



***International Association of Fire Fighters
AFL-CIO, CLC***

**Submission to the Canadian Commission on
Building and Fire Codes:**

Consultation on Objective-based Code Format

April, 2003

Introduction

The International Association of Fire Fighters represents 260,000 professional fire fighters and emergency medical personnel across North America, including 18,400 in Canada. As first responders to structural fires in Canada's cities, professional fire fighters have an inherent stake in the standards, codes and regulations governing fire safety and building construction.

Consequently, the IAFF provides the following comment as part of the current Review of Canada's Fire and Building Codes. In particular, this comment reflects the move to objective-based codes in 2004.

It is the position of the IAFF that the move to objective-based codes represents a step backward in fire and building safety, and consequently fire fighter safety, for the reasons that are outlined below.

The Evolution of Performance-Based Fire Safety Regulations

Historically, NFPA Standards in the United States have taken the form of what is commonly referred to as the "prescriptive" approach. Prescriptive-based codes specifically state fire safety goals, and reference approved methods (such as the installation of sprinklers) that can be used to demonstrate compliance with its requirements. The standard may include a method for quantifying equivalencies to an existing prescriptive-based code or standard, or it may identify one or more existing prescriptive codes or standards as approved solutions. Either way, the document allows the use of any solution that demonstrates compliance with detailed requirements.

The development of computerized fire models and other computational techniques has led to a widespread suggestion that society should move to "performance-based codes". The original proposal for performance-based codes was that society would set a level of safety and fire engineers would build to that level. A true performance-based code explicitly states its fire safety goals and defines desired levels of safety and risk. The code references and provides design objectives that will achieve its goals, and allows any solution that meets the design objectives. Performance-based codes are commonly referred to as objective based codes because 1) Regulators would set a level of safety (*social objectives*), and 2) Fire engineers could then use "any technology" that promised the needed level of safety (*technical objectives*).

A very different definition and approach is shown by the Canadian suggestion of "objective" based codes. The Canadian approach "deconstructs" the code into a series of objectives of ever increasing non-technical specificity. At some point this process stops and the "functional requirement" for each sub-objective is articulated in technical language. Functional requirements set forth might be prescriptive- or performance-based, or a combination of both. Since the code will only mandate compliance with the "functional requirements", rather than the "objectives" it would appear that the "objectives" are part of the *code making process* as opposed to the *code*.

The weak spot is still the linkage between the final social objective and the technical requirement. The Canadian approach does increase the code domain to much more precisely specify the objectives. However, to achieve a tighter fit between objectives and technical requirements, the objective based code proposal adds the problem of “horizontal” linkage among a large number of subsystems.

The objectives approach can lead to design system error because engineers complying with functional objectives may not understand how a choice of compliance strategies can impinge on another part of the system. Consider a hypothetical commercial occupancy in which a well-intending engineer installs a heat and smoke venting system capable of exceeding the functional requirements set forth in the Canadian objective.

However, this overachieving engineer also installs a ROR (rate-of-rise) detection and suppression system. The ROR system is designed to activate if the incremental change of temperature exceeds a pre-set limit. However, if the smoke and heat exhaust system activates and disturbs the thermal layering, the preset incremental change may not be reached at the incipient stage of the fire, thus delaying the activation of the ROR system and suppression of the fire.

To make the objective system work one would have to “reconstruct” what was deconstructed and ensure that each piece continues to work properly. The Canadian objective-based system as proposed does not include this.

Consider the differences between the following examples of standard language from the NFPA 101 Life Safety Code requiring that in a building “any ignition [in a building] will be controlled by reliable automatic systems so that no ordinary fire larger than 2.5 Megawatts will occur” versus “a building shall be provided safeguards against fire spread so that occupants have time to escape to a place of safety.”

While the first example clearly sets forth an “engineering” design directive, the second has not evolved to the point specifically directing engineers in which engineering methodologies to use when meeting the requirements. The tasks of determining parameters for buildings under such a standard proves difficult as each individual involved often has a differing opinion of what is intended.

Herein lies the danger of the Canadian model of objective-based codes which allow for a wide range of acceptable alternatives that give the *appearance* of meeting the “objectives” when *in reality they would not pass a rigorous fire engineering testing program.*

Conclusion

Though the champions of the Canadian objective-based codes tout that one asset of these codes is that they are “more accommodating to innovation,” the Canadian objective-based codes lack the technical criteria found in performance-based codes, and hence there

is no means for assuring that the objective-based Canadian code system satisfies important fire engineering performance objectives.

Society cannot delegate building safety decisions to an engineer unless there is demonstrated assurance that the engineer *can* and *will* follow the social mandate in creating a safe level of safety. Future design codes should include both performance-based and prescriptive-based design options. Codes should specifically state their fire safety goals, and reference approved methods that can be used to demonstrate compliance with their requirements.

Respectfully submitted,

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