INTERSTELLAR BOUNDARY EXPLORER (IBEX) MISSION DEFINITION REQUIREMENTS AGREEMENT (MDRA)-LEVEL 2 REQUIREMENTS

DECEMBER 2005

SwRI® Project 11343

Document No. 11343-IBEX_MDRA-01
Revision 1
Contract NNG05EC85C

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REVISION TABLE

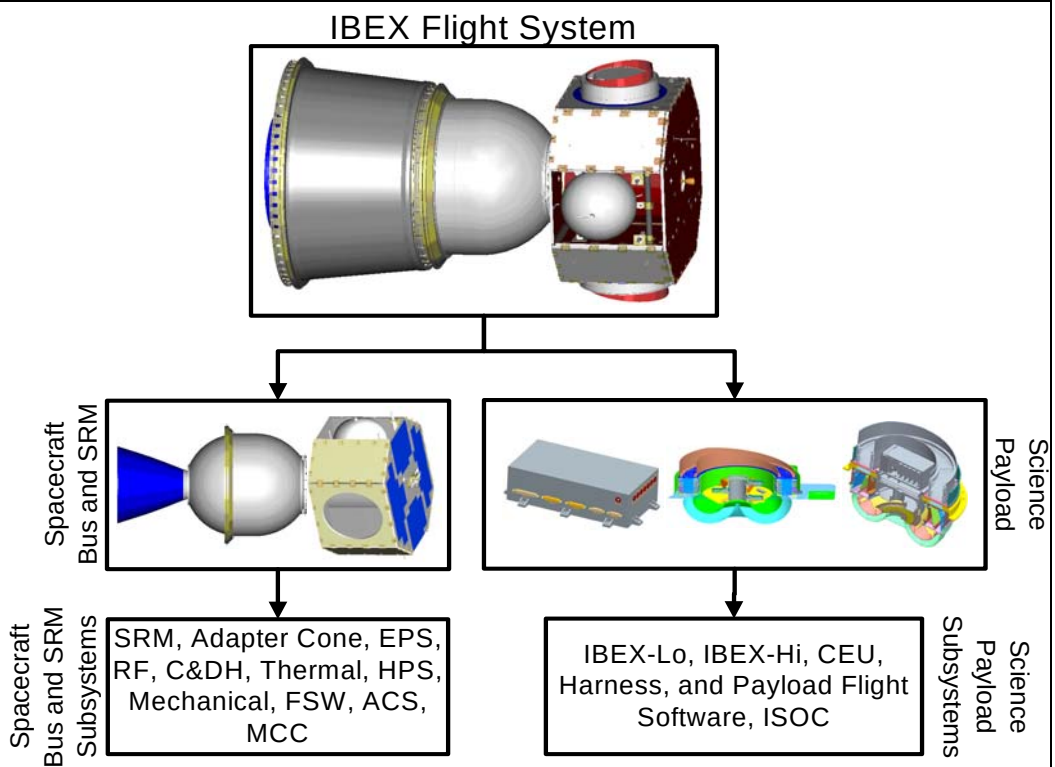
Revision Number	DOORS Baseline Number	Notes
Draft 1	0.1	Sent to IBEX team for review on May 30, 2005
Draft 2	0.2	Incorporated comments from IBEX team. Send to IBEX team for review on June 27, 2005.
Draft 3	0.3.1	Incorporate comments and send to IBEX team for another review on July 25th. This version is the "final draft". Comments will be incorporated following Payload (Aug 4-5) and S/C TIM (Aug 11-12).
	0.3.2	Correct spelling errors and incorporate minor wording changes in section 3.1.4. Updated calibration requirements. Update mission phase names. Removed copy of level 1. Add links to PLR. Modified payload and ground segment requirements. Sent to team for review on August 17, 2005
	0.3.3	Incorporated comments from Steve F and Herb F to the Payload sections
Draft 4	0.4	Updated wording in sensor pointing section. Modified document per SRR chart prep comments.
		Updated Flight System subsystem figure
		Added requirement for HV turnoff (ID 1091). Add missing PLR links.
Revision 0	1.0	Export Object ID and Text to Word for incorporation into this configuration controlled document. Set attribute access for object text and object heading to Read only in DOORS.
Revision 1	2.0	Section 3.3.3.5 (IBEX_MDRA 1074): The level 1 requirement for oxygen direction measurement was tentatively modified. That change trickled down into the level 2 requirements in this document. This requirement was "…centroid the directions of interstellar oxygen to within 0.2° FWHM." After further examination and discussion the level 1 requirement was "un-modified" and set back to its original, proposed wording. Section 3.3.3.6 (MDRA 1081 and 1082): These calibration requirements were entered as "…> 200 V" in error. They have been corrected to read "….< 200 V". Section 3.3 (IBEX MDRA 1104): Added "single-point" Sections3.2.1 (IBEX_MDRA 750, 751), Section 3.2.8 (IBEX_MDRA 1066): Clarification on mission design life. The mission design life is 2 years with 4 years as a goal. The wording for these requirements was "….shall preclude a 4 year lifetime."

