



Meeting Agenda (Draft V.1)
SSPC-34: Designation & Safety Classification of Refrigerants
Flammability Subcommittee

10:00 AM - 3:00 PM Saturday, 23 June 2018
 Hilton Americas Houston (Grand B (4)) Houston, TX

1. CALL TO ORDER

1.1. ASHRAE Code of Ethics Review (ATTACHMENT 1)

“Commitment to the ASHRAE Code of Ethics – In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interests. (See full Code of Ethics: <https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics>.)”

1.2. Introduction of Members and Guests

1.3. Quorum Determination (16 Voting Members) [10 PCVM, 6 PSVM]

SSPC 34 Flammability Subcommittee Roster for 2017 – 2018

Producer/Refrigerant (5)	User/Systems (2)	User/Components (2)	General (7)
Sean Cunningham (C 2019)	Warren Clough (C 2019)	Marc Scancarello (C 2021)	Scott MacLeod <i>Chair</i> (C 2018)
Sarah Kim (S 2021)	Chun-cheng Piao (C 2018)	Chris Seeton (C 2018)	Andrew Kusmierz (S 2019)
Evan Laganis (S 2019)			John Senediak (C 2018)
Robert Richard (S 2018)			IIAR ¹ , Eric Smith (C 2018) / David Rule (alternate - 2018)
Jian Sun-Blanks (S 2019)			Sonny Sundaresan (C 2021)
			Kenji Takizawa (C 2019)
			Jing Zheng (S 2019)

(C = PCVM, S = PSVM, year indicates end of term after the June Conference meeting)

¹IIAR is an organizational member represented by Eric Smith with Dave Rule as an alternate PCVM.

2. AGENDA REVIEW

➤ Motion: Approve the agenda (as written / as modified)

1st : _____ 2nd : _____

0 / 0 / 0 / 0 CNV (for / against / abstention / missing CV or CNV)

3. MINUTES OF THE LAST MEETING / TELECONFERENCES

3.1. Approval / revision to the minutes of the January 20, 2018 meeting (in Chicago, Ill)

➤ Motion: Approve the minutes of the January 20, 2018 meeting (as written / as modified) distributed on January 29, 2017.

1st : _____ 2nd : _____

0 / 0 / 0 / 0 CNV (for / against / abstention / missing CV or CNV)

3.2. Approval / revision to the minutes of the March 26, 2018 teleconference.

➤ Motion: Approve the minutes of the March 26, 2018 teleconference (as written / as modified) distributed on March 26, 2018.

1st : _____ 2nd : _____

0 / 0 / 0 / 0 CNV (for / against / abstention / missing CV or CNV)

4. ROSTER STATUS

The Chair will review the Flammability Subcommittee roster for roll offs, changes and proposed additions for the 2018-2019 Society year beginning June 30, 2018. (See ATTACHMENT 2 for the "Proposed SSPC 34 Flammability Subcommittee Membership Roster 2018-2019".)

- Rolling Off
 - Sean Cunningham
- Changes
 - Scott MacLeod to Consultant (NVM)
- Proposed Additions
 - Julie Majurin (Chair, VM)
 - Bob Low (VM)
- Anyone interested in becoming a voting member or otherwise active in SSPC 34 Flammability Subcommittee, please contact Sean Cunningham or Julie Majurin.

➤ NO ACTION: For information only

5. PUBLICATION PUBLIC REVIEW DRAFTS

- 5.1. Standard 34-2016 Status – an informative summary table for addenda to ASHRAE Standard 34-2016 is in ATTACHMENT 3.

➤ *NO ACTION: For information only*

- 5.2. The following addenda will be voted on by the Standards Committee and the Board of Directors (BOD) in June 2018. Formal publication will follow an ANSI review.

Addendum g to Standard 34-2016: Adds 2L as a distinct classification rather than as a subclassification of 2.

Addendum i to Standard 34-2016: This addendum adds the zeotropic blend R-463A [R-744 / 32 / 125 / 1234yf / 134a (6.0 / 36.0 / 30.0 / 14.0 / 14.0 by mass %)] to Table 4-2 and Table D-2 as A1.

