

Latin American Space Challenge

2023 LASC Edition



Launch Operations Procedures

*The electronic version is the official, approved document.
Verify this is the correct version before use.*

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LIST OF REVISIONS

REVISION	DESCRIPTION	DATE
00	<ul style="list-style-type: none">Baseline of the 2023 LASC Launch Operations Procedures.	07/08/2023

1. PURPOSE AND SCOPE

This document promotes **flight & ground safety** at the Latin American Space Challenge by defining the overarching "run-rules" governing rocket launch related activities (i.e. "the launch") occurring on the Cape Canavial property during the event – to include all LASC launches as well as all non-competing, demonstration launches.

These activities include the Flight Safety Review process, the final launch setup and countdown procedure(s), and safe rocket retrieval practices.

This document's intended audience includes all participants in the launch – to include the roles and responsibilities of team members (e.g. "Rocketeers & Satelliters") as well as the launch organizers.

It is not the purpose of this document to dictate how these roles are assigned to people but to share some examples of how others have organized launches. Understanding that no single document can encompass the full range of unique technical and environmental considerations possible at the Latin American Space Challenge, the launch facilitators reserve the right to adapt and amend this document's guidance in real time as necessitated by "real-world" conditions.

Departures from these rules and procedures or from any tailored instructions by event staff and volunteers may negatively affect an offending team's flight status or result in ejection from the launch – depending on the degree of severity or frequency of infraction.

Furthermore, the competition related penalties for unsafe or unsportsmanlike conduct by LASC participants are defined in the LASC Rules & Requirements Document.

2. EVENT LOCATIONS

The Latin American Space Challenge features two locations: the Main Auditorium at the FATEC Tatuí and the Launch Site at Cape Canavial.

2.1. ACCESS CONTROL

Teams will need to register at the LASC Registration Desk, at the entrance of the Main Auditorium at the FATEC Tatuí, during the morning of the first event day to obtain their LASC credentials to access the premises on subsequent days.

Teams can access the premises of the Cape Canavial only via Rod. Gladys Bernardes Minhoto.

2.2. FATEC TATUÍ

The **Fatec Tatuí** - Prof. Wilson Roberto Ribeiro de Camargo - is located at the Rod. Mário Batista Mori, 971 - Jardim Aeroporto, Tatuí - SP, 18280-000, about 3,4 km North-West of Tatuí City Center and 164 km of the São Paulo-Guarulhos International Airport (GRU).



Figure 1 - Fatec Tatuí location near Tatuí downtown.

The Google Maps link with correct position of the Fate Tatuí can be accessed by the following link:

<https://www.google.com/maps/place/Fatec+Tatu%C3%AD+-+Prof.+Wilson+Roberto+Ribeiro+de+Camargo+-+Faculdade+de+Tecnologia+de+Tatu%C3%AD/@-23.3305979,-47.8707448,17z/>

The Main Auditorium at the FATEC Tatuí will have a basic infrastructure for teams to check-in and register for the event. All teams will have their rockets and/or satellite evaluated during the first day and selected teams may present their projects to the overall audience.

Important reminder for all participants: it is **prohibited** to bring any type of energetics or propellant to the **Fatec Tatuí**.

The access to the LASC Registration Desk and the Main Auditorium will be available by the door near the end of the property as shown in Figure 2.



Figure 2 - Fatec Tatuí in detail.

2.3. CABO CANAVIAL LAUNCH AREA

The launch site will be located at the Cabo Canavial, about 21 km West of Fatec Tatuí, reachable by car in approximately 24 minutes from there. The Cabo Canavial is located at the Gramas Xavier property.

The Google Maps link with correct position of the Cape Canavial can be accessed by the following link:

<https://www.google.com/maps/place/Latin+American+Space+Challenge/@-23.3691882,-48.0115186,15z/>

Important reminder for all participants: it is **prohibited** to access the Cabo Canavial via other roads or access. Figure 4 shows the road closure points from August 25 to 27, 2023, the Parking Lot, the Cabo Canavial Launch Area (CCLA) and the main route from Tatuí.



Figure 3 - Route from Fatec Tatuí to Cabo Canavial.



Figure 4 - Route from Tatuí to Cabo Canavial.

In the Event Center and the Spectator Area (i.e. Public Area), spectators and teams will find an event truss tent that will be open to the teams and public for leisure, for the live stream of the event, the Safety Briefing and the Awards Ceremony.

A spectator area in front of the tribune will be where all spectators can follow the launches. Please note that the launch site layout (see Figures 5 and 6) might be subject to changes. Then, the Cabo Canavial features the following areas:

- **Public Areas*:** Parking Lot, Main Entrance, Event Center, Spectator Area
- **Restricted Areas:** Rocket Assembly Area (RAA), Pyro Preparation Area (PPA), Mission Control Center (MCC), Launch Control Center (LCC), and Launch Pads.

(*) To access a public area, all participants shall wear their respective badge.



Figure 5 - Arriving in the Cabo Canavial.

Cars, vans, buses and other types of vehicles shall be parked at the Parking Lot. Only Staff Vehicles will be authorized to drive to the Event Center.



Figure 6 - The Cape Canavial Launch Area.

The access to the RAA will be controlled by the MCC. Only registered rocketeers and satelliteers will be allowed to enter in the area. The LCC and Launch Pads are zones not allowed to enter unless authorized by a PION Operations Control official.

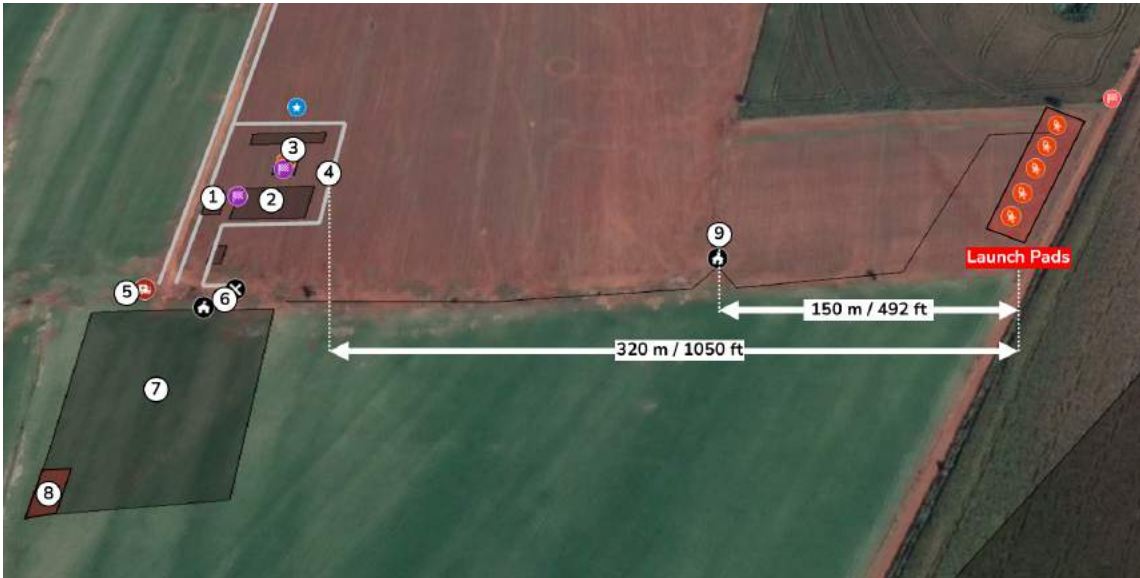


Figure 7 - Minimum Distance of Cleared Area and Minimum Personnel Distance.

