

# Using Engineered Systems

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Recently I was talking to an American Society of Plumbing Engineers chapter president. He told me that the building officials in his area are requiring plumbing systems designed by an engineer to be classified as engineered systems, which require a special periodic inspection by the design engineer and a written report by the design engineer per Section 107.2

of the International Plumbing Code. He also stated that the local inspectors are requiring numerous inspections beyond those required by clients, which is placing a heavy financial burden

on local engineering companies. Area plumbing engineers have discussed this issue many times with the building officials but have not been able to convince them that a system designed by an engineer is not an engineered system as described in the plumbing codes.

Section 105.4 of the International Plumbing Code and Section 301.2 of the Uniform Plumbing Code discuss engineered systems. These systems fall under the category of "alternative engineered design" in the IPC and "alternative methods" in the UPC. These sections allow plumbing designers to design plumbing systems not specifically discussed in the plumbing codes. Both plumbing codes require an engineered system to conform to the intent of the provisions of the plumbing codes and to provide an equivalent level of quality, strength, effectiveness, fire resistance, durability, and safety.

IPC and UPC discuss many different plumbing systems, including various drainage systems, several water systems, and many equipment systems. Not all plumbing systems designed by plumbing engineers need to be categorized as engineered systems. Any designer, including contractors and homeowners, can use any system discussed in the plumbing codes. An individual vented drain waste and vent system or a combination drain and vent system is not an engineered system, even if an engineer designed it. Those plumbing systems

described in the respective plumbing codes are not engineered systems. The plumbing systems described in the plumbing codes can be designed by anyone and used in any plumbing system, provided that they meet the prescriptive parameters identified in the plumbing codes.

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## What Makes a Plumbing System an Engineered System?

Is it who designs the system? Or is it more complicated than that?

The simplest definition of an engineered system is a system not specifically discussed in the plumbing codes that has documentation, including test reports, showing that it functions properly in normal installations. To be more specific, an engineered system is any system that either is not addressed by the codes or does not meet the prescriptive parameters of the codes but can be demonstrated to still meet the intent of the codes.

The plumbing codes cannot envision or address all innovations that may be developed in the future or that even are available currently. For this reason, both plumbing codes contain sections discussing alternative methods. These sections are intended to allow innovative ideas and new technology. Both the IPC and the UPC are revised and republished on three-year cycles. Many code cycles may pass before a new concept is included in the plumbing codes. Systems such as Sovent and the Philadelphia stack have been used for more than 50 years, but they still are not included in the plumbing codes. As design engineers, we should have the option to use such systems if they meet our clients' requirements and the intent of the plumbing codes.

Since the Sovent system and the Philadelphia stack system have no references in the plumbing codes, they are classified as engineered systems. These systems have been used throughout the United States for many years and are accepted by many jurisdictions as though they were discussed in the codes. Other systems with no specific references in the plumbing codes also are classified as engineered systems.

A plumbing designer needs to apply sound judgment when using an engineered system for a specific project.

Appropriate information and data need to be submitted to the code official to assist the building official in reviewing the construction documents. Acceptable data needed to substantiate the engineered system include test results performed by an approved third-party testing agency. Design calculations or an evaluation report issued by an authoritative agency helps in the evaluation.

A code official also needs to apply sound technical judgment to determine that an engineered system conforms to the intent of the provisions of the plumbing codes and that the engineered system provides an equivalent level of quality, strength, effectiveness, fire resistance, durability, and safety.

Engineered systems are important options available to plumbing designers. But you must take care when using an engineered system. You must work closely with the building official from the beginning of the project, so he is comfortable with the system. ■



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