Addendum o to Standard 34-2016: This addendum adds the zeotropic blend R-436C [R-290 / 600a (95.0 / 5.0 by mass %)] to Table 4-2 and Table D-2 as A3.

➤ *NO ACTION: For information only*

- 5.3 Addendum p to Standard 34-2016. R-1234ze(E) / 227ea (91.1 / 8.9 mass %). Recommended by SSPC34 for PPR. Final vote 11-1-4. SPLS will review June 29 or July 6.

➤ *NO ACTION: For information only*

6. APPLICATIONS FOR REFRIGERANT DESIGNATION AND SAFETY CLASSIFICATION

The PC reviews new and amended applications that are received by SSPC 34 members 30 days or more prior to first subcommittee meeting (9.1.3 Timing). Applications are reviewed in order that they are received (9.1.4 Precedence). The last distributed amendment or supplement to an application is used to determine review precedence.

- 6.1. **R0098-18-05 from Jason Juhasz (Chemours) for proposed single component refrigerant HFO-1336mzz(E) (Trans-1,1,1,4,4,4-hexafluoro-2-butene).**

➤ **ACTION: Vote on the flammability Safety Classification for this application.**

Recommend SSPC 34 to accept this application from Jason Juhasz, Chemours Company, as meeting the Flammability requirements of Standard 34, and assign the flammability classification of **1** for the single component refrigerant HFO-1336mzz(E) (Trans-1,1,1,4,4,4-hexafluoro-2-butene).

Note: This refrigerant has a heat of combustion of 8.07 MJ/kg [3469 BTU/lb] at 25 °C.

Discussion:

Motion:

Second:

Discussion:

Affirmative:

Against:

Abstain:

Result 0/0/0/0 CNV

Reason for Against:

Reason for Abstention:

Motion Carries?

6.2. **R0099-18-05 from Samuel Yanna Motta (Honeywell) for proposed single component refrigerant trifluoroiodomethane (CF₃I).**

➤ **ACTION: Vote on the flammability Safety Classification for this application.**

Recommend SSPC 34 to accept this application from Samuel Yanna Motta Honeywell Fluorine Products, as meeting the Flammability requirements of Standard 34, and assign the flammability classification of **1** for the single component refrigerant trifluoroiodomethane (CF₃I).

Note: This refrigerant has a heat of combustion of 0.99 MJ/kg [426 BTU/lb] at **25 °C**.

Discussion:

Motion:

Second:

Discussion:

Affirmative:

Against:

Abstain:

Result 0/0/0/0 CNV

Reason for Against:

Reason for Abstention:

Motion Carries?

6.3. **R0100-18-05 from Samuel Yana Motta (Honeywell) for proposed zeotropic refrigerant blend R-32/R-125/ CF₃I (49.0/11.5/39.5 % by mass) with composition tolerance +0.5, -2.0 / +2.0, -0.5 / +2.0, -0.5 by mass %.**

➤ **ACTION: Vote on the flammability Safety Classification for this application.**

Recommend SSPC 34 to accept this application from Samuel Yanna Motta Honeywell Fluorine Products, as meeting the Flammability requirements of Standard 34, and assign the flammability classification of 1 for the zeotropic refrigerant blend R-32/R-125/CF3I (49.0/11.5/39.5 % by mass with composition tolerance +0.5, -2.0 / +2.0, -0.5 / +2.0, -0.5 by mass %).

Note: This refrigerant has a nominal heat of combustion of 5.45 MJ/kg [2343 BTU/lb] nominal at **25°C**.

Note: This refrigerant has a heat of combustion of 0.99 MJ/kg [426 BTU/lb] at 25 °C.

Discussion:

Motion:

Second:

Discussion:

Affirmative:

Against:

Abstain:

Result 0/0/0/0 CNV

Reason for Against:

Reason for Abstention:

Motion Carries?

