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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Aerospace — Pipelines — Identification

Aéronautique et espace — Tuyauteries — Identification

Reference number
ISO 12 : 1987 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 12 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*.

This second edition cancels and replaces the first edition (ISO 12 : 1976), which has been technically revised as follows:

— the scope and field of application has been modified;

— a symbol has been added for filtered air (see table 1 and figure 2);

— sub-clause 3.3 (now 4.3) on the supplementary identification marker has been expanded.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Aerospace — Pipelines — Identification

1 Scope and field of application

This International Standard lays down the requirements for a scheme to indicate, by appropriate marking, the functions or contents of rigid pipe assemblies in aircraft and spacecraft systems, but excluding those in aero-engines with the exception of those which connect directly to the airframe systems at their break points.

These requirements may also be applied to hose assemblies, if desired.

The purpose of the scheme is to provide the minimum identification necessary for normal maintenance purposes.

NOTE — Markers used for the purpose of applying this identification scheme should not adversely affect the chemical or mechanical properties of the pipes or conduits.

2 Reference

ISO 3323, *Aircraft — Hydraulic components — Marking to indicate fluid for which component is approved.*

3 Identification scheme

3.1 General

3.1.1 Where ambient temperatures permit, the scheme shall consist of markers fixed to the pipelines to indicate their functions or contents, to give due warning where the contents are dangerous and, when required, to indicate the direction of flow of the contents. Typical applications of the scheme are shown in figure 1.

Any supplementary identification required should be separate and distinct from the lettering, symbols and colours specified in this International Standard. It is recommended that such supplementary identification should be by means of a number code [see figure 1d)].

3.1.2 Where ambient temperatures are too high to permit the use of markers, the requirements of this International Standard shall be met as fully as possible. As a minimum requirement, one inscription in black letters, located in accordance with clause 5, shall be applied in such a manner that it remains legible throughout the temperature range imposed on the pipeline.

3.2 Basic identification

3.2.1 Each rigid pipe in the pipe systems listed in table 1 shall be identified by a marker bearing the designation of the system, together with the appropriate symbol as described in table 1 and shown in figure 2.

3.2.2 Pipelines for replenishment, vents, pressure transmission, priming and drains, or related functional equipment, shall be identified by the same marker as the main pipeline.

Table 1 — Pipe systems and symbols

Designation of pipe system	Symbol (see figure 2)	
	Description	No.
Air conditioning (including cabin pressurizing)	Dot pattern	11
Battery activator	Ellipse with radiating lines	24
Breathing oxygen	Rectangle	10
Compressed gas	Broad diagonal stripe	16
Coolant	Broad undulations	9
De-icing	Triangle[1]	13
Drinking water	"H_2O"	25
Electrical conduit	Flash of lightning	17
Filtered air	"NBC"	27
Fire protection	Horizontal diamond	12
Fuel	Four-pointed star	1
Hydraulic	Circle	6
Inerting	Pipe cross[1]	19
Instrument air	Zig-zag line[2]	8
Lubrication	Square[1]	5
Monopropellant	Block T	21
Rain repellent	Falling raindrops	22
Pneumatic	"X"[2]	7
Rocket catalyst	Three vertical stripes[2]	15
Rocket fuel	Four-pointed star inside crescent	3
Rocket oxidizer	Crescent	2
Solvent	Horizontal stripes	20
Vacuum	Wavy line[2]	23
Waste water	Chain[2]	26
Water injection	Chevron	4

1) Alternate symbols to be staggered.

2) Continuous pattern.

3.2.3 The contents of pipelines other than those listed in table 1 (e.g. toilet) shall, where necessary, be identified by markers bearing the name of the function or contents only.

3.3 Supplementary identification

3.3.1 Sub-division of basic identification

Where necessary for the further identification of a pipeline, a basic identification shall be sub-divided by means of additional words, describing the specific function or contents of the sub-division (e.g. "Methyl bromide", "Auto-pilot"), which may be on a second, narrower marker adjacent to the basic identification marker or interposed between the words on the latter [see figure 1e)].

