



SURFACE VEHICLE STANDARD

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Superseding J2683 JUN2005

Refrigerant Purity and Container Requirements for Carbon Dioxide (CO₂ R-744)
Used in Mobile Air-Conditioning Systems

RATIONALE

This standard is being updated to reflect the latest in R744 developments that are taking place preparing systems for production and to add the table for certification according to SAE J2911.

1. SCOPE

This SAE Standard applies to Carbon Dioxide R-744 refrigerant used to service motor vehicle passenger air-conditioning (A/C) systems designed to use CO₂ (R-744).

Hermetically sealed, refrigerated cargo systems are not covered by this document.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J2911 Procedure for Certification that Requirements for Mobile Air Conditioning System Components, Service Equipment, and Service Technician Training Meet SAE J Standards

3. DEFINITIONS

3.1 CRITICAL TEMPERATURE

The critical temperature of a substance is the temperature at and above which vapor of the substance cannot be liquefied, no matter how much pressure is applied.

3.1.1 SUBLIMATION TEMPERATURE

Temperature at which a substance changes from the solid phase to the gas phase without passing through an intermediate liquid phase.

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Documents

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4. PROPERTIES

4.1 Physical properties of main constituent carbon dioxide

Table 1 - Physical properties

Parameter	Unit	Value
Molar Mass	g/mol	44.01
Triple point:		
Temperature	K (°C)	216.58 (- 56.57)
Pressure	MPa	0.519
Heat of fusion	kJ/kg	196.7
Density in relation to dry air (15°C, 0,1 MPa)	-	1.528
Critical Temperature	K (°C)	304.21 (31.06)
Sublimation Temperature at 1013 hPa	K (°C)	194.65 (-78.5)
Vapour pressure at 20 °C	MPa	5.733

4.2 Purity of R744 refrigerant

Table 2 - Constituent of the refrigerant

Name	Unit	Value
Purity of carbon dioxide	Vol. %	≥ 99.9
Limits for Minor constituents (volumetric values)		
Water (H ₂ O)	ppm	≤ 120
Oxygen (O ₂) + Nitrogen (N ₂)	ppm	≤ 500
C _n H _m (volatile/non-volatile hydrocarbons)	ppm	≤ 50
That data in ppm shall be considered ideal volume portions (= MOL portions).		

Purity and constituents can be analyzed using gas chromatography or optical absorption chromatography. Alternative methods according to AHRI STANDARD 700 or DIN EN 936 might also be used. Moisture content can be determined by oscillating crystal analysis, Karl-Fischer-titration, gas burette (DIN EN 936).

5. CONTAINER REQUIREMENTS AND IDENTIFICATION (CAPACITY UP TO 43. KG [95 POUNDS])

5.1 Standard Valve Outlet Connection

CGA 320 0-20.670 kPa (For 0-3000 psi)

5.2 UN Number

UN 1013

5.3 DOT Identification

Carbon Dioxide