Committee Input No. 45-NFPA 54-2021 [Global Input]

The committee is looking at breaking out multi-sentence requirements into separate line items and changing exceptions into requirement line items.

Submitter Information Verification

Committee: NFG-AAA

Submittal Date: Tue Sep 21 16:54:44 EDT 2021

Committee Statement

Committee Statement: The committee is looking at breaking out multi-sentence requirements into separate line items and changing exceptions into requirement line items.

Response Message: CI-45-NFPA 54-2021

Committee Input No. 46-NFPA 54-2021 [Global Input]

The the committee is looking into combustion air requirements and linking it to commonly used blower door testing procedures and ASHRAE published air change factors. A task group has been formed that will also look into potential test methods and who will be conducting these tests. See attachments for proposed tables for converting ACH50 to ACHnat

Supplemental Information

File Name	Description	Approved
ACH50_to_ACHnat_-_variables_reduced.docx		
ACH50_to_ACHnat_conversion_-_Michigan_-_1_story.docx		

Submitter Information Verification

Committee: NFG-AAA

Submittal Date: Wed Sep 22 14:00:16 EDT 2021

Committee Statement

Committee Statement: The the committee is looking into combustion air requirements and linking it to commonly used blower door testing procedures and ASHRAE published air change factors. A task group has been formed that will also look into potential test methods and who will be conducting these tests. See related Public Input 86 as well.

Response Message: CI-46-NFPA 54-2021

Converting ACH50 to estimated ACHnat using Equation 4-3 from ASHRAE 62.2 2019, Section 4.1.2.1 – "Effective Annual Average Infiltration Rate (Q*inf*) Using a Single-Point Envelope Leakage Test"

Equation 4-3: $Q_{inf} = .052 \times Q_{50} \times wsf \times (H/Hr)^z$ $ACH_{nat} = .052 \times Q_{50} \times wsf \times (H/Hr)^z \times 60/volume$					
Single story – 1200 sq.ft/9600 cu.ft. volume – Height 9.5'					
ACH50	CFM50	WSF (Low/High)	ACHnat	WSF (Avg/-4 high/-4 low)	ACHnat
3	480	.5	.08	.583	.096
		.67	.11	.572	.095
				.593	.098
4	640	.5	.11	.583	.13
		.67	.15	.572	.12
				.593	.13
5	800	.5	.14	.583	.16
		.67	.18	.572	.16
				.593	.16
6	960	.5	.165	.583	.19
		.67	.22	.572	.19
				.593	.20
7	1120	.5	.19	.583	.225
		.67	.26	.572	.22
				.593	.23
8	1280	.5	.22	.583	.26
		.67	.295	.572	.25
				.593	.26
9	1440	.5	.25	.583	.29
		.67	.33	.572	.28
				.593	.29
10	1600	.5	.275	.583	.32
		.67	.37	.572	.315
				.593	.33
11	1760	.5	.30	.583	.35
		.67	.40	.572	.35
				.593	.36
12	1920	.5	.33	.583	.385
		.67	.44	.572	.38
				.593	.37
13	2080	.5	.36	.583	.42
		.67	.48	.572	.41
				.593	.42
14	2240	.5	.385	.583	.45
		.67	.52	.572	.44
				.593	.46

Summary next page for Single-Story in Michigan

Potential ACH numbers to be used for KAIR combustion air calculations for Section 9.3 of the NFPA 54

ACH50	ACHnat	ACH50	ACHnat	ACH50	ACHnat	ACH50	ACHnat	ACH50	ACHnat
3,4	**.10**	5,6	**.15**	7,8	**.20**	9,10	**.25**	11	**.30**
ACH50	ACHnat	ACH50	ACHnat						
12,13	.**35**	14	**.4**						

$ACH_{nat} = .052 \times Q_{50} \times wsf \times (H/Hr)^Z \times 60 / volume$
$ACH_{nat} = .052 \times 800 \times wsf \times 1.08 \times 60 / 16{,}000$
(the ACH50 and wsf are now the only variables)

Single story		
ACH_{50}	wsf	ACH_{nat}
3	.30	.05
	.35	.06
	.40	.07
	.45	.08
	.50	.08
	.55	.09
	.60	.10
	.65	.10
	.70	.10
	.75	.10
	.80	.10
	.85	.15
	.90	.15
	.95	.15
	1.00	.15
	1.05	.175
	1.10	.20
	1.15	.20
ACH_{50}		
4	.30	
And so on…	.35	
	.40	

Height correction factor $(H/Hr)^Z$
Single story with varying heights of conditioned space above grade

Height in feet	$(H/Hr)^Z$	ACH_{nat} wsf - .5 and .9
8	.99	.077 / .139
8.5	1.01	.079 / .142
9	1.04	.08 / .146
9.5	1.06	.083 / .149
10	1.08	.084 / .152
10.5	1.10	.086 / .154
11	1.12	.087 / .157
11.5	1.14	.089 / .160
12	1.16	.09 / .161

Looking at variations in Height Correction Factor by inserting average ACHnat calculations (8 and 10 foot) into the KAIR formula using 100k input units

Draft hood	Draft induced
ACHnat – Volume	ACHnat - Volume
.077 – 27,273 cu.ft	.077 – 19,480 cu.ft
.084 – 25,000	.084 – 17,857
.139 – 15,108 cu.ft.	.139 – 10,791 cu.ft
.152 – 13,815	.152 – 9,868

The differences are all within 10%

Variations in square footage or volume of buildings is not needed because the ACH50 uses volume in its calculation. To determine the CFM50 (Q50) needed in performing the calculation for estimated natural ACH, the ACH50 is multiplied by the volume and divided by 60. As the volume of the building changes, so does the CFM50. The calculation done using a specific wsf can use any size building because at a specific ACH50, the CFM50 will change proportionally to a change in volume. A 2,000 square foot building with 8-foot ceiling height was used in the calculations above. At an ACH50 of 3, this works out to 800 CFM50.