3.3.2 Warning symbol

Markers bearing the skull and crossbones symbol, as shown in figure 2 (No. 14), shall be applied adjacent to the basic identification markers on all pipelines where it is necessary to indicate that the contents of the pipelines are considered to be dangerous to maintenance personnel.

3.3.3 Direction of flow

When required, the direction of flow of the contents of a pipeline shall be indicated by means of additional markers bearing arrows, as shown in figure 2 (No. 18).

4 Markers

4.1 General

Except as laid down in 4.2.2 and 4.3.2, all lettering and symbols shall be printed in black upon a white or equivalent background.

If desired, alternate lines or, where appropriate, pairs of lines of the lettering may be inverted.

4.2 Basic identification marker

4.2.1 The basic identification marker shall be not less than 25 mm wide and shall bear

a) the appropriate symbol, at regular intervals or forming a continuous pattern (see figure 2) in a band approximately 7 mm wide on one margin of the marker;

b) the designation of the pipe system, in lettering not less than 3 mm high, repeated at regular intervals such that the gap between the lines is not more than twice the height of the lettering, on the portion of the marker not used for the symbol.

4.2.2 If desired, the background to the written description may be coloured, in which case the colouring shall be as shown in figure 2. The colours shall have the colorimetric values given in table 2 and shall not be of such density as to obscure the lettering. Where there is more than one colour, the widths of the bands shall be approximately equal.

Table 2 — Colorimetric values of colours

Colour	Chromaticity coordinates and luminance factor under CIE* Standard Illuminant B		
	Value x	Value y	β %
(A) Blue	0,201	0,188	8,8
(B) Green	0,366	0,510	14,3
(C) Yellow	0,483	0,488	62,3
(D) Brown	0,506	0,386	3,3
(E) Orange	0,620	0,356	16,2
(F) Red	0,645	0,316	7,7
(G) Grey	0,342	0,363	29,1

* Commission internationale de l'éclairage (International Commission on Illumination)

4.3 Supplementary identification marker

4.3.1 A marker used for supplementary identification purposes (see 3.3) shall be not less than 12 mm wide and shall bear either

a) the appropriate symbol at regular intervals, as shown in figure 2 (Nos. 14 and 18), or

b) the desired inscription, in lettering not less than 2 mm high, repeated at regular intervals such that the gap between the lines is not more than twice the height of the lettering.

4.3.2 Where a supplementary identification marker is used to indicate the type of fluid for which a hydraulic system pipeline is approved, the inscription shall be the name of the particular type of fluid as specified in ISO 3323. Where ISO 3323 makes provision for the use of a colour to indicate a particular type of fluid, the background to the written inscription may be coloured, if desired, in which case the colour used shall be that specified in ISO 3323 for that particular type of fluid.

