

# HOT-APPLIED ASPHALT SETS QUALITY STANDARD FOR ENDURANCE IN COMMERCIAL ROOFING

BY ROBERT ALMON

This article examines the quality of commercial roofing systems in general, and specifically, hot-applied asphalt and modified bitumen (MB). Asphalt built-up roof (BUR) systems continue to set the endurance standard by which other roof products can be measured. Although the traditional, hot-applied asphalt BUR may be the benchmark for quality, modified bitumen products offer other top-quality options.

The performance attributes of traditional asphalt BUR are reviewed here with respect to the changing needs of the industry and the introduction of new bituminous roofing products.

## Quality Standards

The word “quality” often is used simply to refer to a characteristic or attribute. As used by industry today, “quality” refers to the standard or grade of a product, and the word is often modified by another word or phrase, such as “high” quality or “good enough” quality. In a third sense, “quality” means excellence or superiority. When a company advocates “quality” as a corporate ideal, it declares that its products or ser-

vices meet the highest standards, i.e., they are first rate, second to none, or perhaps comparable to the best of the best.

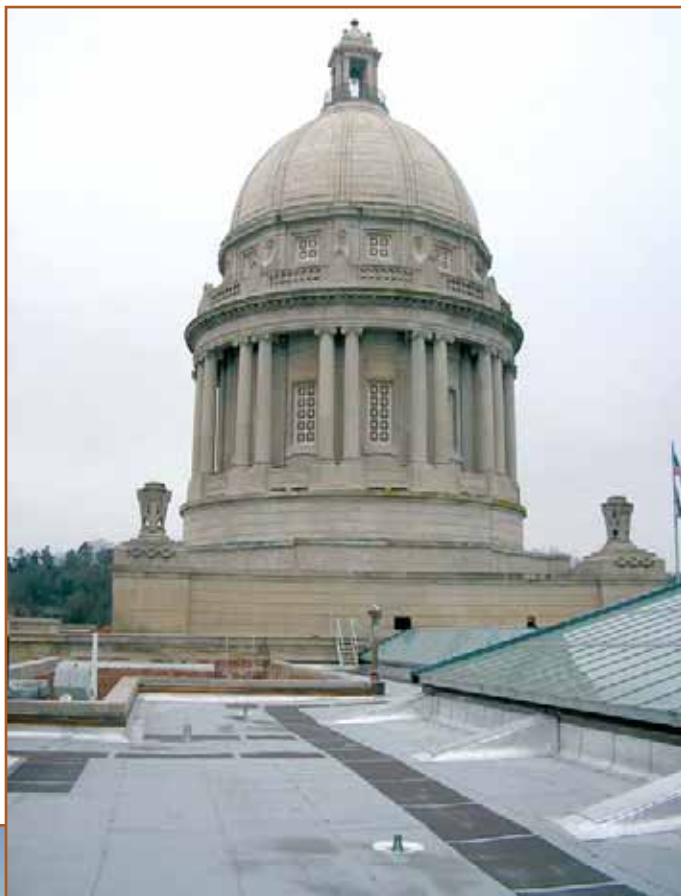
## Three Durations

Now the stage is set for a closer examination of the meaning of quality with respect to commercial roofing. This can be analyzed in the context of three time periods characterized by three qualities. A superior system should receive high marks in all three and be a clear favorite in at least one.

- **Reliability**, as it relates to short-term performance immediately after installation. (What are the chances of early failure because of

improper installation?)