In the Figure: (1) Main Entrance; (2) Event Center; (3) Food Court, (4) Spectator Area; (5) Safety Area (Ambulance and Emergency Response Team; (6) Mission Control Center; (7) Rocket Assembly Area; (8) Pyro Preparation Area (PPA); and (8) Launch Control Center (LCC).

The minimum distance from any launch pad at the Cape Canavial Launch Area to any person or property not associated with the operation will be no less than 320 meters or 1,050 ft, in accordance with the Tripoli Rocketry Association Safety Code.

The minimum distance from any launch pad at the Cape Canavial Launch Area to any person or property associated with the operation will be no less than 150 meters or 492 ft.

It is defined as a “person associated with the operation” of all LASC Operations Control Staff and the maximum of 2 (two) operators of each team clearly authorized by the LASC Operations Control official. For Hybrids and Liquids, the total number of operators will be defined by the LASC Operations Control official.

The number of allowed operators in the LCC shall not be greater than 10 (ten) at the same time during operations (red flag).



Figure 8 - View of the launch pad area and launch rails of 2022 LASC.

3. PROCEDURE FOR ACQUIRING CREDENTIALS

All participants of the Latin American Space Challenge shall bring an acceptable form of government issued photo ID to access the Fatec Tatauí and the Cape Canavial.

A valid passport, Documento Nacional de Identidad (any country of Mercosul), or Brazilian driver's license are all considered acceptable forms of government issued photo ID. Team members will receive their event badges during Onsite Registration and Check-in after showing their official document.

Any team members arriving late to the Latin American Space Challenge – while scheduled events are occurring in the Fatec Tatuí (Day 1) and in the Cape Canavial (Days 2, 3 and 4) – must check-in to receive their badge at the Onsite Registration and Check-in.

After successfully checking-in at the Onsite Registration and Check-in, the LASC personnel will hand over a badge for the event. There are 4 (four) types of badge category: Spectator, Rocketeer/Satelliteer, Staff and Operations Control Badges.

Each badge category has a level and permission to access different areas of the event, including the launch pad. Also, each badge identifies the role and responsibilities of the person wearing it during the event. The permissions for each badge category is presented in the Launch Site Status section.



Figure 8 - View of the 2023 LASC Badges.

All participants at the LASC shall wear their badges at all times while in Fatec Tatí or on the Cape Canavial property. Badges shall be worn above the waist, where they are clearly visible – clipped either to a garment or to a provided lanyard.

All participants shall also carry their respective form of government issued photo ID with them at all times, while in Fatec Tatuí or in the Cape Canavial property.

3.1. “SPECTATOR” BADGED PERSONNEL

Friends and family of LASC Rocketeers/Satelliteers, and members of the general public are welcome to come to spectate the launch. These individuals will be asked to pay a spectator fee at the entrance to the event in exchange for a themed badge, marked with the word “Spectator”. This badge grants them access onto the Fatec Tatuí & Cape Canavial, and unescorted access within the designated Public Area.

3.2. “ROCKETEER/SATELLITEER” BADGED PERSONNEL

All Rocketeers and Satelliteers will be issued a themed badge, marked with the word "Rocketeer/Satelliteer". This badge grants them access onto the Fatec Tatuí & Cape Canavial, and unescorted access within the Public Area and Rocket Assembly Area(s). During launch operations, Rocketeers/Satelliteers are granted access to the Launch Area(s) in accordance with the LCO and RSO's latest instructions.

3.3. “STAFF” BADGED PERSONNEL

All members of the LASC Team and other Competition Officials will be issued a themed badge, marked with the word “Staff”. This badge grants them access onto the Fatec Tatuí & Cape Canavial, and unescorted access within the designated Public Area, Rocket Assembly Area (RAA), and Launch Control Center (LCC).

During launch operations, LASC Team Members and Competition Officials are granted access to the Launch Area(s) in accordance with the LCO and RSO's latest instructions.

3.4. “OPERATIONS CONTROL” BADGED PERSONNEL

Members of the Cape Canavial Operations Control will be issued a themed badge, marked with the word “Operations Control”. This badge grants them access to all areas of the Cape Canavial.

The Cape Canavial Operations Control team members are responsible for the launch operations. Each member will have a specific role and responsibilities during the event in accordance with the Roles and Responsibilities section of this document.

3.5. VEHICLES

All vehicles shall be checked-in during the Cape Canavial (Days 2, 3 and 4). Fees may apply depending on the vehicle. All vehicles shall be parked in the Parking Lot of the Cape Canavial and an appropriate Vehicle Placard shall be displayed to exit the location. Placards shall be displayed prominently – on top of either the dashboard or hanging from the rearview mirror.

4. LOGISTICS & ACQUISITIONS

4.1. COTS SOLID MOTOR ACQUISITION

Only COTS solid motors from the official LASC Suppliers are permitted at the Latin American Space Challenge. Teams shall contact LASC organizers to receive detailed information on the acquisition process, including ordering, transport, and payment.

Teams should be aware that the motors have manufacturing tolerances and thus do not always fit in the casing. Thus, teams shall come prepared to accommodate all difficulties that may arise, taking into attention that there will be no spares for the team's motor.

LASC Staff reserves the right to not supply any COTS Solid Motors during the event at its own discretion.

4.2. SRAD MOTORS

Teams with SRAD motors are required to submit the appropriate data and information in the Project Technical Report. This must include motor technical details and details on fuels/oxidizers/propellants.

After the submission of the Project Technical Report, the LASC officials will assess the SRAD propulsion system case by case during the days of the event in accordance with **Section 10.4. Flight Readiness Review (FRR)** of the 2023 LASC Documents and Rules.

4.3. LIQUIDS & GASES ACQUISITION

Liquid/gaseous propellants may be acquired through LASC. Teams are required to indicate their fuel/oxidizer needs to the LASC Staff at least 15 days prior to the event. LASC Staff reserves the right to not supply any liquid/gaseous propellants during the event at its own discretion.

Teams should ensure to order a sufficient amount of fuel/oxidizers, to account for possible mishaps or possible needs for additional launch attempts. No additional fuel/oxidizer will be on stock besides the amounts ordered by the teams. Please note that the bottle fittings might be different from the ones normally used by the team and shall take all necessary precautions.

