SLOVENSKI STANDARD
SIST EN 378-1:2008/oprA1:2008

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Hladilni sistemi in toplotne ļ rpalke - Varnostnotehniļ ne in okoljevarstvene zahteve - 1. del: Osnovne zahteve, definicije, razvrstitev in merila za izbor - Dopolnilo 1

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

Systèmes de réfrigération et pompes à chaleur - Exigences de sécurité et d'environnement - Partie 1 : Exigences de base, définitions, classification et critères de choix - Amendement 1

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

Systèmes de réfrigération et pompes à chaleur - Exigences de sécurité et d'environnement - Partie 1 : Exigences de base, définitions, classification et critères de choix - Amendement 1

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

This draft amendment A1, if approved, will modify the European Standard EN 378-1:2008. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

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Foreword

This document (EN 378-1:2008/prA1:2008) has been prepared by Technical Committee CEN/TC 182 “Refrigerating systems, safety and environmental requirements”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

1 Annex E

Replace Annex E by the following table.

Annex E
(normative)

Safety classification and information about refrigerants

Table E.1 — Refrigerant Designations

	Refrigerant Number	Chemical Name[b]	Chemical Formula	Safety Group[d]	PED Fluid Group	Practical Limit[e] (kg/m³)	ATEL/ODL[i] (kg/m³)	Flammability LFL[j, k] (kg/m³)	Vapour Density 25°C, 101.3 kPa[a] (kg/m³)	Molecular Mass[a]	Normal Boiling Point[a] (°C)	ODP [a, f]	GWP[a, g] (100 yr ITH)	Auto-ignition Tempe-rature (°C)
Methane Series														
	11	Trichlorofluoromethane	CCl_3F	A1	2	0.3	0.3	—	5.824	137,4	23.8	1	3800	—
	12	Dichlorodifluoromethane	CCl_2F_2	A1	2	0.5	0.5	—	5.039	120,9	– 29.0	1	10600	—
	12B1	Bromochlorodifluoromethane	$CBrClF_2$		2	0.2	0.2	—	N.D.	165,4	– 4.0	3	1300	—
	13	Chlorotrifluoromethane	$CClF_3$	A1	2	0.5	0.5	—	4.309	104,5	– 81.4	1	14000	—
	13B1	Bromotrifluoromethane	$CBrF_3$	A1	2	0.6	0.6	—	6.169	148,9	– 58.0	10	5400	—
	14	carbon tetrafluoride	CF_4	A1	2	N.D.	N.D.	—	3.611	88,0	– 128.0	0	6500	—
	22	Chlorodifluoromethane	$CHClF_2$	A1	2	0.3	0.3	—	3.587	86,5	– 40.8	0.055	1700	635
	23	Trifluoromethane	CHF_3	A1	2	0.68	0.68	—	2.884	70,0	– 82,1	0	12000	765
	30	Dichloromethane (methylene chloride)	CH_2Cl_2	B2	2	0.017	N.D.	0.417	N.D.	84,9	40.0		9	662
	32	difluoromethane (methylene fluoride)	CH_2F_2	A2	1	0.061	0.085	0.306	2.153	52,0	– 51.7	0	550	648
	50	Methane	CH_4	A3	1	0.006	N.D.	0.032	0.657	16,0	– 161.0	0	21	645
Ethane Series														
	113	1,1,2-trichloro-1,2,2-trifluoroethane	CCl_2FCClF_2	A1	2	0.4	0.4	—	3.467	187,4	47,6	0.8	4800	—
	114	1,2-dichloro-1,1,2,2-tetrafluoroethane	$CClF_2CClF_2$	A1	2	0.7	0.7	—	7.207	170,9	3,8	1	9800	—
	115	Chloropentafluoroethane	$CClF_2CF_3$	A1	2	0.6	0.6	—	6.438	154,5	– 39.0	0.6	7200	—
	116	Hexafluoroethane	CF_3CF_3	A1	2	0.55	0.55	—	5.696	138,0	– 79.0	0	11900	—
	123	2,2-dichloro-1,1,1-trifluoroethane	$CHCl_2CF_3$	B1	2	0.1	0.1	—	5.872	153,0	27,9	0.02	120	730
	124	2-chloro-1,1,1,2-tetrafluoroethane	$CHClFCF_3$	A1	2	0.11	0.11	—	5.728	136,5	– 12,1	0.022	620	—
	125	Pentafluoroethane	CHF_2CF_3	A1	2	0.39	0.39	—	4.982	120,0	– 48,1	0	3400	733
	134a	1,1,1,2-tetrafluoroethane	CH_2FCF_3	A1	2	0.25	0.25	—	4.258	102,0	– 26,2	0	1300	743
	141b	1,1-dichloro-1-fluoroethane	CH_3CCl_2F	A2	2	0.013	0.013	0.43	3.826	117,0	32.0	0.11	700	532
	142b	1-chloro-1,1-difluoroethane	CH_3CClF_2	A2	1	0.066	0.10	0.329	4.223	100,5	– 10.0	0.065	2400	750
	143a	1,1,1-trifluoroethane	CH_3CF_3	A2	1	0.056	0.53	0.282	3.495	84,0	– 47,0	0	4300	750
	152a	1,1-difluoroethane	CH_3CHF_2	A2	1	0.026	0.14	0.13	2.759	66,0	– 25.0	0	120	455
	170	Ethane	CH_3CH_3	A3	1	0.008	0.01	0.038	1.239	30,0	– 89.0	0	3[i]	515
	1150	Ethene (ethylene)	$CH_2=CH_2$	A3	1	0.007	N.D.	0.036	1.153	28,1	– 104.0	0	3[i]	—

