



Minutes (Final)
SSPC-34: Designation & Safety Classification of Refrigerants
8:00 – 10:00 AM (EST), March 1, 2024
Interim Virtual Meeting
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1. CALL TO ORDER

1.1 ASHRAE Value Statement

In ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, inclusiveness and respect for others, which exemplify our core values of excellence, commitment, integrity, collaboration, volunteerism and diversity, and shall avoid all real or perceived conflicts of interest. Our culture is one of inclusiveness, acknowledging the inherent value and dignity of each individual. We celebrate diverse and inclusive communities, understanding that doing so fuels better, more creative and more thoughtful ideas, solutions and strategies for the Society and the communities our Society serves. We respect and welcome all.

Code of Ethics - <https://www.ashrae.org/about/governance/code-of-ethics>

Core Values - <https://www.ashrae.org/about/ashrae-s-core-values>

Diversity Statement - <https://www.ashrae.org/about/diversity-equity-and-inclusion-dei>

1.2 Introduction of Members and Guests

1.3 SSPC 34 Roster

SSPC 34 Roster for 2023 – 2024 (12)			
Producer/Refrigerant (3)	User/Systems (3)	User/Components (2)	General (4)
Sarah Kim (2024) Chair	Sivakumar Gopalnarayanan (2027)	Brian Fricke (2025)	Mark Olson (2026)
Gary Jepson (2027)	Stephen Kujak (2026)	Sara Kampfe (2027)	Andrew Kusmierz (2027)
Ankit Sethi (2025)	Julie Majurin (2024) Vice Chair / Flammability Subcommittee Chair		John Senediak (2026)
			Kenji Takizawa (2027)
			Felix Flohr (2024) Consultant (NVM)
			John Scott (2024) Consultant (NVM)
			Asbjorn Vonsild (2024) Consultant (NVM)

1.4 Quorum determination

10 out of 12 voting members present.

1.5 Chair/ASHRAE Announcements (Sarah and Kai)

2. AGENDA REVIEW

Motion: Agenda approved as written

1st : Siva 2nd : Gary

9 / 0 / 1-CNV / 2 (*for / against / abstention / missing*)

3. MINUTES OF THE LAST MEETING / TELECONFERENCES

Motion: Approve the minutes of the 2024 Chicago meeting as written

1st : Andrew 2nd : Sara

8 / 0 / 2 / 2 (*for / against / abstention / missing*)

Reason for abstention: Mark - missed meeting; CNV

4. ROSTER STATUS

Changes to the SSPC 34 roster since January 2024

- Resignations – Tatsuro Kobayashi, Greg Woyczynski, Gurunarayana Ravi
- Status change (Spring 2024)
 - Ivan Rydkin – moving from D&N Chair to Toxicity Chair
 - Harshad Inamdar – D&N Chair and PCVM

5. APPLICATIONS FOR REFRIGERANT DESIGNATION AND SAFETY CLASSIFICATION

SSPC 34 reviews new and amended refrigerant applications that are received by SSPC 34 members at least 30 days prior to the first scheduled SSPC 34 subcommittee meeting (Section 9.1.3, “Timing”). Applications are reviewed in the order in which they are received (Section 9.1.4, “Precedence”). The last distributed amendment or supplement to an application is used to determine review precedence.

Received amendments to previously tabled or rejected applications, R0153-23-12 and R0154-23-12, will be reviewed at next scheduled subcommittee meetings and subsequent PC meeting.

➤ *NO ACTION: Information only*

6. CONTINUOUS MAINTENANCE PROPOSALS

There are 13 open CMPs that requires committee response. Proposals have been assigned to respective subcommittees or group of experts where appropriate. See attached.