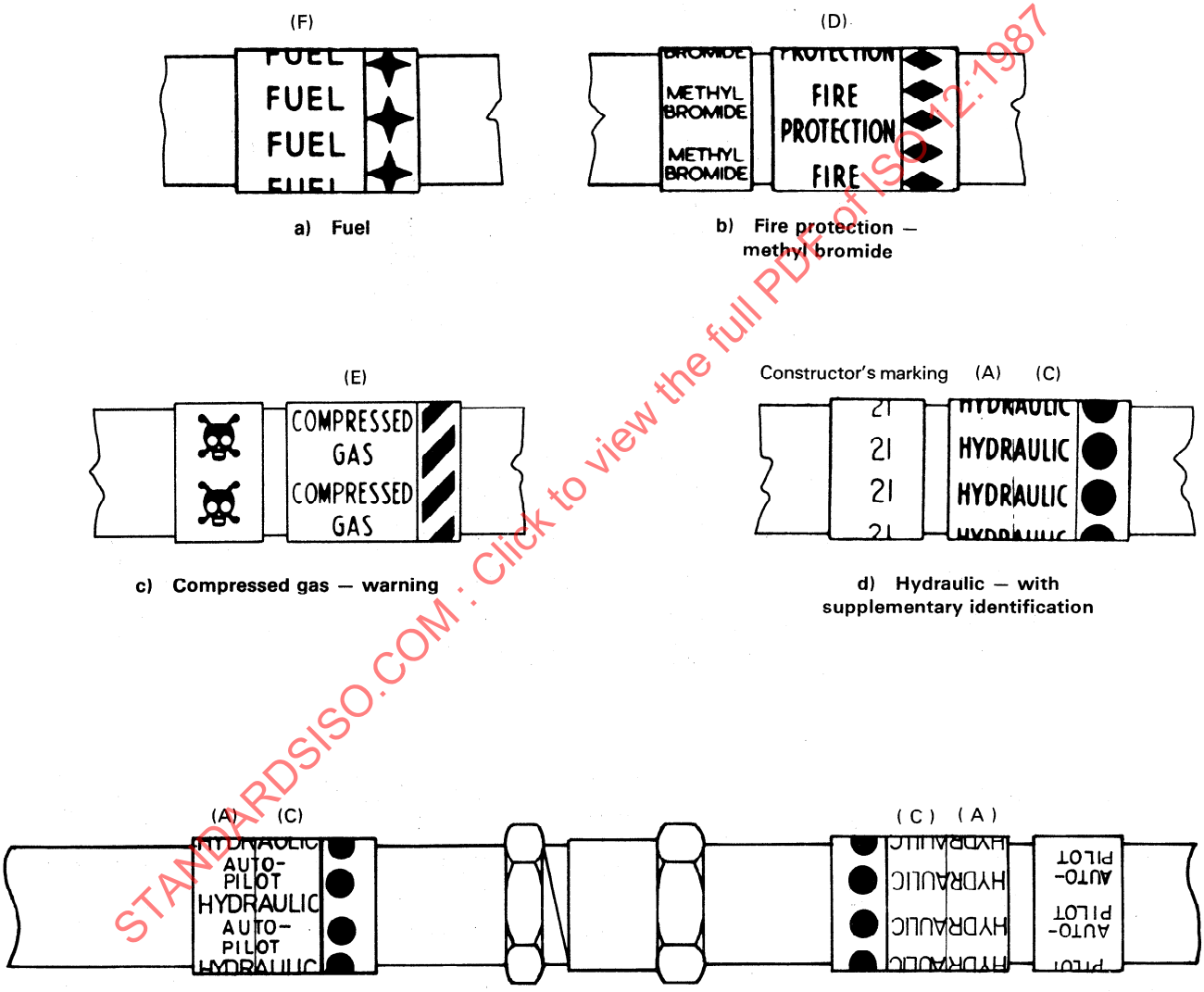
4.4 Identification

For purchasing and handling purposes, the markers shall be identified by the number of the relevant national standard together with the appropriate symbol number as shown in table 1 and/or figure 2.

5 Location of markers

Markers shall be located at both ends of a pipeline component and at intervals along the pipeline. Identification points shall be selected so that when the pipeline is installed at least one marker is located adjacent to each servicing point and inspection door. Where a length of pipeline is less than 600 mm and the installed pipeline may be readily traced, only one marker need be used.

To preclude over-application of markers, discretion may be exercised when implementing these requirements. Where visibility is unrestricted over a one-piece pipeline of considerable length, the markers need only be placed at intervals necessary to ensure that at least one marker is visible and recognizable from any observation point along the pipeline.



