

NASA STD-3001, Volume1, Appendix D Requirements Compliance Matrix

Purpose

Due to the complexity and uniqueness of spaceflight, all of the requirements in this NASA Technical Standard must be assessed for applicability for each program or project. This assessment should be iterative and based on information available (conops, DRM, vehicle design, crew size, etc.). The Requirements Compliance Matrix (below) is intended to document applicability of the technical requirements with corresponding rationale. This information should support any documentation to the Health and Medical Technical Authority (HMTA) for requirement compliance.

Additionally, each requirement has been reviewed to include human rating association. This matrix is not intended to substitute for the human rating certification process as captured in NPR 8705.2C Human-Rating Requirements for Space Systems and NASA-STD-8719.29 NASA Technical Requirements for Human-Rating, but to provide the reference of NASA-STD-3001 into that process.

During the assessment of each technical requirement, each program should indicate if the requirement is applicable by marking “Yes” or “No” to the “Applicable” column. If the requirement is not considered applicable, then adequate rationale should be documented on that assessment for HMTA reference. The “Rationale or Comments” column should also document information on applicability or tailoring. This matrix can also include other documentation of requirement implementation.

NASA-STD-3001, Volume 1						
Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
3.1	Medical Management	[V1 3000]	All terrestrial and in-mission medical aspects included in this NASA Technical Standard shall be in accordance with current U.S. and appropriate partners medical care standards, with limitations as imposed by mission constraints, and managed by the Flight Medicine team, which includes, but is not limited to, the Flight Medicine Clinic, Crew Surgeon, Deputy Crew Surgeon, and their designees, including the in-mission medical care providers (Crew Medical Officers).		✓	
3.2	Selection and Recertification	[V1 3001]	Crewmembers shall be medically and psychologically selected and annually recertified following the guidance in OCHMO-STD-100.1A, NASA Astronaut Medical Standards Selection and Annual Recertification.			

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
3.3	Pre-Mission Preventive Health Care	[V1 3002]	<p>Pre-mission preventive strategies shall be used to reduce in-mission and long-term health medical risks, including, but not limited to:</p> <ul style="list-style-type: none"> a. Optimization of nutrition. b. Vitamin D supplementation. c. Assessment of medications needed for in-flight use. d. Triennial imaging of bone mineral density. e. Maintenance of optimal aerobic and strength physical fitness. f. Maintenance of flexibility, agility, and balance. g. Annual and preflight physicals/periodic health evaluations. h. Preventive dental care. i. Vaccinations as recommended by CDC and local epidemiological conditions as recommended by flight medicine team (eg. influenza, tetanus toxoid, varicella zoster vaccine, severe acute respiratory syndrome (SARS), coronavirus (Covid-19)), etc. j. Behavioral health and performance training. k. Flight surgeon monitoring of crewmembers during hazardous training and preflight science testing. l. Total radiation dose control/monitoring. m. Pre-mission Health-Stabilization Program (HSP) to reduce the likelihood of contracting an infectious disease before launch. n. Assisted Reproductive Technology (ART) if desired by the crewmember to preserve gametocytes prior to missions with exposure to radiation. 		✓	

