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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 12

IDENTIFICATION OF AIRCRAFT PIPELINES

2nd EDITION

June 1970

This second edition supersedes the first edition.

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 12, *Identification of aircraft pipelines*, was drawn up by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 20, which was circulated to all the ISO Member Bodies for enquiry in June 1953. It was approved by 20 Member Bodies. No Member Body opposed the approval of the Draft.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in January 1955, to accept it as an ISO RECOMMENDATION.

BRIEF HISTORY RELATING TO THE 2nd EDITION

At the meeting of ISO/TC in June 1967, the Netherlands delegation submitted a proposal for a revision of ISO Recommendation R 12-1955 to include aerospace applications. Work on this question led to the adoption of Draft ISO Recommendation No. 1782, which was circulated to all ISO Member Bodies for enquiry in February 1969. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Israel	Thailand
Austria	Netherlands	Turkey
Belgium	New Zealand	U.A.R.
Canada	Peru	United Kingdom
Czechoslovakia	South Africa, Rep. of	U.S.S.R.
France	Spain	
Greece	Switzerland	

The following Member Body opposed the approval of the Draft :

Italy

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as the second edition of ISO Recommendation R 12-1955.

This edition (2nd Edition) supersedes the first edition of ISO Recommendation R 12-1955.

ISO Recommendation R 12 June 1970

IDENTIFICATION OF AIRCRAFT PIPELINES

1. SCOPE

This ISO Recommendation states the requirements for a scheme to indicate, by appropriate marking, the functions of pipe systems in aircraft and spacecraft, and thus to provide the minimum identification necessary for normal maintenance purposes.

2. THE SCHEME

2.1 General

2.1.1 Where ambient temperatures permit, the scheme should consist of markers fixed to the pipe systems to indicate their functions, 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 additional identification required should be separate and distinct from the lettering, symbols and colours specified in this ISO Recommendation. It is recommended that such additional identification should be by means of a number code.

2.1.2 Where ambient temperatures are too high to permit the use of markers, the requirements of this ISO Recommendation should be met as fully as possible. As a minimum requirement, one inscription in black letters, located in accordance with section 4, should be applied in such a manner that it remains legible throughout the temperature range imposed on the line.

2.1.3 Where adhesive tape is used for the purposes of the scheme, it should comply with the requirements, for physical properties specified in the relevant national standard and a liberal coating of suitable clear lacquer should be applied with a soft brush, overlapping both edges of the tape by not less than 6.5 mm (0.25 in) and forming a complete film.

2.2 Basic identification

2.2.1 Each of the pipe systems listed in Table 1 should be identified by a marker bearing the name of the main function of the system and the appropriate symbol as described in Table 1 and shown in Figure 2.

2.2.2 Filler lines, vent lines, pressure transmitter lines, priming lines and drain lines for the main functions or related functional equipment should be identified by the same marker as the function line.

2.2.3 The contents of pipelines other than those listed in Table 1 (for example drinking water) should, where necessary, be identified by markers bearing the name of the function only.

2.3 Supplementary identification

2.3.1 *Sub-division of main functions.* Where necessary for the further identification of a pipeline, a sub-division of a main function should be by means of additional words, describing the specific contents or function of the sub-division (for example "Methyl bromide", "Vacuum", "Auto-pilot"), which may be on a second, narrower marker alongside the left-hand edge of the basic identification marker or interposed between the words on the main marker.

2.3.2 *Warning symbol.* Markers bearing the skull and crossbones symbol, as shown in Figure 2 (14), should be applied adjacent to the basic identification markers on all lines for rocket installations and on other lines where it is necessary to indicate that the contents of the lines are considered to be dangerous to maintenance personnel.

2.3.3 *Direction of flow.* When required, the direction of flow of the contents of a pipeline should be indicated by means of additional markers bearing arrows, as shown in Figure 2 (18).

TABLE 1 – **Pipe systems and symbols**

Pipe system	Symbol (see Fig. 2)	
	Description	Code No.
Air conditioning (including cabin pressurization)	Dot pattern	11
Breathing oxygen	Rectangle	10
Compressed gas	Broad diagonal stripes	16
Coolant	Horizontal S	9
De-icing	Staggered triangles	13
Electric conduit	Flash of lightning	17
Fire protection	Horizontal diamond	12
Fuel (including pressure, vent and boost lines)	Four-pointed star	1
Hydraulic	Circle	6
Inerting fluid	Staggered pipe crosses	19
Instrument air	Continuous zig-zag line	8
Lubrication	Staggered squares	5
Monopropellant	Block T	21
Rain repellent	Falling raindrops	22
Pneumatic	Continuous X-form lattice	7
Rocket catalyst	Three vertical stripes	15
Rocket fuel	Four-pointed star inside crescent	3
Rocket oxidizer	Crescent	2
Solvent	Horizontal stripes	20
Water injection	Chevron	4

3. MARKERS

3.1 General

Except as provided in clause 3.2.2, all lettering and symbols should be printed in black upon a white or equivalent ground.