TBD/TBR TABLE

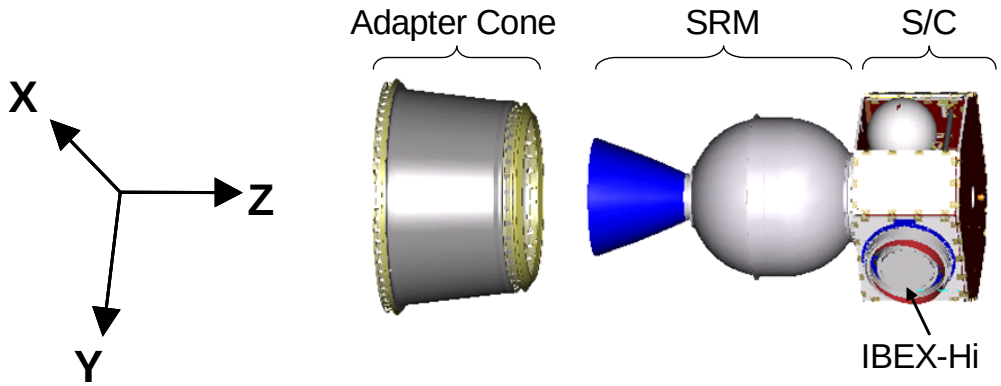
Section Number	DOORS ID Number	TBD/TBR description
2.1	N/A	Waiting on definition of PLR document number from NASA Headquarters.
3.1.1	215	This requirement depends on the results of the MAR contract agreements
3.3.2.4	881, 882	This section includes two TBRs related to the definition of the background requirements for IBEX-Hi.
3.3.3.4	1061, 1062	This section includes two TBRs related to the definition of the background requirements for IBEX-Lo. These values will be defined after more analysis on the sensor background.
3.5.1	110	The percentage of error free data needs to be defined

The following table is an export from the IBEX DOORS database (baseline version as shown in the revision table).

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 126	**1 INTRODUCTION**
IBEX_MDRA 127	This document contains the IBEX Mission Level 2 requirements for the baseline mission. Level 2 requirements are flowed down from the baseline level 1 requirements as programmatic, system, payload, spacecraft bus (SCB), and Ground Segment requirements. These requirements form the basis for payload, SCB, and Ground Segment subsystem requirements. The Mission System Engineer shall flow down these requirements and ensure that the subsystem specifications capture all of them.
IBEX_MDRA 128	In the context of this document, statements using the word *shall* are mandatory requirements for specifications, to be verified by ground inspection, test, or analysis. Statements using the words *is* or *will* are descriptive, or indicate intent, and provide information relative to understanding the requirements, but are not themselves requirements subject to verification. Statements using the word *should* indicate goals for which a best effort shall be made.
IBEX_MDRA 652	This document is under configuration control by the Mission System Engineer. Any changes must be routed to the Mission System Engineer, who will obtain the necessary agreement from scientists and engineers (starting with those people on the signature page, but also including subsystem leads for any affected systems) before posting it as the official version.
IBEX_MDRA 129	• Trades that affect SCB and SRM subsystems or payload subsystems (see Figure 1) may be made within the resources of the subsystem (with the knowledge of the Mission System Engineer). • Trades that impact subsystem (Level 2) requirements, interfaces, or resource allocations are under configuration control, and require concurrence by the Mission System Engineer and Project Manager. The MSE and PM must demonstrate that the changes to the Level 2 requirements do not affect the Level 1 requirements. • Trades that impact science or programmatic (Level 1) requirements will be addressed as described in the "Mission Program-Level Requirements for the IBEX Project" document.