Table E.1 (*continued*)

	Refrigerant Number	Chemical Name[b]	Chemical Formula	Safety Group[d]	PED Fluid Group	Practical Limit[e] (kg/m³)	ATEL/ODL[i] (kg/m³)	Flammability LFL[j, k] (kg/m³)	Vapour Density 25°C, 101.3 kPa[a] (kg/m³)	Molecular Mass[a]	Normal Boiling Point[a] (°C)	ODP[a, f]	GWP[a, h] (100 yr ITH)	Auto-ignition Tempe-rature (°C)
Propane Series														
	218	Octafluoropropane	$CF_3CF_2CF_3$	A1	2	0.44	0.44	—	7.853	188.0	– 37	0	8600	—
	227ea	1,1,1,2,3,3,3-heptafluoropropane	CF_3CHFCF_3	A1	2	0.49	0.49	—	7.137	170.0	– 15.6	0	3500	—
	236fa	1,1,1,3,3,3-hexafluoropropane	$CF_3CH_2CF_3$	A1	2	0.59	0.59	—	6.418	152.0	– 1.4	0	9400	—
	245fa	1,1,1,3,3-pentafluoropropane	$CF_3CH2CHF_2$	B1	2	0.19	0.19	—	5.689	134.0	14.9	0	950	—
	290	Propane	$CH_3CH_2CH_3$	A3	1	0.008	0.09	0.038	1.832	44.0	– 42	0	3[h]	470
	1270	Propene (propylene)	$CH_3CH{=}CH_2$	A3	1	0.008	0.010	0.040	1.745	42,1	– 48	0	3[h]	455
Butane (and higher) Series														
	365mfc	1,1,1,3,3-pentafluorobutane	$CF_3CH_2CF_2CH_3$	ND	N.D.	N.D.	N.D.	N.D.	N.D.	148.0	40.1	0	890	—
	43-10mee	1,1,1,2,2,3,4,5,5,5-decafluoropentane	$CF_3CF_2CHFCHF CF_3$	A1	2	N.D.	N.D.	—	N.D.	252.0	54.6	0	1500	—
Cyclic Organic Compounds														
	C318	Octafluorocyclobutane	C_4F_8	A1	2	0.81	0.81	—	8.429	200,0	– 6	0	10000	—
Hydrocarbons														
	600	Butane	$CH_3CH_2CH_2CH_3$	A3	1	0.0086	0.19	0.043	2.450	58.1	0	0	3[h]	365
	600a	2-methyl propane (isobutane)	$CH(CH_3)_3$	A3	1	0.0086	0.06	0.043	2.440	58.1	– 12	0	3[h]	460
	601	Pentane	$CH_3CH_2CH_2CH_2 CH_3$	A3	1	0.008	N/A	0.041	2.058	72.1	36.1	0	3[h]	—
	601a	2methyl butane (isopentane)	$(CH_3)_2CHCH_2CH_3$	A3	1	0.008	N/A	0.041	2,786	72.1	27.8	0	3[h]	—
Other Organic Compounds														
	E170	Dimethyl Ether	$(CH_3)_2O$	A3	1	0.013	0.08	0.064	1.914	46	– 24.8	0		235