a) Fuel

b) Fire protection — methyl bromide

c) Compressed gas — warning

d) Hydraulic — with supplementary identification

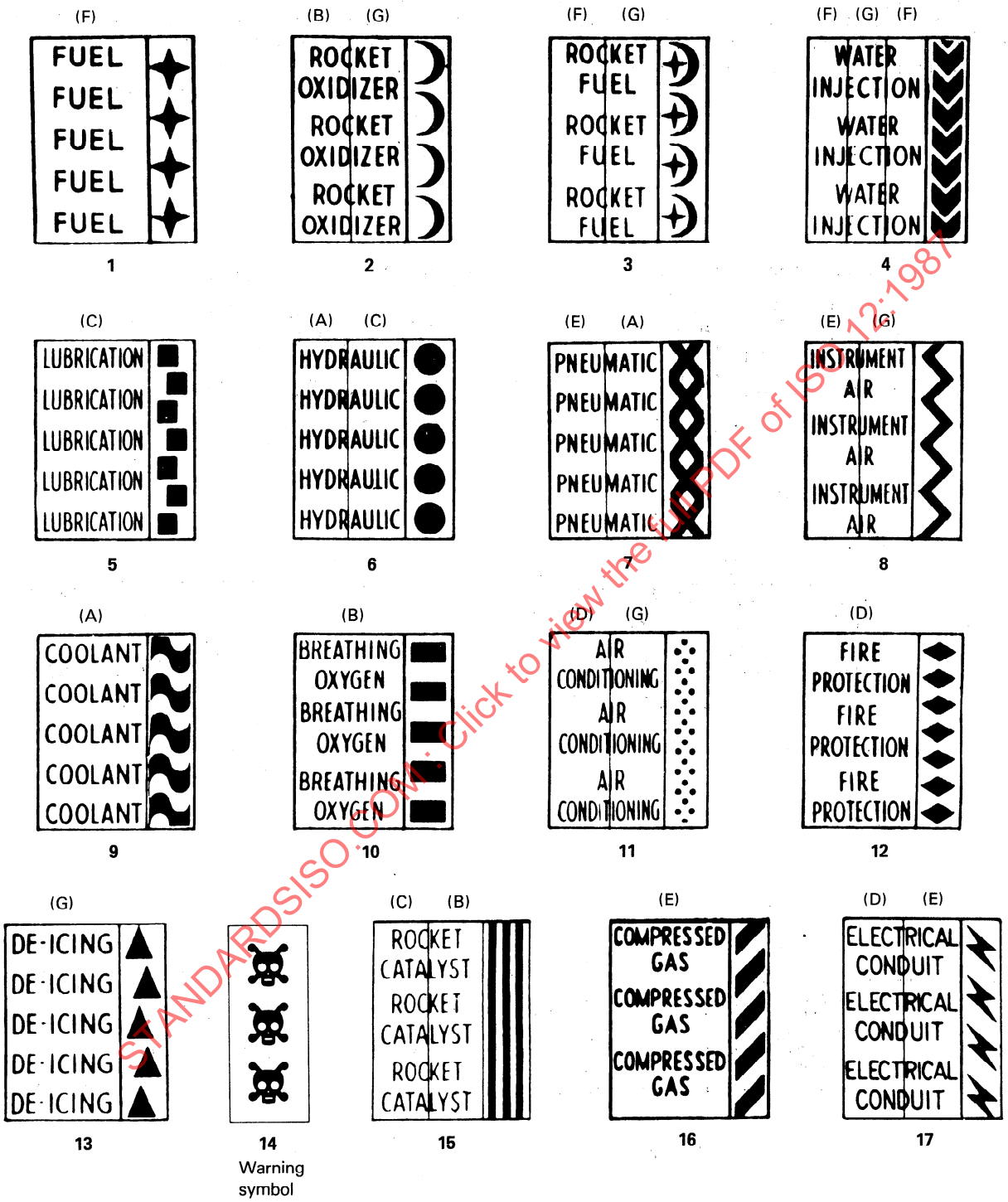
e) Positioning of markers showing alternative methods of giving supplementary information (see 3.3.1)

NOTES

1 The letters above the markers are the serial letters of the colours as given in table 2.

2 The supplementary identification marker may be located on either side of the basic identification marker (see 3.3.1).

Figure 1 — Typical applications of markers



NOTES

1 The letters above the markers are the serial letters of the colours as given in table 2. The numbers below the markers are the symbol numbers for identification purposes.

2 The symbol may be located on either margin of a marker [see 4.2.1a)].

Figure 2 — Identification symbols and colours