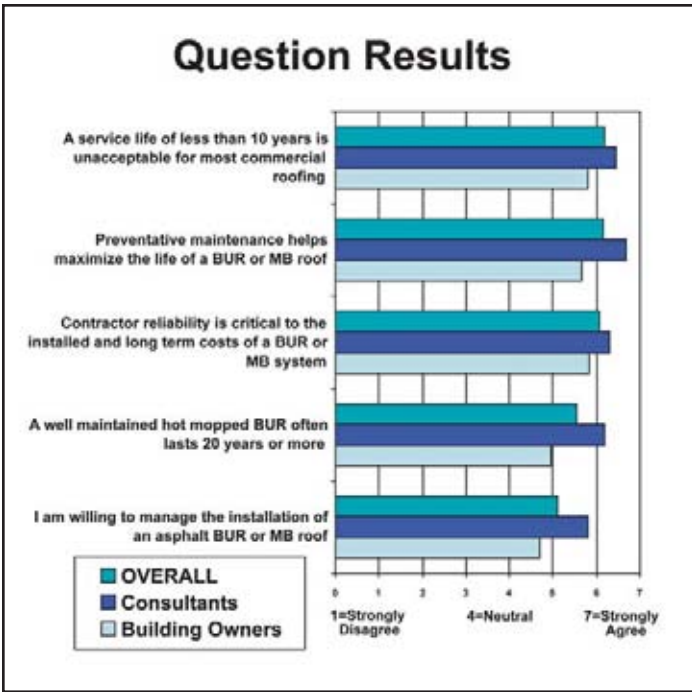
- **Endurance**, or the expected life cycle of a properly installed system. (How long does it last?)



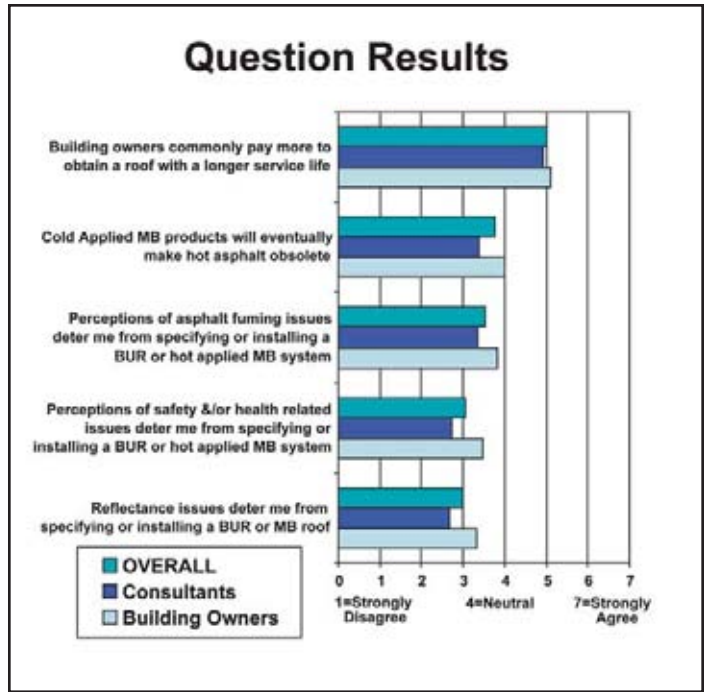
*Above: The State Capitol building in Frankfort, Kentucky was re-roofed using a 2-ply modified bitumen roofing system from Siplast, an ARMA member. The base layer of modified bitumen was installed in hot asphalt and the modified cap sheet was installed with cold process adhesive. (Photo courtesy of Patrick D. Murphy Co., Inc.)*



*Left – A traditional built-up roof (BUR) covers this laboratory building. BUR is one of the longest-lasting roofing systems available. (Photo courtesy of GAF, an ARMA member.)*



Graph 1



Graph 2

- Sustainability**, or the environmental viability of a system. (What resources are consumed or depleted during manufacturing and use? What waste is generated at the end of the life cycle?)

#### Reliability

Although the time required to install a roof may be brief compared to its total life cycle, it is a period of great activity. It is also

a time when quality management by the contractor is a special concern.

According to Patrick D. Murphy of Patrick D. Murphy Architects in Louisville, Kentucky, a commercial roofing system is literally manufactured in place on the facility. A well-trained crew encompasses a range of skills, from helpers with experience to journeyman. For that reason, the redundancy of BUR is important. "For a built-up roof, where the ply sheets are joined together