Table E.1 (*continued*)

	Refrigerant Number	Chemical Name[b]	Chemical Formula	Safety Group[d]	PED Fluid Group	Practical Limit[e] (kg/m³)	ATEL/ODL[i] (kg/m³)	Flammability LFL[j, k] (kg/m³)	Vapour Density 25°C, 101.3 kPa[a] (kg/m³)	Molecular Mass[a]	Normal Boiling Point[a] (°C)	ODP[a, f]	GWP[a, h] (100 yr ITH)	Auto-ignition Tempe-rature (°C)
Inorganic Compounds														
	717	Ammonia	NH_3	B2	1	0.00035	0.00035	0.104	0.704	17,0	– 33	0	0	630
	744	Carbon dioxide	CO_2	A1	2	0.07	0.07	-	1.808	44,0	– 78[c]	0	1	—

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

N.D Signifies Not Determined

[a] The vapour density, molecular mass, normal boiling point, ODP and GWP are not part of this 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] See Annex G. Unclassified refrigerants indicate either insufficient data to classify or no formal request for classification.

[e] See Annex G.

[f] Adopted under the Montreal Protocol.

[g] IPCC, Third Assessment Report 2001. Values used in EC Regulation 842/2006 (F Gas Regulation)

[h] 1998 Ozone Assessment Report.

[i] Acute-Toxicity Exposure Limit or Oxygen Deprivation Limit, whichever is lower.

[j] Lower Flammability Limit.

[k] Where the required data are not given, the refrigerant is listed for information only.