4.4. ENERGETICS ACQUISITION

Energetics (e.g., black powder, e-matches, igniters, CO2 cartridges) can be acquired directly via LASC. Teams should provide all the information regarding their energetics needs to the LASC Staff at least 15 days prior to the event, including special requests.

After a formal contact to the LASC Staff regarding the energetics, the team will receive more detailed information on the products available and respective costs. Teams should not forget to account for spares. Several products will also be available, in limited quantities, at the event for acquisition.

While the LASC Organization will always work to provide the best solution, teams need to be aware that some products (e.g., black powder) might not be exactly the same as the team is used to.

4.5. IMPORT/EXPORT TO/FROM BRAZIL

SRAD hybrid and liquid motors can generally be imported into Brazil in a neutral, non-dangerous state, nonetheless teams need to ensure on their own that all import requirements that might apply are fulfilled. The same applies to the inert propellants for hybrid motors, but once again teams shall ensure that all the import requirements are fulfilled and that they have the right documentation.

When shipping via parcel teams need to ensure a timely shipping, be aware that there might be delays or customs complications that require some time to handle, causing at the limit a team inability to launch.

It is **strictly forbidden** for the teams to directly import loaded SRAD solid motors or propellant into Brazil.

Solid motors that remain unused by the end of LASC will be destroyed unless teams find a way to ship it or another feasible alternative.

4.6. TRANSPORTATION TO/AT THE EVENT

Teams are responsible for their own transportation getting to and from LASC as well as getting around during the event.

For loading/unloading purposes, it is expected that teams can temporarily access an area at the Rocket Assembly Area (RAA), to be checked prior with the LASC Operations Control official present on site.

Nonetheless for the remaining time teams need to comply with the designated parking area. Entrance at the Cape Canavial Launch Area will be restricted to

authorized personnel only, so be sure to use the team’s credentials, provided during the registration, at all times.

5. CAPE CANAVIAL LAUNCH SITE ORGANIZATION

5.1. ROLES AND RESPONSIBILITIES

While Safety is the responsibility of all participants, to ensure launch operations as well as an overall successful event, the LASC officials are structured in several primary areas headed by the responsible officer which counts with various deputies in order to fulfill the respective responsibilities. The list of roles is defined in more detail in the following sections and referenced throughout the rest of this document.

- Safety & Launch Director
- Range Safety Officer (RSO)
- Launch Control Officer (LCO) and Launch Control Team
- Mission Control officer (MCO) and Mission Control team

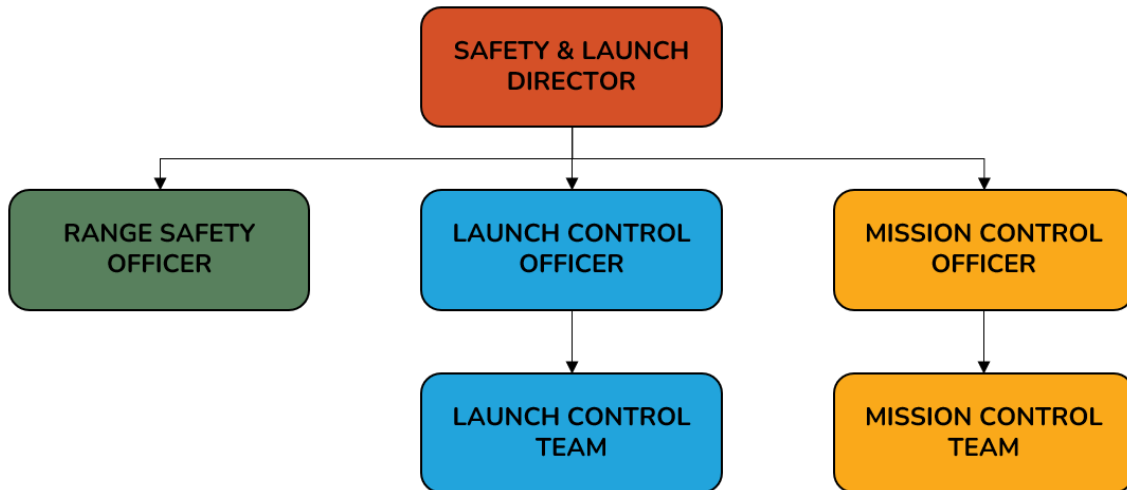


Figure 9 - List of roles of the LASC Operations Control team.

During the event, when in need to reach out to the organization, teams should streamline the contacts according to the respective roles and responsibilities, in this way guaranteeing the most accurate and timely response. Teams can find below more detailed information on each officer’s responsibility, to better understand what to expect and who the team should contact in the various cases once arriving at LASC.

The **Safety & Launch Director**, with the help of the deputies, will oversee and orchestrate the overall event operations. Also, the Safety & Launch Director will ensure that the launch site operations are in accordance with regulations and standards. It will coordinate with the Mission Control Officer on the outcome and Action Items of the Flight Readiness Review (FRR). To assure that everyone, at all times, is aware of the safety measures put in place during LASC, the Safety & Launch Director will conduct safety briefings and drills. The Safety & Launch Director will oversee the overall scheduling at the launch area as well as the FRR schedule. The Safety & Launch Director will be the only issuer of a Flight Card. All launch operation related matters/questions shall be discussed with the Safety & Launch Director.

The **Range Safety Officer (RSO)**, with the help of the deputies, will ensure that the range is closed for operations and are in accordance with regulations and standards while also overseeing and orchestrating operations in the public area and media area. The Range Safety also manages the airspace clearance, also monitoring the meteorological conditions. The RSO will oversee the access control to the launch site and manage the launch site clearance according to the range status. The RSO is responsible for coordinating the emergency response. If a team needs medical assistance, it shall request aid to the emergency authorities available on site, to assure a timely response. If at any given moment a team feels there is a safety breach of any kind, it shall contact the RSO immediately.

The **Launch Control Officer (LCO)**, with the help of the deputies, will oversee and orchestrate the launch pad operations. It will manage the setup and operation of the launch rails, the handling and loading of liquids and gasses, as well as the overseeing of the installation and test of ignition systems on the launch pad. It will oversee the teams in the launch control area and teams wanting to proceed to the Launch Pad shall do so only with the authorization of the LCO. In accordance with the various moments of the launch operations the MCO will set the Launch Site Status. Launch site inspections will be performed to ensure adequate hazard mitigation measures in all areas, if at any moment a team identifies a potential hazard it should report it to the LCO in order to be taken appropriate measures. The LCO will oversee and assist the teams with launchpad integration, and it will conduct a final safety inspection on the launch rail. The LCO will orchestrate and conduct the countdown, being also responsible for managing the rocket tracking and the coordination of the Recovery Team.