DOORS ID	IBEX_MDRA Object Text	
IBEX_MDRA 690	 **Figure 1. Definition of Flight System Subsystems**	
IBEX_MDRA 939	**2 APPLICABLE DOCUMENTS**	
IBEX_MDRA 940	**2.1 NASA Documents**	
IBEX_MDRA 1096	TBD	IBEX Project Level Requirements Document
IBEX_MDRA 943	410-RQMT-0026	Small Explorer (SMEX) Program, IBEX, Mission Assurance Requirements
IBEX_MDRA 1099	NSS1740.14	
IBEX_MDRA 975	**2.2 SwRI Documents**	
IBEX_MDRA 1052	11343-MassControlPlan-01	IBEX Mass Control Plan
IBEX_MDRA 1055	11343-CCP-01	IBEX Contamination Control Plan
IBEX_MDRA 1058	DOP-16-15-301	ESD Control, Rev. 7

DOORS ID	IBEX_MDRA Object Text	
IBEX_MDRA 996	**2.3 Orbital Documents**	
IBEX_MDRA 999	S924-GR2320	IBEX General Environment/Interface Specification Requirement and Test Document
IBEX_MDRA 1001	**2.4 Military Documents**	
IBEX_MDRA 1004	MIL-STD-461C	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
IBEX_MDRA 1007	MIL-STD-462	Measurement of Electromagnetic Interference Characteristics
IBEX_MDRA 133	**3 LEVEL 2 REQUIREMENTS**	
IBEX_MDRA 198	**3.1 Programmatic Requirements**	
IBEX_MDRA 214	***3.1.1 Quality Assurance***	
IBEX_MDRA 215	IBEX shall implement a Quality Assurance program per Small Explorer (SMEX) Program, IBEX, Mission Assurance Requirements (410-RQMT-0026) (TBR).	
IBEX_MDRA 218	***3.1.2 Space Debris and Disposal***	
IBEX_MDRA 219	IBEX Flight Operations shall meet the disposal orbit and space debris requirements in NSS1740.14.	
IBEX_MDRA 653	***3.1.3 Descope Plan***	
IBEX_MDRA 657	IBEX shall develop a Descope plan.	
IBEX_MDRA 656	***3.1.4 Education and Public Outreach (E/PO) Program***	
IBEX_MDRA 865	IBEX shall develop an E/PO plan.	
IBEX_MDRA 659	IBEX shall implement an E/PO program that includes the following:	
IBEX_MDRA 864	An IBEX specific website.	
IBEX_MDRA 863	A curriculum in collaboration with Great Explorations in Math and Science (GEMS).	
IBEX_MDRA 866	A Digistar 3 planetarium show for distribution.	
IBEX_MDRA 867	A professional development and student outreach program in collaboration with Los Alamos Space Science Outreach (LASSO).	

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 868	Program evaluation with an outside evaluator, Program Evaluation and Research Group (PERG) at Lesley University.
IBEX_MDRA 658	***3.1.5 Integrated Independent Review Plan***
IBEX_MDRA 654	IBEX shall develop an Integrated Independent Review (IIR) plan.
IBEX_MDRA 914	***3.1.6 Project Data Management Plan***
IBEX_MDRA 913	IBEX shall develop a project data management plan.
IBEX_MDRA 915	The project data management plan shall be delivered no later than the IBEX Critical Design Review.
IBEX_MDRA 229	**3.2 System Requirements**
IBEX_MDRA 1084	The IBEX flight system shall be launched on a Pegasus XL.
IBEX_MDRA 749	***3.2.1 System Lifetime***
IBEX_MDRA 750	All elements of the flight system shall be designed for a 2 year mission (starting at the conclusion of commissioning-nominally 1 month), but nothing in the design should preclude a 4 year lifetime goal.
IBEX_MDRA 751	The orbit shall be chosen for a 2 year mission (starting at the conclusion of commissioning-nominally 1 month), but nothing in the orbit parameters should preclude a 4 year lifetime.
IBEX_MDRA 566	***3.2.2 Flight System Coordinate Definition***
IBEX_MDRA 1089	 **Figure 2. IBEX Flight System**
IBEX_MDRA 692	The flight system coordinate system is defined in Figure 2. The spacecraft spin axis is oriented in the +Z direction. The IBEX-Hi central axis is oriented in the +Y direction. The IBEX-Lo central axis is oriented in the -Y direction. The X-axis completes the right-handed cartesian coordinate system.