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6.1 Continuous Maintenance Proposal (CM 34-22-0003/002)

PROPOSAL – D&N	
Standard version	2022
Proposer #	0003 (Asbjorn Vonsild)
Proposal #	002
Proposal Title	HCC and HCO
Section	5.2.2, 4 th sentence
Proposal Text	The composition designating prefixes for halogenated olefins shall be either “CFC,” “HCFC,” “ <u>HCC</u> ,” or “HFC” to refer to chlorofluorocarbon, hydrochlorofluorocarbon, <u>hydrochlorocarbon</u> , or hydrofluorocarbon, respectively, or with substitution of an “O” for the carbon “C” as “CFO,” “HCFO,” “ <u>HCO</u> ,” or “HFO” to refer to chlorofluoro-olefin, hydrochlorofluoro-olefin, <u>hydrochloro-olefin</u> , or hydrofluoro-olefin, respectively.
Substantiating Comments	<p>Almost editorial:</p> <p>ASHRAE 34 allows for using CFO, HCFO, and HFO for unsaturated CFC, HCFC and HFC respectively.</p> <p>In ISO817 it is also allowed to use HCO for unsaturated HCC.</p> <p>This means that R-1130(E), CHCl=CHCl, is HCO-1130(E) in ISO 817, but it is not clear whether it is allowed to use the prefix HCC in ASHRAE, and clearly it is not allowed to use HCO in ASHRAE.</p> <p>Note there is currently typos after CFC, HCFC, CFO, and HCFO in ASHRAE 34</p> <p>Proposal: Add HCC and HCO for unsaturated hydrochloro-olefins.</p>

- Motion: D&N to recommend to the MC to accept this comment for PPR without modification.

MP move to accept. BF 2nd. 8-0-1-2-CV (yes/no/abstain/absent-chair)

AS Abstaining: **change not required.**

D&N Action: IR to work with AS to look at optimization to the section 5.2.2

- Action: Review and vote on PPR if necessary

PC Motion: Accept this comment for PPR without modification.

1st: Julie, 2nd: Brian

8 / 1 / 1-CNV / 2 (for / against / abstention / missing)

Reason for against : Steve – should be rejected until a proposal to address this topic is available. More language adds to ASHARE staff's time and cost of publishing the standard.

6.2 Continuous Maintenance Proposal (CM 34-22-0003/003)

PROPOSAL – D&N	
Standard version	2022
Proposer #	0003 (Asbjorn Vonsild)
Proposal #	003
Proposal Title	Substances which can be explicitly determined from the refrigerant numbers
Section	4.1
Proposal Text	The identifying numbers assigned to the hydrocarbons, halocarbons <u>and ethers</u> of the methane, ethane, ethene, propane, propene, butane, butene, cyclobutane, <u>and cyclobutene</u>
Substantiating Comments	The 1st sentence is missing ethers and cyclobutene in the list of substances which can be explicitly determined from the refrigerant numbers

- Motion: D&N to recommend to the MC to accept this comment for PPR with modification ("cyclobutene").

DH move to accept. JH 2nd. 9-0-0-2-CV (yes/no/abstain/absent-chair)

- Action: Review and vote on PPR if necessary

PC Motion: Accept this comment for PPR with modification.

1st: Mark, 2nd: Brian

9 / 0 / 1-CNV / 2 (for / against / abstention / missing)

6.3 Continuous Maintenance Proposal (CM 34-22-0003/004)

PROPOSAL – PC	
Standard version	2022
Proposer #	0003 (Asbjorn Vonsild)
Proposal #	004
Proposal Title	B2.1 reference to WCFE test
Section	B2.1, 1 st paragraph
Proposal Text	Change: ...under conditions of leakage (see Section B2.34) and successive charge/recharge conditions (see Section B2.4)
Substantiating Comments	Current test references Section B2.3, but this not on leakage. Leakage conditions are in Section B2.4 (both for leakage from containers and from equipment).

- Action: Review and vote on PPR if necessary

Motion: Accept this comment for PPR without modification.