7. CONTINUOUS MAINTENANCE PROPOSALS

7.1. Continuous Maintenance Proposal (R. Tharp) CM 34-16-12-0002/001

Add a Column to Table E-1 to List LFL in Terms of lb/ft³

7.1.1. A copy of the CMP is found as ATTACHMENT 4

7.1.2. See ATTACHMENT 5 for the flammability subcommittee history on this item.

7.1.3. Committee responses:

7.1.3.1. There is no official record of a subcommittee response recommendation to the full PC regarding this CM.

11.1.1 Responding to the Proposer

A committee responder shall draft a recommended SSPC or SGPC response, including any potential changes to the standard and submit it to the SSPC or SGPC Chair. Options for SSPC or SGPC responses are limited to:

- a) proposed change accepted for public review without modification;
- b) proposed change accepted for public review with modification;
- c) proposed change accepted for further study; and
- d) proposed change rejected.

The response shall provide reasons for any recommendation other than option a) "accepted for public review without modification."

Option c) "proposed change accepted for further study" shall not be used unless the further study can be completed within 7 months of approval of the option. Upon completion of the further study, the PC shall approve response option a, b, or d above.

➤ **ACTION: Develop response recommendation to the full PC on this CM item.**

7.1.4. Team Established

The following team was identified at an August 2016 Interim meeting to work on this item: Yanna-Motta / Koban / Cunningham. At the Chicago 2018 meeting, Clough & Richard agreed to be part of this team.

7.1.5. Teleconference (June18,2018)

A team call (Clough, Koban, MacLeod present) was held to advance this item. It was agreed at that time to prepare the LFL in Terms of lb/ft³ for table E.1 as requested and the calculations have been completed.

7.1.6.Update

Since it was previously clarified by R. Tharp that his CM was incorrect in that he really wanted the LFL in Terms of lb/ft³ added to normative tables 4.1 (single component) and 4.2 (blends) rather than informative table E.1 (single components), the LFL calculations in 7.1.4 should rather be incorporated into Table 4.1 instead of E.1.

➤ **ACTION: Develop agreement as to the best path forward (e.g. submit Table 4.1 revisions for PC recommendations and return to 4.2 later?).**

8. OLD BUSINESS

8.1. The LFL of the WCF or the WCFE at 23°C to be used in FCL/RCL assignments.

At the unofficial April 2014 Morristown Interim meeting, some flammability committee members discussed that applications need to be reviewed and results reported back to the committee at the next meeting in Seattle. S. Cunningham and W. Clough volunteered to go through past applications to determine what was used in past/recent applications.

At the January Chicago 2015 meeting, S. Cunningham presented an initial draft survey of previous applications regarding the source of LFL sources assignments

based on Flammability subcommittee meeting minutes. There were some inconsistencies observed.

At the June Atlanta 2015 meeting, a motion was made to “Establish LFL at the WCF at 23°C. The motion was made, seconded and carried 8/2/1 CNV.

Do we need to survey more historical data? Are we ready to support a continuous maintenance proposal that revises the standard to clarify the selection of the LFL?

At the September 2, 2015 interim teleconference, discussion on this item included support for selection of the LFL based on the WCF by several members. There was also support for continuing the survey of previous applications regarding the source of LFL sources assignments to include those recently investigated for incorporation into ISO 817 by their Maintenance Agency (MA) Flammability Task Force. B. Minor suggested also that the survey include include kg/m³ data to compare and contrast to vol% data. S. Cunningham, S. MacLeod and B. Minor agreed to develop this data for presentation at the January 2016 Orlando meeting.

There was no data available at the time of February 2016 interim teleconference. M. Koban agreed to share the data she is compiling for ISO 817 MA by the end of February 2016 that might be of assistance.

It was generally agreed by the members present at the July 10, 2017 interim teleconference this item be incorporated with with the group that is working on item 8.1 (Continuous Maintenance Proposal (R. Tharp) CM 34-16-12-0002/001).

At the Chicago 2018 meeting, a team consisting of S. Cunningham, M. Koban, S. Yanna-Motta, W. Clough & R. Richard were identified to move this item forward.