An estimated average height of conditioned space above grade was used in the formula also. I used 10 foot which calculates to a height correction factor of 1.08. I do not believe there is a significant enough concern in using this for determination of estimated ACHnat. Comparing extremes from 8 to 10 shows KAIR calculations within 10% for combustion air purposes.

This allows 3 tables to be built (granted, they would be long ones) – single story, two story and three story. There would be 14 ACH50 categories for the single story, 10 for two story and 9 for 3 story. In looking at previous calculations I had done, these are where the infiltration rate of the building climbs above .4 at which you could now use the Standard Method. You can use the KAIR method up to an ACH of .6 per the 54 so there is a wild card there. The tables could also be shortened in the wsf columns by lumping like ACH numbers into a single row. For example, in the above table, you could say from ".60 to .80 – ACHnat is .1.

Lastly, if this is built, it might show that we just don't want any appliances using interior air for combustion if the building is a particular ACH50 or below. You can see from the above table that for an ACH50 of 3, the best ACHnat you are going to see is a .20 in Alaska. There just should not be any combustion air taken from the inside in these buildings. So, that could reduce the number of ACH50 listings in the tables.

Committee Input No. 47-NFPA 54-2021 [Global Input]

The Technical Committee is looking into issues with the current code in regards to installations Industrial or large commercial. There are issues such as the line pressure regulator installations and venting of ovens where there are clear incompatibilities between the code and common industrial practices.

Submitter Information Verification

Committee: NFG-AAA

Submittal Date: Wed Sep 22 14:09:03 EDT 2021

Committee Statement

Committee Statement: The Technical Committee is looking into issues with the current code in regards to installations Industrial or large commercial. There are issues such as the line pressure regulator installations and venting of ovens where there are clear incompatibilities between the code and common industrial practices.

Response Message: CI-47-NFPA 54-2021

Committee Input No. 41-NFPA 54-2021 [New Section after 3.3.84.1]

3.3.84.2 Draft Control Damper System

A listed electronically controlled damper device attached to a chimney, vent connector, breeching, or flue gas manifold to control the vent, vent connector or chimney pressure.

Submitter Information Verification

Committee: NFG-AAA

Submittal Date: Tue Sep 21 15:43:00 EDT 2021

Committee Statement

Committee Statement: Draft control dampers systems are usually placed inside the chimney, vent or vent connector to automatically maintain the required appliance outlet pressure. These devices are common and should be addressed by NFPA 54. The committee is looking at adding further requirements in chapter 12 around their use.

Response Message: CI-41-NFPA 54-2021

Public Input No. 127-NFPA 54-2021 [New Section after 3.3.84.1]

Public Input No. 126-NFPA 54-2021 [Section No. 3.3.84.1 [Excluding any Sub-Sections]]

Committee Input No. 48-NFPA 54-2021 [New Section after 4.5]

4.X Gas Detection.

Where fuel gas detection and warning equipment is required in residential occupancies with gas service, the installation shall be in accordance with NFPA 715, Standard for the Installation of Fuel Gases Detection and Warning Equipment. (See Committee Input Substantiation for further detail and See FR 32)

Submitter Information Verification

Committee: NFG-AAA

Submittal Date: Wed Sep 22 14:26:05 EDT 2021

Committee Statement

Committee Statement: The Technical Committee believes that requiring fuel gas detectors in residential or other occupancies with gas service would be better addressed in building and fire codes, such as NFPA 101, Life Safety Code® or NFPA 5000, Building Code. These codes address the installation of similar warning equipment, such as carbon monoxide alarms, and the Technical Committee believes that the enforcing authorities who enforce the Life Safety Code or the Building Code would be better equipped to enforce fuel gas detector requirements in residential and other occupancies.

Response Message: CI-48-NFPA 54-2021

Committee Input No. 30-NFPA 54-2021 [Section No. 12.1]

12.1* Minimum Safe Performance.

12.1.1

Venting systems shall be designed and constructed to convey all flue and vent gases to the outdoors.

12.1.2

The chimney or vent system shall be sized for the total btu input.

Submitter Information Verification

Committee: NFG-AAA

Submittal Date: Mon Sep 20 16:43:15 EDT 2021

Committee Statement

Committee Statement: The committee is aware of certain instances in which venting systems and chimneys are being sized for operating appliance input and not total appliance input and is looking to add requirements to require total appliance input when sizing venting systems and chimneys.

Response Message: CI-30-NFPA 54-2021

Public Input No. 128-NFPA 54-2021 [New Section after 12.7.4.3]