1st: Andrew, 2nd: Julie

9 / 0 / 1-CNV / 2 (for / against / abstention / missing)

6.4 Continuous Maintenance Proposal (CM 34-22-0003/005)

PROPOSAL – PC	
Standard version	2022
Proposer #	0003 (Asbjorn Vonsild)
Proposal #	005
Proposal Title	B2.1.1 reference to WCFF test
Section	B2.1.1, 1 st sentence
Proposal Text	...in accordance with Section B2.34
Substantiating Comments	The WCFF test is not in B2.3, but in B.2.4.

- **Action:** Accept without modification and will be corrected through erratum.

6.5 Continuous Maintenance Proposal (CM 34-22-0004/001)

PROPOSAL – PC	
Standard version	2022
Proposer #	0004 (Jake Rede)
Proposal #	001
Proposal Title	Update to RCL values for A2L refrigerants
Section	Table 4-2
Proposal Text	Specifically: Remove/Delete current RCL's listed and update RCL for applicable refrigerants to 50% of LFL instead of the default 25%.
Increase of engineering or construction cost	no, I do not believe so. Although some existing facilities may wish to update sensor setpoints to the new values.
Substantiating Comments	<p>IEC 60335-2-40 & the 4th edition of UL's version of this standard will show in Annex GG that the acceptable concentration per that standards requirements to be using a safety factor of 1/2 the LFL instead of 1/4. Listed HVAC equipment with A2L, A2 & A3 refrigerants, per that standards requirements, will have instructions that expressly require installers to compute the space volume and ensure that the equipment's total charge cannot exceed the 1/2 of LFL safety factor for installation in that application.</p> <p>It seem prudent, that this standard be updated to match these general requirements, and denote specifically any refrigerants where this value of RCL would pose a toxicity hazard to the occupants, in the event of a refrigerant release.</p>

- **Action:** Review and vote on PPR if necessary
- **Discussions:** Steve - First time hearing this issue; Andrew: Are the 2-40 standards taking the same ½ safety factor for 2L, 2, 3?; Harshad - 2-40 4th edition doesn't calculate charge based on room size. Upper limit is $m1=3 \times LFL$, if charge exceeds $m1$, then room based calculation is needed. A2 and A3 have an absolute upper limit of $m1$. 2-89 specifies room volume values based on RCL. Need to coordinate with ASHRAE 15 as the proposed change will have conflict with other standards. ASHRAE 15 has requirements for setpoints for detectors and ventilation rates tied to RCLs. For equipment that is under the scope of 2-40, LFL values are directly used and an equation is provided for charge calculations. Machinery rooms directly reference RCL,

therefore changing the safety factor to $\frac{1}{2}$, will only apply to certain groups of equipment under the scope of ASHRAE 15.

Based on the discussions, committee members would recommend the commenter to submit the CMP to ASHRAE 15.

➤ **Motion:** Reject this CMP.

1st: Siva, 2nd: Julie

9 / 0 / 1-CNV / 2 (for / against / abstention / missing)

7. SUBCOMMITTEE REPORTS (Chicago 2024 meeting)

7.1 Designation and Nomenclature

Went through all agenda items. Updated D&N checklist will be distributed to members shortly.

7.2 Flammability

Flammability SC reviewed 10 applications and 9 out of 10 were rejected or tabled. Discussions were held if there are ways to help the applicants, especially new applicants, to increase the success rate of application acceptance. Application checklist will be updated to guide the applicants better and potentially include a flowchart.

There will be an interim meeting scheduled prior to the summer conference to review CMPs and applications submitted since the winter meeting.

7.3 Toxicity

Update/modify R-1270 anesthetic values in ASHRAE 34 as follows:

