GG 234-14
804.2

Proponent: Brenda Thompson, Clark County Development Services, Las Vegas, NV, representing Chair, Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) (SEHPCAC@iccsafe.org)

Revise as follows:

804.2 Post-construction, pre-occupancy baseline IAQ testing. Where this section is indicated to be applicable in Table 302.1, and after all interior finishes are installed, the building shall be tested for indoor air quality. ~~and~~ The testing results shall indicate that the summed concentration of all of the individual volatile organic compounds, also known as total volatile organic compounds, including tentatively identified compounds, expressed as a toluene equivalent value using testing protocols in accordance with ASTM Methods D 6196, D 5466, or other approved methods, do not exceed 500 micrograms per cubic meter of air above outdoor concentrations. Where detected in the indoor total volatile organic compound samples, the concentrations for the individual volatile organic compounds shall not exceed the amounts indicated in Table 804.2, after correction for outdoor levels. Formaldehyde shall be tested using testing protocols in accordance with ASTM Method D 5197, or other approved methods. The formaldehyde levels shall not exceed 27 parts per billion above outdoor concentrations. ~~levels of VOCs meet the levels detailed in Table 804.2 using testing protocols in accordance with ASTM D 6196, ASTM D 5466, ASTM D 5197, ASTM D6345, and ISO 7708~~. Test samples shall be taken in not less than one location in each 25,000 square feet (1860 m2) of floor area or in each contiguous floor area. Test samples shall be taken in not less than two outdoor areas near outdoor air intakes. Test samples shall be collected over a time period of not less than 4 hours.

Exceptions:

1. Group F, H, S and U occupancies shall not be required to comply with this section.
2. A building shall not be required to be tested where a similarly designed and constructed building as determined by the *code official*, for the same owner or tenant, has been tested for indoor air quality and the testing results indicate that the level of VOCs meet the levels detailed in Table 804.2.
3. Where the building indoor environment does not meet the concentration limits in Table 804.2 and the tenant does not address the air quality issue by mitigation and retesting, the building shall be flushed-out by supplying continuous ventilation with all air-handling units at their maximum outdoor air rate for at least 14 days while maintaining an internal temperature of at least 60°F (15.6°C), and relative humidity not higher than 60 percent. Occupancy shall be permitted to start 7 days after start of the flush-out, provided that the flush-out continues for the full 14 days.

TABLE 804.2
MAXIMUM CONCENTRATION OF INDOOR AIR POLLUTANTS[b]

MAXIMUM CONCENTRATION OF AIR POLLUTANTS RELEVANT TO IAQ	MAXIMUM CONCENTRATION, ug/m^3 ~~(unless otherwise noted)~~
1-Methyl-2-pyrrolidinone[a]	160
~~1,1,1-Trichloroethane~~	~~1000~~
1,3-Butadiene	20

~~1,4-Dichlorobenzene~~	~~800~~
~~1,4-Dioxane~~	~~3000~~
2-Ethylhexanoic acid[a]	25
~~2-Propanol~~	~~7000~~
4-Phenylcyclohexene (4- PCH)[a]	2.5
Acetaldehyde	140
Acrylonitrile	5
Benzene	60
~~t-Butyl methyl ether~~	~~8000~~
Caprolactam[a]	100
~~Carbon disulfide~~	~~800~~
~~Carbon monoxide~~	~~9 ppm and no greater than 2~~ ppm above outdoor ~~levels~~
Carbon tetrachloride	40
~~Chlorobenzene~~	~~1000~~
Chloroform	300
Dichloromethane	400
~~Ethylbenzene~~	~~2000~~
Ethylene glycol	400
~~Formaldehyde~~	~~27~~
~~n-Hexane~~	~~7000~~
Naphthalene	9
Nonanal[a]	13
Octanal[a]	7.2
~~Particulates (PM 2.5)~~	~~35 (24-hr)~~
~~Particulates (PM 10)~~	~~150 (24-hr)~~
Phenol	200
~~Styrene~~	~~900~~
Tetrachloroethene	35
Toluene	300
~~Total volatile organic~~ compounds (TVOC)	~~500~~
~~Trichloroethene~~	~~600~~
~~Xylene isomers~~	~~700~~

a. This chemical has a limit only where carpets and fabrics with styrene butadiene rubber (SBR) latex backing material are installed as part of the base building systems.

b. The concentrations in the Table are to be applied after outdoor levels of these compounds are subtracted from the indoor levels.

ug/m^3 = micrograms per cubic meter ppm = parts per million

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action

Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Text for 804.2

Tentatively identified compounds (TICs) and the use of toluene for determining a TVOC equivalent concentration for the VOCs detected is referenced in Section 3.9.4 of the California "Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers Version 1.1 - California Specification 01350. – Feb. 2010" which is also identified in Section 806 of this Code. These criteria are common aspects of the methods used by IAQ professionals for determining indoor Total VOC concentrations.

The ASTM methods described are not commonly used by air sampling/IAQ professionals so "or equivalents" was added so that the methods that are used (EPA TO-15 and TO-17) wouldn't be excluded.

Since those who construct buildings have no control over the outdoor air why should they be held accountable for its contribution to indoor air pollution? As such, the 500 micrograms per cubic meter TVOC maximum should be for what is due to indoor air contaminants over which contractors can have control. Outdoor air levels should be subtracted from the Total VOC levels found indoors. This approach is supported in Table 3.1 of the EPA specification titled **"Testing** for Indoor Air Quality, Baseline IAQ, and Materials Division 1 Section
01445" and "Section 01 81 09 - testing for indoor air quality".

The VOCs in Table 804.2, when identified by the TVOC test described in the text, will have their concentrations compared to those in the Table and they should not exceed those levels. This is to help insure that particularly hazardous VOCs are not above levels of concern even though the TVOC levels may have met the 500 ug/m^3 criteria.

Formaldehyde is called out separately because it requires a different collection and analysis method and it is of particular concern regarding IAQ. Its evaluation would help determine whether low or no formaldehyde emitting products were actually used in the project.

The four hour minimal sampling time is provided so that sampling times will not be so short as to give results with too high a detection limit making them useless for comparison to the criteria specified. This time limit has been a part of LEED for many years.

Table 804.2

"Indoor" and the b. note below the Table are added to clarify that the compounds and maximum concentrations are for indoors. Correcting for outdoor levels has been discussed previously.

"Unless otherwise noted" was eliminated because it no longer applies if the changes are made as proposed.

Compounds with maximum concentrations above 500 ug/m^3 were removed because the 500 ug/m3 maximum concentration for TVOCs would already be exceeded if these levels were present. The TVOC measurement makes evaluating these compounds unnecessary.

PM10 and PM2.5 are eliminated because they are not VOCs and they are EPA outdoor air standards which are not applicable to indoor air quality (my professional opinion). A building being tested after construction and before occupancy should not have these particles in the air unless they were due to the outdoors (discussed previously) or due to occupants disturbing or generating the particles which should not be the case. Particles would come from occupant activities, poor filtration of the particles generated by indoor activities, the outdoors, and/or from poor housekeeping. None of these things are the responsibility of the builder except for the filtration which should be evaluated in the commissioning phase and be an on-going maintenance issue. A better determinate would be visible dust which would be an unacceptable condition for the new occupants and would be a punch list item to be corrected.

Carbon monoxide is eliminated because it is not a VOC and it is not a building material emission product. It is associated with combustion which may be related to use issues but not construction issues, especially when construction is supposed to be complete.

The meanings of ug/m^3 and ppm were added to the end of the table for clarification.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

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