FINAL DRAFT

AMENDMENT

ISO 5149-1:2014 FDAM 2

ISO/TC **86**/SC **1**

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2020-12-22

Refrigerating systems and heat pumps — Safety and environmental requirements —

Part 1: **Definitions, classification and selection criteria**

AMENDMENT 2: Update of Annex A and the refrigerant tables

Systèmes frigorifiques et pompes à chaleur — Exigences de sécurité et d'environnement —

Partie 1: Définitions, classification et critères de choix

AMENDEMENT 2: Mise à jour de l'Annexe A et des tableaux de fluides frigorigènes

Reference number
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This document was prepared by Technical Committee ISO/TC 86, *Refrigeration and air-conditioning*, Subcommittee SC 1, *Safety and environmental requirements for refrigerating systems*.

A list of all parts in the ISO 5149 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Refrigerating systems and heat pumps — Safety and environmental requirements —

Part 1: Definitions, classification and selection criteria

AMENDMENT 2: Update of Annex A and the refrigerant tables

Clause 3

Replace the introductory paragraph with the following:

For the purposes of this document, the terms and definitions given in ISO 817 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.7.2

In the SOURCE, replace "2.5" with "3.1.5, modified".

3.7.3

Reverse the order of the "Note 1 to entry" and the SOURCE. In the indication of the SOURCE, replace "2.1.44" with "3.1.43, modified — Note 1 to entry has been added".

3.7.9

In the indication of the SOURCE, replace "2.32" with "3.1.35, modified".

3.10.3

Delete Note 1 to entry.

3.10.4

Delete Note 1 to entry.

Annex A, Table A.1

In row A – a, delete “Toxicity limit × Room volume or see A.5” from Location classification column I and add “Toxicity limit × Room volume” in its place. Add the following note:

NOTE The national variations to this table do not alter any requirements from those specified in this International Standard. This table was revised to remove the incorrect inference that Clause A.5 can be applied to location Classification I. The text of Clause A.5 states that it is only application to location Classification II.

A.5.1, list

Replace the third dashed indent with the following:

— for appliances with more than one indoor unit, individual indoor unit cooling capacity shall not exceed 35 kW when tested in accordance with ISO 5151, ISO 13253, or ISO 15042 at T1 conditions;

— for heating, only appliances with more than one indoor unit, individual indoor unit heating capacity shall not exceed 35 kW when tested in accordance with ISO 5151, ISO 13253, or ISO 15042 at H1 conditions;

A.5.2.3

Replace the reference to "Table B.1" with "Table A.3".

Annex B, Tables B.1, B.2 and B.3.

Replace Tables B.1, B.2 and B.3 with the following:

Table B.1 — Refrigerants designation

Refrigerant number	Chemical name[b]	Chemical formula	Safety group	Practical limit kg/m³	ATEL/ ODL[f] kg/m³	Flammability LFL[g] kg/m³	Vapour density 25°C, 101,3 kPa[a] kg/m³	Relative molar mass[a]	Normal boiling point[a] °C	ODP[a,d]	GWP[a,e] (100 yr ITH)	Auto-ignition temperature °C
Methane series												
11	Trichlorofluoromethane	CCl_3F	A1	0,3	0,006 2	NF	5,62	137,4	24	1	4 750	ND
12	Dichlorodifluoromethane	CCl_2F_2	A1	0,5	0,088	NF	4,94	120,9	−30	1	10 900	ND
12B1	Bromochlorodifluoromethane	$CBrClF_2$	ND	0,2	ND	NF	6,76	165,4	−4	3	1 890	ND
13	Chlorotrifluoromethane	$CClF_3$	A1	0,5	ND	NF	4,27	104,5	−81	1	14 400	ND
13B1	Bromotrifluoromethane	$CBrF_3$	A1	0,6	ND	NF	6,09	148,9	−58	10	7 140	ND
14	Carbon tetrafluoride	CF_4	A1	0,4	0,40	NF	3,60	88,0	−128	0	7 390	ND
22	Chlorodifluoromethane	$CHClF_2$	A1	0,3	0,21	NF	3,54	86,5	−41	0,055	1 810	635
23	Trifluoromethane	CHF_3	A1	0,68	0,15	NF	2,86	70,0	−82	0	14 800	765
30	Dichloromethane (methylene chloride)	CH_2Cl_2	B1	0,017	ND	NF	3,47	84,9	40	ND	8,7	662
32	Difluoromethane (methylene fluoride)	CH_2F_2	A2L	0,061	0,30	0,307	2,13	52,0	−52	0	675	648
50	Methane	CH_4	A3	0,006	ND	0,032	0,654	16,0	−161	0	25	645

NOTE 1 See Tables B.2 and B.3 for zeotropic and azeotropic blends.

