OCHMO Human Spaceflight Standards Newsletter

Source: NASA

July 2026

What is NASA-STD-3001?

NASA-STD-3001, NASA Spaceflight Human-System Standard Volumes 1 and 2, establishes Agency technical requirements that enable human spaceflight missions by minimizing health risks, providing vehicle design parameters, and enabling the performance of flight and ground crew. Applicability and tailoring of these technical requirements are determined based on each program's mission profile and procurement strategy.

NASA-STD-3001 Volume 1 covers the technical requirements needed to support astronaut health and Volume 2 covers system design that will maintain astronaut health, safety and promote performance.

Through partnerships with the programs (e.g., ISS, Commercial Crew, Artemis, Moon Base), international and commercial partners, the Human Research Program, and subject matter experts (internal and external to NASA), the technical requirements are constantly evolving and being reworked to minimize human health and performance risks. The Standards Team works with all NASA Spaceflight Programs to help tailor the technical requirements for their specific missions.

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Contact Us

POC – Dave Francisco: david.r.francisco@nasa.gov

Sarah Taoufik: sarah.taoufik@nasa.gov

Kristin Coffey: kristin.m.coffey@nasa.gov

Doug Ebert: douglas.j.ebert@nasa.gov

Joanne Kaouk: joanne.l.kaouk@nasa.gov

Kim Lowe: kimberly-michelle.p.lowe@nasa.gov

Anna Berry: anna.m.berry@nasa.gov

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Office of the Chief Health Medical Officer (OCHMO)

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NASA-STD-3001 Volume 2, Revision F – Released July 15, 2026

Updates

NEW: Martian Dust Requirement

6.2.8.4 Martian Dust Contamination

[V2 6253] The system shall limit the levels of Martian dust particles less than 10 µm in size in the habitable atmosphere below a time-weighted average of 0.1 mg/m^3 during exposure scenarios lasting up to 30 days in duration.

UPDATED: Decompression Sickness

6.2.2.4 Decompression Sickness (DCS) Risk Identification

[V2 6008] Each program **shall** define mission unique DCS mitigation strategies to achieve less than 4% probability of DCS occurrence with 95% confidence by using the following ground chamber test criteria:

a. No serious DCS in ground exposures

b. VGE shall be assessed to determine decompression stress.

NEW: Contingency Suited CO2

11.3.6 Contingency Spacesuit Carbon Dioxide Levels for Partial Gravity Scenarios

[V2 11040] The spacesuit inspired CO_2 partial pressure (P_iCO_2) shall not exceed 20 mmHg during contingency scenarios up to a duration of 1-hour.

The updated OCHMO-STD-3001 Document is available at: https://www.nasa.gov/ochmo/human-spaceflight-and-aviation-standards/

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Updates

UPDATED: Human Rating Applicability Matrix: Table D.2-1

Table D.2-1—Requirement Compliance Matrix

NASA-STD-3001, Volume 2						
Section	Title	Number	Requirement Text	Applicable (Enter Yes or No)	Human-Rating	Rationale
3.2	Human-Centered Task Analysis	[V2 3006]	Each human spaceflight program or project shall perform a human-centered task analysis to support systems and operations design.		✓	
3.3	Human Error Analysis	[V2 3102]	Each human spaceflight program or project shall perform a task-based human error analysis (HEA) to support systems and operations design.		✓	
3.4	Iterative Developmental Testing	[V2 3101]	Each human spaceflight program or project shall perform iterative human-in-the-loop (HITL) testing throughout the design and development cycle.		✓	
4.1.1	Functional Anthropometric Accommodation	[V2 4102]	The system shall ensure the range of potential crewmembers can fit, reach, view, and operate the human systems interfaces by accommodating crewmembers with the anthropometric dimensions and ranges of motion as defined in data sets in Appendix E, Sections E.3 Anthropometry and E.4 Range of Motion.		✓	
4.1.2	Body Mass, Volume, and Surface Area Data	[V2 4103]	The system shall accommodate the body characteristic data for mass, volume, and surface area as defined in Appendix E, Sections E.5 Body Surface Area, E.6 Whole Body and Segments Properties, and E7 Body Volume.		✓	
4.1.3.1	Crew Operational Loads	[V2 4104]	The system shall be operable by crew during all phases of flight, including prelaunch, ascent, orbit, entry, and postlanding, with the lowest anticipated strength as defined in Appendix E, Section E.8.2 Crew Operational Loads.		✓	
4.1.3.2	Withstand Crew Loads	[V2 4105]	The system shall withstand forces imparted by the crew during all phases of flight, including but not limited to prelaunch, ascent, orbit, entry, and postlanding, as defined in Appendix E, Section E.8.1 Withstand Maximum Strength Crew Loads without sustaining damage.		✓	
4.2	Muscle Effects	[V2 4013]	The effects of muscle endurance and fatigue shall be factored into system design.		✓	
4.3	Aerobic Capacity	[V2 4015]	The system shall be operable by crewmembers with the aerobic capacity as defined in NASA-STD-3001, Volume 1.		✓	
5.1.1	Operability	[V2 10003]	The system shall provide crew interfaces that enable tasks to be performed successfully within the appropriate time limit and degree of accuracy.		✓	
5.1.2	Usability	[V2 10001]	The system shall provide crew interfaces that result in a NASA			

