

Energy Code Provisions for the Use of Light-Gauge, Cold-Formed Steel

Author: Eric Burnett

Date: 2000

Preface and acknowledgments

This report is one of a series of reports by the Pennsylvania Housing Research Center (PHRC) that document the development of an alternative energy code for the Commonwealth of Pennsylvania. Its intended audience includes policy makers in state and local governments, building code officials, builders, contractors and others involved in the development or implementation of building code regulation in Pennsylvania.

This project was initiated at the request of members of the PHRC's Industry Advisory Council. The Council ensures that projects conducted by the PHRC are important and relevant to the housing industry in Pennsylvania. This project received financial or other support or both from the following:

- The Pennsylvania Department of Community and Economic Development (DCED);
- The individuals, associations, and corporations that are members of the PHRC;
- The Pennsylvania College of Technology; and
- The Pennsylvania State University.

This report was prepared by Eric Burnett. Rob Bombino, Michelle McMullen and Angela Burnett assisted with the production of the final version of this report. The assistance or feedback or both of the following individuals, on behalf of the steel industry, was greatly appreciated:

Carl Wilhelm of U. S. Steel

Jonathan Humble of AISI

Don Moody of NASFA

Leo De Meo of Dofasco

Tom Trestain, a steel industry consultant from Toronto, who gave freely of his time and expertise.

None of these individuals bears any responsibility for the contents of this report.

The PHRC was responsible for initiating and producing this report. Two of our more general objectives are to stimulate discussion about housing and to promote the development of quality housing in Pennsylvania. We therefore welcome questions or other feedback regarding the report.

Eric F. P. Burnett

Director

Executive Summary

In November 1999, Pennsylvania's Governor Ridge signed the Uniform Construction Code (UCC) legislation into law, creating a statewide building code across Pennsylvania. The Act requires the Pennsylvania Department of Labor and Industry (DLI) to promulgate regulations to implement the requirements of the legislation. Chapter 3, Section 301 (c) requires the DLI to promulgate regulations for prescriptive methods to implement energy conservation requirements that take into account the various climatic regions in the Commonwealth.

The PHRC has developed the PA-Alternative Chapter 11 to replace the International Residential Code, Chapter 11, Energy Efficiency. The PA-Alternative Chapter 11 provides a code chapter that is simpler, more flexible, and better focused on Pennsylvania. In order to develop this Chapter, an effective insulation strategy for use with light-gauge steel framing had to be developed.

This report documents a project that was conducted to determine whether the IRC 2000 code requirements do provide for satisfactory heat and moisture control for the conditions that prevail in low-rise, new housing in Pennsylvania and, if not, to develop the appropriate requirements for the PA-Alternative Chapter 11.

It was found that:

- The IRC 2000 requirements were not satisfactory and appropriate recommendations had to be developed for the PA-Alternative Chapter 11.
- In general, the recommended R-values contained in PA-Alternative Chapter 11 are not that dissimilar from the IRC 2000 requirements except when moisture control provisions predominate and the insulated sheathing requirements increase.
- It is largely the use of 2x6 steel studs with larger amounts of batt insulation (R15 but especially when R 19 or more is provided) that is adversely affected by the IRC 2000 provisions. The IRC 2000 does not appear to make any real provision for moisture control. Given the liability and the monetary stakes involved and the numerous examples of legal class actions generated by moisture-related problems, it is difficult to understand how or why the steel industry could have ignored such a fundamental and obvious building science issue for so long.
- It was necessary to provide separate design requirements for detached, single-family housing (Type A1) and row or Type A2 housing. When moisture-control considerations dominate, the insulated sheathing requirements become onerous and the insulation requirements for Type A1 and A2 housing tend to be the same.

