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Interested committees:

Title: Draft BS EN 378-5 Refrigerating systems and heat pumps - Safety and environmental requirements. Part 5: Safety classification and information about refrigerants.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

English Version

Refrigerating systems and heat pumps - Safety and environmental requirements - Part 5: Safety classification and information about refrigerants

Systèmes frigorifiques et pompes à chaleur - Exigences de sécurité et d'environnement - Partie 5: Classification de sécurité et informations sur les réfrigérants

Kälteanlagen und Wärmepumpen - Sicherheitstechnische und umweltrelevante Anforderungen - Teil 5: Sicherheitsklassifikation und Informationen über Kältemittel

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 182.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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European foreword

This document (prEN 378-5: 2025) has been prepared by Technical Committee CEN/TC "182", the secretariat of which is held by Germany.

This document is currently submitted to the CEN Enquiry.

EN 378 consists of the following parts under the general title "Refrigerating systems and heat pumps — Safety and environmental requirements":

- Part 1: Basic requirements, definitions, classification and selection criteria
- Part 2: Design, construction, testing, marking and documentation
- Part 3: Installation site and personal protection
- Part 5: Safety classification and information about refrigerants

[\[1\]](#) applies for operation, maintenance, repair and recovery.

1 Scope

This document specifies criteria for safety and environmental considerations of different refrigerants used in refrigeration and air conditioning.

This part of [2] specifies the classification and selection criteria applicable to refrigerating systems.

These classification and selection criteria are used in [3], [4], [5] and [1].

Product family standards dealing with the safety of refrigerating systems take precedence over horizontal and generic standards covering the same subject.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 378-1, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basic requirements, definitions, classification and selection criteria*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 378-1 apply.

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

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Safety classification of refrigerants

[Table 1](#), [Table 2](#) and [Table 3](#) list the refrigerants, their relevant safety classification and other relevant information necessary for [3], [4], [5] and [1].

Refrigerants listed in [Table 1](#), [Table 2](#) and [Table 3](#) use the designation and safety class specified in [6]. Practical limits values shall be those assigned in [Table 1](#), [Table 2](#) and [Table 3](#).

The practical limit for a refrigerant represents the highest concentration level in an occupied space which will not result in any escape impairing (i.e. acute) effects or create a risk of ignition of the refrigerant. It is used to determine the maximum charge size for that refrigerant in a specific application.

For refrigerants including blends that were commercialised by 2003, the practical limits existing at that time (as set in previous international or national standards) shall be maintained unless, for non-flammable refrigerants, the ATEL/ODL values exceed the practical limit, in which case the ATEL/ODL values shall be used.

The toxicity class of the refrigerant (A or B, the first character of the safety group) shall be according to [Table 1](#), [Table 2](#) and [Table 3](#).

The flammability class of the refrigerant (1, 2L, 2 or 3, being the part of the safety group after the first character) shall be as indicated in [Table 1](#), [Table 2](#) and [Table 3](#). Fluid group classification is determined according to the Safety Data Sheet compliant with Annex II of Regulation (EC) No 1907/2006 (REACH) [7]. See [Annex A](#).

In [Table 1](#), [Table 2](#) and [Table 3](#) the vapour density, molecular mass, normal boiling point (with bubble point and dew point), azeotropic temperatures, ODP and GWP (AR5) are not part of this document and are provided for information purposes only.

NOTE Further detailed information of refrigerants can be found on the safety data sheet.