NOTE 2 NA signifies not applicable.

NOTE 3 ND signifies not determined.

NOTE 4 NF signifies non flammable.

[a] The vapour density, normal boiling point, ODP, and GWP are not part of this International Standard, and are provided for information purposes only.

[b] The preferred chemical name is followed by the popular name in parentheses.

[c] Sublimes. Triple point is −56,6 °C at 5,2 bar.

[d] Adopted under the Montreal Protocol.

[e] Data from IPCC 4th assessment report 2007. When not available, WMO Scientific assessment of ozone depletion 2010 is used as first priority and then the UNEP RTOC 2010 report.

[f] Acute-Toxicity Exposure Limit or Oxygen Deprivation Limit, whichever is lower, values taken from ISO 817.

[g] Lower Flammability Limit.

[h] Data from UNEP RTOC 2010 report.

[i] Data from WMO Scientific assessment of ozone depletion 2010.

Table B.1 *(continued)*

Refrigerant number	Chemical name[b]	Chemical formula	Safety group	Practical limit kg/m³	ATEL/ ODL[f] kg/m³	Flammability LFL[g] kg/m³	Vapour density 25°C, 101,3 kPa[a] kg/m³	Relative molar mass[a]	Normal boiling point[a] °C	ODP[a,d]	GWP[a,e] (100 yr ITH)	Auto-ignition temperature °C
Ethane series												
113	1,1,2-trichloro-1,2,2-trifluoroethane	CCl_2FCClF_2	A1	0,4	0,02	NF	7,66	187,4	48	0,8	6 130	ND
114	1,2-dichloro-1,1,2,2-tetrafluoroethane	$CClF_2CClF_2$	A1	0,7	0,14	NF	6,99	170,9	4	1	10 000	ND
115	Chloropentafluoroethane	$CClF_2CF_3$	A1	0,76	0,76	NF	6,32	154,5	−39	0,6	7 370	ND
116	Hexafluoroethane	CF_3CF_3	A1	0,68	0,68	NF	5,64	138,0	−78	0	12 200	ND
123	2,2-dichloro-1,1,1-trifluoroethane	$CHCl_2CF_3$	B1	0,10	0,057	NF	6,25	152,9	27	0,02	77	730
124	2-chloro-1,1,1,2-tetrafluoroethane	$CHClFCF_3$	A1	0,11	0,056	NF	5,58	136,5	−12	0,022	609	ND
125	Pentafluoroethane	CHF_2CF_3	A1	0,39	0,37	NF	4,91	120,0	−49	0	3 500	733
134a	1,1,1,2-tetrafluoroethane	CH_2FCF_3	A1	0,25	0,21	NF	4,17	102,0	−26	0	1 430	743
141b	1,1-dichloro-1-fluoroethane	CH_3CCl_2F	ND	0,053	0,012	0,363	4,78	116,9	32	0,11	725	532
142b	1-chloro-1,1-difluoroethane	CH_3CClF_2	A2	0,049	0,10	0,329	4,11	100,5	−10	0,065	2 310	750
143a	1,1,1-trifluoroethane	CH_3CF_3	A2L	0,048	0,48	0,282	3,44	84,0	−47	0	4 470	750

NOTE 1 See Tables B.2 and B.3 for zeotropic and azeotropic blends.

