



AEROSPACE INFORMATION REPORT

AIR8469™

Issued

2025-12

Aircraft Skin Pressures and Temperatures

RATIONALE

This document is raised to provide information on deicing operations with regard to allowable aircraft skin pressures and temperatures to meet original equipment manufacturer (OEM) limits. It is intended to provide answers to airlines'/air operators' queries on compliance with these OEM limits.

Based on the information provided in this document, there is a high confidence that the current deicing pressures and temperatures are not exceeding airframe manufacturers' guidance. The source document is AIR8471 "Aircraft Pressures and Temperatures – Resource Document." See Section 4 for further details.

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1. SCOPE

This information report covers all known aircraft with respect to deicing operations, especially with regard to OEM pressure and temperature limitations on the airframe. It provides data for airlines/operators on compliance with OEM limits and confirms that OEM limits are not exceeded during deicing operations.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

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

AIR6284 Forced Air or Forced Air/Fluid Equipment for Removal of Frozen Contaminants

AIR8471 Aircraft Pressures and Temperatures – Resource Document

ARP1971 Aircraft Deicing Vehicle - Self-Propelled

2.2 Aircraft Manufacturer Manuals

Aircraft Maintenance Manuals (AMMs). Available to aircraft owners/operators.

2.3 Transport Canada Publications

Available from Transport Canada, Tower C, Place de Ville, 330 Sparks Street, Ottawa, Ontario K1A 0N5, Canada, Tel: 1-888-830-4911, www.tc.canada.ca.

TP 13644E Safety Issues and Concerns of Forced Air Deicing Systems

3. AIRCRAFT MANUFACTURERS – SKIN IMPACT PRESSURES (SEE 2.2 OEM AMMs)

The information provided here may not be up to date – always check the OEM's AMM.

3.1 Airbus

- Not more than an impact pressure of 10 psi (0.6895 bar) on all surfaces.

Temperatures:

- Skin temperature should not rise above 70 °C (see Section 7).

3.2 Boeing

- 10 psi max over the whole aircraft. Care must be taken around instruments and other limited areas (Pitot-static ports, Angle of attack, doors, windows, windscreens, etc., as prescribed by the manufacturer).
- The pressure is taken generally over an area of 25 in²/160 cm² (area of transducer).

Temperatures:

- Nozzle temperatures: 60 to 80 °C (140 to 180 °F).

3.3 Bombardier

Pressures (applicable to Challenger, Global, and Learjet business jets):

- Do not exceed 10 psi of pressure for deicing fluids applications.
- For general cleaning, do not exceed 10 psi of pressure for dry air application.
- For general cleaning, it is recommended that water supply pressure does not exceed 60 psi.

Temperatures:

- For Challenger and Global business jets, maximum fluid temperature is 93 °C (200 °F).
- For Learjets, maximum fluid temperature is 60 °C (140 °F).

For all models, maximum dry air temperature for general cleaning is 55 °C (130 °F).

3.4 Embraer

- 30 psi for compressed air application (snow and ice removal on nacelle/engine and APU).
- 5 psi for forced air application (removal of snow that does not bond to the surface).
- 5 psi for deicing fluid application.

Maximum (nozzle) value of 70 psi for water flow.

Temperatures:

- E-JETS, E-JETS E2, and ERJ families: Maximum fluid temperature 93 °C (200 °F).
- Phenoms and Praetor business jets: Maximum fluid temperature 60 °C (140 °F).

4. SPRAY IMPACT

The following data is extracted from AIR8471, which combines ARD50102 (cancelled) and TFT (Task Force Tips) data shown here (most of this testing was performed around the year 2000). Comparison tables for the TFT chart shown here and the Vestergaard testing shown in 5.1 and 5.2 are given in 4.1. Comparison of the same distances versus measured impact pressure show similar values and are well within the airframe manufacturers' requirements. One outlier is shown in the Vestergaard table for 5.2 (1500 mm/12 psi). This could be a tolerance issue on the sensor or a momentary peak. However, 12 psi is only just outside the airframe manufacturers' requirements and thus can be accepted in the testing range.

Identified forced air systems have been shown to exert less force on the aircraft surface than conventional fluid systems (see Figure 2; refer to AIR8471 and TP 13644E).

