

INVENTIONS & INNOVATION

Success Story



RR-1 INSULATING SCREW CAP

New Fastening System Reduces Energy Use in Buildings and Provides Greater Durability

Benefits

- ◆ Saves heating and cooling energy by eliminating the thermal bridging
- ◆ Through 2000, has cumulatively saved over 2.3 billion Btu
- ◆ Provides greater durability through its materials and component design
- ◆ Lowers labor installation costs
- ◆ Has avoided 100 tons of CO₂ emissions through 2000

Applications

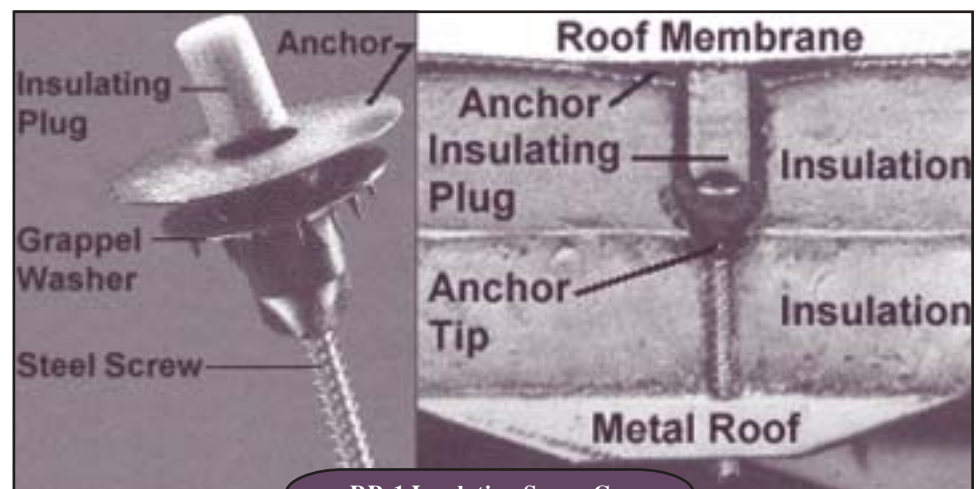
Best used on single-ply (flexible) membrane roofs on commercial and industrial buildings. Can be used to retrofit older roofs.

Capabilities:

- ◆ Replaces conventional metal or plastic fasteners
- ◆ Best used for fastening single-ply roofing or rigid insulation to metal decking
- ◆ Resistant to back-out problems and corrosion

Roofing systems on industrial and commercial buildings continue to show impressive strides in their performance and durability. Fasteners play an essential role by keeping many of these roofs intact through the joining of pieces or multiple layers. However, the combination of newer roofing materials, known as single-ply membrane, with conventional metal fasteners leads to increased heat loss. This loss occurs because the metal screw and plate of the fastener are only minimally insulated from the surroundings and conductive heat flow occurs through the thermal bridge created by the metal fastener. The RR-1 Insulated Screw Cap Assembly, developed and patented by The Romine Company of Newark, Ohio, with the aid of a grant from DOE's Inventions and Innovation Program, is a simple but elegant solution to heat loss and back-out problems found with many conventional fasteners. This improved fastener consists of an injection-molded fiberglass-reinforced nylon anchor, soft insulating plug, and optional grappel washer. It is simple to install and incredibly strong.

The key advantage of the RR-1 is that the metal screw portion of the fastener is embedded at least one inch into the insulation board, reducing the rate of heat transfer and the potential for corrosion. A foam plug is inserted in the cavity created and acts as an insulator and provides an extremely smooth surface without the bumps caused by typical screw heads.



In tests conducted on wind uplift, the strength of the RR-1 insulating fastener proved to be greater than the holding power of the metal decking. The developer, Robert Romine, also worked to ensure that the RR-1 resists back-out. This feature and fastener tear-out are particularly critical with the newer flexible membranes; no pre-drilling is needed. The simple flush mount requires less torque and time to screw in and, at the same time, results in a smoother finish. Less costly materials are used in manufacturing the RR-1 insulating fastener, so it's more economical than the all-plastic fasteners available on the market.

Energy Savings and Pollution Prevention

The National Institute of Standards and Technology (NIST) has estimated that after 10 years on the market, the RR-1 would save an equivalent of 210,000 barrels of oil per year just in the reduced heating and cooling of buildings. A study conducted by NIST stated that the payback, in both humid and cold climates, is about 4.5 years. Cumulative energy savings through the year 2000 have surpassed 2.3 billion Btu with an associated reduction in CO₂ emissions of 100 tons.

System Economics and Market Potential

The greatest potential for the RR-1 assembly is in the single-ply (flexible) membrane systems, which have gained increasing market share—55% of the commercial roofing market—because of their greater durability and lower labor installation costs. This submarket, combined with installations in cold or humid climates, offers great market opportunity and little competition for the RR-1 Insulated Screw Cap, a simple but unique technology for today's roofing industry.

INVENTIONS AND INNOVATION PROGRAM

The Inventions and Innovation Program provides financial assistance for establishing technical performance and conducting early development of innovative ideas and inventions. Ideas that have a significant energy-savings impact and future commercial market potential are chosen for financial support through a competitive solicitation process. Inventions funded by the program have saved enough energy to light 10 million homes per year. In addition, the program offers technical guidance and commercialization support to successful applicants. Ideas that benefit the Industries of the Future, designated by the Office of Industrial Technologies as the most energy-intensive industries in the United States, are especially encouraged.



"This product would not exist without DOE's support."

— Robert Romine
Inventor of the RR-1
Insulating Screw Cap

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