
**Space systems — Fluid characteristics —
Part 5:
Nitrogen tetroxide propellant**

Systèmes spatiaux — Caractéristiques des fluides —

Partie 5: Peroxyde d'azote comburant

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ISO 14951-5:1999

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 14951-5 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

ISO 14951 consists of the following parts, under the general title *Space systems — Fluid characteristics*:

- Part 1: Oxygen
- Part 2: Hydrogen propellant
- Part 3: Nitrogen
- Part 4: Helium
- Part 5: Nitrogen tetroxide propellant
- Part 6: Monomethylhydrazine propellant
- Part 7: Hydrazine propellant
- Part 8: Kerosene propellant
- Part 9: Argon
- Part 10: Water
- Part 11: Ammonia
- Part 12: Carbon dioxide
- Part 13: Breathing air

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Space systems — Fluid characteristics —

Part 5: Nitrogen tetroxide propellant

1 Scope

This part of ISO 14951 specifies limits for the chemical composition and physical properties of N_2O_4 propellant and test methods for verification of propellant composition. This part of ISO 14951 is applicable to N_2O_4 propellant of the following types and grades, intended for use as an oxidizer in propellant systems of space systems:

- types
 - NTO: nominal 99,5 % N_2O_4 purity with red-brown colour;
 - MON-1: nominal 99 % N_2O_4 and 1 % NO with green colour;
 - MON-3: nominal 97 % N_2O_4 and 3 % NO with green colour;
 - MON-10: nominal 90 % N_2O_4 and 10 % NO with green colour;
 - MON-25: nominal 75 % N_2O_4 and 25 % NO with green colour;
- grades:
 - standard: no iron requirement;
 - low-iron: 0,5 $\mu\text{g/g}$ iron maximum.

This part of ISO 14951 is applicable to propellant used in both flight hardware and ground facilities, systems, and equipment. It is applicable to influents only to the extent specified herein.

CAUTION — Nitrogen tetroxide, in the liquid or vapour form, is toxic and volatile. Care should be taken in the handling and storage of nitrogen tetroxide to prevent contact with the human body and with materials that are not compatible.

2 Term and definition

For the purposes of this part of ISO 14951, the following term and definition apply.

2.1

particulate

undissolved solids retained on a filter paper with a 10 μm nominal and 40 μm absolute rating

3 Chemical composition and physical properties

The chemical composition and physical properties of N₂O₄ propellant delivered to the flight vehicle interface shall be in accordance with the limits given in Table 1 when tested in accordance with the applicable test methods.

4 Qualitative properties

The propellant shall be a clear, homogeneous liquid when examined visually by transmitted light. The NTO shall be red-brown in colour; the MON shall be green in colour.

5 Test methods

5.1 Sampling

The propellant should be selected in accordance with a sampling plan that will produce results with sensitivities and accuracies equivalent to or better than those required to meet the programme or project requirements.

5.2 Composition tests

The chemical composition and physical properties of the propellant shall be tested by such methods, apparatus, or analyzers as may be required to produce results with the sensitivities and accuracies necessary to meet programme or project requirements.

Table 1 — Composition limits

Composition		Limits				
		NTO (Red-brown)	MON-1 (Green)	MON-3 (Green)	MON-10 (Green)	MON-25 (Green)
N ₂ O ₄ assay	mass fraction, %, min.	99,5	—	97,0	88,8	—
Nitric oxide (NO) content	mass fraction, %, max.	a	1,0	3,0	11,0	26,0
	min.	a	0,6	1,5	10,0	25,0
N ₂ O ₄ + NO	mass fraction, %, min.	—	99,5	99,5	—	99,5
Water equivalent	mass fraction, %, max.	0,17	0,17	0,20	0,20	0,17
Chloride content	mass fraction, %, max.	0,040	0,040	0,040	0,040	0,040
Non-volatile residue ^b	mg/l, max.	—	10,0	10,0	10,0	10,0
Iron content ^b	µg/g max.	—	0,5	1,0	1,0	0,5
Particulate	mg/l max.	10,0	10,0	—	—	10,0

^a The NO content shall be limited to that which does not change the specified red-brown colour of the propellant.

^b This requirement applies to the low-iron grade of the propellant only.

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