four (4) "Green" labels and then the "Grant Airworthiness" label (*the label that will be given to those who receive the final green label*) will be entitled to launch their rocket.

**5.2.3.** Teams that fail to obtain all "Green" and "Grant Airworthiness" labels will not be given permission to launch their rocket in the competition.

**5.2.4.** In the evaluation to be made by the Competition Committee for the teams that cannot obtain all the "Green" and "Grant Airworthiness" labels, the relevant teams will be given permission to launch their rocket out of the competition, if there is no safety issue regarding the flight of the rocket and if requested by the team.

**5.2.5.** To launch their rocket out of competition, teams must submit a written application (*signed both by the Captain and Advisor*) to the referee committee.

**5.2.6.** By submitting a petition, the teams accept that they will not be subject to scoring and will not be included in the ranking, even if they successfully complete the tasks given in the specification, in the event of them flying out of the competition.

**5.2.7.** After the applying teams have been cleared for out-of-competition flight, the Chief Referee will have the authority not to allow any team to launch their rocket due to safety requirements.

**5.2.8.** Teams must obtain the green labels for Aerodynamic and Structural Integrity as a minimum condition to launch their rocket out of competition.

**5.2.9.** The final decision regarding the teams' out-of-competition launch will be made by the Chief Referee, taking into account the opinions of the "Avionics" and "Payload and Recovery Systems" referees, when necessary.

**5.2.10.** Integration scoring is presented in **Table 5.2**;

| INTEGRATION SCORING         | SCORE      |
|-----------------------------|------------|
| Payload and Recovery System | 50         |
| Avionics                    | 50         |
| Structural Integrity        | 50         |
| Aerodynamics                | 50         |
| <b>TOTAL</b>                | <b>200</b> |

**Table 5.2** Assembly/Integration Scoring

### 5.3. FLIGHT AND RECOVERY EVALUATION

**5.3.1.** The success of the flight will be evaluated out of 200 (two hundred) points.

**5.3.2.** The success of the recovery of the rocket and payload will be evaluated out of 100 (one hundred) points (*the final point will be decided by the Chief Referee following the damage assessment carried out by the referees*).

**5.3.3.** The minimum altitude that the rockets must reach is presented in **Table 3.3**. Teams that reach an altitude lower than this will be considered to have made an unsuccessful flight.

**5.3.4.** The flights performed by the teams will be listed and the altitude of the team that reached the highest altitude will be accepted as the reference.

**5.3.5.** The teams' target altitude information must be submitted in written form to the Competition Committee prior to the flight.

**5.3.6.** One of the success criteria (*deviation coefficient*) of the flight which is reaching the pre-planned flight altitude will be calculated using the "Altitude Deviation Coefficient (x)" formula below:

$$\text{Deviation Coefficient } (x) = 1 - \frac{|\text{Actual Altitude} - \text{Target Altitude}|}{\text{Target Altitude}}$$

**5.3.7.** The Deviation Coefficient (x) will be calculated taking into account the values recorded

by the teams' altimeter. Those outside the  $\pm 15\%$  tolerance will not be taken into consideration and their Deviation Coefficient ( $x$ ) will be assumed to be zero (0).

**5.3.8.** Devices other than the altimeter provided to the teams by the Competition Committee will not be used in calculating the points related to the target altitude reached.

**5.3.9.** The second success criteria (*altitude coefficient*) of the flight will be measured by the highest altitude that can be reached in the relevant category and the highest altitude in that category. This success will be calculated using the following "Altitude Reach Coefficient ( $y$ )" formula:

$$\text{Altitude Coefficient } (y) = 1 - \frac{\text{Highest Altitude in this Category} - \text{Altitude Reached in this Category}}{\text{Highest Altitude in this Category}}$$

**5.3.10.** The teams' "Flight Points" will be calculated using the following formula:

$$\text{Flight Points} = 200 * x * y$$

**5.3.11.** When scoring and ranking the teams and determining the teams worthy of awards, the flight and recovery missions must achieve "Full Success" or "Partial Success".

**5.3.12.** In flight mission success evaluation, a flight will be deemed "Fully Successful" if the parachutes are deployed on time and completely (*the ropes and dome are not entangled when the parachute is first deployed, but they may be entangled later due to the wind*), and "Partially Successful" if the parachutes are deployed late and/or not fully deployed (*the ropes and dome are entangled when the parachute is first deployed*).

