PERFORMANCE CHARACTERISTICS OF INDUSTRIAL INSULATION

First Quarter 1995

12A. SELECTING ACCESSORY PRODUCTS TO COMPLEMENT THE TOTAL INSULATION SYSTEM

Coatings and Fabrics

PREFACE

Over the past several issues of this newsletter, we have discussed the physical characteristics of insulation and its environmental impact. But, when looking at the total insulation system, the importance of compatible accessory products such as coatings, sealants, fabrics and jacketing is often overlooked.

Regardless of the amount of detail spent analyzing a particular insulation product's ability to meet your specific needs, if quality, compatible accessories are not used, the dependability of the system could be placed at unnecessary risk.

SUMMARY

Accessory products are often viewed as commodities with little differentiation among competitive products, and are often selected as an afterthought. Also, the choice of accessory products is sometimes changed at the last minute by the contractor — and often unknown to the end-user.

At Pittsburgh Corning, we recommend the adoption of a "total system" approach to specifying insulation and accessory products to result in a high-quality insulation system.

Throughout the next few issues of this technical newsletter, we will be focusing on accessory products: their function, uses by various applications, characteristics that complement the total insulation system and potential problem areas of which specifiers need to be aware.

This issue of the newsletter will focus specifically on coatings and reinforcing fabrics. Future issues will discuss adhesives, sealants, jacketing and mechanical fasteners.

COATINGS

Coatings for exterior protection of insulation historically have been classified as breathers, also called weather barriers (if more than 1 perm) or vapor retarders (if less than 1 perm).

Weather barrier coatings, when installed on the outer surface of the thermal insulation, protect the insulation from rain, snow, sleet, wind, solar radiation and mechanical damage. Examples are bituminous or resin-based coatings. Bituminous weather barriers can be emulsions or asphalt cut-back (solvent) types. Resin-based weather barriers can be polyvinyl acetate, acrylic or a combination of these two resins.

Vapor retarder coatings, when installed on the outer surface of the thermal insulation (high vapor pressure side), retard the passage of water vapor to the lower vapor pressure side. Vapor retarders can also be bituminous or resin-based. Almost all bituminous vapor barriers are asphalt cut-back types. Resin vapor barriers are made of various types of resins and can be solvent or water based.

All mastic coatings are dull or flat in appearance. Regardless of a particular coating's material make-up, the higher the solids content by volume, the less shrinkage and subsequent cracking and splitting there will be. The more fillers that are used, the greater the coating's permeability to water vapor.

While it is commonly thought that a so-called permeable coating will allow entrapped water to leave, in reality, only a small amount of water vapor can pass through any coating in a short period of time. In most cases, entrapped water will result in rupture or severe blistering when the insulated system is exposed to solar or system heating.

Chemical Resistance

If chemical resistance is a factor in the specification, the color of the coating is vital. Black coatings may have surface temperatures in excess of 170°F when exposed to the sun, decreasing their resistance to chemicals.

The geometry of the insulated vessel or pipelines must also be taken into consideration, as well as the nature of the chemical. For example, the top of a vessel or top side of a horizontal pipe may be considerably warmer than the bottom due to solar heat. This can cause slower evaporation of volatile chemicals on the bottom side, allowing them to concentrate and stay in contact with the coating for a longer period of time.

Once installed, coatings should be immediately inspected for compliance with the specification, proper installation at protrusions and flashings and for freedom from pinholes. Any necessary repairs should be made immediately. Periodic inspections and maintenance should be conducted on any insulated system.

PITTSBURGH CORNING COATING & FABRIC DESCRIPTIONS

ACCESSORY	TYPE	ADVANTAGES
PITTCOTE® 300	Asphalt vapor & weather barrier	Strong, expands and contracts with system without cracking, resists alkalis and acids.
PITTCOTE® 404	Acrylic latex weather barrier	High solids content, flexible, resistant to cracking, and chemical and UV exposure.
PC® Fabric 79	Polyester mesh fabric	For breathable and vapor-barrier systems, has high tensile strength, is non-wicking.

Often, the coating itself will communicate to you if repairs are needed before extensive damage occurs. For example, a large liquid filled blister can signify there is a leak or tear somewhere above the blister. Cracks or splits can mean there is a stress that needs to be corrected.

Installation

In theory, a dry film thickness of at least 45 mils is preferable over any insulation system. In practice, however, the surface cells of FOAMGLAS® insulation will consume some of this, making the thickness above the cells a little less. Therefore, coverage is recommended to be 6.5 gallons/100 sq. ft. for 50% volume solids and up to 12 gallons/100 sq. ft. for 30% volume solids. Again, if there is not a high enough solids content, the coating will shrink as it dries, resulting in even less coverage. Reinforcing fabrics, in addition to adding strength and support, act as a gauge for coating thickness. Fabrics are discussed in more detail later in this newsletter.

In order to increase gloss or provide an additional level of protection, various top coats including aluminized asphalt, urethane and textured latex, may be applied over the mastic.

Dual coating systems are often used to provide additional color or performance characteristics. This has been a relatively common practice when used over insulation, as almost every painting operation includes a primer or filler coat and at least one finish coat. Common scenarios involve an aluminized asphalt mastic over an asphalt base coat, or vinyl over a latex coat. While vinyl coatings over latex mastics provide a lower permeability, the vinyl eventually becomes brittle due to weathering and can crack.