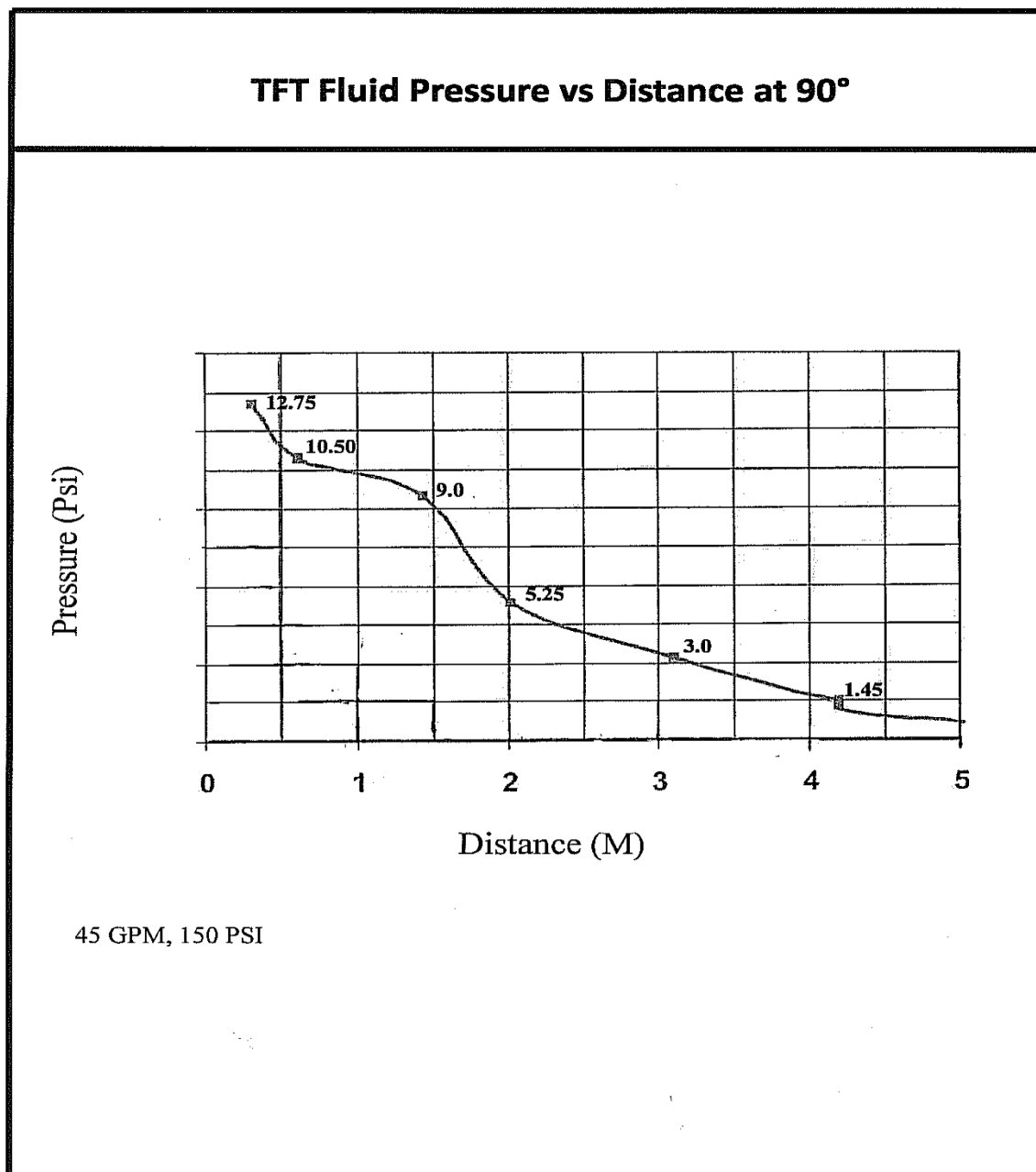


Figure 1 - Original chart
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4.1 Tested Data

Pressure over distance at 90-degree angle (vertical) and dividing factor – from TFT Chart (see Figure 1).

Spray distance (meters)	Impact pressure (psi)	Dividing factor
1	10	15
2	5.25	28
3	3	50
4	1.5	100

Vestergaard testing results – see 5.1.

Spray distance (mm)	Pressure (peak) (psi)	Pressure (over 25 in ²) (psi)
180	6.8	1.0
650	9.3	1.4
1000	9.7	1.5
1500	5.8	0.9

Vestergaard results – see 5.2.

Spray distance (mm)	Measurement pressure (psi)
1500	12
2438	4
3048	2