

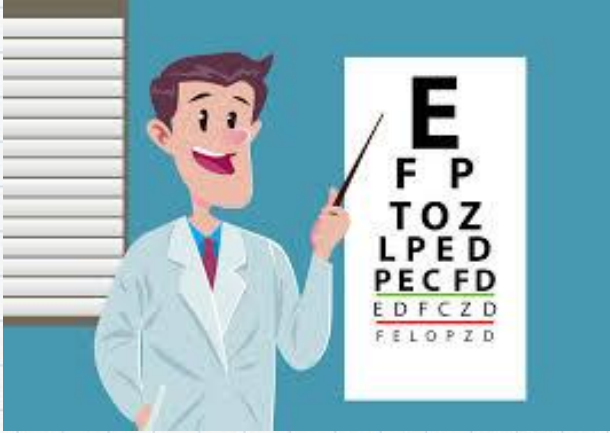


Vehicle Operator License Application
– Part 450 –
Launch and Reentry Requirements





To get a California drivers license, you need to take three tests.
SAFETY IS IMPORTANT.



Eye exam



Written exam



Driving test

To Obtain A Launch & Re-entry License, It Takes Appox. Two Years. Safety is Important!

- **Virgin Galactic** is the 1st suborbital Part 450 license, the Federal Aviation Administration (FAA) will have processed.
- **Secretary of Transportation** oversees, licenses, and regulates commercial space launch and reentry activities through the **Commercial Space Launch Act of 1984.** (51 U.S.C. 50901-50923)
- Secretary of Transportation delegated authority to carry out the above functions to the **FAA.**
- FAA created a single set of licensing and safety regulations across several types of operations and vehicles, while streamlining commercial space regulations - 14 CFR Part 450.

Spaceports, Officially Called “Launch or Reentry Site”, Around Country

- 14 Licensed Spaceports
- Different types of Spaceports
 - Horizontal Launches (Take off and Land on Runway)
 - Vertical Launches (92% of Launches)
- Need to Support Infrastructure - Testing, Manufacturing, Builds, Test Engines on Site.
- Consider trajectory, orbitals, suborbital
- Private Spaceports
 - Not Multiuser Site
 - 3 in Texas
 - Single Vehicle Licenses
 - Own Spaceport and Launch.
 - Do not need both a Launch License and a Spaceport License, they are combined.

Scope of Vehicle Operator License – Launch/Launch End

1. “Launch” begins when hazardous pre-flight operations commence at a U.S. launch site that may pose a threat to the public:
 - a) Pressurizing or loading of propellants into the vehicle.
 - b) Operations involving a fueled launch vehicle.
 - c) The transfer of energy necessary to initiate flight.
 - d) Any hazardous activity preparing the vehicle for flight.
2. For a suborbital launch that includes a reentry, launch ends after reaching apogee per 14 CFR 450.3.

Part 450 – Parts A, B, C, D

- Part 450 is divided into subparts A through D:
 - Subpart A: General
 - Subpart B: Requirements to Obtain a Vehicle Operator License
 - Subpart C: Safety Requirements
 - Subpart D: Terms and Conditions of a Vehicle Operator License
- The licensing process begins with pre-application consultation, which sets the stage for an applicant to submit a license application.
- Ultimately, the license specifies the range of activities the licensee may undertake along with any limitations.
- After license issues – operator's responsibility for public safety and compliance with its license, representations in the license application, and FAA regulations.
- An important component of this compliance is the FAA's authority to perform safety inspections.

Part 450 – Parts A, B, C, D

- **Subpart A—General Information.**
 - § 450.1 Applicability.
 - § 450.3 Scope of a vehicle operator license.
 - § 450.5 Issuance of a vehicle operator license.
 - § 450.7 Duration of a vehicle operator license. – 5 Years
 - § 450.9 Additional license terms and conditions.
 - § 450.11 Transfer of a vehicle operator license.
 - § 450.13 Rights not conferred by a vehicle operator license.
- **Subpart B—Requirements to Obtain a Vehicle Operator License.**
 - § 450.31 General.
 - § 450.33 Incremental review and determinations.
 - § 450.35 Accepted means of compliance.
 - § 450.37 Equivalent level of safety.
 - § 450.39 Use of safety element approval.
 - § 450.41 Policy review and approval.
 - § 450.43 Payload review and determination.
 - § 450.45 Safety review and approval.
 - § 450.47 Environmental review.