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 238	***3.2.3 Orbit and Spacecraft Spinning***
IBEX_MDRA 630	The orbit shall be chosen to capture a global image of the heliosphere every 6 months of the mission.
IBEX_MDRA 239	3.2.3.1 Apogee
IBEX_MDRA 241	Minimum initial apogee altitude shall be 25 R_E.
IBEX_MDRA 242	Maximum initial apogee altitude shall be 50 R_E.
IBEX_MDRA 240	Initial apogee altitude should be as high as possible within the range described above.
IBEX_MDRA 243	3.2.3.2 Mission Perigee
IBEX_MDRA 244	Mission perigee shall be chosen to ensure that the flight system is capable of surviving the mission radiation dose for a 2 year mission life (starting at the conclusion of commissioning-nominally 1 month).
IBEX_MDRA 245	Mission perigee shall be chosen to ensure a margin of 3 dB in downlink acquisition capability.
IBEX_MDRA 573	3.2.3.3 Eclipses
IBEX_MDRA 251	The orbit and planned flight operations should limit time spent in eclipses to avoid excessive battery discharge.
IBEX_MDRA 753	No science data is required to be gathered during long eclipses (1.5-4.5 hours).
IBEX_MDRA 249	3.2.3.4 Clear View
IBEX_MDRA 250	The orbit shall provide global (at least 95% of 4π sr.) clear viewing of the sky including the heliospheric nose and tail over a period of two years.
IBEX_MDRA 252	Sum of Argument of Perigee plus Right Ascension of the Ascending Node (RAAN) of the initial mission orbit shall not fall between 194° and 314°.
IBEX_MDRA 668	Sum of Argument of Perigee plus RAAN of the initial mission orbit should be as close to 74° as possible.
IBEX_MDRA 253	3.2.3.5 Flight System Pointing Control and Knowledge
IBEX_MDRA 672	3.2.3.5.1 Pointing Control During Launch/Orbit Raising Operations
IBEX_MDRA 754	Nutation and all other losses before and during SRM burn shall not cause the flight system to fail to meet minimum apogee requirement.
IBEX_MDRA 755	Nutation before and during SRM burn should be minimized to reduce uncertainty in initial apogee height.

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 756	Nutation following the SRM burn shall be sufficiently low to ensure a safe separation of the spacecraft from the SRM.
IBEX_MDRA 574	3.2.3.5.2 Pointing Control During Low Altitude Operations
IBEX_MDRA 255	Each orbit in nominal operations, when the S/C is below 10 RE, the spacecraft shall be repointed such that, without active control, the spacecraft spin axis is pointed at the sun at apogee (within the pointing control requirements described in the Sensor Pointing section).
IBEX_MDRA 254	If the maximum apogee altitude of 50 R_E is reached by the S/C, the orbit period would be such that the spacecraft spin axis could be pointed approximately 4° from the sun. This angle decreases with lower apogee orbits.
IBEX_MDRA 575	3.2.3.5.3 Sensor Pointing
IBEX_MDRA 861	*3.2.3.5.3.1 Pointing Budget*
IBEX_MDRA 785	The pointing budget for the sensors is as follows (all pointing numbers are the maximum value (3 sigma) allowed including uncertainty):
IBEX_MDRA 584	(a) The spacecraft pointing shall be controlled to ± 2.5° during science operations.
IBEX_MDRA 420	(b) IBEX-Hi and IBEX-Lo shall be mounted on a spacecraft panel such that the normal to the sensor mounting surface points ± 0.3° from the Y-axis.
IBEX_MDRA 590	(c) IBEX-Hi and IBEX-Lo sensor boresights shall point ± 0.2° from the normal to the spacecraft mounting surface.
IBEX_MDRA 862	*3.2.3.5.3.2 Sun Shielding*
IBEX_MDRA 759	During nominal operations, the sun shall not have a direct line of sight into the sensor apertures.
IBEX_MDRA 256	3.2.3.5.4 Pointing Knowledge During Science Operations
IBEX_MDRA 257	The IBEX system shall provide pixel viewing knowledge to ± 0.5° for heliospheric hydrogen.
IBEX_MDRA 798	3.2.3.6 Spin Rate During Science Operations
IBEX_MDRA 799	Spin rate shall be maintained between 3.5 and 4.5 rpm during science operations.
IBEX_MDRA 258	***3.2.4 Mission Radiation Environment***
IBEX_MDRA 259	The mission radiation environment for all components shall be described in the General Environmental/Interface Requirements and Test Document.
IBEX_MDRA 679	All components shall be designed to survive the mission radiation dose with a Radiation Dose Margin (RDM) of two.

