

APPENDIX B. LAND LAUNCH STANDARD OFFERINGS AND OPTIONS

This appendix lists Land Launch standard offerings and options for

- Standard-offering hardware.
 - Standard-offering launch vehicle performance.
 - Standard-offering launch services.
 - Standard-offering facilities and support services.
 - Optional services.
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STANDARD-OFFERING HARDWARE

The following lists the basic hardware items and associated services that will be provided for a Land Launch mission.

Launch Vehicle

- Zenit-2SLB two-stage booster
or
 - Zenit-3SLB three-stage vehicle that includes the Block DM-SLB upper stage.
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Payload Fairing (PLF) and Spacecraft Adapter (SCA)

- PLF with up to two access doors, RF window and a customer logo.
 - SCA with compatible mechanical interfaces and separation system. Current standard offering adapters are SCA2624 and Zenit-2 adapter for the Zenit-2SLB and SCA937, SCA1194, and SCA1666 for the Zenit-3SLB. Contact Boeing Launch Services for adapters not listed.
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Electrical Interfaces

RF interfaces

RF (command and telemetry) links between spacecraft and spacecraft electrical ground support equipment (EGSE) during operations when the integrated launch vehicle is erect at the launch site.

Hard-line interfaces

- Two in-flight disconnect connectors for telemetry, command, and power interfaces to the spacecraft.
 - Hard-line (command and telemetry) umbilical links.
 - In-flight disconnect break wires as needed.
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STANDARD-OFFERING LAUNCH VEHICLE PERFORMANCE

The following lists the basic performance that will be provided for a two stage or three stage Land Launch mission.

Orbit and Mass

- 12,000 kg payload systems mass to a 51.6° inclined, 400 km low earth orbit for Zenit-2SLB two-stage booster.
 - 3,600 kg payload systems mass to GTO requiring a net velocity change of 1500 meters per second to GSO for Zenit-3SLB three-stage vehicle that includes the Block DM-SLB upper stage.
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Orbit Accuracy

- See Section 3 for the injection accuracy for the Land Launch family of vehicles to representative orbits.
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STANDARD-OFFERING LAUNCH SERVICES

The following sections list the basic launch services to be provided for a Land Launch mission.

Mission Management

Mission Management includes program-level services, such as contracts, scheduling, program management, mission integration and launch operations

- Program Management Plan

Meetings and Reviews

- Customer kickoff meeting.
- Preliminary and final ICD review.
- Preliminary and Critical Design Reviews (PDR & CDR).
- System readiness review.
- Ground operations working group and technical interchange meetings as required.
- Ground operations readiness review (ready to receive spacecraft).
- Combined operations readiness review (ready to mate spacecraft to SCA).
- Ascent unit (or payload unit for the Zenit-2SLB) readiness review (ready to transfer ascent unit to LV integration facility).
- Transfer readiness review (ready to transport the ILV to the launch pad).
- Launch readiness review (ready to launch).
- Post launch flight data review.

Documentation

The following documents will be provided to each customer according to the mission integration schedule (developed by Sea Launch with customer concurrence after mission identification):

- Mission integration schedule.
- Program Management Plan.
- Spacecraft/Land Launch ICD.
- Launch Operations Plan.
- Master Countdown Procedure.
- Launch commit criteria.
- Matchmate plan (if matchmate is required)

Mission Integration

Analyses

The following analyses will be conducted. Unless noted otherwise, each analysis will involve two cycles (preliminary and final) for first-time integration, and one cycle for repeat integration.

- Mission design.
- Spacecraft shock analysis (one cycle for both first-time and repeat integration).
- Spacecraft acoustic analysis (one cycle for both first-time and repeat integration).
- Spacecraft separation analysis.
- Critical clearance analysis (dynamic).
- Coupled loads analysis.
- Pre-launch environmental control system analysis (normal and abort scenarios).
- Flight thermal analysis.
- Venting analysis.
- Contamination assessment.
- EMC assessment.
- Spacecraft on-pad RF link analysis (one cycle for both first-time and repeat integration).
- Spacecraft/PLA clearance analysis (static).
- Post flight analysis (one cycle for both first-time and repeat integration).

Verification

Land Launch will perform verification of spacecraft requirements as defined in the ICD.

Separation state vector

A spacecraft separation state vector is normally provided to the customer within 50 min of separation.

Interface test

For each first-of-type spacecraft, Land Launch will perform a matchmate test at the spacecraft factory that includes the SCA and a flight equivalent separation system. Matchmate tests consist of mechanical and electrical interface testing between spacecraft and SCA.

STANDARD-OFFERING FACILITIES AND SUPPORT SERVICES

The following sections list the facilities and support services available to each Land Launch customer for the processing, assembly, installation, transportation, fueling and launch of their spacecraft. See Section 6 for details.