Table 1 — Refrigerant designations

Refrigerant number		Chemical name ^b	Chemical formula	Safety class	PED ^m fluid group	Practical limit ^d (kg/m ³)	ATEL/ODL ^g (kg/m ³)	LFL ^h (kg/m ³)	Vapour density 25 °C, 101,3 kPa ^a (kg/m ³)	Molecular mass ^a	Normal boiling point ^a (°C)	ODP ^{a e}	GWP ⁱ (F-Gas)(100 yr ITH)	GW P ^{a f} (AR 6) (100 yr ITH)	Auto ignition temperature (°C)	Hot Surface Ignition temperature (°C) ^o
Methane series																
	11	Trichlorofluoromethane	CCl ₃ F	A1	2	0,3 ⁱ	0,0062 ^j	NF	5,62	137,4	24	1	5 560	5 560	ND	ND
	12	Dichlorodifluoromethane	CCl ₂ F ₂	A1	2	0,5 ⁱ	0,088 ^j	NF	4,94	120,9	– 29,0	1	11 200	11 200	ND	ND
	12B1	Bromochlorodifluoromethane	CBrClF ₂	ND	ND	0,2	ND	NF	6,76	165,4	– 4	3	1 930	1 930	ND	ND
	13	Chlorotrifluoromethane	CClF ₃	A1	2	0,5 ⁱ	ND	NF	4,27	104,5	– 81	1	16 200	16 200	ND	ND
	13B1	Bromotrifluoromethane	CBrF ₃	A1	2	0,6 ⁱ	ND	NF	6,09	148,9	– 58	10	7 200	7 200	ND	ND
	13I1	trifluoroiodomethane	CF ₃ I	A1	2	0,016	0,016	NF		195,9	– 21,9		1	1	ND	ND
	14	Carbon tetrafluoride	CF ₄	A1	2	0,4	0,40 ^j	NF	3,60	88,0	– 128	0	7 380	7 380	ND	ND
	22	Chlorodifluoromethane	CHClF ₂	A1	2	0,3 ⁱ	0,21 ^j	NF	3,54	86,5	– 41	0,05 ⁵	1 960	1 960	635	ND
	23	Trifluoromethane	CHF ₃	A1	2	0,68 ⁱ	0,15	NF	2,86	70,0	– 82	0	14 800	14 600	765	ND

Refrigerant number	Chemical name ^b	Chemical formula	Safety class	PED _m fluid group	Practical limit ^d (kg/m ³)	ATEL/ODL ^g (kg/m ³)	LFL ^h (kg/m ³)	Vapour density 25 °C, 101,3 kPa ^a (kg/m ³)	Molecular mass ^a	Normal boiling point ^a (°C)	ODP _{ae}	GWP ⁱ (F-Gas)(100 yr ITH)	GWP ^{a f} (AR 6) (100 yr ITH)	Auto ignition temperature (°C)	Hot Surface Ignition temperature (°C) _o
30	Dichloromethane (methylene chloride)	CH ₂ Cl ₂	B2	2	0,017	ND	0,417	NA	84,9	40	ND	11,2	11,2	662	ND
32	Difluoromethane (methylene fluoride)	CH ₂ F ₂	A2L	1	0,061	0,30 ^j	0,306	2,13	52,0	- 52	0	675	771	648	ND
50	Methane	CH ₄	A3	1	0,006 ⁱ	0,0007	0,032	0,654	16,0	- 161	0	27,9	27,9	645	ND
Ethane series															
113	1,1,2-trichloro-1,2,2-trifluoroethane	CCl ₂ FCClF ₂	A1	2	0,4 ⁱ	0,02 ^j	NF	NA	187,4	48	0,8	6 520	6 520	ND	ND
114	1,2-dichloro-1,1,2,2-tetrafluoroethane	CClF ₂ CClF ₂	A1	2	0,7 ⁱ	0,14 ^j	NF	6,99	170,9	4	1	9 430	9 430	ND	ND
115	Chloropentafluoroethane	CClF ₂ CF ₃	A1	2	0,76 ⁱ	0,76 ^j	NF	6,32	154,5	- 39	0,6	9 600	9 600	ND	ND
116	Hexafluoroethane	CF ₃ CF ₃	A1	2	0,68	0,68	NF	5,64	138,0	- 78	0	12 200	12 400	ND	ND
123	2,2-dichloro-1,1,1-trifluoroethane	CHCl ₂ CF ₃	B1	2	0,1 ⁱ	0,057 ^j	NF	NA	153,0	27	0,02	90,4	90,4	730	ND
124	2-chloro-1,1,1,2-tetrafluoroethane	CHClCF ₃	A1	2	0,11 ⁱ	0,056 ^j	NF	5,58	136,5	- 12	0,02 ₂	597	597	ND	ND
125	Pentafluoroethane	CHF ₂ CF ₃	A1	2	0,39 ⁱ	0,37 ^j	NF	4,91	120,0	- 49	0	3 500	3 740	733	ND