Special attention needs to be paid to the fact that FOAMGLAS® insulation has a rough surface which requires a heavy mastic to fill the cells and to embed the reinforcing fabric.

Because FOAMGLAS® insulation is impermeable—actually more impermeable than any coating—a vapor retarder coating, unless used for chemical resistance, is a redundant system which is only required in case of joint sealant failure or breakage of the insulation.

Recommendations

Over the past year, Pittsburgh Corning has tested many coatings for use over FOAMGLAS® cellular glass insulation in regards to chemical resistance, weathering and appearance.

After more than 16 months of outdoor exposure, acrylic latex and asphalt cut-back coatings, if covered with metal jacketing for outdoor applications, have shown to be the preferred coating for FOAMGLAS® insulation applications exposed to the weather. Coatings made of vinyl acetate, terpolymer, coal tar, chlorinated rubber, CPE and butyl have been found to harden, crack or weather poorly. Many products did not meet their advertised temperature ranges and had higher shrinkage and lost elasticity. Although test results by competing companies for these characteristics may well perform as advertised on other insulation products, the scope of our testing was limited specifically to their use in conjunction with FOAMGLAS® insulation.

Pittsburgh Corning recommends using the following with FOAMGLAS® insulation:

PITTCOTE® 300 Finish

PITTCOTE® 300 Finish is an asphalt coating especially formulated for use with FOAMGLAS® insulation in the low to moderate temperature range where a vapor retarder and weather barrier coating—or chemical resistance—is required.

PITTCOTE® 300 Finish protects the insulation under metal jacketing as well as shaped areas in underground applications which are not covered by jacketing. When used with PC® Fabric 79, it produces a high-strength system that will expand and contract with the insulated system without cracking. PITTCOTE® 300 Finish offers good chemical resistance to alkalis and most acids. However, it is not recommended for outdoor applications where exposed to direct UV light unless it is covered with a metal jacket.

Applied by spray, trowel or glove, PITTCOTE® 300 Finish is black in color, and is recommended for service temperatures of -40°F to 200°F. If sprayed, its solids content by weight is 62%-65%, and if troweled, 66%-70%. Its water vapor permeability is 0.003 perm-inch.

PITTCOTE® 404 Coating

PITTCOTE® 404 Coating is a highly flexible, acrylic latex coating for use where a superior weather barrier finish is required. This breathable system allows small amounts of water vapor to escape while forming a barrier against liquid water.

For use on applications with continuous service temperatures of -30°F to 180°F, or intermittent temperatures of up to 220°F, PITTCOTE® 404 Coating serves as a general purpose exterior coating for applications ranging from cryogenic to high temperature.

Like PITTCOTE® 300 Finish, when used with PC® Fabric 79, it produces a high-strength system that will expand and contract with the insulation system without cracking. Also, it is resistant to most salts, ammonia and a few solvents, and will not discolor with normal use and exposure to UV.

PITTCOTE® 404 Coating is available in white, which is chemically accepted by USDA for food applications, gray and custom colors, and can be applied by spray, trowel, glove or brush. Its solids content by volume is 55%-57%, and its permeability is .4 perm inch.

REINFORCING FABRICS

Pittsburgh Corning recommends that, when used as exterior protection, all mastic coatings be reinforced with a meshed fabric. In addition to providing a gauge for coating thickness, fabric also adds strength and support to the system during thermal and mechanical movement.

Most fabrics sold for use with coatings are either glass or cotton. Glass fabric is more brittle and, due to weathering or movement of the system, will rupture. Cotton fabric has the ability to wick water and/or solvents, which can seriously compromise the integrity of the system. Polyester fabrics will not wick moisture like cotton and are not brittle like glass. Plus, the high elongation of polyester accommodates large thermal and mechanical movements without rupture and allows maximum movement of the coating.

When selecting a fabric, attention needs to be paid to the size of the mesh. Larger openings will allow heavy mastics to penetrate the fabric to bond to the insulation. With smaller openings, there is a greater chance the coating will not be able to pass through the fabric and will not adhere properly to the insulation. Additionally, pin holes are much more common with smaller mesh sizes.

Recommendations

PC® Fabric 79

Pittsburgh Corning recommends the use of PC® Fabric 79, a white polyester mesh fabric, which can be used in both breathable and vapor barrier systems. Because it is polyester, it is non-hazardous and will not wick or absorb moisture. Its mesh opening is .125 inch and it has been specifically designed to work with PITTCOTE® 300 and PITTCOTE® 404 Coatings.

Its high tensile strength reinforces the coating, and its high elongation accommodates thermal and mechanical movement without rupturing.

ADDITIONAL INFORMATION

While the above-mentioned coatings and fabrics have all been tested and proven to perform well in a FOAMGLAS® insulation system, there may be other products on the market that, depending on your specific requirement, can also meet your needs. Please contact your Pittsburgh Corning representative for more information.

PITTSBURGH CORNING
800 Presque Isle Drive
Pittsburgh, PA 15239, U.S.A.
Tel: 412-327-6100
Telefax: 412-327-5890

FI-PC/TN12A 10M 4/95