At a June 18 teleconference (June18,2018), a team call (Cunningham, Yanna Motta and MacLeod present) was held to advance this item. There was considerable discussion as to whether the clarification of composition and temperature used in FCL/RCL assignments. Should it be made in the LFL (or ETFL) definition or as a footnote to the table where the FCL/RCL assignments are indicated to avoid confusion with the LFL's indicated in Table 6.1.3 Flammability Classifications. In any case, the team agreed that this clarification is best combined with the Continuous Maintenance Proposal (R. Tharp) CM 34-16-12-0002/001 (see item 7.1)

➤ ACTION: Open Discussion

8.2. BV to be specified as BV of WCFF; modify WCFF definition.

At the September 2, 2015 interim teleconference, S. MacLeod (asked to draft revision January 2015 meeting in Chicago) introduced the following draft wording:

worst case of fractionation for flammability (WCFF): the composition produced during fractionation of the worst case of formulation for flammability that results in the highest concentration of flammable component(s) as identified in this standard in the vapor or liquid phase. The most flammable composition may be based on criteria such as the flammability limit or burning velocity testing.

There was general concern that more detail is needed to clarify the idea that a WCFF definition has two considerations (i.e. flammability limit and burning velocity) as its

basis. R. Richard suggested that if mass concentration rather than volume concentration, then the selection of WCFF for LFL would more likely align with BV. D. Kennoy, R. Richard and S. MacLeod agreed to draft a rewording for follow up at the January 2016 Orlando meeting.

No rewording was available at the time of the July 10, 2017 interim teleconference.

➤ ACTION: Review rewording if available.

8.3. Flammability Application Checklist Revisions (*Sarah Kim and Ivan Rytkin*)

➤ ACTION: Share proposed revisions.

9. NEW BUSINESS

- 9.1. Explore variation in conversion of LFL to kg/m³ from different blend compositions (e.g. nominal, WCF, WCFF) as well as temperature effects (B. Minor, M. Koban) (See 10.1 & 7.3.1).

At the July 10, 2017 interim teleconference, it was generally agreed by the members present that this item be incorporated with the group that is working on item 8.1 (Continuous Maintenance Proposal (R. Tharp) CM 34-16-12-0002/001).

S. Cunningham, M. Koban, Sam Yanna-Motta, W. Clough & R. Richard were previously identified as a team to move this along.

➤ ACTION: Discussion on path forward.

- 9.2. Draft CM to Clarify conditions for selection of the LFL (e.g. WCF @ 23°C).

There was no activity to report on this item at the Chicago 2018 meeting where one committee member suggested that we consider utilizing the footnote on page 16 of the 34 standard. Another suggested incorporating this into the group that is working on item 8.1 (Continuous Maintenance Proposal (R. Tharp) CM 34-16-12-0002/001) and item 9.1.

➤ ACTION: Discussion on path forward.

- 9.3. Revise section 6.1.3 of ASHRAE 34 to include clarification on the selection of composition (e.g. nominal) for HOC calculation (A. Kusmierz).

At the Chicago 2018 meeting, A. Kusmierz agreed to draft proposed revisions for subcommittee consideration in Houston.

➤ **ACTION: Update on this item.**

9.4. RCL-OEL Calculation Corrections (S. Kujak).

When the RCL calculator was revamped in 2017, it became obvious beyond just the mistakes in the g/m³ calculation that there were more issues identified in both RCL's and OEL's. Toxicity committee who is responsible for the calculator formed a small committee to review and summarizes these needed changes (Steve, Ken, Sean and Gary).

The separate spreadsheet attachment (std 34 Discrepancies RCLs OELs.xlsx) is the result of this work and recommendations to change values and reasons behind the changes.

Issues were found in both RCL's and OEL's. Most were inconsistencies in rounding as well as the wrong conversion to g/m³.

Most are flammability ones just because we have been classifying A2L over the past few years. Please add this discussion to your agenda. Hopefully you can get to it so we can move this to the full PC for consideration in Chicago. These are mostly just calculation errors, not problems with LFL's. There may be 1 with an LFL issue.

Approximately 50-100 dozen potential such errors exist where flammability is being asked to address. Most are fairly small but some are more significant.

At the Chicago 2018 meeting, C. Seeton and M. Koban agreed to work on confirming the appropriate corrections to the hi-lited spreadsheet values by March 1, 2018. Ken S. offered to clarify any comments in the spreadsheet.

