

**RESEARCH TOPIC ACCEPTANCE REQUEST**  
**TC/TG10.5 – Refrigerated Distribution & Storage Facilities**

**Title:**

Long Term Performance Characteristics of Insulated Panels

**Research Category:** Refrigeration Systems

**Research Classification:** Basic/Applied

**TC/TG Priority:** 2

**Estimated Cost:** \$85,000

**Other interested TC/TGs:** TC 4.4 & 10.8

**Possible Co-funding Organizations:**

International Association of Refrigerated Warehouses (IARW)

**Handbook Chapters to be Affected By Results of this Project:**

Refrigeration, Chapters 12, 13 & 15; Fundamentals, Chapter 25

**State-of-the-Art (Background):**

During the past 25 to 30 years, the use of insulated panels of various types has become the dominant method for providing wall and ceiling enclosures for insulated structures used in refrigeration storage facilities and freezing apparatus.

The principal insulations used in the metal-faced panels have been of two general materials, polyurethane/polyisocyanurate (PUR/PIR) and expanded polystyrene (EPS). Various methods have been used to manufacture the panels to provide for structural integrity and for ease of assembly at the construction sites.

The insulation for the panels is determined through tests by the manufacturers either in their own laboratories and/or outside laboratories on an as-built and perhaps on an "aged" basis. There has, however, been no known research as to the long-term performance of panels in actual refrigerated structures. There is some anecdotal evidence of insulation value deterioration, but it has been insufficient to provide reliable data for future designs and trends.

**Advancement to the State-of-the-Art (Justification):**

There is a need to determine the effective performance of the various panel designs and types in actual structures that have been in operation for approximately 5, 15, and 25 years. This data will provide information to enable designers to improve the long-term performance of insulated panels as well as to provide practitioners accurate insulating values for current projects on an aged basis.

To be comprehensive, this research needs to be conducted in two general locations -- high humidity locations east of the Rockies and low humidity areas west of the Rockies. In addition, three types of applications should be tested; those structures operating at 0°F to -20°F; those operating 28°F to 40°F; and those with cyclical operation such as belt freezers that operate from 90°F to -40°F. Finally, the testing methods used should be both destructive and non-destructive to achieve reliable information.

The justification for obtaining accurate results of insulated panel performance on a long term basis will lead to better decision-making with respect to selections for particular applications and to improvement in future designs to increase insulation effectiveness and durability. This value is not readily calculable, but it is very large in terms of energy and investment.

### **Objective**

The objectives are to obtain reliable long-term test data for the targeted insulated panel structures for use by designers and fabricators to improve long-term performance and by application practitioners to have accurate information for assessing long-term loads.

The results will be published in Transaction and the ASHRAE Journal and incorporated in Chapter 12, 13, and 15 of the Refrigeration Handbook.