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Standard atmosphere

标准大气

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is modified to adopt ISO 2533:1975 "Standard Atmospheres".

Compared with ISO 2533:1975, this document has many structural adjustments. The comparison table of the structural number changes of the two documents is shown in Appendix A.

The technical differences between this document and ISO 2533:1975 and their reasons are as follows.

--- Added the term and definition of "barometric altitude" (see Chapter 3) to enhance readability;

--- Adjust the content of Chapter 3 of ISO 2533:1975 to an informative appendix (see Appendix B), and improve the scientific notation of the standard atmospheric table. Some parameter values expressed in this way are added to enhance the completeness and facilitate the application of this document.

The following editorial changes have been made to this document.

--- Incorporated the contents of ISO 2533:1975/Add1.1985/Add2.1997, in the outer margin of the relevant clauses the positions are marked with vertical double lines (||);

--- Change the table that changes alternately with geometric height and geopotential height to a table that changes with geometric height and a table that changes with geopotential height respectively.

table.

--- Changed the description of the standard atmospheric parameters table (see Chapter 5) to increase coordination and facilitate the application of this document.

1 Scope

This document gives the basic principles, calculation formulas and standard atmosphere tables for the standard atmosphere between -5km and 80km altitude.

This document applies to the design and testing of aircraft, the design and calibration of aircraft instruments, and the processing of geophysical and meteorological observation data.

For reference only.

2 Normative references

This document has no normative references.

3 Terms and Definitions

The following terms and definitions apply to this document.

pressure scale height at a specific temperature, the atmospheric pressure changes exponentially with altitude, and the value decreases to $1/e$ ($e=2.718$) of the initial value.

The corresponding height change.

Note: Atmospheric pressure is also commonly referred to as atmospheric pressure in some industries.

4.1 Main constants and symbols

This document is based on the assumption that the air is an ideal gas without water vapor and dust, and is based on the standard thermodynamic atmospheric temperature at mean sea level, Standard atmosphere calculated using mean sea level standard atmospheric pressure, mean sea level standard atmospheric density and the constants in the table below. Standard atmosphere calculation the main constants used in the calculation are shown in Table 1.

Table 1 Main constants used in standard atmosphere calculations

Symbol	Name	Value	Unit
g _n	Standard acceleration of free fall	9.80665	m·s ⁻²
M	Molar mass of air at sea level	28.964420	kg·kmol ⁻¹
N _A	Avogadro constant	602.257×10 ²⁴	kmol ⁻¹
p _n	standard atmospheric pressure at mean sea level	101.325×10 ³	Pa
hPa	760 mmHg	1.01325×10 ⁵	Pa
R*	Universal gas constant	8314.32	J·K ⁻¹ ·kmol ⁻¹ or kg·m ² ·s ⁻² ·K ⁻¹ ·kmol ⁻¹