Refrigerant number	Chemical name ^b	Chemical formula	Safety class	PED _m fluid group	Practical limit ^d (kg/m ³)	ATEL/ODL ^g (kg/m ³)	LFL ^h (kg/m ³)	Vapour density 25 °C, 101,3 kPa ^a (kg/m ³)	Molecular mass ^a	Normal boiling point ^a (°C)	ODP _{ae}	GWP ⁱ (F-Gas)(100 yr ITH)	GWP ^{a f} (AR 6)(100 yr ITH)	Auto ignition temperature (°C)	Hot Surface Ignition temperature (°C) _o
134a	1,1,1,2-tetrafluoroethane	CH ₂ FCF ₃	A1	2	0,25 ⁱ	0,21 ^j	NF	4,17	102,0	- 26	0	1 430	1 530	743	ND
141b	1,1-dichloro-1-fluoroethane	CH ₃ CCl ₂ F	ND	2	0,053	0,012 ^j	NA	NA	117,0	32	0,11	860	860	532	ND
142b	1-chloro-1,1-difluoroethane	CH ₃ CClF ₂	A2	1	0,066	0,10 ^j	0,329	4,11	100,5	- 10	0,06 ₅	2 300	2 300	750	ND
143a	1,1,1-trifluoroethane	CH ₃ CF ₃	A2L	1	0,056	0,58 ^j	0,282	3,44	84,0	- 47	0	4 470	5 810	750	
152a	1,1-difluoroethane	CH ₃ CHF ₂	A2	1	0,027 ⁱ	0,14	0,130	2,70	66,0	- 25	0	124	164	455	ND
170	Ethane	CH ₃ CH ₃	A3	1	0,008 ₆	0,008 ₆ ^j	0,038	1,23	30,0	- 89	0	0,437	0,43 ₇	515	ND
Propane series															
218	Octafluoropropane	CF ₃ CF ₂ CF ₃	A1	2	1,84	0,85 ^j	NF	7,69	188,0	- 37	0	9 290	9 290	ND	ND
227ea	1,1,1,2,3,3,3-heptafluoropropane	CF ₃ CHFCF ₃	A1	2	0,63	0,63 ^j	NF	6,95	170,0	- 15	0	3 220	3 600	ND	ND
236fa	1,1,1,3,3,3-hexafluoropropane	CF ₃ CH ₂ CF ₃	A1	2	0,59 ⁱ	0,34 ^j	NF	6,22	152,0	- 1	0	9 810	8 690	ND	ND
245fa	1,1,1,3,3-pentafluoropropane	CF ₃ CH ₂ CHF ₂	B1	2	0,19	0,19	NF	5,48	134,0	15	0	1 030	962	ND	ND

Refrigerant number		Chemical name ^b	Chemical formula	Safety class	PED _m fluid group	Practical limit ^d (kg/m ³)	ATEL/ODL ^g (kg/m ³)	LFL ^h (kg/m ³)	Vapour density 25 °C, 101,3 kPa ^a (kg/m ³)	Molecular mass ^a	Normal boiling point ^a (°C)	ODP _{ae}	GWP ⁱ (F-Gas)(100 yr ITH)	GWP ^{a,f} (AR6)(100 yr ITH)	Auto ignition temperature (°C)	Hot Surface Ignition temperature (°C) _o
	290	Propane	CH ₃ CH ₂ CH ₃	A3	1	0,008	0,09	0,038	1,80	44,0	- 42	0	0,02	0,02	470	ND
	1224yd(Z)	cis-2,3,3,3-tetrafluoro-1-chloro-1-propene	CF ₃ CF=CHCl	A1	2	0,36	0,36	NF	6,33	148,5	14	~0	0,06	1	ND	ND
	1233zd(E)	Trans-1-chloro-3,3,3-trifluoroprop-1-ene	CF ₃ CH = CHCl	A1	2	0,086	0,086	NF	5,34	130,5	18,1	~0	3,88	0,45 ₄	ND	ND
	1234yf	2,3,3,3-tetrafluoroprop-1-ene	CF ₃ CF = CH ₂	A2L	1	0,058	0,47 _j	0,289	4,66	114,0	- 29,5	0	0,501	0,50 ₁	405	>800
	1234ze(E)	Trans-1,3,3,3-tetrafluoroprop-1-ene	CF ₃ CF = CHF	A2L	2 ⁿ	0,061	0,28	0,303	4,66	114,0	- 19	0	1,37	1,37	368	ND
	1270	Propene (propylene)	CH ₃ CH = CH ₂	A3	1	0,008 _i	0,0017 _{jk}	0,046	1,72	42,1	- 48	0	0	0	455	ND
Ethene series																
	1130(E)	Trans-1,2-dichloroethene	CHCl=CHCl	B2	1	0,004	0,004	0,257	NA	96,9	47,7	~0	0	0	ND	ND
	1132(E)	(E)-1,2-Difluoroethene	(E)-CFH=CFH	B2		0,023	0,079	0,115		64,0	- 52,5		1	0		
	1132a	1,1-difluoroethylene	CF ₂ =CH ₂	A2	1	0,026	0,073	0,131	2,64	64	- 83,0		0,052	0,05 ₂	640	ND