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
3.4	In-Mission Preventive Health Care	[V1 3003]	<p>All programs shall provide training, in-mission capabilities, and resources to monitor physiological and psychosocial well-being and enable delivery of in-mission preventive health care, based on epidemiological evidence-based probabilistic risk assessment (PRA), individual crewmember needs, clinical practice guidelines, flight surgeon expertise, historical review, mission parameters, and vehicle-derived limitations. These analyses consider the needs and limitations of each specific vehicle and design reference mission (DRM) with particular attention to parameters such as mission duration, expected return time to Earth, mission route and destination, expected radiation profile, concept of operations, and more. In-mission preventive care includes, but is not limited to:</p> <ul style="list-style-type: none"> a. Periodic monitoring of general health status. b. Optimization and periodic monitoring of nutrition intake – To include caloric density and macro/micronutrients (including antioxidants, flavonoids, lycopene, omega-3 fatty acids, lutein, sterols, and prebiotics), to support multiple physiological systems such as immune function, bone and muscle health, effectiveness of radiation damage repair mechanisms, cognitive and mental well-being, microbiome, etc. Optimization of nutrition intake also includes such aspects as food palatability and food variety, to support psychological well-being and crew morale. c. Vitamin D supplementation – For bone and immune function. d. Maintenance and periodic monitoring of aerobic and strength physical fitness – For maintenance of muscle strength and aerobic capacity (essential for performance of safety-critical physical tasks such as emergency vehicle egress), bone strength, immune system performance, sensorimotor function, behavioral health/stress relief, and reduction in renal stone formation. e. Maintenance and periodic monitoring of flexibility, agility, and balance – For sensorimotor function (essential for performance of safety-critical physical tasks such as emergency vehicle egress). f. Maintenance and monitoring of work/rest schedules and optimal sleep/circadian rhythm. g. Maintenance and monitoring of environmental parameters at optimal levels for crew health and performance, as outlined in other technical requirements. h. Prevention of pressure-related illness or injury (dysbarism) by utilizing the appropriate prebreathe and equipment protocols. i. Preventive dental care. j. Hearing conservation and protection (as required in [V2 9057] Hearing Protection Provision), including periodic monitoring. k. Optimization and periodic monitoring of psychosocial countermeasures for team cohesion, privacy, social isolation, and sensory deprivation. l. Preventive measures for orthostatic intolerance and neuro-vestibular challenges during G-transitions. m. Spaceflight Associated Neuro-Ocular Syndrome (SANS) periodic monitoring, and prevention with to-be-determined countermeasures (to be validated by research in the coming years). n. Periodic monitoring of vascular motility and patency of venous drainage pathways in the neck as well as the deep veins in the lower extremities. o. Optimization and periodic monitoring of immune function via implementation of a suite of multi-component countermeasures. p. 		✓	

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
			<p>For missions that land on planetary bodies – Training, capabilities, and resources for rehabilitation on the planetary surface, analogous to the functions of the post-Earth-landing recovery team, rehabilitation team, and flight surgeon team to enable surface mission success. q. Monitoring and management of any future risks as they emerge.</p>			

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
3.5	In-Mission Medical Care	[V1 3004]	<p>All programs shall provide training, in-mission medical capabilities, and resources to diagnose and treat potential medical conditions based on epidemiological evidence-based PRA, individual crewmember needs, clinical practice guidelines, flight surgeon expertise, historical review, mission parameters, and vehicle-derived limitations. These analyses consider the needs and limitations of each specific vehicle and design reference mission (DRM) with particular attention to parameters such as mission duration, expected return time to Earth, mission route and destination, expected radiation profile, concept of operations, and more. . In-mission capabilities (including hardware and software), resources (including consumables), and training to enable in-mission medical care, and behavioral care, are to include, but are not limited to: a. Medical system architecture and infrastructure (i.e., electronic medical records(including data encryption /protection), inventory monitoring/maintenance, medical stowage allocation [including pressurized or refrigerated volume], etc.).b. Medical kits (personal, routine, emergency, and survival) and resources, including appropriate pharmaceuticals, equipment, and supplies selected for ease-of-use, and personal protective equipment (e.g., biohazards and sharps containment). c. Configuring environment for medical care (including privacy considerations).d. Obtaining and recording history of medical encounter.e. Performing and recording the physical exam.f. Periodic monitoring and treatment of dental health as appropriate.g. Capability to provide deployed crewmembers with optical correction (e.g., glasses). h. Assessing, recording, monitoring, and trending vital signs and additional physiological and behavioral health signs. i. Conducting ancillary tests as needed, including imaging, laboratory analyses, and electrocardiography.j. Performing procedures and recording outcomes.k. Providing physical restraints for the patient, caregiver, and medical equipment appropriate to specific gravity environments of the mission con-ops.l. Recording treatment plan and its execution as appropriate.m. Administering and managing all medications. n. Consumables.o. Capability to diagnose and treat – pressure related illness or injury (dysbarism). p. Monitoring and balancing work/rest schedule. q. Treating neurobehavioral disorders with medical devices and/or evidence-based asynchronous behavioral health treatment protocols available on electronic devices.r. Private two-way communication (e.g. audio, video, messaging, images) with ground medical and psychological support, family, and crew support system.s. Private transmission of medical data (including imaging) to ground medical support or other mission vehicles.t. Means of providing autonomous medical care and advanced life support.u. Medical evacuation.v. Palliative care.</p>		✓	
3.6	Medical Evacuation	[V1 3007]	<p>Medical evacuation to a location with a higher level of medical care shall be available for illness/injuries occurring during a spaceflight mission, which are beyond the medical capabilities available at the crew's location.</p>		✓	