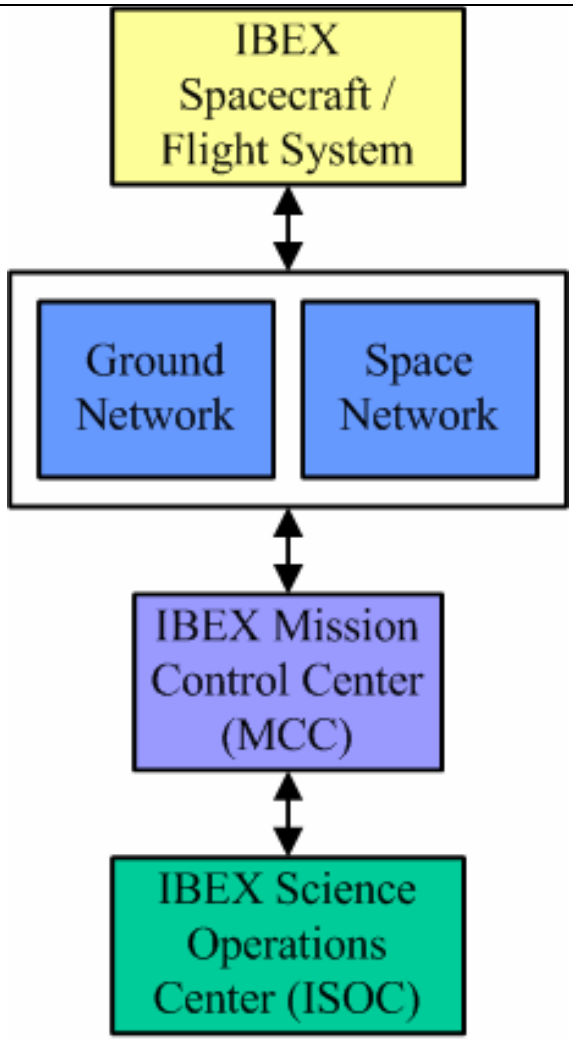
DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 260	***3.2.5 Flight System Mass***
IBEX_MDRA 789	Flight system mass shall be managed and reported as specified in the IBEX Mass Control Plan (11343-MassControlPlan-01).
IBEX_MDRA 261	Flight system mass shall not exceed the launch vehicle capability of the Pegasus XL as specified in the IBEX Launch Vehicle Interface Control Document.
IBEX_MDRA 636	Flight system mass should be optimized to reach the high altitude apogee described above.
IBEX_MDRA 844	***3.2.6 Flight System Structural Analysis***
IBEX_MDRA 790	All structural analysis for the flight system shall be performed for a flight system mass equal to the launch vehicle capability.
IBEX_MDRA 822	***3.2.7 Separation Systems***
IBEX_MDRA 823	All flight system separation events shall occur without re-contact.
IBEX_MDRA 1065	***3.2.8 Flight System Contamination Control***
IBEX_MDRA 1091	The IBEX mission shall generate and follow a contamination control plan.
IBEX_MDRA 1066	All Flight System components shall be designed, assembled, tested, and launched using contamination control practices to ensure that they will survive for a 2 year mission (starting at the conclusion of commissioning), but nothing should preclude a 4 year lifetime goal.
IBEX_MDRA 231	***3.2.9 Communications***
IBEX_MDRA 816	3.2.9.1 Link Margin
IBEX_MDRA 817	Link margin on all communications links shall be greater than 3dB.
IBEX_MDRA 843	3.2.9.2 Telemetry
IBEX_MDRA 835	The system shall provide real-time state of health telemetry when in contact with ground.
IBEX_MDRA 383	The system shall provide the capability for low-rate command and housekeeping telemetry uplink and downlink at all altitudes throughout the mission.
IBEX_MDRA 185	The system shall provide capability to transmit, receive, analyze, and archive both science and housekeeping data while at altitudes less than 10 R_E
IBEX_MDRA 184	The system shall provide capability to collect and store data from observations at altitudes greater than 10 R_E.
IBEX_MDRA 795	The system should have real-time downlink capability during and immediately following the SRM burn.