Part 450 – Parts A, B, C, D

- **Subpart C: Safety Requirements**

- **Hazard Control Strategies**
- § 450.108 Flight Abort
- § 450.109 Flight Hazard Analysis
- § 450.110 Physical Containment
- § 450.111 Wind Weighting
- **Flight Safety Analysis**
- § 450.113 Flight Safety Analysis Requirements—Scope.
- § 450.115 Flight Safety Analysis Methods.
- § 450.117 Trajectory Analysis for Normal Flight
- § 450.119 Trajectory Analysis for Malfunction Flight.
- § 450.121 Debris Analysis. § 450.123 Population Exposure Analysis.
- § 450.131 Probability of Failure Analysis
- § 450.133 Flight Hazard Area Analysis
- § 450.135 Debris Risk Analysis
- § 450.137 Far-field Overpressure Blast Effects Analysis.
- § 450.139 Toxic Hazards for Flight
- **Prescribed Hazard for Safety-Critical Hardware and Computing Systems**
- § 450.141 Computing Systems

Part 450 – Parts A, B, C, D

- **Subpart C: Safety Requirements**

- **Prescribed Hazard for Safety-Critical Hardware and Computing Systems**
 - § 450.143 Safety-Critical System Design, Test, and Documentation
 - § 450.145 Highly-Reliable Flight Safety System
- **Other Prescribed Hazard Controls**
 - § 450.147 Agreements
 - § 450.149 Safety-Critical Personnel Qualifications
 - § 450.151 Work Shift and Rest Requirements
 - § 450.153 Radio Frequency Management.
 - § 450.155 Readiness
 - § 450.157 Communications
 - § 450.159 Pre-flight Procedures
 - § 450.161 Control of Hazard Areas (Slides need to be moved from FSA Briefing)
 - § 450.163 Lightning Hazard Mitigation
 - § 450.165 Flight commit criteria
 - § 450.167 Tracking (Slides need to be moved from FSA Briefing)
 - § 450.177 Unique Policies, Requirements and Practices
- **COLA, Safety at End of Launch**
 - § 450.169 Launch and Reentry Collision Avoidance Analysis Requirements
 - § 450.171 Safety at End of Launch
- **Mishap & Test Induced Damage**
 - § 450.173 Mishap Plan—Reporting, Response, and Investigation Requirements.
 - § 450.175 Test-induced Damage
- **Ground Safety**
 - § 450.179 Ground Safety—General.
 - § 450.181 Coordination with a Site Operator
 - § 450.183 Explosive Site Plan
 - § 450.185 Ground Hazard Analysis
 - § 450.187 Toxic Hazards Mitigation for Ground Operations
 - § 450.189 Ground Safety Prescribed Hazard Controls

Part 450 – Parts A, B, C, D

Subpart D—Terms and Conditions of a Vehicle Operator License.

§ 450.201 Public safety responsibility.

§ 450.203 Compliance with license.

§ 450.205 Financial responsibility requirements.

§ 450.207 Human spaceflight requirements. Must Comply with Part 460 (Crews trained + Informed Consent + Waiver = Space Flight Participants and Government Astronauts)

§ 450.209 Compliance monitoring.

§ 450.211 Continuing accuracy of license application; application for modification of license.

§ 450.213 Pre-flight reporting.

§ 450.215 Post-flight reporting.

§ 450.217 Registration of space objects.

§ 450.219 Records.

Means of Compliance (MOCs)

- An applicant may demonstrate compliance with part 450 requirements by using accepted MOC.
- MOC may be government standards, industry consensus standards, or unique MOC developed by an individual.
 - An applicant may tailor an accepted MOC and submit it as a unique MOC
- For the following 5 sections, a MOC must be accepted by the FAA prior to application acceptance:
 1. 450.115(b)(1) Flight Safety Analyses
 2. 450.139(e)(1) Toxic Hazards for Flight
 3. 450.145(b) Highly-Reliable Flight Safety System
 4. 450.163(a)(1) Lightning Hazard Mitigation
 5. 450.187(e)(1) Toxic Hazards Mitigation for Ground Operations
- For all other requirements of part 450, an applicant may submit MOC as part of its application for the FAA to review during the application evaluation.

Advisory Circulars - The FAA “ACs” to inform the aviation public in a systematic way of nonregulatory material. Unless incorporated into a regulation by reference, the contents of an advisory circular are not binding on the public.

The table below contains the Part 450 Advisory Circulars that have been published to date. The FAA seeks public comment on each of these documents for a period of 30 days when issued. FAA will issue an updated version if warranted based on comments received. Each guidance document contains a feedback form with instructions on how to provide feedback at any time during the process. The [Part 450 Means of Compliance Table \(PDF\)](#) provides an estimated issuance date for all planned ACs.

Part 450 Guidance Documents	Issuance Date	Comment Period Closes
AC 450.101-1 High Consequence Event Protection (PDF)	October 15, 2020	November 16, 2020
AC 450.115-1 High Fidelity Flight Safety Analysis (PDF)	October 15, 2020	November 16, 2020
AC 450.141-1 Computing Systems and Software (PDF)	October 15, 2020	November 16, 2020

Let's Watch How Virgin Galactic Is Creating a Space Company



Thank you for your time

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