The **Mission Control Officer (MCO)**, with the help of the deputies, will oversee and orchestrate operations in the Rocket Assembly Area (RAA) and in the Pyro

Preparation Area (PPA). It will coordinate with the Safety & Launch Director and control and help with the resolution of Action Items issued in the FRR, while also conducting the Launch Readiness Reviews (LRR). The MCO will oversee the launch scheduling thus, questions regarding LRR, overall schedule, launch slots, scrubbed flights shall be directly communicated to the MCO. The Mission Control officials will manage the preparation and integration of pyrotechnics and motors. After launch and recovery, all teams shall be prepared for the MCO to conduct the Postflight Review (PFR) and fill the Postflight Record. Mission Control personnel is also responsible for assuring that the flight predictions are within the safety limits, thus, teams shall provide the most up to date simulations and make the officials aware of any changes made to the rocket.

5.2. LAUNCH SITE OPERATION REGULATIONS

The Cabo Canavial Launch Area (see Figure 10) has a circular diameter of 1000 m (radius of 500 m) with the launch pad at its center and a minimum spectator distance of 320 m from the launch pad. Only essential launch personnel may be allowed as close as 150 m to the launch pad with explicit permission by the RSO. All event areas, including mission control, are set up outside of the 320 m diameter.

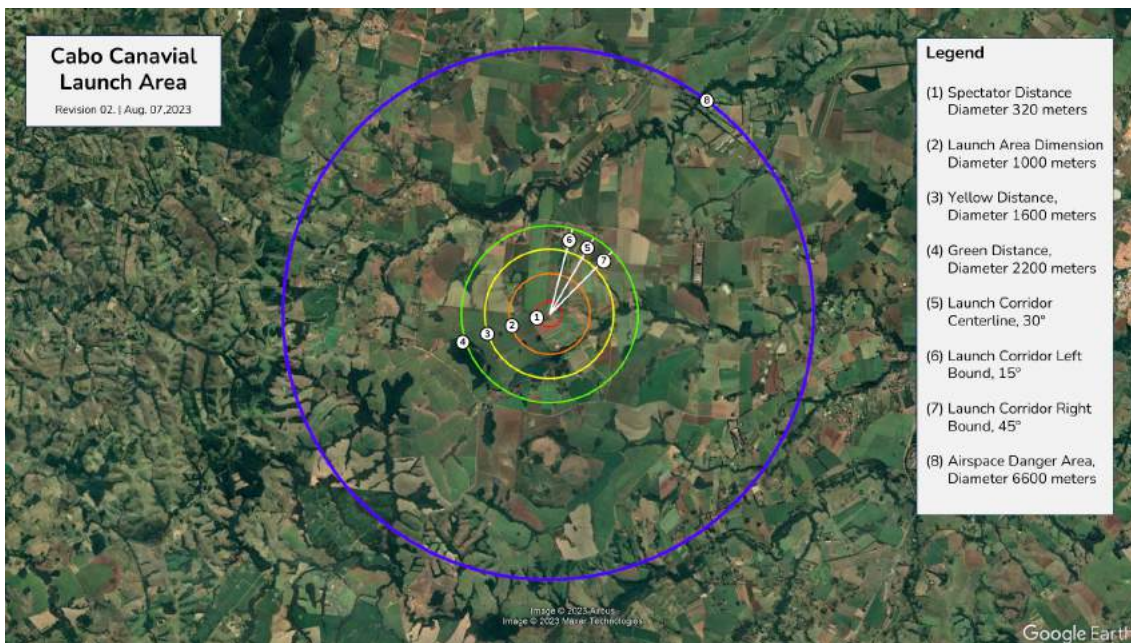


Figure 10 - Cabo Canavial Launch Area.

Teams shall only be permitted to launch if a nominal flight is projected to touch down downrange well within the green distance of 2200 m. The launch corridor is in the

form of a circle segment with a +/- 15° arc with a length (radius) of 2200 m downrange.

5.3. LAUNCH PAD LOCATION AND LAUNCH DIRECTION

Nominal launch direction is 30° from North Azimuth, roughly towards the north-northeast. The wind direction will be monitored, and the launch direction may be adjusted accordingly. The maximum inclination of the launch rails is 85±1°. Launch rail inclination may be lowered by the event organizers if they see fit to further increase the safety margin.

Table 1: Launch Pad Details.

Latitude of Launch Pad	23°21'48.71"S
Longitude of Launch Pad	48° 0'46.05"O
Elevation of Launch Pad	667 m above mean sea level
Nominal Launch Direction	30° from North Azimuth
Nominal Launch Rail Inclination	85±1° from horizontal

5.4. VEHICLE OPERATIONAL REGULATIONS

In accordance with the LASC Design, Test & Evaluation Guide, the minimum rocket take-off velocity off the launch rail is 30 m/s, the minimum static stability margin off the launch rail is 1.5 calibers, and the maximum permitted impulse of the rockets is 40,960 Ns.

5.5. METEOROLOGICAL CONDITIONS

The meteorological conditions are assessed via forecasts, meteorological data, and a launch site weather station. For launch operations to commence, the maximum allowable wind speed on-ground is 10 m/s.

The ascent trajectory needs to be free of clouds. In case of thunderstorm or lightning in the area, launch operations will be suspended immediately. LASC will not be responsabilized for the suspension of the event due to meteorological conditions.

5.6. LAUNCH SITE STATUS

The launch site status will be indicated visually via a coloured flag (green-yellow-red) near the mission control, and in addition via Public Announcement. The following four statuses may be raised, each with increasing restrictiveness.

Green Flag Status: A green flag indicates that no direct launch operations are on-going. Only non-hazardous preparatory work is underway. Teams and staff are free to move on the launch site, respecting and keeping clear of teams' and staff's direct work areas. Visitors are free to move on the spectator area. However, visitors may not enter the teams' areas, except if by explicit invitation by a team or staff and shall be accompanied at all times.

Yellow Flag Status: A yellow flag indicates that launch preparations are on-going. Potentially hazardous tasks are underway, such as handling of motors, pyrotechnics, and propellants in the pyro preparation area, on route to the launch pad, and at the launch pad. Teams and staff may remain in these areas and shall be aware of the on-going activities. Personnel not directly involved in hazardous tasks shall stay clear of them. In addition, the team and staff areas in their entirety are off-limits to spectators.

Red Flag Status: A red flag indicates that launch preparations are in their final stages. Additional, potentially hazardous tasks are underway on the launch pad, such as connecting of igniters, arming of electronics, and removal of safety pins. Only essential personnel may be at the launch pad (within the 320 m safety diameter). The team and staff areas in their entirety are clear of all non-essential personnel. Essential personnel may also include team members in need to perform critical tasks on their vehicle to ensure launch readiness for their launch slot later during the launch day. All personnel must be on high alert, immediately ready at all times to move to the spectator's area as soon as the final launch status signal sounds.

Final Launch Status: A final announcement together with an acoustic signal indicates that launches are imminent. No additional flag will be raised, the red flag remains up. The team and staff areas in their entirety are clear of all personnel, and remaining personnel are to move to the spectator area. Only launch control personnel may be within the 320 m safety diameter at the forward mission control. All other personnel are either at the mission control or at the spectator area. Movement to, from, and on the launch site may be restricted.