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 847	3.2.9.3 Uplink
IBEX_MDRA 845	Uplink shall be sufficient to upload two orbits of stored commands within one ground station pass.
IBEX_MDRA 849	3.2.9.4 Downlink
IBEX_MDRA 380	Downlink shall be sufficient to download two orbits of stored data within one ground station pass.
IBEX_MDRA 792	Downlink should minimize ground contact time as possible.
IBEX_MDRA 850	The ground station pass shall be at an altitude less than 10 R_E.
IBEX_MDRA 280	**3.3 Payload Requirements**
IBEX_MDRA 907	The IBEX Payload shall include two sensors (IBEX-Hi and IBEX-Lo) that meet the requirements described below.
IBEX_MDRA 1090	All Payload subsystems (IBEX-Hi, IBEX-Lo, and CEU) shall be able to survive an abrupt HV turnoff without damage
IBEX_MDRA 1104	No single-point failure of either sensor shall cause a failure in the other sensor.
IBEX_MDRA 585	***3.3.1 Payload Calibration***
IBEX_MDRA 858	Cross calibration between IBEX-Hi and IBEX-Lo shall have hydrogen flux calibration relative accuracy of ±10%.
IBEX_MDRA 357	IBEX shall provide in-flight cross calibration capability.
IBEX_MDRA 282	***3.3.2 IBEX-Hi***
IBEX_MDRA 896	3.3.2.1 Sensitivity
IBEX_MDRA 871	IBEX-Hi shall be capable of measuring fluxes of 1.0 ENA $(cm^2\ s\ sr\ keV)^{-1}$ at energies between 0.3 and 1 keV.
IBEX_MDRA 872	IBEX-Hi shall be capable of measuring fluxes of 0.005 ENA $(cm^2\ s\ sr\ keV)^{-1}$ at energies greater than 1keV.
IBEX_MDRA 897	3.3.2.2 Field of View
IBEX_MDRA 874	IBEX-Hi shall have a field of view no coarser than 7° x 7° FWHM.
IBEX_MDRA 898	3.3.2.3 Energy Range
IBEX_MDRA 876	IBEX-Hi shall have an energy range of 0.3 - 6 keV.