Table E.2 — Refrigerant Designations of R400 Blends

Refrigerant Number	Composition c (Weight %)	Composition Tolerances (%)	Safety Group[d]	PED Fluid Group	Practical Limit[e] (kg/m³)	ATEL/ODL[h] (kg/m³)	Flammability LFL[i, j] (kg/m³)	Vapour Density 25°C, 101.3 kPa[a] (kg/m³)	Molecular Mass[a]	Bubble Point/Dew Point at 1.0 at. (°C)[a]	ODP[f]	GWP[g] (100 yr ITH)	Auto-ignition Tempe-rature[j] (°C)
401A	R-22/152a/124 (53/13/34)	± 2/+ 0,5 – 1,5/± 1	A1	2	0.3	0.3	-	3.929	94.4	– 33.4 to – 27.8	0.037	1130	681
401B	R-22/152a/124 (61/11/28)	± 2/+ 0,5 – 1,5/± 1	A1	2	0.34	0.34	-	3.860	92.8	– 34.9 to – 29.6	0.04	1220	685
401C	R-22/152a/124 (33/15/52)	± 2/+ 0,5 – 1,5/± 1	A1	2	0.24	0.24	-	4.211	101	– 28.9 to – 23.3	0.03	900	—
402A	R-125/290/22 (60/2/38)	± 2/+ 0.1, – 1.0/± 2	A1	2	0.33	0.33	-	4.214	101.5	– 49.2 to – 47.0	0.021	2690	723
402B	R-125/290/22 (38/2/60)	± 2/+ 0.1, – 1.0/± 2	A1	2	0.32	0.32	-	3.929	94.7	– 47.2 to – 44.8	0.033	2310	641
403A	R-290/22/218 (5/75/20)	+ 0,2 – 2,0/± 2/± 2	A1	2	0.33	0.33	-	3.817	92	-47.7 to –44.3	0.041	3000	—
403B	R-290/22/218 (5/56/39)	+ 0,2 – 2,0/± 2/± 2	A1	2	0.41	0.41	-	4.289	103.3	– 49.1 to –46.84	0.031	4310	—
404A	R-125/143a/134a (44/52/4)	± 2/± 1/± 2	A1	2	0.48	0.48	-	4.057	97.6	– 46.5 to – 45.7	0	3780	728
405A	R-225/152a/142b/C318 (45/7/5,5/42,5)	± 2/± 1/± 1/± 2[b]	A1	2	0.26	0.26	-	4.665	111.9	– 32.8 to – 24.4	0.028	5160	—
406A	R-22/600a/142b (55/4/41)	± 2/± 1/± 1	A2	1	0.13	0.13	0.302	3.744	89.9	– 32.7 to – 23.5	0.057	1920	—
407A	R-32/125/134a (20/40/40)	± 2/± 2/± 2	A1	2	0.33	0.33	-	3.743	90.1	– 45.2 to – 38.7	0	1990	685
407B	R-32/125/134a (10/70/20)	± 2/± 2/± 2	A1	2	0.35	0.35	-	4.274	102.9	– 46.8 to – 42.4	0	2700	703
407C	R-32/125/134a (23/25/52)	± 2/± 2/± 2	A1	2	0.31	0.31	-	3.582	86.2	– 43.8 to – 36.7	0	1650	704
407D	R-32/125/134a (15/15/70)	± 2/± 2/± 2	A1	2	0.41	0.41	-	3.784	90.9	– 39.4 to – 32.7	0	1500	—
407E	R-32/125/134a (25/15/60)	± 2/± 2/± 2	A1	2	0.40	0.40	-	3.482	83.8	– 42.8 to – 35.6	0	1430	—
408A	R-125/143a/22 (7/46/47)	± 2/± 1/± 2	A1	2	0.41	0.41	-	3.614	87.0	– 44.6 to – 44.1	0.026	3020	—
409A	R-22/124/142b (60/25/15)	± 2/± 2/± 1	A1	2	0.16	0.16	-	4.055	97.5	– 34.7 to – 26.3	0.048	1540	—
409B	R-22/124/142b (65/25/10)	± 2/± 2/± 1	A1	2	0.17	0.17	-	4.021	96.7	– 35.8 to – 28.2	0.048	1500	—
410A	R-32/125 (50/50)	+ 0,5 – 1,5/+ 1,5 – 0,5	A1	2	0.44	0.44	-	3.007	72.6	– 51.6 to – 51.5	0	1980	—
410B	R-32/125 (45/55)	± 1/± 1	A1	2	0.43	0.43	-	3.131	75.5	– 51.5 to – 51.4	0	2120	—
411A	R-1270/22/152a (1,5/87,5/11,0)	+ 0 – 1/+ 2 – 0/+ 0 – 1	A2	1	0.04	0.09	0.186	3.420	82.4	– 39.6 to – 37.1	0.048	1500	—
411B	R-1270/22/152a (3,94/3)	+ 0 – 1/+ 2 – 0/+ 0 – 1	A2	1	0.05	0.09	0.239	3.446	83.1	– 41.6 to – 40.2	0.052	1600	—
412A	R-22/218/142b (70/5/25)	± 2/± 2/± 1	A2	1	0.07	0.18	0.329	3.883	92.2	– 36.5 to – 28.9	0.055	2220	—
413A	R-218/134a/600a (9/88/3)	± 1/± 2/+ 0, – 1	A2	1	0.07	0.21	0.375	4.334	103.9	– 29.4 to – 27.4	0	1920	—
414A	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	± 2/± 2/± 0.5/+ 0.5, – 1.0	A1	2	0.10	0.10	-	4.040	97.0	– 33.2 to – 24.7	0.045	1440	—
414B	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	± 2/± 2/± 0.5/+ 0.5, – 1.0	A1	2	0.10	0.10	-	4.232	101.6	– 33.1 to – 24.7	0.042	1320	—