- a. Note: "other" was changed to ND in ASHRAE 34 per June 2023 meeting.
- b. Change anesthetic NOEL from 10,000 ppm to ND.
- c. Add 69,000 ppm as the anesthetic LOEL (This is 50% of the lethality ATEL which is already 28.3% of LC50 value of 490,000 ppm.
- d. Use 35,000 ppm as the anesthetic ATEL based on 50% of the LOEL and is consistent with the data treatment described in ASHRAE 34 and ISO817.
- e. Background/basis:
ASHRAE 34 voted at the last meeting to remove the R1270 "other" value from the table and make it ND. No one can find any reference supporting the "other" value. R1270 is a simple asphyxiant and both the anesthetic and "other" categories are without credible, available data. Even the lethality data seems suspect, although there was some rodent acute inhalation work was done in 1926. In that study, lethality in rodents didn't occur until concentrations of 700,000 ppm were achieved, minimal anesthesia in rats occurred at 300,000-400,000 ppm and dogs were unaffected even after hours at 500,000 ppm. This demonstrates that R1270 is not acutely toxic. The R1270 anesthetic NOEL value of 10,000 came from the highest concentration tested in a cancer study, but the cancer study is a chronic study and is not relevant to acute toxicity.
NOEL test can't exceed 10,000 due to flammability concerns.

- Toxicity SC Motion: Use lethality (acute toxicity) value (50 % of lethality ATEL) a basis for R-1270 anesthetic value and treat per ASHRAE 34 and/or ISO817. See point C above. 1st: Gary

Second: Christine ASHRAE, Paul ISO817
Vote: 4-0-0 (For-Against-Abstain)

- Action: Review and vote on PPR if necessary

Table E-1 Toxicity Table for Standard 34—ATEL, ODL, FCL, and RCL Values for Single-Compound Refrigerants^a (ppm v/v) (Continued)

Refrigerant Number	Chemical Name	Cardiac Sensitization			Anesthesia				ATEL	ODL	FCL	RCL	LFL	ATEL Source	RCL Source
		LC ₅₀ ^{b,c}	LOEL ^d	NOEL ^d	EC ₅₀ ^e	LOEL ^f	NOEL ^g	Other ^h							
744	carbon dioxide	159,000	ND	30,000	ND	-p-	50,000	50,000 ^d	30,000	140,000	NA	30,000	—	100% Cardiac NOEL	ATEL
1132a	1,1-difluoroethene	100,000	ND	50,000	ND	ND	200,000	ND	28,000	ND	13,000	13,000	50,000	28.3% LC ₅₀	25% LFL
1132(E)	trans-1,2-difluoroethene	106,000	ND	116,000	ND	ND	106,250	ND	30,000	140,000	11,000	11,000	43,000	Mortality	FCL
1224yd(Z)	cis-1-chloro-2,3,3,3-tetrafluoro-1-propene	213,000	ND	75,000	ND	152,000	ND	ND	60,000	140,000	NA	60,000	ND	28.3% LC ₅₀	ATEL
1234yf	2,3,3,3-tetrafluoro-1-propene	>406,000	ND	>120,000	ND	201,000	ND	ND	100,000	140,000	16,000	16,000	62,000	50% CNS/Anesthesia LOEL	25% LFL
1234ze(E)	trans-1,3,3,3-tetrafluoro-1-propene	>207,000	ND	>120,000	ND	ND	>207,000	ND	59,000	140,000	16,000	16,000	65,000	28.3% LC ₅₀	25% LFL
1270	propene (propylene)	>490,000 ^a	ND	ND	ND	ND	10,000	7200 ND	1000	140,000	6700	1000	27,000	Sect 7.1.1(b)	ATEL

- PC Discussion:
 - Are blends containing R-1270 affected by this change? No, as tox is driven by cardiac sensitization, which determines the ATEL.
 - Why do we need a value for LOEL instead of keeping it as ND? Can't do the calculation for blend toxicity.
 - Why are cardiac values left ND? Cardiac values defaults to a very low value of 1,000 ppm per 7.1.1 (b).
 - From a flammability perspective, class 2 and 3 are similar, however, class 2 refrigerants are required to submit toxicity test data. Therefore, class 3 refrigerants should not be waived from toxicity test requirements due to flammability. All tox data is required to be submitted as part of the application and should not relax the requirement for class 3 refrigerants.
 - When hydrocarbons are a minor component of the blend, it's less of a concern to default to a low value, but for pure hydrocarbon blends, there may be a need for a research study to be carried out.
 - Anesthetic, unlike cardiac, is not a yes or no judgement call. Toxicity SC is proposing a conservative number of 69,000 ppm based on lethality instead of the current 10,000 ppm, which has no reference or source to be found.
 - The current standard does not list default values for simple asphyxiants. For unknown molecules, it is required to provide all the toxicity information. In order to treat hydrocarbons as a simple asphyxiant and waive the toxicity data, there should be an exemption clearly listed in the Standard.