**5.3.13.** For the flight missions of the teams competing in the A4 competition category:

- In case of "**Full Success**", the total score (100%) given by the Competition Committee to the team regarding integration, flight and recovery (*rocket and payload*) in the Aksaray Firing Test Range will be valid,
- In case of a "**Partial Success**", half (50%) of the total points given by the Competition Committee to the team regarding integration, flight and recovery (*rocket and payload*) in the Aksaray Firing Test Range will be valid.

**5.3.14.** If the rocket and payload are recovered within a maximum of one (1) hour and presented to the Competition Committee, a recovery evaluation will be made; otherwise, the team will not be considered for recovery evaluation.

**5.3.15.** The evaluation of the recovery of the Rocket and the Payload (*Rocket and Payload will be evaluated separately out of 50 points*) will be evaluated by the referee panel and decided by the Chief Referee.

## 6. PRIZES

### 6.1. PRIZES FOR A4 CATEGORY

**6.1.1.** The table below shows the total amount that will be awarded to the teams that qualify for the prize. The first, second and third prizes shall be equally divided among all team members and deposited into the bank accounts specified by each member.

| CATEGORY | FIRST     | SECOND    | THIRD     |
|----------|-----------|-----------|-----------|
| A4       | 5,500 USD | 5,000 USD | 4,500 USD |

**Table-6.1** TEKNOFEST-2025 Rocket Competition Awards

**6.1.2.** A prize payment of 300 USD (*three hundred American Dollars*) will be made to the advisors of the winning teams. If the advisor is not in attendance in the competition area, she or he will not be able to benefit from the prize in question.

## **6.2. MINIMUM SUCCESS CRITERIA FOR ELIGIBILITY**

**6.2.1.** The flight and mission performances of the teams are divided into three: Full Success, Partial Success and Failure.

**6.2.2.** Teams failing to meet any of the following items will be considered “Failed”:

- The fired rocket lifts off from the launch rail without any problem;
- The rocket reaches its target altitude with a tolerance of  $\pm 15\%$ ;
- The successful separation of the payload from the rocket *immediately* after the apogee of the flight.
- Recovery of the rocket components as a whole (body and nose together) and the payload separately (*components and payload must be landed safely with parachutes in such a way that they can be reused*).

**6.2.3.** Successful and Partially Successful teams are entitled to be included in the award ranking.

**6.2.4.** Partially Successful teams will not be entitled to the first place prize, even if they have the top score at the end of the competition. In such a case, the team will be awarded second place at best.

## **7. CODE OF CONDUCT AND OTHER RULES**

### **7.1. CODE OF CONDUCT**

**7.1.1.** Persons found to have exhibited any behaviour, actions, verbal expressions, etc. that are against social ethics in the festival area, or during the competition (*reporting stages, evaluation process, etc.*) will be disqualified from the competition, with legal action being taken against them immediately, and such persons will be banned from participating in any organisation or event hosted by the Turkish Technology Team Foundation (T3) for at least two (2) years.

**7.1.2.** Regarding the discourse and style used/to be used in all contacts and communications established with the Competition Committee:

- Rude and impolite (including insults) comments (verbal, written, etc.) and behaviours should be avoided,
- Insults, threats and bad language must be avoided;
- Competition officials and team members should not be targeted or subjected to accusations, whether directly or indirectly, through social media or any other communication tools, such as Facebook, Skype, Messenger, WhatsApp, X, LinkedIn, etc.
- Attention must be paid to spelling rules and style in all petitions and objections.

**7.1.3.** If a team and/or team advisor uses rude, discourteous, insulting, threatening, humiliating and accusatory expression(s) in any written and verbal communication with the Competition Committee, the team and its advisor will be eliminated from the competition altogether and, if necessary, they will be banned from participating in any organisation and event held by the Turkish Technology Team (T3) Foundation for a minimum of two (2) years.

**7.1.4.** The Competition Committee has the right to remove advisors and/or team members who do not comply with the code of conduct from the competition area when necessary.

**7.1.5.** Behaviours, acts, discourse, etc. that negatively affects the operation and motivation of other teams in the festival area are forbidden.