UPDATED: Acceleration and Dynamic Loads

Table 6.5-6—Az Sustained Translational Acceleration Limits (Standing)

Acceleration limits for non-deconditioned crew (standing)

Upper limit (with lower body compression garment)	Duration [s]	0.5	0.5 < t < 900	900	Sustained
	Acceleration [m/s²]	9.8			
Upper limit (without lower body compression garment)	Duration [s]	0.5			
	Acceleration [m/s²]	9.8			
Lower limit	Duration [s]	0.5			
	Acceleration [m/s²]	-0.			

Acceleration limits for deconditioned cr

Upper limit	Duration [s]	0.5	30	50
	Acceleration [m/s²]	9.81	9.81	7.8
Lower limit	Duration [s]	0.5	Sustained	
	Acceleration [m/s²]	-0.5	-0.5	

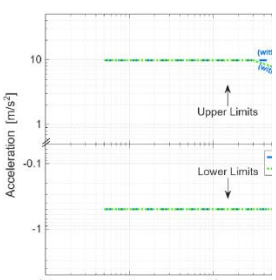

Table 6.5-3—Az Sustained Translational Acceleration Limits (Seated)

Acceleration limits for emergency conditions (seated)

Upper limit	Duration [s]	0.5	120	1200
	Acceleration [m/s²]	167	58.8	37.3
Lower limit	Duration [s]	0.5	120	1200
	Acceleration [m/s²]	-63.7	-22.6	-15.7

Acceleration limits for non-deconditioned crew (seated)

Upper limit	Duration [s]	0.5	5	1200	
	Acceleration [m/s²]	81.4	62.8	39.2	
Lower limit	Duration [s]	0.5	5	60	1200
	Acceleration [m/s²]	-58.8	-37.3	-21.6	-9.81

Acceleration limits for deconditioned crew (seated)

Upper limit	Duration [s]	0.5	15	30	36	50	80
	Acceleration [m/s²]	19.6	12.3	9.81	9.12	8.53	7.55
Lower limit	Duration [s]	0.5	1000				
	Acceleration (A_T < 9.81 m/s²) [m/s²] *	0	0				
	Acceleration ($A_T \geq$ 9.81 m/s²) [m/s²] *	1.96	1.96				

*The lower A_z acceleration limit is 0 m/s² from Entry Interface until the total Linear Reaction A_T reaches 9.81 m/s², then the l

$\sqrt{A_x^2 + A_y^2 + A_z^2}$.

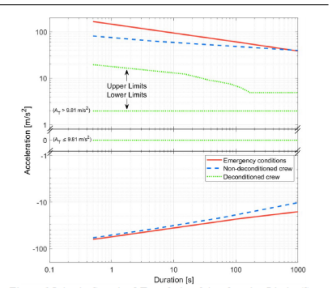

Figure 6.5-4—Az Sustained Translational Acceleration Limits (Seate

Table 6.5-2—Ay Sustained Translational Acceleration Limits (Seated)

Acceleration limits for emergency conditions (seated)