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
3.7	In-Mission Evacuation to Definitive Medical Care Facilities	[V1 3008]	Plans and vehicle(s) shall be available to transport severely ill or injured crewmember(s) to appropriate Medical Care Facilities, including Definitive Medical Care Facilities (DMCF) in the event of a contingency.		✓	
3.8	Palliative Comfort Care	[V1 3009]	The program shall provide in-mission palliative comfort care capabilities for medical scenarios where onboard medical resources have been exhausted, or a timely return to Earth (or another location of higher medical capability) is not feasible, and survival of the crewmember has been determined to be impossible.		✓	
3.9	Termination of Care	[V1 3010]	Each human spaceflight program shall have criteria for termination of care available prior to flight.		✓	
3.10.1	Pre-Mission Crew Mortality Plan	[V1 3050]	The program shall develop and execute a Crew Mortality Plan and determine legal jurisdiction prior to each mission (including preflight activities, launch, operations, and landing).		✓	
3.10.2	Pronouncement of Crew Death	[V1 3051]	The program shall define the process to medically assess the death of an in-mission crewmember and legally record the pronouncement of death.		✓	
3.10.3	In-Mission Forensic Sample Collection	[V1 3052]	The program shall have the capability to obtain in-mission forensic evidence from a deceased crewmember and return this evidence to Earth.		✓	
3.10.4	Crew Mortality Remains Return to Earth	[V1 3053]	The program shall be capable of returning the remains of a deceased crewmember back to Earth.		✓	
3.10.5	In Situ Disposition of Deceased Crewmember Remains	[V1 3054]	The program shall meet planetary protection regulations in the case of in situ or jettison disposition of the remains of a deceased crewmember.		✓	
3.10.6	Surviving Crew Support	[V1 3055]	The program shall provide behavioral health support to the deceased crewmembers family, surviving crewmembers, and support team in-mission and post-mission.		✓	
3.10.7	Crew Mortality Mishap Investigation Plan	[V1 3056]	The program shall have plans in place prior to a mission to gather the appropriate data to support a Presidential Commission mishap investigation.		✓	