➤ **ACTION: Update on this item.**

10. NEXT CONFERENCE: 12 – 16 JAN 2019 Atlanta, GA

D&N	Saturday, January 12	7:00 am – 10:00 am
Flammability	Saturday, January 12	10:00 am – 3:00 pm
Toxicology	Sunday, January 13	6:30 pm – 10:00 pm
SSPC 34	Monday, January 14	6:30 pm – 10:00 pm

11. ADJOURN

ATTACHMENT 1

ASHRAE Code Of Ethics

(Approved by ASHRAE Board of Directors January 30, 2013)

1.140.001.1 As members of ASHRAE or participants in ASHRAE committees, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct.

A. Efforts of the Society, its members, and its bodies shall be directed at all times to enhancing the public health, safety and welfare.

B. Members and organized bodies of the Society shall be good stewards of the world's resources including energy, natural, human and financial resources.

C. Our products and services shall be offered only in areas where our competence and expertise can satisfy the public need.

D. We shall act with care and competence in all activities, using and developing up-to-date knowledge and skills.

E. We shall avoid real or perceived conflicts of interest whenever possible, and disclose them to affected parties when they do exist.

F. The confidentiality of business affairs, proprietary information, intellectual property, procedures, and restricted Society discussions and materials shall be respected.

G. Each member is expected and encouraged to be committed to the code of ethics of his or her own professional or trade association in their nation and area of work.

H. Activities crossing national and cultural boundaries shall respect the ethical codes of the seat of the principal activity.

ATTACHMENT 2**Proposed SSPC 34 Flammability Subcommittee
Membership Roster 2018-2019**

Flammability Subcommittee (16) [11 PCVM, 5 PSVM]

<i>Producer / Refrigerant</i> (5)	<i>User / Systems</i> (2)	<i>User / Components</i> (3)	<i>General</i> (6)
Sarah Kim (C 2021)	Warren Clough (C 2019)	Julie Majurin (C 2021) <i>Flammability Subcommittee Chair</i>	Andrew Kusmierz (C 2019)
Evan Laganis (S 2019)	Chun-cheng Piao (C 2022)	Marc Scancarello (C 2021)	John Senediak (C 2022)
Bob Low (S 2022)		Chris Seeton (C 2022)	IIAR ¹ , Eric Smith (C 2022) / David Rule (alternate - 2022)
Robert Richard (S 2022)			Sonny Sundaresan (C 2021)
Jian Sun-Blanks (S 2019)			Kenji Takizawa (C 2019)
			Jing Zheng (S 2019)
			Scott MacLeod (2020) Consultant (NVM)

¹IIAR is an organizational member represented by Eric Smith with Dave Rule as an alternate PCVM.

ATTACHMENT 3

Summary of New Refrigerants to Standard 34 - Informative

ID	applicant	composition	R-name class	conference	notes	status
R0068-15-05	Daikin	R-32 / 125 / 134a (32.5 / 15.0 / 52.5 mass %)	R-407H A1	JUN 2015	Addendum 34w to 34-2013 / 34-2016 Comment received PC finalized	Posted as addendum on ASHRAE website
R0064-15-05	AGC (Asahi Glass)	1,1,2-trifluoroethene (HFO-1123)	---	JUN 2015	Toxicity data being generated	Tabled
R0065-15-05	AGC (Asahi Glass)	HFO-1123 / R32 (45.0 / 55.0 mass %)	---	JUN 2015	HFO-1123 tox data needed	Tabled
R0066-15-05	AGC (Asahi Glass)	HFO-1123 / R32 (40.0 / 60.0 mass %)	---	JUN 2015	HFO-1123 tox data needed	Tabled
R-0081-16-05	Arkema	R-32 / 1234yf / 1234ze(E) (68.0 / 26.0 / 6.0 mass %)	R-459A A2L	JUN 2016	Addendum 34ak to 34-2013 / 34-2016 0 comments	Posted as addendum on ASHRAE website
R-0082-16-05	Arkema	R-1234yf / 134a / 152a (77.5 / 8.5 / 14.0 mass %)	R-516A A2L	JUN 2016	Addendum 34b to 34-2016 0 comments	Posted as addendum on ASHRAE website
R-0083-16-05	Mexichem	R-32 / 1234yf / 1234ze(E) (77.5 / 8.5 / 14.0 mass %)	R-459B A2L	JUN 2016	Addendum 34al to 34-2013 / 34-2016 0 comments	Posted as addendum on ASHRAE website
R-0084-16-05	Mexichem	R-32 / 125 / 134a / 1234ze(E) (12.0 / 52.0 / 14.0 / 22.0 mass %)	R-460A A1	JUN 2016	Addendum 34am to 34-2013 / 34-2016 0 comments	Posted as addendum on ASHRAE website
R-0085-16-05	Mexichem	R-32 / 125 / 134a / 1234ze(E) (28.0 / 25.0 / 20.0 / 27.0 mass %)	R-460B A1	JUN 2016	Addendum 34an to 34-2013 / 34-2016 0 comments	Posted as addendum on ASHRAE website