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 877	IBEX-Hi shall have six overlapping energy passbands.
IBEX_MDRA 901	3.3.2.4 Background and Noise
IBEX_MDRA 881	Backgrounds and noises other then Cosmic Rays for IBEX-Hi shall be ≤ 3 x 10^{-6} (TBR) double coincidence events (start and stop) per second.
IBEX_MDRA 882	IBEX-Hi shall have a background count level less than 1.8 x 10^{-2} (TBR) counts/s/pixel in the energy ranges from 1 keV to 3 keV. These background requirements apply during nominal orbit conditions (Solar Wind density = 7 cm^{-3}, Electron and ion temperature of 10^5, and solar wind speed = 450 km/s, Proton temperature = 1.2 x 10^5 K, and Electron temperature = 1.4 x 10^5 K).
IBEX_MDRA 873	IBEX-Hi shall reject incident ions and electrons that will add to sensor background.
IBEX_MDRA 1075	3.3.2.5 Calibration
IBEX_MDRA 1077	IBEX-Hi shall have flux calibration relative accuracy of ±10%.
IBEX_MDRA 1078	IBEX-Hi shall have flux calibration absolute accuracy of ±25%.
IBEX_MDRA 308	***3.3.3 IBEX-Lo***
IBEX_MDRA 908	3.3.3.1 Sensitivity
IBEX_MDRA 883	IBEX-Lo shall be capable of measuring fluxes of 1.0 ENA (cm^2 s sr keV)$^{-1}$ at energies between 0.1 and 1 keV.
IBEX_MDRA 902	3.3.3.2 Field of View
IBEX_MDRA 885	IBEX-Lo shall have a field of view no coarser than 7° x 7° FWHM.
IBEX_MDRA 886	IBEX-Lo shall a higher resolution field of view over an azimuthal sector
IBEX_MDRA 909	3.3.3.3 Energy Range
IBEX_MDRA 888	IBEX-Lo shall have an energy range of 0.01 - 2 keV.
IBEX_MDRA 889	IBEX-Lo shall have eight overlapping energy passbands.
IBEX_MDRA 912	3.3.3.4 Background and Noise
IBEX_MDRA 1061	Backgrounds and noises other then Cosmic Rays for IBEX-Lo shall be 8 x 10^{-4} (TBR) double coincidence events (start and stop) per second.

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 1062	IBEX-Lo shall have a background count level less than 1.4×10^{-2} (TBR) counts/s/pixel in the energy ranges from 200 eV to 1 keV. These background requirements apply during nominal orbit conditions (Solar Wind density = 7 cm^{-3}, Electron and ion temperature of 10^5, and solar wind speed = 450 km/s, Proton temperature = 1.2×10^5 K, and Electron temperature = 1.4×10^5 K).
IBEX_MDRA 884	IBEX-Lo shall reject incident ions and electrons that will add to sensor background.
IBEX_MDRA 1073	3.3.3.5 Oxygen Measurement
IBEX_MDRA 891	IBEX-Lo shall differentiate between incoming hydrogen and oxygen.
IBEX_MDRA 1074	IBEX shall measure incoming oxygen atoms from the interstellar medium and determine their direction of arrival to within 2° FWHM.
IBEX_MDRA 1083	3.3.3.6 Calibration
IBEX_MDRA 1079	IBEX-Lo shall have hydrogen flux calibration relative accuracy of ±10% for energies > 200 eV
IBEX_MDRA 1080	IBEX-Lo shall have hydrogen flux calibration relative accuracy of ±20% for energies > 200 eV
IBEX_MDRA 1081	IBEX-Lo shall have hydrogen flux calibration absolute accuracy of ±25% for energies < 200 eV.
IBEX_MDRA 1082	IBEX-Lo shall have hydrogen flux calibration absolute accuracy of ±30% for energies < 200 eV.
IBEX_MDRA 335	***3.3.4 Combined Electronics Unit and Payload Flight Software***
IBEX_MDRA 643	3.3.4.1 Power Handling
IBEX_MDRA 336	The CEU shall provide power to the sensors.
IBEX_MDRA 642	3.3.4.2 Commanding
IBEX_MDRA 338	The CEU shall control the sensor observation sequences
IBEX_MDRA 346	3.3.4.3 Data Handling
IBEX_MDRA 341	The CEU shall receive and interpret payload commands
IBEX_MDRA 347	The CEU shall format and store raw and binned data for at least two orbits.
IBEX_MDRA 340	The CEU shall store time, position, and orientation data