Table 2: Access rights according to Launch Site Status.

Category	Area			
	Public Area	RAA/MCC	LCC	Launch Pad
Spectators	Open	By invitation		
General Rocketeers	Open	Open	By invitation	
Essential Rocketeers	Open	Open	By invitation	By invitation
LASC Staff	Open	Open	Open	By invitation
Operations Control	Open	Open	Open	Open

Personnel of group [Category] can be at [Area] during [Flag Color] but must leave once the status is raised.

Example: Personnel of group General Rocketeers can be at the Launch Pad (only by invitation) during Green Flag but must leave once the status is raised.

Example: Personnel of group Essential Rocketeers can be at the LCC (by invitation) during Red Flag but must leave once the status is raised.

The definition of “by invitation” means a verbal invitation made by a LASC Operations Control official. The definition of “open” means that the area is open for all-day access to Cabo Canavial activities for the indicated category.

6. SCHEDULING

6.1. SCHEDULING PROCESS

The LASC scheduling process follows a first-come, first-served principle for the FRR, LRR, and launch time slots. In addition, for the launch time slots, technical considerations such as target altitude, propulsion type, hybrid/liquid pressurization considerations are taken into account.

Teams shall apply for a timeslot for the FRR after the opening of the Cape Canavial Launch Area on the event’s second day (Aug. 25, 2023). After the FRR, if the status is “Nominal” or “Provisional”, teams shall apply for a LRR and Launch time slots with the LASC staff.

6.2. BACKUP LAUNCH SLOTS

Time Slots may be subject to changes due to unforeseen issues or force majeure (i.e., weather).

In such cases, a backup possibility for the team may be attempted, prioritizing launch slot selection by the LASC staff according to the table below (see Table 3). In all cases, LASC is reserving the right to alter the launch slots/launch order if necessary.

Table 3: Access rights according to Launch Site Status.

Slot	Priority given in launch slot choice	If yes, priority is
Original	Was this the launch slot originally filled by the team?	1
Backup	Is there a readily available open launch slot later on the launch day, not interfering with any other planned launches?	2
	Was the team's earlier launch scrubbed due to force majeure?	3
	Was the team's launch attempt scrubbed due to a third party?	4
	Was the team's launch attempt scrubbed due to the team itself?	5

Despite the best efforts, events related to force majeure are out of the control of the LASC organizers. Therefore, a general guarantee that teams can launch at the event or will have a backup launch slot under all circumstances cannot be given.

6.3. SETUP TIME

The baseline for an efficient and safe setup is a well-trained and independently acting crew. Good training can be achieved prior to the competition via static firing tests.

Teams should train, drill, improve, and organize, focusing on becoming more efficient, for example taking the lessons learned to design ground support equipment for efficient use. Some target setup times are included below for reference (see Table 4).

Note: the target setup times for launch preparation will be taken into account if a team is occupying more than the total time for the activities. The total time that a team can occupy a LASC-provided launch pad is the “serial time” according to propulsion type.

Table 4: Target setup times for launch preparation activities according to propulsion type.

Activity	SRM	HRM	LRE
Mission Control setup	15 min	30 min	30 min
Launch Pad equipment setup	10 min	30 min	45 min
Rocket on rail and rail erected to launch angle	5 min	5 min	5 min
Power-up, telemetry and checkouts (*)	10 min	10 min	10 min
Igniter loading (*)	5 min	5 min	5 min
Propellant loading, including pressurization (*)	N/A	45 min	60 min
Pyrotechnics arming, final check (*)	5 min	10 min	10 min
Total (serial / parallel), in minutes	50 / 35	135 / 100	165 / 130
(*) Actions that cannot be carried out in parallel.			

7. PRE-LAUNCH PREPARATION

Prior to attempting flight at the Latin American Space Challenge, each rocket must pass a FRR and a subsequent final LRR. Furthermore, LASC competitors are responsible for submitting their payload(s), including satellites, to inspection prior to fully integrating their launch vehicle for the LRR – when it is expected the payload(s) may no longer be easily removed.

No rocket will be allowed to depart the Rocket Assembly Area (RAA) without an associated Digital Flight Card. Teams seeking re-approval to attempt flight following any on-pad abort which forced the rocket's return to the Rocket Assembly Area (RAA) must begin the approval procedure over from the beginning; however, the FRR may be abbreviated in such situations at the LCO & MCO discretion.

7.1. SAFETY BRIEFING

The Safety Briefing aims at synchronizing all the involved in the launch operations, run through the plan for the event, address criticalities and questions. The Safety Briefing will occur during the morning of the Day 2 of the event and it will be **mandatory** for all team members.

Teams should take this opportunity to raise any questions, concerns or to proactively address any issue or concern that might impact the team's readiness to launch or that could be potentially relevant for safety.

7.2. AD-HOC BRIEFING

The ad-hoc briefing can occur at any moment during the launch days at the RAA to update team members about the launch schedule and any safety issue.

The ad-hoc briefing is mandatory for the team leader with the option of one more team member for support. Teams should take this opportunity to raise any questions, concerns or to proactively address any issue or concern that might impact the team's readiness to launch or that could be potentially relevant for safety.

7.3. FLIGHT READINESS REVIEW (FRR)

Check Section **10.4. Flight Readiness Review (LRR)** of the 2023 Latin American Space Challenge Rules & Requirements Document.

7.4. SATELLITE & PAYLOAD CHECK-IN

The LASC competitors are responsible for submitting their Satellites and/or Payload(s) to inspection at the Mission Control Center (MCC) before or during the FRR. Satellites and/or Payload(s) are expected to be easily accessed for visual inspection.

The process follows a **first-come, first-served** principle for the Satellite or Payload Check-in - Note: A rocket vehicle is not necessary to perform a Satellite or Payload Check-in. A MCO Deputy there will assess compliance with the LASC Rules & Requirements Document.

When finished, the inspector will input all collected information on the Digital Flight Card, making sure to record the time, date and all appropriate information in the appropriate field of this row.

7.5. LAUNCH RAIL FIT CHECK

The Launch Rail Fit Check is part of the FRR in the MCC where teams need to demonstrate that their vehicle fits and can be safely mounted on the respective launch

rail, event-provided or team-provided, for which teams shall coordinate with the MCO. Teams shall have the launch lugs readily available at the Rocket Assembly Area.

When bringing their own launch rail, teams need to ensure that the rocket fits the launch rail. On the launch site, the LCO or Deputy will check again that the vehicle is mounted properly on the launch rail for all teams.

7.6. LAUNCH RAIL SETUP

LASC provided launch rails will be set up by the event organization, while team provided launch rails shall be set up by the team. Transport of team launch rails to the launch pad shall be organized by the team – please note that the road is very rough and uneven including some big boulders. The transport shall be approved by the Safety & Launch Director.