**7.1.6.** Legal action will be taken against any person(s) who act to the detriment of social harmony in the dormitory and in the proximity of the location where accommodation services are provided.

**7.1.7.** It is the responsibility of the teams to back up/store the equipment and materials to be used in the design and production processes, taking into account any potential problem that may occur, and to replace the parts when necessary.

**7.1.8.** Throughout the competition, it is forbidden to copy the reports from previous years or the current teams, or to engage in any collaborative designs, tests or analyses with other teams. Such acts are considered grounds for disqualification.

**7.1.9.** It is mandatory to behave objectively and in accordance with the requirements of the competition while in the competition area, without discrimination against language, religion, philosophical belief, political opinion, race, age or gender, and avoiding any behaviour or practices that hinder equal opportunities.

**7.1.10.** The goods/resources provided by a company/institution/organisation contributing to the competition to be used in the activities must be used exclusively in line with their purpose and service requirements, and the said goods/resources should not be wasted. Wastefulness and extravagancy in buildings, vehicles and other public goods/resources must be avoided throughout the competition. It is of vital importance to behave effectively, efficiently and economically when using public goods, resources, workforces and facilities.

**7.1.11.** It is important to support activities that facilitate the conducting of the competition; to meet needs in the most effective, fast and efficient way; to increase service quality; and to ensure satisfaction throughout the course of the competition.

**7.1.12.** Competition area officials must abstain from behaviours that negatively affect, or that appear to affect, the conducting of their duties in an impartial and objective manner; and no request can be made that may benefit themselves/their relatives/friends or person(s) or organisations to which they are related. Legal action shall be taken against person(s) failing in this regard.

**7.1.13.** Team members will be held accountable for their responsibilities and liabilities, and must be open to transparent corporate evaluation and auditing; managers must take the necessary precautions to prevent corruption, as well as any actions and procedures that are in contravention with the objectives and policies of their institutions. They shall also train their staff in the principles of ethical behaviour, shall ensure their compliance with these principles and shall provide guidance in ethical behaviours.

**7.1.14.** While carrying out their tasks, team members must not make any statements, commitments, promises or suggestions that are binding on the institutions for which they work, and shall avoid making deceptive and false statements.

## **7.2. OTHER RULES**

**7.2.1.** Objections fall under two categories: Report Objections and Final Stage Objections. Report Objections are received via the Corporate Management System within 48 (forty eight) hours after the report results are announced. The objections of teams that cannot submit their

objection in accordance with the regulations at <https://teknofest.org/tr/competitions/objection/> within the period announced by the TEKNOFEST Competitions Coordination Office will not be accepted. The objections of the teams will be sent to different referee committees and re-evaluated.

**7.2.2.** Final Stage Objections can be made during and after the competition. Objections to be made after the competition must be made within 48 (forty eight) hours after the rankings are announced. Objections for any issue other than situations contrary to the specifications and violations of rules will not be accepted. No objections will be received for evaluations made based on quantitative criteria, and a new final or presentation evaluation will not be made. Such objections must be sent to [iletisim@teknofest.org](mailto:iletisim@teknofest.org) in the form of a petition, along with the reason for the objection. Objections made in accordance with the rules will be reviewed by the TEKNOFEST Competitions Coordination Office.

**7.2.3.** Teams will not post their objections on social media in any way. Otherwise, they will be eliminated from the competition.

**7.2.4.** Any work presented in the competition should not be seen as a product belonging to the team advisor, but as a product that was created with the collective effort of the competitor(s) in the team and the support of the advisor, reflecting the characteristics of all team members.

**7.2.5.** In the report, it should be stated on the relevant page that the teams that have benefited from the Previous Year Reports on the TEKNOFEST website have made citations. CITATION FORMAT: "Cited Phrase(s)" (Year, Competition Name, Category, Team Name)

**7.2.6.** The TEKNOFEST Rocket Competition Committee reserves the right to cancel the competition in the event of there being an insufficient number of applications with the necessary technical knowledge and skills required for participation following the evaluations made as part of the application process.

**7.2.7.** The team captain, after registering on the system during the application period, is to ensure the full and correct registration of the advisor and team captain/members, in addition to sending them invites by e-mail. The invited member logs into the Application system to accept the invite, found in the "Team information" section, and the registration is duly completed. Otherwise, the registration is not done.