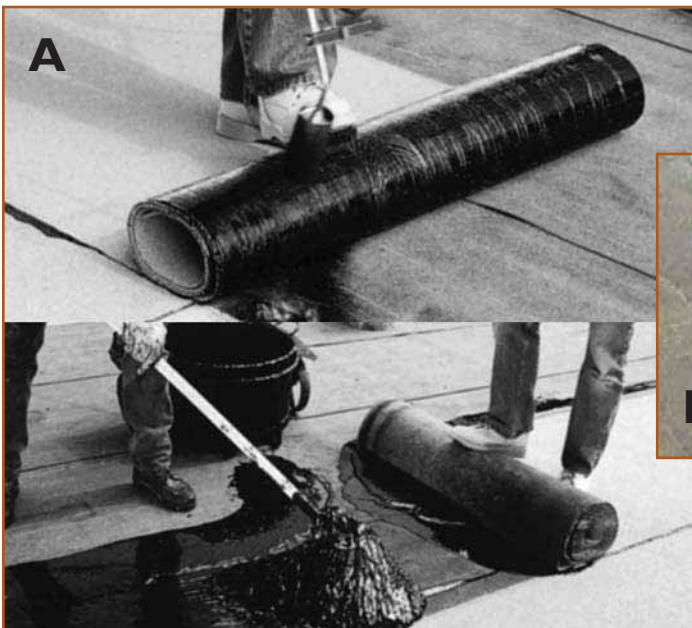
Murphy. "When the assembly is complete, the owner has a monolithic, multi-layer roof system to keep the building dry."

The Quality Commercial Asphalt Roofing Council (QARC) recently conducted an informal survey of roof consultants and building managers. A somewhat unexpected result was the strong agreement between both consultants and building managers regarding the importance of reliable installation.

Of the 24 statements surveyed, the third strongest agreement was received for the statement that "Contractor reliability is critical to the installed and long-term costs of a BUR or MB system." (See Graphs 1 and 2.)

Fortunately, in North America, a strong infrastructure is in place for the installation of BUR and modified bitumen. Reliable contractors with the proper equipment and training can be found throughout the United States. Consultants often

are called upon to serve as quality managers, checking the references of the contractors and monitoring the installation, much as one would monitor the quality of prod-



Asphalt roofing application methods include A) hot-applied, B) cold-applied, and C) torch-applied. (Photos courtesy of ARMA.)

ucts produced in a factory setting.

When dealing with reputable contractors and quality materials, the probability of obtaining a reliable BUR is high. Statistics from roof asset management companies indicate that installation errors, if present, are most likely to show up very early in the life cycle.

If a system survives for two years without the need for major repairs, it is likely to survive for many more. While this is true for all systems, it is especially true for BUR systems, which can endure for decades if properly installed and maintained.

### Endurance

Endurance is the quality that makes something lasting and resistant to wear and decay. It is longevity. Referring to the period of time between installation and replacement of the roofing system, it is measured as a life cycle or service life of durable goods.

In the QARC survey, both roof consultants and building managers agree with the statement, "A service life of less than ten years is unacceptable for most commercial roofing applications." In fact, this statement produced the most agreement of the 24 statements, and agreement was stronger among consultants than building managers (See Graph 1).

Ironically, today there are many systems that do not offer the long life cycle of asphalt roofing. Fifty years ago, longevity was an essential requirement. Building owners would opt for the longest lasting system that was readily available, and in most cases that meant asphalt BUR.

Today, according to Patrick Murphy, "Many of our decisions depend on a client's construction budget. The length of time that the owner plans to remain in a facility is very important. For example, the state of Kentucky has used only BUR and two-ply modified bitumen in the reroofing projects on which we have provided consulting. The reason for this is because the state intends to keep the buildings as long-term owners."

### Sustainability

One benefit of a long-lasting system is that because it does not have to be replaced as often, less waste is dumped into the environment. According to the QARC survey, roof consultants and building owners agree with the statement, "Preventive maintenance helps maximize the life of a BUR or an MB roof." However, sustainability and

environmental concerns take a backseat to reliability and endurance, which are more pressing issues for most building owners and consultants. Fortunately, the goals of sustainability and endurance are mutually compatible.