Refrigerant number	Chemical name ^b	Chemical formula	Safety class	PED _m fluid group	Practical limit ^d (kg/m ³)	ATEL/ODL ^g (kg/m ³)	LFL ^h (kg/m ³)	Vapour density 25 °C, 101,3 kPa ^a (kg/m ³)	Molecular mass ^a	Normal boiling point ^a (°C)	ODP _{ae}	GWP ⁱ (F-Gas)(100 yr ITH)	GWP ^{a,f} (AR 6)(100 yr ITH)	Auto ignition temperature (°C)	Hot Surface Ignition temperature (°C) _o
1150	Ethene (ethylene)	CH ₂ = CH ₂	A3	1	0,006 ⁱ	0,0011	0,036	1,15	28,1	– 104	0	4	0	ND	ND
Butene series															
1336mzz(Z)	cis-1,1,1,4,4,4-hexafluoro-2-butene	CF ₃ CH=CHCF ₃	A1	2	0,87	0,87	NF	NA	164,1	33,4	0	17,9	17,9	ND	ND
1336mzz(E)	trans-1,1,1,4,4,4-hexafluoro-2-butene	CF ₃ CH=CHCF ₃	A1	2	0,048	0,048	NF	ND	164,1	7,4	0	2,08	2,08	ND	ND
Cyclic organic compounds															
C318	Octafluorocyclobutane	C ₄ F ₈	A1	2	0,81	0,65	NF	8,18	200,0	– 6	0	10 200	10 600	ND	ND
Hydrocarbons															
600	Butane	CH ₃ CH ₂ CH ₂ CH ₃	A3	1	0,008 ₉ ⁱ	0,002 ₄ _{jk}	0,038	2,38	58,1	0	0	0,006	0,006	365	ND
600a	2-methyl propane (isobutane)	CH(CH ₃) ₃	A3	1	0,011 ⁱ	0,059	0,043	2,38	58,1	– 12	0	0	0	460	ND
601	Pentane	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	A3	1	0,008 ⁱ	0,002 ₉ _{jk}	0,035	NA	72,1	36	0	0	0	ND	ND
601a	2methyl butane (isopentane)	(CH ₃) ₂ CHCH ₂ CH ₃	A3	1	0,008 ⁱ	0,002 ₉ _{jk}	0,038	NA	72,1	27	0	0	0	ND	ND
Other organic compounds															

Refrigerant number	Chemical name ^b	Chemical formula	Safety class	PED _m fluid group	Practical limit ^d (kg/m ³)	ATEL/ODL ^g (kg/m ³)	LFL ^h (kg/m ³)	Vapour density 25 °C, 101,3 kPa ^a (kg/m ³)	Molecular mass ^a	Normal boiling point ^a (°C)	ODP ^{a e}	GWP ⁱ (F-Gas)(100 yr ITH)	GW P ^{a f} (AR6) (100 yr ITH)	Auto ignition temperature (°C)	Hot Surface Ignition temperature (°C) ^o
E170	Dimethyl ether	(CH ₃) ₂ O	A3	1	0,013 ⁱ	0,079	0,064	1,88	46	- 25	0	1	1	235	ND
Inorganic compounds															
702	hydrogen	H ₂	A3	1	0,000 ₆₄	0,011 ₄	0,003 ₂	0,082	2,0	- 253		6	6	585	ND
704	helium	He	A1	2	0,022 ₉	0,022 ₉	NF	0,085	4,0	- 269		0	0	ND	ND
717	Ammonia	NH ₃	B2L	1	0,000 ₃₅ ⁱ	0,000 ₂₂ ⁱ	0,116	0,700	17,0	- 33	0	0	0	630	ND
744	Carbon dioxide	CO ₂	A1	2	0,1 ⁱ	0,072 ⁱ	NF	1,80	44,0	- 78 ^c	0	1	1	ND	ND

See Tables 2 and 3 for R-400 and R-500 blends.

NA signifies not applicable.

ND signifies not determined.

NF signifies non-flammable.

^a The vapour density, molecular mass, normal boiling point, ODP and GWP (AR6) are not part of this document and are provided for information purposes only.

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

^c Sublimation temperature. Triple point is -56,6 °C at 5,2 bar.

^d Determined according to [Clause 4](#) of this document.

^e Adopted under the Montreal Protocol.

^f Data from IPCC Assessment Report IV (AR6); for fluids which are not included in AR6, data from WMO Scientific Assessment of Ozone Depletion 2022 [\[8\]](#) (where <<1 is interpreted as 0 and <1 is interpreted as 1); for R-702 data is from European F-Gas regulation N° 2024/573 [\[9\]](#).