**7.2.8.** All processes required within the scope of the competition (Report Reception, Report Results, Financial Support Application, Objection Processes, etc.) It is done through the CMS portal. Teams should keep track of their processes via the CMS portal.

**7.2.9.** The competitors accept and undertake to participate in all kinds of written or visual promotions, publications, social media and Internet broadcasts related to the competition, whether made before or after the competition, by the T3 Foundation and/or TEKNOFEST. They further accept and undertake to make the relevant work available to the public within the framework of the T3 Foundation's open source policy.

**7.2.10.** I (We) declare that I (we) have used my (our) own ideas, knowledge and skills in selecting the project topic, that I (we) have received limited assistance from my (our) advisor and other relevant persons in relation to the problems that I (we) have encountered, that the said project belongs entirely to me (us), that TEKNOFEST has no obligation to ensure or monitor the protection of my (our) rights regarding the project, that TEKNOFEST cannot be held responsible for potential violations by third parties, that I (we) have not participated in another TEKNOFEST competition with the same project, and that I (we) have prepared the project in accordance with the rules specified in the competition specifications. I (We) agree and acknowledge that the project summary and the photographs submitted by me (us) and/or prepared by TEKNOFEST

during the project application and/or competition process may be compiled and published by TEKNOFEST for various purposes, including but not limited to the promotion of the competition and compilation of statistics/archives.

**7.2.11.** Contestants may apply for registration or protection at the Turkish Patent and Trademark Office or WIPO (World Intellectual Property Organization) within the framework of the Industrial Property Law No. 6769 and other legal legislation regulating Intellectual Property Rights.

**7.2.12.** In the event of a competitor(s) violating the intellectual and industrial property rights of any product, the damages incurred by the TEKNOFEST Rocket Competition shall be compensated by the relevant team (including its advisor).

## 8. CONTACT

For questions about the competition, you can join the [competition group](#) from the Rocket Competition [page](#) on the TEKNOFEST [website](#). It is the responsibility of the competitors to actively follow this group and at least 1 person from each team to follow the announcements, questions and answers in this group as a member.

TEKNOFEST Competitions Committee is not responsible for the inability of the teams to access up-to-date information that may arise as a result of not following the specified e-mail group.

Questions about the organizational parts of the competition should be sent via [iletisim@teknofest.org](mailto:iletisim@teknofest.org) e-mail address. It is important that your questions are sent through the correct channels above in order to respond quickly to the questions asked.

## 9. COMPETITION CALENDAR

The TEKNOFEST 2025 Rocket Competition schedule is presented in **Table 9.1**.

| TEKNOFEST 2025 ROCKET COMPETITION SCHEDULE       |  |
|--|--|
| DATE   | ACTIVITY   |
| March 15 <sup>th</sup> , 2025                    | Application Deadline for Participation in the Competition for A4-International Category            |
| March 17 <sup>th</sup> , 2025                    | A4-International Category Preliminary Design Report (PDR) Delivery Dates                           |
| March 25 <sup>th</sup> , 2025                    | Announcement of Preliminary Design Report (PDR) Results  |
| May 15 <sup>th</sup> , 2025                      | Critical Design Report (CDR) Deadlines   |
| May 18 <sup>th</sup> , 2025                      | Deadlines for Test Videos  |
| June 22 <sup>th</sup> , 2025                     | Announcement of Finalist Teams and Teams Eligible to Receive Financial Support Based on CDR Points |
| June 27 <sup>th</sup> , 2025                     | Obtaining Undertaking and Bank Information from Teams Receiving Financial Support                  |
| August 08 <sup>th</sup> , 2025                   | Deadline for Submission of Launch Readiness Report (LRR) and LRR Videos                            |
| August 18 <sup>th</sup> , 2025                   | Announcement of the Teams Qualified for Finals   |
| August 20 <sup>th</sup> -30 <sup>th</sup> , 2025 | Travel Financial Support Payments to be made to the Teams  |
| 01–08 September, 2025                            | Competition Finals (Aksaray Firing Test Range)   |

**Table 9.1** TEKNOFEST-2025 Rocket Competition Schedule