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 360	**3.4 Spacecraft Bus**
IBEX_MDRA 797	***3.4.1 Attitude Control***
IBEX_MDRA 801	3.4.1.1 Spin Reference
IBEX_MDRA 802	The SCB shall provide a spin reference pulse to the Payload.
IBEX_MDRA 803	Spin phase knowledge from spin reference pulse shall be within 0.2°.
IBEX_MDRA 818	***3.4.2 Timing***
IBEX_MDRA 821	All ancillary telemetry (quaternian information that is sent to the payload) shall be time-tagged to within 2 ms relative to the spacecraft bus clock.
IBEX_MDRA 819	The Spacecraft Bus timing shall be accurate to within 2 minutes of UTC over an orbital period.
IBEX_MDRA 824	***3.4.3 Propulsion***
IBEX_MDRA 826	Spacecraft thrusters shall not be operated while payload sensors are collecting data.
IBEX_MDRA 827	Spacecraft thrusters shall be positioned such that there is no line of sight connecting the thruster to the sensor aperture.
IBEX_MDRA 828	***3.4.4 Safing***
IBEX_MDRA 829	The spacecraft bus shall have the capability to autonomously enter and maintain a Sun-pointing state in the event of an anomaly.
IBEX_MDRA 830	***3.4.5 Spacecraft Bus Flight Software***
IBEX_MDRA 832	Flight software shall provide capability to upload and modify spacecraft operational code.
IBEX_MDRA 836	***3.4.6 Electrical Power***
IBEX_MDRA 853	The spacecraft power system shall provide sufficient electrical power to support payload and SCB components over the mission life.
IBEX_MDRA 840	Spacecraft battery shall be sufficient to power the spacecraft through worst-case orbit insertion scenario until the bus achieves positive power balance.
IBEX_MDRA 448	**3.5 Ground Segment Requirements**
IBEX_MDRA 747	The IBEX ground segment is organized as shown in Figure 3.

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 1064	 **Figure 3. S/C to Ground Segment Data Flow**
IBEX_MDRA 457	***3.5.1 IBEX Mission Operations***
IBEX_MDRA 917	The Ground Network and the MCC perform the IBEX mission operations.
IBEX_MDRA 920	The Ground Network shall provide a data link to the flight system and spacecraft.
IBEX_MDRA 1102	The Ground Network shall download more than 95% (TBR) of the SSR data from the previous orbit without errors.

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 918	The MCC shall receive all flight system and spacecraft data from the ground network.
IBEX_MDRA 916	The MCC shall send commands to control and status the spacecraft.
IBEX_MDRA 746	The MCC shall pass stored (not real-time) telemetry to the ISOC.
IBEX_MDRA 745	The MCC shall determine the spacecraft ephemeris with accuracy sufficient to meet the mission orbit requirements.
IBEX_MDRA 461	3.5.1.1 Mission Planning
IBEX_MDRA 922	The MCC (with support from ISOC) shall develop plans for launch, orbit raising, and commissioning operations.
IBEX_MDRA 462	During nominal operations, the MCC (with support from ISOC) shall develop plans for the upcoming two orbits in advance of the ground pass.
IBEX_MDRA 923	The MCC (with support from ISOC) shall develop plans for special operations and anomaly recovery.
IBEX_MDRA 921	The MCC shall obtain the resources from the Ground/Space Network to communicate with the flight system and spacecraft.
IBEX_MDRA 470	***3.5.2 IBEX Science Operation Center***
IBEX_MDRA 1060	The IBEX Science Operations shall perform the science operations for the IBEX mission.
IBEX_MDRA 936	The ISOC shall identify and cull pixels that view the magnetosphere.
IBEX_MDRA 937	The ISOC shall accumulate magnetospheric data in a separate data set.
IBEX_MDRA 482	The ISOC shall generate payload commands and status the payload.
IBEX_MDRA 472	The ISOC shall receive, order, and validate Level 0 data.
IBEX_MDRA 473	The ISOC shall generate quick-look data products.
IBEX_MDRA 474	The ISOC shall generate and validate Level 1 and 2 data products.
IBEX_MDRA 479	The ISOC shall make all data products available to the IBEX team, scientific community, and public as described below:
IBEX_MDRA 932	(a) Level 0 data shall be made available 24 hrs after receipt from the MCC.
IBEX_MDRA 933	(b) Level 1 quick-look data shall be made available 72 hrs after receipt from the MCC.
IBEX_MDRA 935	(c) Level 2 data shall be made available 1 month after each global view is obtained.

DOORS ID	IBEX_MDRA Object Text
IBEX_MDRA 483	The ISOC shall archive all data products.
IBEX_MDRA 924	The ISOC shall distribute Level 0, 1, and 2 for archiving at the National Space Science Data Center.
IBEX_MDRA 928	The science team shall publish scientific results and present findings to the scientific community.