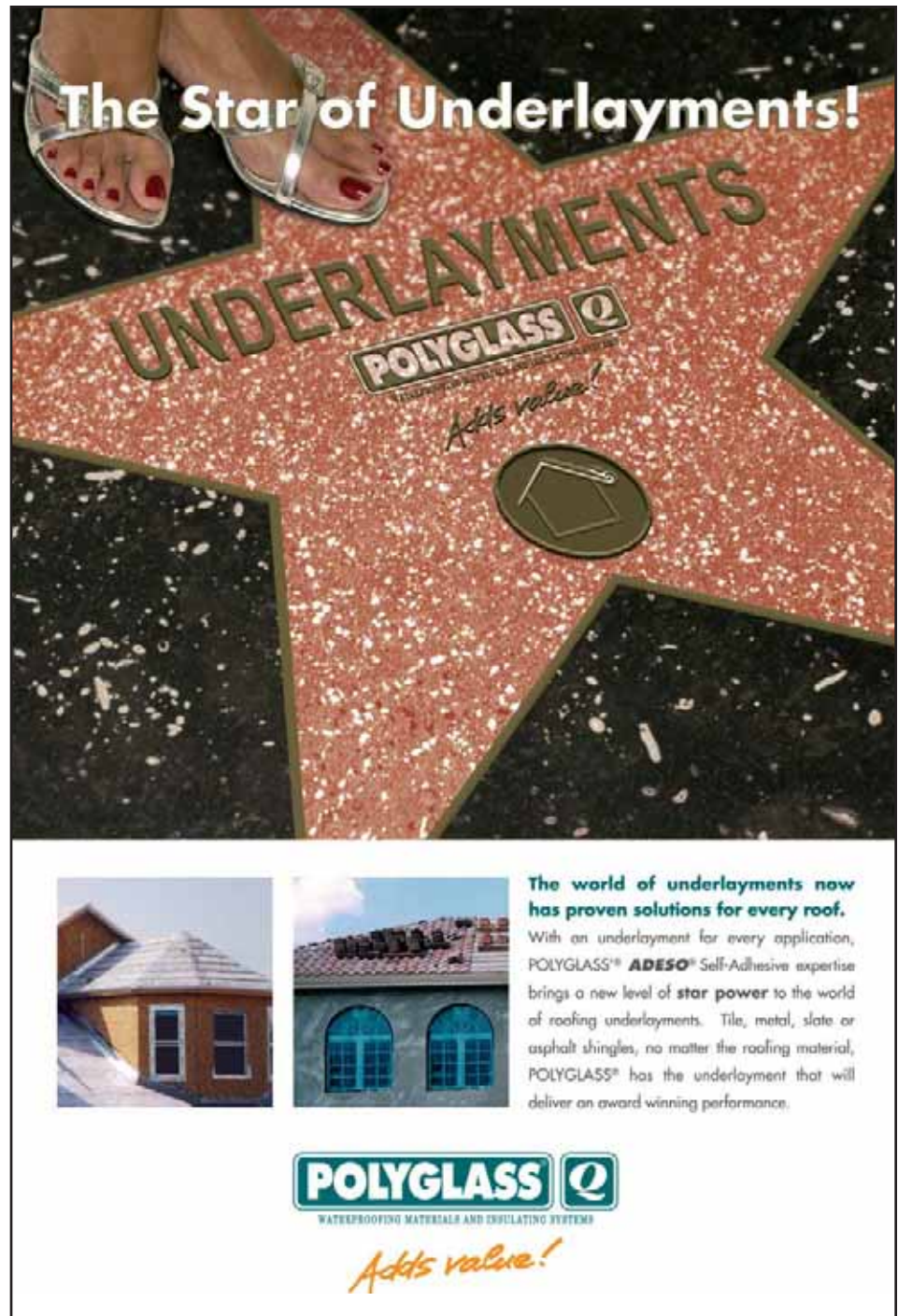
### The Original Quality Contest

Asphalt BUR and MB systems have excellent credentials. Bitumens won the initial quality contest in the 19th century when asphalt and coal tar pitch were adapted for use on the roofs of commercial buildings. It is estimated that the asphalt BUR

originated 170 years ago, during the beginnings of the industrial revolution.


Many factories, warehouses, transportation terminals, and tenement buildings that endure today were constructed in the years that followed, and during that time, asphalt in general and BUR systems in particular were established as benchmarks for roofing.