Payload Processing Facilities (PPF)

Land Launch will assist the customer with unloading the spacecraft and GSE from the aircraft at the cosmodrome airport. Land Launch will provide for the transportation of this hardware and miscellaneous equipment from the airfield to the PPF. The PPF facilities are described in detail in the Land Launch Users Guide. Facilities at the PPF are available to the customer for approximately five weeks during the launch campaign. The activities and services at the PPF include:

- Fit check: a spacecraft-to-spacecraft adapter fit check
- Spacecraft checkout and fueling
- Encapsulation
- Ascent Unit (Payload Unit for the Zenit-2SLB) checkout
- Control rooms
- Remote, or blast hardened, control room
- Offices
- Conference room
- Environmentally controlled areas.

Customer operations may be performed and scheduled on a 24-hr basis with access to the customer office building and the PPF. All customer equipment must be removed from Land Launch facilities within three (3) workdays after the launch is completed. Following the launch, Land Launch will assist the customer and provide for the transportation of the GSE from the PPF to the local airfield.

**PPF
Communications**

The following communication services will be available to customer personnel during PPF operations:

- Intercom
 - TV monitors and cameras
 - Telephones with international access
 - Launch video
 - Countdown net
 - Hand-held radios
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PPF Security

- Twenty four hour perimeter security
 - Security devices on all internal and external doors leading to the payload processing areas
 - Twenty four hour electronic monitoring for ingress and egress, and smoke and fire detection
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**PPF Support
Services**

- Separate technical and facility electrical power
 - Use of clean room compatible mechanical support equipment (e.g., man-lifts and forklifts)
 - Photographic services
 - Protective garments for clean rooms and hazardous operations
 - Negotiated quantities of gaseous nitrogen, liquid nitrogen, gaseous helium, isopropyl alcohol, and other general-purpose cleaning agents and solvents
 - Monitoring system for detection of hazardous vapors
 - Receipt and staging of spacecraft propellants
 - Receipt and storage of ordnance components
 - Use of calibrated weights
 - A photocopier and a facsimile machine
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**Launch Vehicle
Integration
Facility, Area 42**

Land Launch will provide facilities for personnel and spacecraft GSE in the LV integration facility, Area 42, for spacecraft check out and battery charging if required. Land Launch will provide power and conditioned air to the spacecraft. Land Launch will assist the customer during movement and installation of spacecraft GSE from the PPF to Area 42. Typical spacecraft tasks are:

- Spacecraft battery charging
 - Spacecraft/Launch Vehicle umbilical line validation
 - Spacecraft check out
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**Launch Complex
(LC) Facilities,
Area 45**

Land Launch will provide LC facilities for customer personnel and spacecraft GSE. Land Launch will provide the following services:

- Power
 - Gas conditioning
 - RF link from the spacecraft to spacecraft GSE
 - Assistance in installing GSE in a customer GSE room
 - Assistance in SC/LV umbilical line validation
 - Launch complex safety training
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**Launch Complex
Communications**

The following communication links are available within the launch complex, area 45:

- Intercom (including countdown net)
 - TV monitors and cameras (including launch video)
 - Dedicated telephone lines to international circuits
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**Launch Complex,
Area 45, Security**

- Full time security for the spacecraft and GSE
 - The facilities have 24-hr electronic monitoring for smoke and fire detection
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Environmental Controls

Land Launch will maintain spacecraft environments within the limits specified in the *Spacecraft/ Launch Vehicle Interface Control Document (ICD)* while the spacecraft is in the Payload Processing Facility, encapsulated within the ascent unit or payload unit, during transit to and at the launch vehicle integration complex, transit on the ILV to the launch pad, erection to vertical, and final countdown and launch.

Range Services

Land Launch will coordinate with the customer and submit all required range documentation for the launch of the customer's spacecraft on the Zenit Launch Vehicle. Land Launch will provide all necessary telemetry assets to verify launch vehicle functions and conditions from lift-off to spacecraft separation.

Logistics Support

- Accommodations and meal services: Land Launch will make hotel reservations, and make meal services available for the customer team during working hours on base
 - Medical Services: clinic staffed by a medical doctor
 - Emergency evacuation to Western Europe
 - Travel reservations
 - Daily weather forecasts
 - Daily transport between hotel and Cosmodrome facilities
 - Bilingual Secretary
 - Translators
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OPTIONAL SERVICES

The following services can be provided by Land Launch on customer request. These services are considered optional and are subject to negotiation. Requests for other services, not described in this document, will be considered by Land Launch on a case-by-case basis.

Mission Analysis

Repeating any analysis listed or any additional analysis or design work due to changes made by customer special request.

- Interface Tests**
- Matchmate testing at the spacecraft factory for repeat of spacecraft type.
 - Separation shock test.
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- Support Services**
- Additional secretaries and/or translators.
 - Charter airplane for personnel and/or spacecraft parts.
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- Facilities**
- Additional office space depending on availability.
 - Use of any facilities beyond the time frame allocated to the customer.
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- Materials**
- Gaseous nitrogen.
 - Oxygen.
 - Helium.
 - Liquid nitrogen.
 - Isopropyl alcohol.
 - De-ionized water.
 - Solvents and gases in addition to negotiated quantities.
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