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Table B.1 *(continued)*

Refrigerant number	Chemical name[b]	Chemical formula	Safety group	Practical limit kg/m³	ATEL/ ODL[f] kg/m³	Flammability LFL[g] kg/m³	Vapour density 25°C, 101,3 kPa[a] kg/m³	Relative molar mass[a]	Normal boiling point[a] °C	ODP[a,d]	GWP[a,e] (100 yr ITH)	Auto-ignition temperature °C
152a	1,1-difluoroethane	CH_3CHF_2	A2	0,027	0,14	0,130	2,70	66,0	–25	0	124	455
170	Ethane	CH_3CH_3	A3	0,008 6	0,008 6	0,038	1,23	30,1	–89	0	5,5	515
Propane series												
218	Octafluoropropane	$CF_3CF_2CF_3$	A1	1,84	0,85	NF	7,69	188,0	–37	0	8 830	ND
227ea	1,1,1,2,3,3,3-heptafluoropropane	CF_3CHFCF_3	A1	0,63	0,63	NF	6,95	170,0	–15	0	3 220	ND
236fa	1,1,1,3,3,3-hexafluoropropane	$CF_3CH_2CF_3$	A1	0,59	0,34	NF	6,22	152,0	–1	0	9 810	ND
245fa	1,1,1,3,3-pentafluoropropane	$CF_3CH_2CHF_2$	B1	0,19	0,19	NF	5,48	134,0	15	0	1 030	ND
290	Propane	$CH_3CH_2CH_3$	A3	0,008	0,09	0,038	1,80	44,1	–42	0	3,3	470
Ethene Series												
E170	Dimethyl Ether	CH_3OCH_3	A3	0,013	0,079	0,064	1,88	46	–25	0	1	235
1130 (E)	Trans-1,2-dichloroethene	CHCl=CHCl	B2	0,004	0,004	0,258	1,15	96,9	48	0	0	ND
1132a	1,1-difluoroethylene	$CF_2=CH_2$	A2	0,026	0,073	0,131		64,0	–83	0	1	ND
1150	Ethene (ethylene)	$CH_2 = CH_2$	A3	0,006	ND	0,036	1,15	28,1	–104	0	3,7	ND

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Table B.1 *(continued)*

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Propene series												
1224yd (Z)	cis-2,3,3,3-tetrafluoro-1-chloro-1-propene	CF3CH=CHCF3	A1	0,364	0,364	NF		148,5	14	~0		ND
1233zd (E)	Trans-1-chloro-3,3,3-trifluoroprop-1-ene	CF3CH=CHCl	A1	0,086	0,086	NF	5,34	130,5	18,1	~0	4,5	ND
1234yf	2,3,3,3-tetrafluoroprop-1-ene	$CF_3CF = CH_2$	A2L	0,058	0,47	0,289	4,66	114,0	–26	0	4[i]	405
1234ze(E)	trans-1,3,3,3-tetrafluoroprop-1-ene	$CF_3CH = CFH$	A2L	0,061	0,28	0,303	4,66	114,0	–19	0	7[i]	368
1270	Propene (propylene)	$CH_3CH = CH_2$	A3	0,008	0,001 7	0,046	1,72	42,1	–48	0	1,8	455
Butene series												
1336mzz(E)	trans-1,1,1,4,4,4-hexafluoro-2-butene	$CF_3CH=CHCF_3$	A1	0,048	0,048	NF	6,93	164,1	7,4	0	16	ND
1336mzz(Z)	cis-1,1,1,4,4,4-hexafluoro-2-butene	$CF_3CH=CHCF_3$	A1	0,087	0,087	NF	6,93	164,1	33,4	0	9	ND

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Other hydrocarbons												
600	Butane	$CH_3CH_2CH_2CH_3$	A3	0,008 9	0,002 4	0,038	2,38	58,1	0	0	4,0	365
600a	2-methyl propane (isobutane)	$CH(CH_3)_2CH_3$	A3	0,011	0,059	0,043	2,38	58,1	−12	0	~20[h]	460
601	Pentane	$CH_3CH_2CH_2CH_2CH_3$	A3	0,008	0,002 9	0,035	2,95	72,1	36	0	~20[h]	ND
601a	2-methyl butane (isopentane)	$(CH_3)_2CHCH_2CH_3$	A3	0,008	0,002 9	0,038	2,95	72,1	27	0	~20[h]	ND
Cyclic organic compounds												
C318	Octafluorocyclobutane	$-(CF_2)_4-$	A1	0,81	0,65	NF	8,18	200,0	−6	0	10 300	ND
Inorganic compounds												
717	Ammonia	NH_3	B2L	0,000 35	0,000 22	0,116	0,700	17,0	−33	0	<1[h]	630
744	Carbon dioxide	CO_2	A1	0,1	0,072	NF	1,80	44,0	−78[c]	0	1	NA

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