

# Aircraft de-icing/anti-icing methods with fluids

ICS 49.100; 71.100.45

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

**BSI**  
Documents



Document Sharing Hub

# National foreword

This British Standard reproduces verbatim ISO 11076:2000 and implements it as the UK national standard. It supersedes BS M 76:1994 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/57, Aircraft cargo systems and ground equipment, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

## Cross-references

The British Standards which implement international publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

## Summary of pages

This document comprises a front cover, an inside front cover, the ISO title page, pages ii to iv, pages 1 to 20, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 May 2000

© BSI 05-2000

ISBN 0 580 34868 7

## Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
|          |      |          |
|          |      |          |
|          |      |          |
|          |      |          |
|          |      |          |

# INTERNATIONAL STANDARD

**ISO**  
**11076**

Second edition  
2000-03-15

---

---

## **Aerospace — Aircraft de-icing/anti-icing methods with fluids**

*Aéronautique et espace — Méthodes de dégivrage/antigivrage des  
aéronefs à l'aide de liquides*



Reference number  
ISO 11076:2000(E)

**AVA** **Documents**  
Document Sharing Hub



## Contents

|                                                                                                                                               |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----|
| Foreword.....                                                                                                                                 | iv |
| 1 Scope .....                                                                                                                                 | 1  |
| 2 Normative references .....                                                                                                                  | 1  |
| 3 Terms and definitions .....                                                                                                                 | 1  |
| 4 Abbreviated terms .....                                                                                                                     | 3  |
| 5 General requirements.....                                                                                                                   | 3  |
| 6 Requirements for staff training and qualifications .....                                                                                    | 3  |
| 7 Requirements for fluid handling .....                                                                                                       | 4  |
| 8 Procedures .....                                                                                                                            | 5  |
| 9 General aircraft requirements after de-icing/anti-icing.....                                                                                | 11 |
| 10 Final check before aircraft dispatch .....                                                                                                 | 12 |
| 11 Pre-takeoff check.....                                                                                                                     | 12 |
| 12 Communications/procedures .....                                                                                                            | 13 |
| 13 Holdover time .....                                                                                                                        | 13 |
| Annex A (normative) Guidelines for the application of and holdover times anticipated for ISO type I<br>fluid/water mixtures.....              | 15 |
| Annex B (normative) Guidelines for the application of and holdover times anticipated for ISO type II<br>and type IV fluid/water mixtures..... | 17 |
| Bibliography .....                                                                                                                            | 20 |

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 11076 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 9, *Air cargo and ground equipment*.

This second edition cancels and replaces the first edition (ISO 11076:1993), which has been technically revised.

Annexes A and B form a normative part of this International Standard.

Annexes A and B of this International Standard provide guidelines for the application of different types of de-icing/anti-icing fluids as a function of outside air temperature and of weather conditions. This data requires frequent updating. ISO/TC 20/SC 9 has agreed to delegating this task under its own guidance to an ISO Maintenance Agency. The ISO Maintenance Agency designated for this task is:

Society of Automotive Engineers  
400, Commonwealth Drive  
US-Warrendale, PA 15096-0001  
USA  
Telephone: + 1 724 776 4841  
Telefax: + 1 724 776 0002

Updated annexes to this International Standard can be obtained from ISO Central Secretariat upon request.

# Aerospace — Aircraft de-icing/anti-icing methods with fluids

## 1 Scope

This International Standard establishes the minimum requirements for ground-based aircraft de-icing/anti-icing with fluids to ensure the safe operation of transport aircraft during icing conditions (see also 8.3.2). All requirements specified herein are applicable only in conjunction with the referenced International Standards. This International Standard does not specify requirements for particular aeroplane model types.

Frost, ice or snow deposits, which can seriously affect the aerodynamic performance and/or controllability of an aircraft, are effectively removed by the application of the procedures specified in this International Standard.