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
3.11	Terrestrial Launch/Landing Medical Support	[V1 3012]	All programs shall have medical capability at the site of terrestrial launch and landing to address nominal operations and launch/landing contingencies, including, but not limited to the following: a. HSP technical requirements for the crew, the crew's family, and supporting personnel for purpose of disease prevention. b. Access to the full spectrum of medical capabilities, from routine medical and behavioral health care to advanced trauma life support (ATLS) capabilities, advanced cardiac life support (ACLS), or equivalent. c. Incorporation of civilian and/or Department of Defense (DOD) facilities and Emergency Medical Services (EMS).		✓	
3.12.1	DMCF Medical Care	[V1 3013]	The program shall establish medical care agreements with DMCF(s) for each launch and landing (nominal and contingency) location.		✓	
3.12.2	DMCF Transport	[V1 3014]	The program shall have the capability to transport crewmembers to a DMCF for each launch and landing (nominal and contingency) location.		✓	
3.13	Certification of Training Plans for Launch/Landing Medical Team	[V1 3015]	The organization responsible for crewmember health shall certify training plans for internal NASA medical support personnel who work launch/landing and concur on training plans for external organizations that have a specific medical support training plan in support of a NASA spaceflight program. Training includes, but is not limited to: a. Physiological changes occurring as a result of prolonged launch body posture. b. Spaceflight physiology. c. Injuries resulting from launch and landing contingencies (such as trauma, burns, hypoxia, and hypothermia). d. Hazards of exposure to space vehicle-associated toxic chemicals such as propellant, fuels, oxidizers, thermal control fluids, off-gassed products, and their unique treatments and responses. e. Launch/landing suit, helmet, and equipment configuration and safe removal. f. Vehicle-specific failure modes and resulting injury profiles. g. Environmental considerations specific to nominal and off-nominal recovery conditions.		✓	

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
3.16	Post-Mission Health Care	[V1 3016]	Post-mission health care shall be provided to minimize occurrence of deconditioning-related illness or injury, including but not limited to: a. Physical examinations by a flight surgeon or designated medical support personnel immediately following landing and periodically thereafter, until crewmember status is stable. b. Clinical laboratory tests including but not limited to imaging. c. Physical reconditioning (see [V1 3017] Post-Mission Reconditioning). d. Treatment as required. e. Scheduled days off and rest periods. f. Circadian rhythm entrainment. g. Nutrition assessment and support. h. Behavioral health support for the crewmember and their families to assist with transition back into work and family life. i. Monitoring by a flight surgeon during post-mission scientific investigations that may pose some risk to a deconditioned crewmember's health.		✓	
3.15	Post-Mission Reconditioning	[V1 3017]	All programs shall provide the planning, coordination, and resources for an individualized post-mission reconditioning program, specific to each crewmember, mission type, and mission duration. The post-mission reconditioning starts with crew egress at landing and includes a guided, phased reconditioning protocol. The goals of the reconditioning program include the following: a. To ensure the health and safety of returning crew. b. To actively assist the crew's return to full functional abilities and return-to-flight status. c. To actively assist in the crew's return to pre-mission fitness.		✓	
3.16	Post-Mission Long-Term Monitoring	[V1 3018]	Crewmembers returning from spaceflight shall be monitored longitudinally for health, behavioral health, and well-being parameters in a standardized manner.		✓	
4.1.1	Microgravity EVA Aerobic Capacity	[V1 4001]	Crewmembers shall maintain an in-mission VO ₂ max at or above 32.9 ml/(min/kg) for missions with microgravity EVAs as determined by either direct or indirect measures.			
4.1.2	Extraterrestrial Surface EVA Aerobic Capacity	[V1 4002]	Crewmembers shall maintain an in-mission maximum aerobic capacity (VO ₂ max) at or above 36.5 ml/(min/kg) ml•min ⁻¹ •kg ⁻¹ for missions with celestial extraterrestrial surface EVAs as determined by either direct or indirect measures.			
4.1.3	In-Mission Aerobic Capacity	[V1 4003]	The in-mission aerobic capacity shall be maintained, either through countermeasures or work performance, at or above 80% of the pre-mission capacity determined by either direct or indirect measures.			
4.1.4	Post-Mission Aerobic Capacity	[V1 4004]	The post-mission reconditioning shall be aimed at achieving a VO ₂ max at or above the crewmember's pre-mission values.			
4.2.1	Pre-Mission Sensorimotor	[V1 4005]	Pre-mission sensorimotor functioning shall be within normal clinical values for age and sex of the crewmember population.			