- **PC Motion:** Use lethality (acute toxicity) value (50 % of lethality ATEL) a basis for R-1270 anesthetic value and treat per ASHRAE 34 and update E-1 as shown.

Refrigerant R-	Chemical Name	Cardiac Sensitization			Anesthesia			Other ^h	ATEL	RCL Source
		LC ₅₀ ^{b,c}	LOEL ^d	NOEL ^d	EC ₅₀ ^e	LOEL ^f	NOEL ^g			
1270	Propene (propylene)	>490,000 ^s	ND	ND	ND	ND 69,000	40,000 ND	ND	1,000	

1st: Gary, 2nd: Andrew

8 / 1 / 1-CNV / 2 (for / against / abstention / missing)

Reason for against: AS - The change doesn't necessarily affect the ATEL, but we should follow the standard and not exempt hydrocarbons from data requirements.

8. OTHER BUSINESS

8.1 Equation (7-3) RCL Unit Conversion factor Inquiry

$$RCL_M = RCL \times a \times M \quad (7-3)$$

where

RCL_M = RCL expressed as lb/1000 ft³ (g/m³)

RCL = RCL expressed as ppm v/v

$a = 1.160 \times 10^{-3}$ for lb/1000 ft³ (4.096×10^{-5} for g/m³)

M = relative molar mass of the refrigerant, **lb/mol** (g/mol)

- Action: Review Michael, Mary and Clare's recommendation and vote on proposed changes.



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C34_Request_rev03%2

Discussion: To be reviewed again in Indianapolis. Consider option where constant 'a' is recalculated and provided in lieu of an equation.

8.2 Review of SSPC 34 Calculator (Michael Petersen)

- Action: No actions, just a verbal report out in this area.
New refrigerant addenda were added to the calculator and will be posted on basecamp. Tox values and flammability information are being monitored for future updates.

8.3 ISO817 / SSPC34 alignment (Bill Walter, Asbjorn Vonsild)

- Action: No actions, just a verbal report out in this area.
ISO 817 have been voted on and received some comments. Still sorting through them but most are editorial. Meeting scheduled in April to address these comments. Final draft will be circulated for vote beginning of June and published September/October.

8.4 Update missing LFL and BV for A2Ls in Table 4.2

- Action: Julie, Bob, and Sarah to work together

Motion: Update Table 4-2 with the flammability data as shown.

Refrigerant	LFL ¹	BV ^p
-------------	------------------	-----------------

	ppm v/v	lb/1000 ft ³	g/m ³	(cm/s)
[...]				
457B				<u>4.9</u>
457C				<u>5.6</u>
[...]				
467A	<u>125,000^m</u>	<u>22.9^m</u>	<u>367^m</u>	<u><4</u>
468A	<u>73,000</u>	<u>16.9</u>	<u>270</u>	<u>2.1</u>
468B	<u>72,000</u>	<u>17.3</u>	<u>278</u>	<u>7.3^q</u>
468C	<u>92,000</u>	<u>17.2</u>	<u>276</u>	<u>7.6</u>
[...]				
474A				<u>3.3</u>
[...]				

1st: Brian, 2nd: Sara

8 – 0 – 1 (CNV) – 3 (yes/no/abstain/missing)

Steve, Ankit, Sara, Gary, Brian, Andrew, Mark, Siva, Sarah (present)

Julie, Kenji, John (absent)

9. REFRIGERANTS AND RCL VALUES IN THE CODES (M. Koban)

- 9.1 Uniform Mechanical Code (UMC)
- 9.2 International Mechanical Code (IMC & IFC)
- 9.3 Any other information from the CIS (Code Interaction Subcommittee).