Teams can set up their launch rails on the launch pad on the Day 2 of the Latin American Space Challenge. Teams should bring all the tools and equipment needed to do so. Team launch rails should be set up all the way to the side of the launch pad, and then moved to the final position in the morning of the launch day when they are needed. The final position of the launch rails shall be coordinated with the event staff. Independently of what launch rail teams use, teams should have a dedicated and trained launch rail crew.

Teams using the LASC launch rails can train during the preparation days. Teams are responsible to and for any damage that bad utilization of the launch rails may impose to equipment and people.

7.7. ON-SITE TESTING

Testing should be done prior to the event. Potentially hazardous testing, especially involving black powder and energetics for the recovery system, shall be done with the permission of the Safety & Launch Director at the Pyro Preparation Area (PPA).

Teams also may conduct tests at the launch site, for example tracking/telemetry, ignition system, or remote filling station. Any tests at the launch site shall be coordinated with the MCO, LCO and RSO. Teams shall limit the number of people on the launch site to the necessary minimum to ensure smooth preparation. Support will be provided by the LASC staff.

7.8. ENERGETICS

Energetics, other than the Rocket Motor, shall be applied only after a “Nominal” FRR (“green”).

The LASC team will supervise, review and support the teams with the application of igniters or other pyrotechnical devices, under approval of the LCO.

7.9. SOLID MOTORS PREPARATION

All Solid Rocket Motors shall be assembled and loaded only after a “Nominal” FRR (“green”).

For **SRAD Solid Motors**, please see Sections 4.2. and 4.5. of this document.

Teams that have ordered a **COTS Solid Motor** will receive it during Day 2 of the event and check with the LASC staff if everything is in order. Some COTS solid motors need more elaborate preparation, (e.g., parts needing to be glued and to cure) which needs to be done during the preparation days by the team in conjunction with the LASC staff. LASC staff can provide support, teams shall communicate early if needing support.

7.10. HYBRID & LIQUID ROCKETS PREPARATION

All Hybrid & Liquid Rocket Motors shall be assembled and loaded only after a “Nominal” FRR (“green”).

The main points in hybrid & liquid rocket preparation are checking if all bottles are complete, if the bottle fittings are appropriate, setting up the loading station, and testing the loading station. Teams can bring their own bottles to the event during Day 2 and store it onsite with the support of LASC Operations Control officials.

8. PRE-LAUNCH OPERATION

8.1. UPDATED FLIGHT SIMULATION AND TRAJECTORY ANALYSIS

Any open questions about the flight simulation should be addressed as early as possible, at the latest at the FRR. Teams must provide flight simulation data representing real-world launch conditions (vehicle launch configuration, wind

direction, wind speed) in an OpenRocket format to MCO during the LRR to ensure that the stability and trajectory are compliant with the operation regulations before the launch.

Along with the flight simulations, teams must provide a motor thrust curve for the final flight configuration. The last version of the file must include all the physical modifications and weight improvements made after FRR and before LRR.

If instructed, teams must show and explain their project changes to the MCO or its Deputy at mission control to explain and check their final flight simulation setup.

8.2. LAUNCH READINESS REVIEW (LRR)

Check Section **10.5. Launch Readiness Review (LRR)** of the 2023 Latin American Space Challenge Rules & Requirements Document. For a team to successfully pass the LRR, the officials will have to raise all criteria to “green” and the flight status to “Nominal”.

At the end of the LRR, the issuance of the Digital Flight Card by the Safety & Launch Director to the team certifies that the LRR has been passed successfully.

8.3. LAUNCH PREPARATION

Launch operations start with the collection of the launch vehicle from the transportation truck, followed by settling into the already assigned preparation tent to do all the preparation towards the LRR. Teams shall also start preparing all the necessary mission control equipment.

If a team gets clearance from the LRR, they will be assigned a LASC Official Pickup Truck to transport their vehicle to the Launch Control Center.

8.4. TEAM OPERATIONS PERSONNEL

The number of personnel accompanying a particular rocket into the Cape Canavial Launch Area (CCLA) shall not exceed the minimum number absolutely necessary to make whatever final preparations are necessary at the launch pad.

Nominally, this number **should not exceed 2 (two)**. The Team Leader may seek an exception for additional personnel from the LASC Operations Control Team, at the end of the LRR.

8.5. TRANSPORT OF THE ROCKET TO THE LAUNCH PAD

With the signature of the Safety & Launch Director on the Digital Flight Card, the teams are eligible to move to the Launch Control Center, where they will inform the LCO that they are ready to move to the launch pad.

The LCO will give its oral approval once the appropriate operational conditions are given, which must be confirmed with the RSO and Safety & Launch Director as well as other officials. Only then are teams permitted to move to the Launch Pad.

Teams will move their vehicle by the LASC Official Pickup Truck. Transport of the vehicle is only permitted with the vehicle in a “safed” state. The vehicle should always be pointed away from any personnel towards an open area.

8.6. LAUNCH PAD PREPARATION

Teams must prepare the launch pad setup after being assigned a launch rail. Teams using their own launch rail must move it to the designated area on the launch day during Green Flag and with the permission of the Safety and Launch Director. LASC launch rails will be operational on their respective areas.

Teams should consider the uneven terrain and prepare themselves with solutions to keep their setup leveled and balanced to ensure the correct operation of all equipment.

8.7. MOUNTING ON THE LAUNCH RAIL

Once the LASC Official Pickup Truck arrives at the Launch Pad, the LCO (or Deputy) will guide the team to their respective Launch Rail and instruct the team about the mounting of the vehicle on the Launch Rail. The LCO will inspect the Launch Rail prior to mounting to ensure its mechanical stability and readiness.

For the team-provided launch rails, the team will oversee the mounting of the vehicle, with support of the LCO. For event-provided launch rails, the LCO will oversee it.

9. LAUNCH OPERATION

9.1. WEATHER CHECK

LASC requires that cloud cover shall not mask the ascent, thus for cloud covered sky the launches will be suspended. Low hanging cloud cover may allow 3 km launches.

The wind speed and direction on ground will be monitored by a weather station by the LASC staff. The weather information is passed on to the teams to consider for the updated flight simulation.

9.2. ESTABLISHING LAUNCH READINESS

Before final launch preparation, all non-essential personnel are removed from the Launch Pad and must exit the specified Launch Area Safety distance (320 m).

Once all preparations have been concluded, excluding only those preparations that need to be completed immediately before launch due to the specifics of the vehicle (e.g., for liquid/hybrid vehicles), the LCO (or Deputy) will conduct a final visual inspection of the vehicle to ensure its launch readiness. The LCO will confirm over the radio the final inspection.

The LCO shall inform all the LASC Operations Control Officials, MCO and the RSO about the readiness of the vehicle and wait for the Safety and Launch Director approval to continue with the “arming” process. For this, the LCO and RSO will transfer the launch site into a Launch Ready state. Once the LCO has confirmed launch readiness with the Safety and Launch Director, the vehicle is ready to be “armed”.