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
4.2.2	In-Mission Fitness for Duty Sensorimotor	[V1 4006]	In-mission Fitness-for-Duty technical requirements shall be guided by the nature of mission-associated critical operations (such as, but not limited to, vehicle control, robotic operations, EVAs).			
4.2.3	In-Mission Fitness for Duty Sensorimotor Metrics	[V1 4007]	In-mission Fitness-for-Duty technical requirements shall be assessed using metrics that are task specific.			
4.2.4	Sensorimotor Performance Limits	[V1 4008]	Sensorimotor performance limits for each metric shall be operationally defined.			
4.2.5	Sensorimotor Countermeasures	[V1 4009]	Countermeasures shall maintain function within performance limits.			
4.2.6	Post-Mission Sensorimotor Reconditioning	[V1 4010]	Post-mission reconditioning shall be monitored and aimed at returning to baseline sensorimotor function.			
4.3.1	Mission Cognitive State	[V1 4011]	Pre-mission, in-mission, and post-mission crew behavioral health and crewmember cognitive state shall be within clinically accepted values as judged by behavioral health evaluation.			
4.3.2	End of Mission Cognitive Assessment and Treatment	[V1 4012]	End-of-mission assessment and treatment for crewmember cognitive status shall include cognitive assessment, monitoring, and as needed, transitioning the crewmember back to pre-mission values.			
4.3.3	End of Mission Psychosocial Assessment	[V1 4013]	End-of-mission assessment and treatment for behavioral health of the crewmember shall include behavioral health and psychosocial assessment, monitoring, and as needed, transitioning the crewmember back into terrestrial work, family, and society.			
4.3.4	Completion of Critical Tasks	[V1 4014]	The planned number of hours for in-mission completion of critical tasks and events, workday, physical activity/exercise, and planned sleep period shall have established limits to assure continued crew health and safety.			
4.4.1	Pre-Mission Hematological/Immunological Function	[V1 4015]	Crewmember pre-launch hematological/immunological function shall be within normative ranges established for the healthy general population.			
4.4.2	In-Mission Hematological/Immunological Countermeasures	[V1 4016]	In-mission countermeasures shall be in place to sustain hematological/immunological parameters within the normal range as determined by direct or indirect means.			

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
4.4.3	Hematology and Immunology Countermeasures and Monitoring	[V1 4017]	Countermeasures and monitoring shall ensure immune and hematology values remain outside the critical values, i.e., the level that represents a significant failure of the hematological/immunological system, and is associated with specific clinical morbidity, defined for specific parameters.			
4.4.4	Post-Mission Hematological/Immunological	[V1 4018]	Post-mission assessment and treatment shall be aimed at returning to pre-mission baseline.			
4.5.1	Pre-Mission Nutritional Status	[V1 4019]	Pre-mission nutritional status shall be assessed, and any deficiencies mitigated before launch.			
4.5.2	In-Mission Nutrient Intake	[V1 4020]	Programs shall provide each crewmember with 100% of their calculated nutrient and energy requirements, based on an individual's age, sex, body mass (kg), height (m), and an appropriate activity factor.			
4.5.3	Post-Mission Nutritional Assessment and Treatment	V1 4022]	Post-mission nutritional assessment and treatment shall be aimed at returning to pre-mission baseline.			
4.6.1	Pre-Mission Muscle Strength and Function	[V1 4023]	Pre-mission muscle strength and function shall meet or exceed the values in Table 4.6-1—Pre-Mission Muscle Strength Technical Requirements.			
4.6.2	In-Mission Skeletal Muscle Strength	[V1 4024]	Countermeasures shall maintain in-mission skeletal muscle strength at or above 80% of baseline values.			
4.6.3	Post-Mission Reconditioning	[V1 4025]	Post-mission reconditioning shall be aimed at returning to baseline muscle strength.			
4.7.1	Pre-Mission Bone Mineral Density	[V1 4026]	Crewmembers' pre-mission bone mineral density (BMD) T-scores for total hip and lumbar spine (L1-L4), as measured by mass dual energy X-ray absorptiometry (DXA) shall be consistent with an age, sex, gender, and ethnic-matched population.			
4.7.2	In-Mission Bone Countermeasures	[V1 4027]	Countermeasures shall maintain bone mineral density of the hip and spine at or above 95% of pre-mission values and at or above 90% for the femoral neck.			
4.7.3	Post-Mission Bone Reconditioning	[V1 4028]	Post-mission reconditioning shall be aimed at returning bone mineral density to pre-mission baseline.			