To emerge as the winner, bitumens had to possess certain qualities of endurance superior to any other materials available at that time. Asphalt was already known for its applications in shipping, an industry



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renowned for its intelligent use of materials. The greatest attributes of asphalt are proven durability and excellent water-leak resistance, both resulting from a redundancy of multiple layers of material.

Moisture resistance is an inherent property of asphalt, but it is only one factor of a successful system's ability to resist the elements. The multiple layer construction of BUR and MB assemblies results in membranes thicker than other types of low-slope systems. A four-ply BUR provides about 280 mils of waterproofing thickness, whereas some other systems provide 60 mils and often less.

Asphalt remains a superior choice today, just as it was an excellent choice in the past. No material has succeeded in upstaging the performance of hot-applied bitumen as a superior moisture barrier. Even long-lasting metal or tile roofing systems require asphalt-based underlayments for protection against moisture penetration, so it can be argued that asphalt is superior with regard to protection against leaks.

Large commercial roofs are especially vulnerable to structural stresses that place great demands on membranes. A well-designed asphalt system tends to distribute these stresses over a wide area with a thick membrane cross-section. Localized concentrations of high stress can be avoided with a



*A cold-applied, modified bitumen roofing system. (Photo courtesy of ARMA.)*

fully adhered asphalt BUR or MB system, which distributes this load over the entire membrane.

Asphalt-coated fiberglass felts and modified bitumen sheets provide physical strength, and multiple layers provide unsurpassed moisture protection. The asphalt – which imparts the moisture resistance – is visco-elastic, i.e., it has a tendency to yield rather than tear or break. Simultaneously, the redundancy of three or more layers of asphalt, felt, or MB sheets

further decreases the chances that the moisture barrier will be compromised.

For the same reason, asphalt BUR or MB withstands high-velocity winds better than other low-slope systems. Fasteners are designed to hold down a membrane, but high winds produce high stress concentrations that often tear apart membranes that are not fully adhered.

Appropriate fasteners, closely spaced, are used successfully in many roofs. Fasteners imitate the adhesion of hot-applied asphalt, but few come close to matching its performance. Liquid asphalt adheres extremely well to a wide range of decking materials. Asphalt binds the membrane together, and in many systems it also adheres the membrane to the deck over a wide area. In these cases, the whole system can withstand extreme uplift forces that are distributed over the entire surface, resulting in relatively low localized forces.

#### **Best Membrane in a Supporting Role**

The asphalt roofing industry is a vibrant, highly competitive industry, which has developed many innovative products over the past century. Most noteworthy are the modified bitumen (MB) membranes. However, none of these new products has made hot-applied asphalt obsolete.

Many quality asphalt systems today combine the use of MB sheets with hot-applied asphalt BUR in a hybrid system. These systems can be tailored to the application, giving roof consultants and building owners more design choices for longer lasting roofs.

MB base- or cap-sheets can improve the performance of an asphalt BUR system in

#### **ABOUT ARMA**

The Asphalt Roofing Manufacturers Association (ARMA) is the North American trade association representing the manufacturers and suppliers of bituminous-based residential and commercial fiberglass and organic asphalt shingle roofing products, roll roofing, built-up (BUR) roofing systems, and modified bitumen roofing systems. For additional information, contact ARMA or visit: [www.asphaltroofing.org](http://www.asphaltroofing.org).

#### **ABOUT QARC**

Generally referred to as QARC, the Quality Asphalt Roofing Council is an innovative, built-up/modified bitumen roofing initiative under the auspices of ARMA.

The Council is a cooperative effort comprised of asphalt roofing interests, including roll good producers, asphalt suppliers, equipment manufacturers, packaging suppliers, and others. It is also open to current ARMA BUR and modified bitumen manufacturing member companies.

The founding members of QARC designated Robert Almon, president of Mid-States Asphalt and Cant Strip, Inc., Tuscaloosa, AL, as its chairman and Todd Ziems, business manager of Low Slope Commercial Roofing for Owens Corning, Toledo, OH, as its vice chairman.

The mission of the council, according to ARMA executive vice president Russell K. Snyder, is to “promote quality asphalt BUR and modified bitumen to raise the awareness of time-proven quality commercial asphalt roofing systems.”