9.3. ARMING AVIONICS

Once launch readiness has been established, the essential team personnel will check if the recovery system and/or any avionics are ready to be armed. Once this is confirmed, they will request the LCO permission to arm the system.

All ground-started propulsion system ignition circuits/sequences shall not be "armed" until all personnel are at least 15 m away from the launch vehicle.

Personnel that are no longer required at the launch pad thereafter shall urgently leave the Launch Pad to the spectator area.

9.4. CONNECTING IGNITERS

Once arming is completed, the LCO may authorize the essential team personnel to proceed with the installation of the event-provided ignition system or team-provided ignition system, under supervision of the LASC Operations Control Officials.

Be aware that for Solid Motors the use of the LASC provided ignition system is **mandatory**. Hybrids & Liquids may use their own ignition system, but the permission of the LCO shall be granted. Details on the ignition system can be found in the LASC DTEG.

The LASC Operations Control Officials will keep the LCO informed about the status of the ignition system installation process. The LCO will inform the Safety and Launch Director, MCO and RSO about the ignition system installation process.

After installation of the igniters, all remaining essential personnel are to leave the launch pad with urgency to the forward mission control.

9.5. GO/NO-GO CALL

After arming, installation of igniters and retrieval of all personnel from the launch pad the GO/NO-GO call will be managed by the Safety and Launch Director, which is in direct contact with the LCO, RSO, MCO and Team Mission Control. Teams will adhere to this call to confirm readiness for launch.

All deputies are managed internally by the LASC Officers, which shall go through the respective checklists and assure all safety conditions are undertaken. If at any moment, any of the officers has safety concerns the call will be interrupted.

9.6. COUNTDOWN

The Safety and Launch Director will approve the countdown start. Countdown will be initiated down from 10 to 0, while 0 is “ignition”, voiced loudly and relayed via the PA system. The Safety and Launch Director, LCO or RSO can interrupt the countdown at any time if necessary.

9.7. LAUNCH

The success of a mission is not defined by lifting off the launch rail but spans all the way until the recovery. Teams shall remain focused during the whole duration of the mission and best save celebrations for touchdown.

Once the rocket is launched, the main task for the team mission control and the LASC Operations Control Officials is to continuously monitor the flight trajectory and status.

Therefore, a high focus should be kept throughout the whole flight. The teams' mission control should continuously and openly communicate with the LCO the status of the flight, especially if it is nominal or not. If an anomaly is detected that is potentially safety critical, this needs to be communicated immediately.

To ensure clear communication, chatter should be kept down until the mission is completed.

9.8. LAUNCH SCRUB

A launch "scrub" occurs when a particular rocket's ignition system fails to trigger the motor/engine start process (i.e. "misfire"), or any other circumstance(s) which prevent a rocket from attempting ignition without risking either of the following occurring:

- **Non-catastrophic mission failure:** A non-destructive event which prevents achieving one or more critical mission criteria (typically due to on-board consumable resources depletion) as determined by the Rocketeer;
- **Catastrophic failure (CATO):** A destructive event (due to depletion of on-board consumables or an off nominal configuration change occurring since the time of launcher erection) resulting in rocket loss.

Following any scrubbed flight attempt, the LCO may take any one of the following courses of action. The LCO may revise this guidance as needed for unique flight attempts, based either on his/her personal experience or using information recorded on the Digital Flight Card.

- **Press:** Continuing the salvo without pause by starting the Final Countdown process, defined in Section 10.2 of this document, at Step 1 for the next flight attempt;

- **Recycle:** Re-attempting ignition by pausing to re-verifying continuity with the appropriate launch pad and re-entering the Countdown process.
- **Hold:** Implement as long as a two minute hold before continuing to “Press” – in order to eliminate the possibility of a "hangfire" being "mistaken" for a misfire (A "hangfire" describes an ignition attempt whose success is not immediately obvious due to a longer than anticipated delay preceding thrust generation and first-motion).

After facilitating all remaining flight attempts in the window, the LCO may choose again whether to reattempt ignition of any “misfires” at his/her discretion. Each re-attempt shall be preceded by the complete Countdown process.

The LCO will only record a "Pad Abort" or any “Other” scrub event on the Post Flight Record's once either the Safety & Launch Director, RSO, LCO, or Team Leader determine the rocket should be removed from the launcher and returned to the Rocket Assembly Area (RAA).

Teams whose rocket returns to the Rocket Assembly Area (RAA) must begin the approval procedure over from the beginning; however, the FRR may be abbreviated in such situations at the Flight Safety Team's discretion.

9.9. MISHAP

A launch mishap occurs when a flight attempt results in a CATO event, or any other condition rendering it potentially unsafe to continue the salvo without pause. In the event a launch mishap occurs, it automatically triggers the start of a hold period, during which time the LCO and RSO will take the following actions.

The RSO may revise this guidance as needed based on his/her past personal experience or observations on events unfolding in the "real world".

- (a) The LCO will safe the Remote Launch Control Unit (RLCU);
- (b) The RSO will begin using the resources at his/her disposal to assess the condition of the launch areas, and whether any unsafe conditions continue posing either hazards to personnel or risks to further flight attempts;
- (c) The RSO will provide initial guidance to the LCO over the long range radio communications network, updating later as needed. At a minimum this guidance should include the RSO's anticipated hold duration, specifically whether this is more or less than two minutes;

- (d) The LCO will announce the start of the hold over Public Address System, and for personnel in the Rocket Assembly Area (RAA) and Spectator Area to listen for more information while resuming normal activity – reminding these personnel that only during the verbal "ten count" announcement are those able asked to stop what they're doing, and observe the flight;
- (e) When LCO & RSO determine the affected Launch Area is secure, the RSO will instruct the LCO to resume the salvo..

Depending on the available time, resources, and the overall severity/impact of the launch mishap, the RSO should strive to collect additional records of the incident (e.g. photographic/video records, eyewitness accounts, physical evidence, etc.) which may benefit any subsequent investigation.

The primary purpose of investigating mishaps is to determine the cause, identify corrective actions and take preventative measures in future rocket launch operations. Removing and protecting personnel from danger shall always take priority over any investigative concerns.

9.10. CONTINUATION OF SALVO

Once safe touchdown has been confirmed and no fires are spotted, the RSO will give clearance for the continuation of the launch salvo.

10. PROCEDURES FOR RECOVERY

For the recovery phase, teams shall have a Recovery Team composed of 2 or 3 members to be ready immediately after the launch window closes to join the LASC Recovery Team on the search for the vehicle. After RSO's clearance and LCO instructions, the recovery teams can start the operation.

Teams shall also prepare bags or boxes to transport the rocket fragments, in case of recovery system failure. For possible damaged LiPo batteries, all teams should have a dedicated container with the following features:

- Non-metallic inner packaging made of a non-combustible, non-conductive, and absorbent cushioning material that completely encloses the cell/battery; and
- Outer packaging that may be made of metal, wood, or solid plastic.