R-0086-16-05	Behr Refrigerants	R-125 / 143a / 134a / 227ea / 600a) (55.0 / 5.0 / 32.0 / 5.0 / 3.0 mass %)	R-461A A1	JUN 2016	Addendum 34a to 34-2016 0 comments	Posted as addendum on ASHRAE website
R-0087-16-12	Mexichem	1,1-difluoroethylene	R-1132a A2	JAN 2017	Addendum 34f to 34-2016 0 comments	Posted as addendum on ASHRAE website
R0088-16-12	AGC (Asahi Glass)	(Z)-1-chloro-2,3,3,3-tetrafluoropropene (HFO-1224yd(Z))		JAN 2017	Addendum 34c to 34-2016 0 comments	Posted as addendum on ASHRAE website
R0089-16-12	AGC (Asahi Glass)	HFO-1123 / R32 / 1234yf (19.0 / 55.0 / 26.0 mass %)	---	JAN 2017	HFO-1123 tox data needed	Tabled until JUN 2017
R0090-16-12	ICOOL Ningbo	R-32 / 125 / 143a / 134a / 600 (9.0 / 42.0 / 2.0 / 44.0 / 3.0 mass %)	R-462A A2	JAN 2017	Addendum 34d to 34-2016 0 comments	Posted as addendum on ASHRAE website
R0091-16-12	Jiangsu Freeze Environmental Protection and New Material Co, Ltd	R-290 / 600a (95.0 / 5.0 mass %)	R-436C (tentative) A3 (tentative)	JAN 2017	Addendum 34o to 34-2016 0 comments	Move to ASHRAE Standards Committee / Board of Directors for approval vote in JUN 2018
R0092-17-05	Chemours	R-744 / 32 / 125 / 1234yf / 134a (6.0 / 36.0 / 30.0 / 14.0 / 14.0 mass%)	R-463A (tentative) A1 (tentative)	JUN 2017	Addendum 34i to 34-2016 1 comment	Move to ASHRAE Standards Committee / Board of Directors for approval vote in JUN 2018
R0093-17-05	Arkema	R-32 / 290 / 1234yf (21.0 / 7.9 / 71.1 mass%)	R-465A A2	JUN 2017	Addendum 34m to 34-2016 0 comments	Posted as addendum on ASHRAE website
R0094-17-05	Trio Gas Products	R-32 / 125 / 134a / 1234ze(E) (2.5 / 2.5 / 46.0 / 49.0 mass %)	R-460C A1	JUN 2017	Addendum 34j to 34-2016 0 comments	Posted as addendum on ASHRAE website
R0095-17-05	Refrigerant Solutions	R-32 / 125 / 1234ze(E) / 227ea (27.0 / 27.0 / 40.0 / 6.0 mass %)	R-464A A1	JUN 2017	Addendum 34k to 34-2016 0 comments	Posted as addendum on ASHRAE website
R0096-17-05	Daikin	R-32 / 125 / 134a	R-407I A1	JUN 2017	Addendum 34l to 34-2016	Posted as addendum on ASHRAE website

		(19.5 / 8.5 / 72.0 mass %)			0 comments	
R0097-17-05	Honeywell	R-1234ze(E) / 227ea (91.1 / 8.9 mass %) azeotrope		JUN 2017	Addendum 34p to 34-2016	Sent to SPLS for approval for PPR

Addendum e to Standard 34-2016: Modifications to bring in line with ISO 817 (e.g., molar mass)

Status: Posted as addendum on ASHRAE website

Addendum g to Standard 34-2016: Adds 2L as a distinct classification rather than as a subclassification of 2.