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

3.2 Basic identification marker

3.2.1 The basic identification marker should be 25 mm (1 in) wide and should bear :

(1) the appropriate symbol : forming a continuous pattern in a 6.5 mm (0.25 in) wide band on the right-hand margin of the marker;

(2) the written description of the main function of the pipeline : in lettering not less than 3 mm (0.125 in) 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.

3.2.2 If desired, the background to the written description may be coloured, in which case the colouring should be as shown in Figure 2. The colours should have the colorimetric values given in Table 2 and should not be of such density as to obscure the lettering. Standard references of suitable colours are given in the Annex.

TABLE 2 - Colorimetric values of colours used

Colour	Chromaticity co-ordinates and luminance factor under CIE* Standard Illuminant B Illuminated normally – Viewed at 45°		
	Value x	Value y	β_1 %
(1) Blue	0.218	0.225	14.5
(2) Green	0.362	0.517	14.8
(3) Yellow	0.484	0.488	65.2
(4) Brown	0.522	0.341	2.84
(5) Orange	0.650	0.334	12.7
(6) Red	0.641	0.308	3.88
(7) Grey	0.342	0.362	30.4

3.3 Supplementary identification markers

Markers used for supplementary identification purposes (see clause 2.3) should be not less than 13 mm (0.5 in) wide.

3.4 Identification

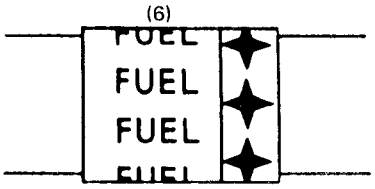
For purchasing and handling purposes, the markers should be identified by the number of the relevant national standard together with the appropriate code number as shown in Table 1.

4. LOCATION OF MARKERS

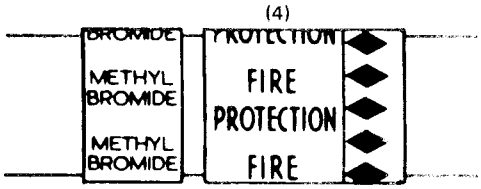
Markers should be located at both ends of a pipeline component and at approximately 600 mm (24 in) spacing along the line. Identification points should be selected so that when the pipeline is installed at least one marker is located adjacent to each servicing point and inspection door.

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 recognisable from any observation point along the line. Similarly, where a length of pipeline is less than 600 mm (24 in) and the installed pipeline may be readily traced, only one marker need be used.

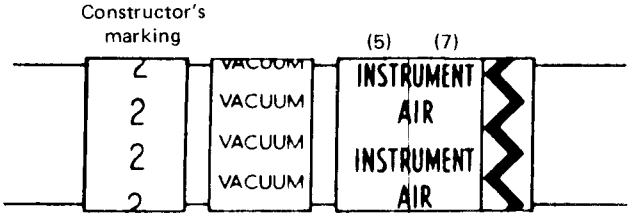
* Commission Internationale pour l'Eclairage (International Commission on Illumination).



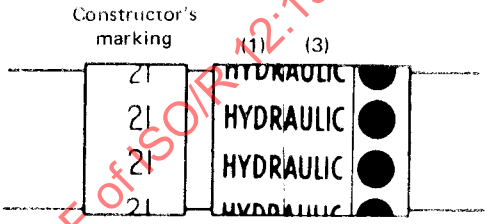
a Fuel



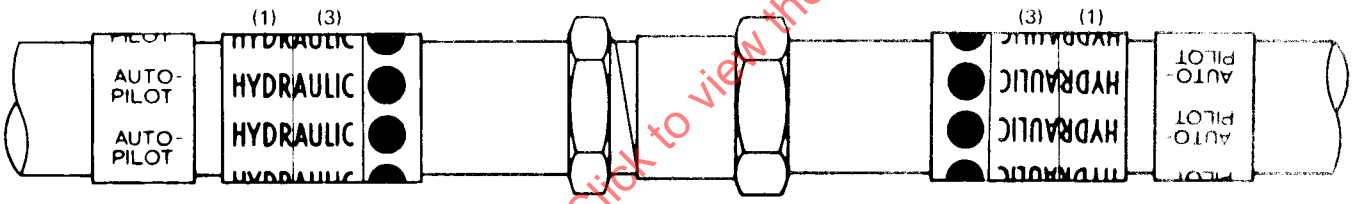
b Fire protection — methyl bromide



c Instrument air — vacuum



d Hydraulic — main



e Positioning of markers

NOTE. – The numbers above the markers are the serial numbers of the colours as given in Table 2 and in the Annex.

FIG. 1 – Typical applications of markers