➤ Action: No actions, just a verbal report in this area.

AHRI's A2L building code map by state: <https://www.ahrinet.org/a2l-refrigerant-building-code-map>

10. NEXT MEETINGS – ASHRAE 2024 Annual Conference, Indianapolis, IN – Saturday, June 22nd to Wednesday, June 26th, 2024, as noted below (subject to change). Refer to <https://ashrae.org/conferences/2024-annual-conference-indianapolis> for full meeting schedule and details.

Committee Name	Tentative Day/Date	Start Time (EDT)	End Time (EDT)
SSPC 34 D&N Subcommittee	Saturday, June 22 nd , 2024	8:00 AM	11:00 AM
SSPC 34 Flammability Subcommittee	Saturday, June 22 nd , 2024	12:00 PM	4:00 PM
SSPC 34 Toxicity Subcommittee/ISO 817 MA Toxicity Task Force (Joint Meeting)	Monday, June 24 th , 2024	8:00 AM	10:30 AM
SSPC 34 (Project Committee)	Monday, June 24 th , 2024	6:30 PM	10:00 PM

11. ADJOURNMENT

Andrew

ATTACHMENT 1

PC Chairs' Meeting Deadlines through 2024

**Please note that some dates are tentatively scheduled a year in advance and are subject to change. If you intend to try to meet one of these deadlines, please confirm the meeting dates and deadlines with Staff well in advance, or agenda items may be moved to the next meeting.*

	2024 Winter Meeting Jan 20 – Jan 24, 2024	SPLS Spring Meeting 2024*	Annual Meeting June 22 – 26, 2024	Fall Meetings 2024*
SPLS Meeting/Conference Call dates	Jan 10, 2024* Feb 1, 2024	Mar 18, 2024*	June 22 & June 26 2024	Oct 2024*
StdC Meeting/Conference Call dates	Jan 15, 2024* Jan 25, 2024	N/A	June 25-June 29, 2024	Oct 2024*
Membership				
New PC member applications & existing member changes (Bio/Bias/Applications** due)	Oct 20, 2023	N/A	April 5, 2024	Aug 2, 2024
PC Chair's Membership Recommendation Form** due	Nov 17, 2023	N/A	May 3 2024	Sep 6, 2024
Publication Public Review Packages				
PC Chairs Publication Public Review Submittal Form** deadline for Normal Track PPR packages (see Note below for Fast Track Process)	Dec 11, 2023	March 1, 2024	May 18, 2024	July 31, 2024
SPLS approval of Normal Track PPRs	Jan 10, 2024	Mar 18, 2024*	June 24, 2024	Oct 13, 2024*
Public Review Starts for 30 and 45 day PRs	Jan 22, 2024	Mar 25, 2024	July 8, 2024	Oct 25, 2024
30-day Public Review ends	Feb 20, 2024	Apr 24, 2024	Aug 7, 2024	Nov 27, 2024
45-day Public Review ends	Mar 7, 2024	May 9, 2024	Aug 22, 2024	Dec 12, 2024
Publication Packages				
PC Chairs' Final Publication Submittal Form deadline (for policy level and documents with unresolved commenters)	Dec 13, 2023	N/A	May 5, 2024	Sep 8, 2024
PC Chairs' Galley Sign-off deadline	Jan 12, 2024	N/A	June 12, 2024	Oct 25, 2024
Other				
TPS Changes and other items**	Dec 20, 2023	Feb 19, 2024	Jun 3, 2024	Sep 15, 2024

* Dates are TBD.

** Membership, TPS Changes, Publication Submittal and other forms can be found on ASHRAE's PC Toolkit page.

Note: Public Review packages that meet the Fast Track criteria noted in PASA Clause 7.2.1.3, *Fast Track Public Review (FTPR)*, may be submitted for public review at any time.