Upper limit	Duration [s]	0.5	1000
	Acceleration [m/s²]	49.0	19.6
Lower limit	Duration [s]	0.5	1000
	Acceleration [m/s²]	-49.0	-19.6

Acceleration limits for non-deconditioned crew (seated)

Upper limit	Duration [s]	0.5	1000
	Acceleration [m/s²]	29.4	19.6
Lower limit	Duration [s]	0.5	1000
	Acceleration [m/s²]	-29.4	-19.6

Acceleration limits for deconditioned crew (seated)

Upper limit	Duration [s]	0.5	100	10000
	Acceleration [m/s²]	19.6	9.81	9.81
Lower limit	Duration [s]	0.5	100	10000
	Acceleration [m/s²]	-19.6	-9.81	-9.81

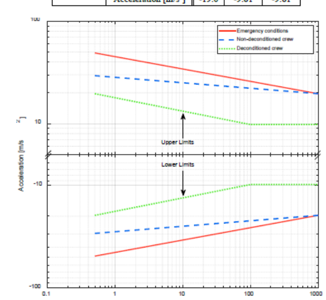

Figure 6.5-3—Ay Sustained Translational Acceleration Limits (Seated)

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OCHMO Technical Briefs

Technical Briefs have been developed for certain topics to offer technical data, background, and application notes to aid with the development of hardware, systems, and vehicles, as well as human needs/limitations. These tech briefs integrate content from multiple Standards and provide a quick, informative resource to reference when working with NASA-STD-3001.

Since the last newsletter release, there have been 11 technical briefs added to the website:

- Crew Medical Support for Entry, Descent and Landing
- Carbon Dioxide
- Circadian Desynchrony (new)
- H. pylori Overview & Treatment Guidance (new)
- Anthropometrics and Crew Physical Characteristics
- Design of Ionizing Radiation Protection
- Health Stabilization Program
- Microbiology in Space Overview
- Occupant Protection
- Urinary Health (new)

OCHMO-STD Technical Brief Page: https://www.nasa.gov/ochmo/hsa-standards/ochmo-technical-briefs/

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Mission Enabling Assessments

Venous Thromboembolism (VTE)

NASA OCHMO initiated a working group to investigate venous thromboembolism in astronauts during ISS missions. This resulted in an updated Clinical practice guideline and a summary report. *VTE Summary Report*

Oxygen Toxicity (OxTox) & Neutral Buoyancy Lab (NBL) Spacesuit Testing

NASA OCHMO initiated a working group to invest operations in the Neutral Buoyancy Lab and a case that led to physiological effects. Results and supporting documentation are available in the summary report. *Summary Report*

Martian Dust Exposure

An assessment of crew health risks associated with exposure to Martian regolith and dust was completed, informing design and operational mitigation strategies for future surface missions. *Martian Dust Summary Report*

Dynamic Loads/Lunar Landing

A working group was convened with the Cardiovascular and Vision Laboratory to update the acceleration standards with the Dragon landing acceleration data. This resulted in an update to the NASA-STD-3001 Volume 2 requirements.

Muscle and Strength Guidance Document

NASA OCHMO met with an external panel of subject matter experts to review the muscle and strength requirements for crew performance. This effort led to the creation of a guidance technical bulletin.

DCS Bubble/ VGE Grading

An external panel was convened to evaluate grading criteria for decompression sickness (DCS)-related bubble and venous gas emboli (VGE) detection. This resulted in updated NASA-STD-3001 Volume 2 requirements.

CO2 Contingency

NASA OCHMO initiated a working group to review and finalize the interim Contingency Spacesuit Carbon Dioxide Levels or partial gravity situations. The result led to a new NASA-STD-3001 Volume 2 requirement.

Establishing a VTE Risk Score for Astronaut Algorithm

NASA OCHMO initiated a working group to review updated VTE case information resulting in new evidence based clinical practice recommendations. *VTE April 2026 Report*

Future Assessments

NASA OCHMO's upcoming assessment priorities include:

- DCS / VTE / PFO (continued integrated review)
- Sensorimotor Operations
- GLP-1 Safety
- Spaceflight-Associated Neuro-ocular Syndrome (SANS)

Mission Enabling Assessments Page: https://www.nasa.gov/ochmo/hsa-standards/ochmo-independent-assessments/