Status: Move to ASHRAE Standards Committee / Board of Directors for approval vote in JUN 2018

Addendum h to Standard 34-2016: Removes the application fee from Standard 34.

Status: Posted as addendum on ASHRAE website

Addendum n to Standard 34-2016: Changes to 6.1.5 and adds new 6.1.5.1 and 6.1.5.2 (makes changes to the toxicity classification procedure (to be based on the nominal formulation of the blend) with the intent to harmonize ASHRAE Standard 34 and ISO).

Status: Posted as addendum on ASHRAE website

ATTACHMENT 4**CM 34-16-12-0002/001****Add a Column to Table E-1 to List LFL in Terms of lb/ft³**1. Submitter: [Rusty Tharp](#) Proposal Number [34-16-12-0002/001](#)Affiliation: [Goodman Manufacturing Company, L.P.](#)Address: [15819 Laurel Cv](#) City: [Tomball](#) State: [TX](#) Zip: [77377](#) Country: [USA](#)Telephone: [281-348-5466](#) Fac: E-Mail: rct1964@hotmail.com or rusty.tharp@goodmanmfg.com2. Number and year of standard: [34-2013](#)3. Page number and clause (section), subclause, or paragraph number: [Table E-1, Appendix E, pages 34-35](#)4. I propose to: Change to read as follows Delete and substitute as follows
(check one) Add new text as follows Delete without substitution

Use underscores to show material to be added (added) and strike through material to be deleted (deleted). Use additional pages if needed.

5. Proposed change:

[See screenshot on next page.](#)

6. Reason and substantiation:

[Proposed Standard 15.2](#), as well as current [Standard 15](#), (in addition to other codes and standards) typically use units for flammability in weight per volume. [Table E-1](#) currently only lists LFL as ppm (v/v). For the convenience of the users of [Standard 15](#), and to eliminate the possibility of conversion errors, the request is to add a column to [Table E-1](#) listing LFL as lb/ft³. Rather than provide values that may be incorrect, our request is for the experts of [SSPC 34](#) to include the proper values.

7. Will the proposed change increase the cost of engineering or construction? If yes, provide a brief explanation as to why the increase is justified. **NO**

Check if additional pages are attached. Number of additional pages: 1

Check if attachments or referenced materials cited in this proposal accompany this proposed change. Please verify that all attachments and references are relevant, current, and clearly labeled to avoid processing and review delays. Please list your attachments here:

(This appendix is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It is subject to the same review and approval process as the standard. It is not intended to be used in lieu of the standard. It is not intended to be used in lieu of the standard. It is not intended to be used in lieu of the standard.)

**INFORMATIVE APPENDIX E
TOXICITY AND FLAMMABILITY DATA FOR SINGLE-COMPOUND REFRIGERANTS**

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

Refrigerant R-#	Chemical Name	LC ₅₀ ^{a,d}	Cardiac Sensitization		Anesthesia		Other ^e	ATEL	ODL	FCL	RCL	LFL	ATEL Source	RCL Source
			LOEL ^a	NOEL ^a	EC ₅₀ ^a	LOEL ^a								
11	trichlorofluoromethane	26,200	4800	1100	35,000	ND	12,500	ND	1100	140,000	NA	1100	100% Cardiac NOEL	ATEL
12	dichlorodifluoromethane	>800,000	50,000	40,000	250,000	ND	200,000	22,700	15,000	140,000	NA	18,000	Other	ATEL
14	tetrafluoromethane	>390,000	ND	200,000	ND	ND	226,000	ND	110,000	140,000	NA	110,000	28.3% LC ₅₀	ATEL
22	chlorodifluoromethane	220,000	50,000	59,300 ^b	140,000	ND	ND	ND	59,000	140,000	NA	59,000	100% Cardiac NOEL	ATEL
23	trifluoromethane	>663,000	ND	800,000	ND	ND	51,000	ND	41,000	140,000	NA	41,000	80% Anesthesia NOEL	ATEL
32	difluoromethane (methylene fluoride)	>760,000	ND	350,000	ND	ND	250,000	ND	200,000	140,000	36,000	36,000	80% Anesthesia NOEL	25% LFL
113	1,1,1-trichloro-1,2,2-trifluoroethane	52,500	4850	2600	28,000	ND	25,000	ND	2600	140,000	NA	2600	100% Cardiac NOEL	ATEL
114	1,2-dichloro-1,1,2,2-tetrafluoroethane	255,000 ^d	25,000	ND	250,000	ND	100,000	ND	20,000	140,000	NA	20,000	80% Cardiac LOEL	ATEL
115	chloropentafluoroethane	>800,000	150,000	ND	ND	ND	800,000	ND	120,000	140,000	NA	120,000	80% Cardiac LOEL	ATEL
116	hexafluoroethane	>800,000	ND	200,000	ND	ND	121,000	ND	97,000	140,000	NA	97,000	80% Anesthesia NOEL	ATEL
123	2,2-dichloro-1,1,1-trifluoroethane	32,000	ND	10,300	27,000	ND	2500	ND	9100	140,000	NA	9100	28.3% LC ₅₀	ATEL
124	2-chloro-1,1,1,2-tetrafluoroethane	263,000	25,000	10,100	150,000	ND	48,000	ND	10,000	140,000	NA	10,000	100% Cardiac NOEL	ATEL