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
4.8.1	As Low as Reasonably Achievable (ALARA) Principle	[V1 4029]	All crewmember radiation exposures shall be minimized using the ALARA principle.		✓	
4.8.2	Career Space Permissible Exposure Limit for Space Flight Radiation	[V1 4030]	An individual crewmember's total career effective radiation dose due to spaceflight radiation exposure shall be less than 600 mSv. This limit is universal for all ages and sexes. Note: The NASA effective dose for determining the threshold limit is calculated using the NASA Q (based on the NASA cancer model of 2012 as referenced in Human Health and Performance Risks of Space Exploration Missions Evidence Book 2009), 35-year-old female model parameters (tissue weighting factors, phantom etc.), for both males and females. Individual crewmember REID calculations are calculated using the appropriate NASA Q (based on the NASA cancer model of 2012) sex and age model parameters.		✓	
4.8.3	Short-Term Radiation Limits – Solar Particle Events	[V1 4031]	The program shall protect crewmembers from exposure to the design reference solar particle event (SPE) environment proton energy spectrum (sum of the October 1989 events) to less than an effective dose of 250 mSv.		✓	
4.8.4	Crew Radiation Limits for Nuclear Technologies	[V1 4032]	Radiological exposure from nuclear technologies emitting ionizing radiation to crewmembers (e.g., radioisotope power systems, fission reactors, etc.) shall be less than an effective dose of 20 mSv per mission year (prorated/extrapolated to mission durations) and utilizing the ALARA principle.		✓	
4.8.5	Crew Radiation Limits from Galactic Cosmic Radiation	[V1 4033]	For habitable space systems designed to support crew for > 60 days, the program shall protect crewmembers from exposure to the galactic cosmic ray (GCR) environment to less than a NASA effective dose (as defined in NASA-STD-3001, Volume 1 [V1 4030] Career Space Permissible Exposure Limits for Spaceflight Radiation) rate of 1.3 mSv/day for systems in free space and to less than 0.9 mSv/day for systems on planetary surfaces. Note: To verify the habitable space system design meets the GCR protection requirement above, the NASA effective dose rate is calculated using the 2009 solar minimum Badhwar O'Neill GCR model spectrum and take into account estimated crew time spent at lightly and more heavily shielded locations throughout the habitable space system. If achievable, further measures are to be taken to reduce crew exposure in accordance with the ALARA principle, as set forth in NASA-STD-3001, Volume 1 [V1 4029] As Low as Reasonably Achievable (ALARA) Principle.		✓	
5.1	Medical Training	[V1 5001]	Medical training shall be provided to crewmembers, flight surgeons (FSs), mission control support staff, and other ground support personnel (GSP).		✓	