10.1. POSTFLIGHT REVIEW & POSTFLIGHT RECORD

After recovery, a Postflight Review will be conducted by LASC officials, upon the team's arrival at the **Mission Control Center (MCC)**. If recovery is not successful, the Postflight Review will take place at the end of the day after launch operations. This review aims at assessing the success of the flight and recovery operations.

Teams must have, at least, gloves, masks, and goggles to handle the vehicle. If needed, teams can use working tools to open the rocket to access obstructed compartments.

Before any action, the vehicle must be in a safe state: propellant tanks shall be empty, remaining, or unburned solid propellants removed, recovery electronics shall be “safed” and energetics shall be “safed” and removed.

During the review teams shall communicate the mission’s success, by assessing it with the LASC officials, e.g., the mission progress and status, rocket integrity, data collected, touchdown coordinates, payload mission and status, etc. Teams shall also communicate to the LASC officials if any rocket part is still missing.

During the Postflight Review, teams shall download, to the possible extent, altitude logging/tracking data, especially from the official altitude logging and tracking device and send it to lasc@lasc.space and show it to the MCO, together with the last flight simulation, including the estimated touch down point.

10.2. LAUNCH SITE MAINTENANCE AND CLEANING

If any equipment is required to be scrapped or dumped (e.g., batteries, chemicals leftovers), the team is responsible for its correct disposal process. Avoid at all costs leaving unnecessary trash at the launch site.

11. SAFETY & GENERAL PROVISIONS

The following sections overview a combination required codes of conduct, through which participants retain the privilege of being authorized access to the Cape Canavial during the event.

11.1. ITEMS AND INDIVIDUALS PROHIBITED

- The possession of weapons, open or concealed, is prohibited within the Cape Canavial.
- Smoking and all alcoholic beverages are prohibited, and any open container will result in the person's immediate removal from the Cape Canavial.
- Animals are prohibited.

11.2. CAMPING, COOKING, AND TRASH DISPOSAL

LASC participants are **prohibited** to camp onsite at the Cape Canavial Area. LASC Organization will not provide accommodations or the permit for camping at Cape Canavial, which is a private property.

Also, cooking will not be permitted in the Cape Canavial Area by the Teams. Any use of charcoal is prohibited.

All attendees are responsible for preventing littering. All trash will be disposed of in provided waste receptacles or bagged by the participants themselves, and disposed of at the indicated areas. Chemical latrine facilities (i.e. "porta-potties") sufficient for roughly 1,200 attendees will be provided and serviced every day.

11.3. VEHICLE USE AT THE CAPE CANAVIAL PROPERTY

No vehicle may operate in excess of 30 km/h while on the Cape Canavial, and should not exceed 10 km/h when in close proximity to personnel or their equipment.

Persons found to be operating vehicles in an unsafe manner will have their on-site vehicle use privileges revoked, and may be subjected to immediate removal from the Cape Canavial, depending on the frequency and severity of infraction.

11.4. RECOMMENDED AND REQUIRED DRESS

All attendees will dress appropriately for the harsh environment – including sun exposure, terrain, and wildlife – by using the following guidance.

- The average daytime temperature during August at the Cape Canavial is 25°C. At night, the temperature may drop to 17°C;

- Attendees should protect themselves from sunburn, reapplied regularly as directed by the manufacturer;
- Attendees should protect themselves from eye damage due to sun exposure with UV protection sunglasses;
- Attendees are required to wear closed toe footwear – which may include closed toe sandals – at all times in the Rocket Assembly Area (RAA) and Launch Area, as well as while engaged in rocket recovery. No individual wearing open toe sandals will be permitted to engage in rocket recovery.

11.5. REQUIRED PERSONAL PROTECTIVE EQUIPMENT

Personnel performing arming operations on stored-energy devices, working near armed stored-energy devices, or handling hazardous substances shall use appropriate personal protective equipment (PPE). The following table provides guidance on PPE appropriate to some common stored-energy devices and hazardous substances.

LASC DTEG provides basic definitions for when these common stored-energy devices may be considered “armed” - as opposed to “safed”, or “non-energetic”. The appropriate Material Safety Data Sheet (MSDS) should always be used as the definitive resource when selecting appropriate PPE for hazardous substance handling.

The LASC Organization will provide a pair of face shields for the teams while working on their vehicles at the Cape Canavial Launch Area (CCLA). Teams shall return the face shields before leaving the CCLA.

Table 5: Required PPE.

DEVICE OR SUBSTANCE CLASS	REQUIRED PPE
Armed Igniters/Squibs	Face shield
Armed Pyrogens (e.g. black powder)	Face shield
Armed Mechanical Devices	Face shield
Armed Pressure Vessels	Face shield
Nitrous Oxide, Cryogen, or similar cold fluid lines and valves handling	Leather gloves (or similar insulating protection approved for use with liquid oxygen); Safety glasses or face shield
Liquid Oxygen (LOX) handling	Leather gloves (or similar insulating protection approved for use with liquid

	oxygen); Safety glasses or face shield
Kerosene or similar liquid hydrocarbon handling	Chemical resistant gloves (e.g. PVC, neoprene, Viton, etc.), safety glasses or face shield
Hydrogen Peroxide handling	Chemical resistant gloves (e.g. PVC, neoprene, Viton, etc.), safety glasses or face shield

12. UNMANNED AERIAL SYSTEM POLICY

This section pertains to unmanned aerial systems (UAS, drone, quadcopter, multi-copter, unmanned aerial vehicle, UAV, radio-controlled airplane or helicopter, etc.) other than those deployed by rocket missions at the LASC. The latter are considered payloads, and not subject to the contents of this section.

UAS not deployed by rocket flights at the Latin American Space Challenge – typically flown for the purpose of launch photography/videography, or to assist recovery operations – will adhere to the following rules.

All UAS **shall be approved** prior to utilization by the Safety & Launch Director. LASC reserves the right to deny or terminate the operations of any UAS at any time, if the planned operations or conduct of the operator run counter to the overall goal of promoting flight safety.

- The UAS or pilot shall be certified by the Agência Nacional de Aviação Civil (ANAC);
- The UAS shall weigh no more than 55 lb;
- The UAS shall not be flown over 400 ft above ground level (AGL);
- The UAS shall not be flown outside the event flight waivers without individual flight approvals from the Agência Nacional de Aviação Civil (ANAC);
- The UAS shall not be flown beyond the pilot’s visual line-of-sight, nor using first-person-view (FPV);
- The UAS shall not be flown over any crowd, designated rocket assembly area, or launch area;
- The UAS shall be launched away from the crowd and from a location such that a “return-to-home-point” feature will not carry the UAS over any of the aforementioned areas;

- The UAS pilot shall submit for approval in person his/her flight plan(s) to the Launch Director (or his/her delegate) prior to conducting their first flight;
- The UAS flight operations shall not interfere with rocket launch operations.