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ATTACHMENT 5

Flammability Subcommittee Update As Of JUL 2017

At the July 2016 Interim On-line Teleconference, the subcommittee agreed, that more clarity was needed from the Commenter (R. Tharp) and Dennis Dorman (see similar request described in 6.3) regarding the proposal including whether the requested values are to be normative or informative, apply to blends and/or single components, and what is the intended end use of the data? S. MacLeod agreed to seek this clarification as an action item.

At the August 2016 Interim On-line Teleconference, S. MacLeod reported the following clarifying responses from R. Tharp. Since a quorum was not present, the development of the subcommittee recommendation to the full PC was tabled.

- a) Are the requested LFL values to be normative or informative? **Normative, because total system refrigerant charge is a normative value in 15. Because of this, my CMP is incorrect, as it would be (my guess anyway) better to add normative LFL values to Table 4-1 & Table 4-2.**
- b) Do the requested LFL values apply only to single components and/or blends? (Table E.1 is informative and is for single component refrigerants). **It would apply to any refrigerant, therefore my CMP is technically incorrect, as it should address both Tables 4-1 & Table 4-2. Essentially**
- c) What is the intended end use of the LFL values? **To set maximum permissible charge for a system based on its end application.**

One attendee suggested adding additional properties to the proposed table modifications in order to align with other standards (e.g. ISO 817). A team (S. Yanna-Motta, M. Koban and S. Cunningham volunteered to work on adding the requested information to the 34 Standard.

At the March 1 Flammability Subcommittee interim meeting / teleconference, the SC chair presented M. Koban's presentation and a spreadsheet prepared by S. Cunningham's spreadsheet regarding the differences between expressing % LFL in v/v and m/v units as well as the flammability subcommittee's historical inconsistency in the compositions / temperatures at which the LFL assignments have been made.



Comparison of LFL
Values v1 1-28-17 [R]

M. Koban→



LFL Data from
ASHRAE34 submissior

S. Cunningham→

O. Kataoka added that the elevation is an issue with IEC 60335-2-40 and recommended consideration be given to this parameter as well. P. Johnson suggested that any elevation correction (e.g. via the models given in 34 or 817) be the responsibility of IEC 60335-2-40 or other refrigerant using product standard. S. Cunningham indicated that before calculations are made, they will need the subcommittee's guidance regarding how to proceed in light of these issues. The chair asked that the team prepare options/recommendations regarding the historical inconsistency in the compositions/temperatures parameter as well as elevation for the consideration at the next meeting.

M. Koban indicated that elevation is a topic of discussion at the upcoming UL 60335-2-40 and ASHRAE SSPC 15/15.2 meetings. One member questioned whether the method of calculation / conversion be incorporated into the ASHRAE 34 standard or the ASHRAE handbook. The temperature at which the conversion (e.g. 23°C or 25°C) is calculated is also of concern. The group is moving forward with meeting to tabulate the values and document the conditions for which they were determined.

A breakout group was formed to address this request with a goal of developing draft tables for consideration at the January 2018 meeting.