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
5.2	Crewmember Training	[V1 5002]]Beginning with the crewmember candidate year, general medical training, including but not limited to, first aid, cardiopulmonary resuscitation (CPR), altitude physiological training, carbon dioxide exposure training, familiarization with medical issues, procedures of spaceflight, psychological training, toxicology, medical equipment, and supervised physical conditioning training shall be provided to the astronaut corps.		✓	
5.2.1	Crew Medical Officer Medical Training	[V1 5003]	Crewmembers who have received a mission assignment as a Crew Medical Officer (CMO) shall be provided with detailed and specific medical training, including but not limited to, health issues, space physiology, behavioral health, medical procedures, medical equipment, toxicology, and countermeasures.		✓	
5.2.1.1	Crew Medical Officers Quantity	[V1 3006]	The program(s) shall train a minimum of two crewmembers per vehicle/platform as Crew Medical Officers (CMOs).		✓	
5.2.2	Medical Training Verification	[V1 5004]	Medical Training shall be verified for all personnel.		✓	
5.3	Flight Surgeon Training	[V1 5005]	Flight Surgeons, including but not limited to NASA and international partners, assigned to support the subject space program shall receive training and certification in accordance with a program-specific training plan.		✓	
5.4	Medical Operations Flight Controller Training	[V1 5006]	All Medical Operations personnel staffing the Mission Control Center (MCC) shall be trained and certified according to program-specific training and certification plans.		✓	
5.5	Support Personnel Training	[V1 5007]	Supervised training programs shall be implemented for individuals including but not limited to NASA personnel, international partners, and commercial/private space programs, who require knowledge of space medicine or flight medical procedures, such as flight directors, medical consultants, and/or other personnel deemed appropriate as part of the Medical and Crew Health Technical Requirements Document.		✓	
5.6	Psychological Mission Training	[V1 5008]	Specific pre-mission briefings and training shall be provided as appropriate to the commander (CDR), CMOs, crewmembers, key ground personnel, and crew families concerning the significant psychological and social phenomena that may arise in all phases of a mission.		✓	
5.7	Physiological Exposure Mission Training	[V1 5009]	[V1 5009] Physiological training shall be provided to assist crewmembers with pre-mission familiarization to in-flight exposures including but not limited to: carbon dioxide [CO ₂] exposure training, hypoxia training/instruction, centrifuge, and high-performance aircraft microgravity adaptation training in preparation for each mission.		✓	

NASA-STD-3001, Volume 1

Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human- Rating	Rationale
6.1	Circadian Shifting Operations and Fatigue Management	[V1 6001]	Crew schedule planning and operations shall be provided to include circadian entrainment, work/rest schedule assessment, task loading assessment, countermeasures, and special activities.		✓	
6.2.1	Private Medical Communication Schedule	[V1 6002]	Private medical communications shall be scheduled on a routine basis, as determined by the Flight Surgeon, at a frequency dictated for short- or long-duration missions			
6.2.2	Private Medical Communications Information Delivery	[V1 6003]	Private Medical Communications information that is sent to/from the ground via spacecraft communication systems shall be considered private communication.		✓	
6.3.1	Behavioral Health and Performance Provisions	[V1 6004]	Program shall implement psychological/behavioral health support programs for the crewmembers, key ground personnel, and crewmember families throughout the mission.		✓	
6.3.2.1	Psychological Communication Schedule	[V1 6010]	Private Psychological Communication (PPC) Schedule. A PPC shall be scheduled on a routine basis at a frequency dictated for short- or long-duration missions		✓	
6.3.2.2	Psychological Communications Information Delivery	[V1 6011]	Psychological information that is sent to/from the ground via spacecraft telemetry shall be considered private communication.		✓	
6.4	Extravehicular Activities (EVAs)	[V1 6006]	All crewmembers shall be medically cleared to perform an EVA by ground medical support personnel prior to each EVA.		✓	
6.5.1	Crew Health Operations Concept Document	[V1 6008]	The program(s) shall develop a crew health concept of operations document to define the medical and health care concepts during all phases of the spaceflight program.		✓	
6.5.2	Medical and Crew Health Technical Requirements Document	[V1 6009]	The program(s) shall develop a medical and crew health technical requirements document based on the concepts outlined in the program-specific crew health operations concept (CHOC) document and NASA-STD-3001.		✓	
7.1	Crew Health Results	[V1 7001]	The results of all crew health monitoring shall be kept in a permanent retrievable format for evaluation including trend analysis.			
7.2	Crew Records Communication	[V1 7002]	The method of transmission of crewmembers' medical health data shall meet the medical operational needs of the program.			
7.3	Crew Records Security	[V1 7002]	The method for handling, storing, and transmission of crewmembers' medical health records shall be secured.			