De-icing/anti-icing by mechanical means is not covered by this International Standard.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 11075:1993, *Aerospace — Aircraft de-icing/anti-icing Newtonian fluids, ISO type I.*

ISO 11077:1993, *Aerospace — Self-propelled de-icing/anti-icing vehicles — Functional requirements.*

ISO 11078:1994, *Aerospace — Aircraft de-icing/anti-icing non-Newtonian fluids, ISO type II.*

## 3 Terms and definitions

### 3.1

#### **de-icing**

procedure by which frost, ice, slush, or snow is removed from an aircraft in order to provide clean surfaces

### 3.2

#### **de-icing fluid**

defined as one of the following:

- a) heated water;
- b) ISO type I fluid in accordance with ISO 11075;
- c) mixture of water and ISO type I fluid;
- d) ISO type II, III or IV fluids in accordance with ISO 11078;
- e) mixture of water and ISO type II, III or IV fluids

NOTE De-icing fluid is normally applied heated in order to assure maximum efficiency.

### 3.3

#### **anti-icing**

precautionary procedure which provides protection against the formation of frost or ice and accumulation of snow or slush on treated surfaces of the aircraft for a limited period of time (holdover time)

### 3.4

#### **anti-icing fluid**

defined as one of the following:

- a) ISO type I fluid in accordance with ISO 11075;
- b) mixture of water and ISO type I fluid;
- c) ISO type II, III or IV fluids in accordance with ISO 11078;
- d) mixture of water and ISO type II, III or IV fluids

NOTE Anti-icing fluid is normally applied unheated on clean aircraft surfaces but may be applied heated.

### 3.5

#### **de-icing/anti-icing**

combination of the procedures described in 3.1 and 3.3

NOTE It may be performed in one or two steps.

### 3.6

#### **holdover time**

estimated time for which an anti-icing fluid will prevent the formation of frost or ice and the accumulation of snow on the protected surfaces of an aircraft, under weather conditions as specified in clause 13

### 3.7

#### **freezing conditions**

conditions in which the outside air temperature is below +3 °C (37,4 °F) and visible moisture in any form (such as fog with visibility below 1,5 km, rain, snow, sleet or ice crystals) or standing water, slush, ice or snow is present on the runway

### 3.8

#### **frost/hoarfrost**

ice crystals that form from ice saturated air at temperatures below 0 °C (32 °F) by direct sublimation on the ground or other exposed objects

### 3.9

#### **freezing fog**

suspension of numerous minute water droplets which freezes upon impact with ground or other exposed objects, generally reducing the horizontal visibility at the earth's surface to less than 1 km (5/8 mile)

### 3.10

#### **snow**

precipitation of ice crystals, most of which are branched, star-shaped or mixed with unbranched crystals and at temperatures higher than -5 °C (23 °F), the crystals are generally agglomerated into snowflakes

### 3.11

#### **freezing drizzle**

fairly uniform precipitation composed exclusively of fine drops [diameter less than 0,5 mm (0,02 in)] very close together which freezes upon impact with the ground or other exposed objects

**3.12****light freezing rain**

precipitation of liquid water particles which freezes upon impact with exposed objects, in the form of drops of more than 0,5 mm (0,02 in) which, in contrast to drizzle, are widely separated

NOTE Measured intensity of liquid water particles are up to 2,5 mm/h (0,10 inch/h) or 25 g/dm<sup>2</sup>/h with a maximum of 2,5 mm (0,10 in) in 6 min.

**3.13****rain or high humidity (on cold-soaked wing)**

water forming ice or frost on the wing surface, when the temperature of the aircraft wing surface is at or below 0 °C (32 °F)

**3.14****sleet**

precipitation in the form of a mixture of rain and snow

NOTE Operation in light sleet is treated as light freezing rain.

**3.15****slush**

snow or ice that has been reduced to a soft watery mixture by rain, warm temperature and/or chemical treatment

**3.16****check**

examination of an item against a relevant standard by a trained and qualified person

**4 Abbreviated terms**

OAT outside air temperature

FP freezing point

**5 General requirements**

A pilot shall not take off in an aeroplane that has:

- a) frost, snow, slush or ice adhering to any propeller, windshield or power plant installation or to airspeed, altimeter, rate of climb or flight altitude instrument systems;
- b) snow, slush or ice adhering to the wings or stabilizing or control surfaces or any frost adhering to the upper surfaces of wings or stabilizing or control surfaces.

**6 Requirements for staff training and qualifications****6.1 Personnel qualifications**

De-icing/anti-icing procedures shall be carried out exclusively by trained and qualified personnel.

**6.2 Training for crews**

Both initial and annual recurrent training for flight crew and ground crew shall be conducted to ensure that all such crews obtain and retain a thorough knowledge of aircraft de-icing/anti-icing policies and procedures, including new procedures and lessons learned.