

Proposed Alternative Definitions and Requirements for the International Fuel Gas Code (IFGC) Coverage of Hydrogen Admixtures

Section 202

[Differences for Circulated Language from ICC PMGCAC Proposal: *The two definitions below are needed to be considered by reviewers as context for the proposed requirements that follow. The definition for “fuel gas” is modified to clarify that up to and including 5% hydrogen by volume only applies to natural gas, not other gases that fall under the scope of the rest of the “fuel gas” definition. Likewise, the “hydrogen admixture” definition is made specific for natural gas blends of hydrogen. This specificity is lacking from the PMGCAC.]*

Fuel Gas. Natural gas (with up to and including 5-percent hydrogen gas by volume), manufactured gas, liquefied petroleum gas or mixtures of these gases including natural gas.

Reason: Testing and analysis of natural gases containing hydrogen, whether introduced through admixing (i.e., blending) or incidentally introduced to the gas supply from other sources, have shown that physical and combustion properties of these compositional changes due to hydrogen do not alter or negatively affect the interchangeability of the baseline natural gas (without hydrogen) from the resulting admixtures.

Hydrogen Admixture. Natural gas into which hydrogen is blended or mixed by the fuel supplier or at the point of delivery to concentrations greater than 5% by volume.

Reason: With the proposed definition change to “fuel gas” to include hydrogen concentrations in natural gas of “up to and including 5% by volume,” admixtures with concentrations greater than 5% by volume in natural gas must be specifically identified as “hydrogen admixtures.” Upper bounds for hydrogen admixtures of natural gas may be defined in terms of physical, combustion, or interchangeability limits, and since these effects on natural gas are significant with respect to composition and added hydrogen, those limits need to be addressed in IFGC requirements as supported by available research and analysis.

101.2.2.1 Hydrogen admixtures. Natural gas blended with hydrogen recognized by this code shall include admixtures exceeding 5% hydrogen by volume but shall not exceed 20% hydrogen by volume.

Reason: The current state of knowledge represented by testing and analysis supports use of hydrogen admixtures in natural gas up to and including 20% without additional appliance approval testing or revision of fuel gas distribution requirements and specifications. This state of knowledge also supports an admixture limit of 20% by volume as compatible with appliances and equipment already approved for use with natural gas without additional testing or approvals. Revision for standards for safety for natural gas appliances is considering using the admixture limit of 20% hydrogen by volume as the basis for approval of new appliances and equipment designs by revising the standards for safety “table of test gases” to include a hydrogen admixture of 20% by volume in natural gas listed appliances. As research and analysis continues to address admixture thresholds for natural gas appliances, future actions on standards for safety may justify a higher threshold than the 20% hydrogen by volume for natural gas appliances, but promulgation of requirements that allow greater than 20% by volume are not justified at this time.

[Differences for Circulated Language from ICC PMGCAC Proposal: Language is cleaned up to clarify that admixtures apply to the delivered gas, not the “gas system” since the gas system may, at any time, change from admixture delivery to the baseline gas delivery within that system. Here, again, the language is made specific to natural gas admixtures of hydrogen, not hydrogen admixtures in all “fuel gases.”]

107.1.1 Hydrogen admixtures in natural gas supply systems. Where hydrogen admixtures are supplied, the code official shall be provided information by the gas supplier on the percentage hydrogen by volume in the natural gas.

Reason: As standards for safety move forward in approving appliances and equipment operation on hydrogen admixtures in natural gas up to and including 20% by volume, authorities having jurisdiction (AHJ) over approval of natural gas systems need to have information on the upper limits of hydrogen in the natural gas supply in the jurisdiction in order to approve of installations that have appliances and equipment that are fully compatible with the natural gas supply and the upper admixture limit relevant to that local jurisdiction. The current state of knowledge supports an admixture limit of 20% by volume as compatible with appliances and equipment already approved for use with natural gas without additional testing or approvals, but new approvals of natural gas appliances and equipment that are listed and labeled for hydrogen admixture

limits must be in agreement with the supplied natural gases. Without information from gas suppliers on hydrogen content of natural gas, the AHJ cannot determine the compatibility of appliance and equipment with potential local gas supplies and may approve of installations in which aberrant appliance function and potential safety hazards might emerge as a significant risk. For example, new natural gas appliances not approved for operation on hydrogen admixture natural gases, or for hydrogen admixtures of lower-than-supply-system limits, may present such heightened risks, but without supply information on hydrogen admixture limits, the AHJ cannot provide reliable approvals for installation of such equipment.

[Differences for Circulated Language from ICC PMGCAC Proposal: Language is cleaned up to clarify that admixtures apply to hydrogen admixtures of natural gas, not all “fuel gases.” Also, total compositional description of natural gas admixtures of hydrogen is not necessary and likely too burdensome to both gas suppliers and code officials. All that is needed for the purposes of code officials and designers/installers is the maximum threshold of hydrogen the natural gas system might see as a matter of normal gas supply operations (and not the actual admixture percentage delivered at any one point in time). The compatibility sought is the acceptability of that maximum with the maximum recognized in the installed appliances and equipment approvals.]