Project Transmit Memorandum

Procurement

Reference: PTM 808

Date: 18/05/2011

RE: MOTIVATION TO PURCHASE METALTEC TC LIQUID INSULATION

Background

Cooling of the air to create productive underground environment is of utmost importance for the safety, health and survival of a mine. Phakisa employs surface icemakers to produce ice that cools the water used underground. The cold water in turn cools the air entering the underground working places.

The icemakers deliver 87.5% of the required capacity. Various factors such as ambient conditions, availability of machines, operability of machines and unnecessary energy losses contribute to the short fall of the ice capacity.

Energy lost to the ambient surrounding contributes enormously to the underperformance in ice production. The non-insulated icemaker vessel compels the energy lost. Excluding the insulation, prevent damage to the insulation during the process of transport from overseas, installation and connection to other equipment.

Phakisa launched an investigation to find the best insulation for the Ice-plant application.

Principle of Insulation

The principle of insulation is to decrease the rate that energy moves through a material. The refrigerant inside the icemaker vessel is at -12ºC while the outside is at 33ºC (design ambient temperature). Without insulation, 965.2W/m2 heat transfers into vessel. Insulating the vessel the heat transfer, from outside to inside, *reduce* since the insulation present resistance to heat flow. The thickness and Overall Heat Transfer Coefficient of the insulation determine the effectiveness of the insulation.

Problems insulating cryogenic equipment

1. Water condenses at sub-zero temperatures on cold surfaces. If the water penetrates the insulation and accumulates between the vessel and the insulating material, it accelerates the corrosion process of steel vessels but worse it unnoticeable.
2. Generally, a good water vapour seal is required before applying insulation. The water vapour seal deteriorate with the change of temperatures of the vessel and water eventually penetrates the insulation.
3. Regular inspections of the vessel will record any corrosion behind the insulation. The process of inspection and subsequent repairs will require that the insulation and water seal have to be replaced.
4. To gain the required resistance the insulation material thickness must be increases. The thick material is difficult to cover bends and valves.
5. To cover the curved areas associated with pipes and vessels the insulation be flexible and hence losses it mechanical strength and a steel cover have to be added to protect the insulation.
6. The insulation material must be environment friendly, flame retarded and with low

toxicity index. These requirements make insulation expensive.

Comparison

The investigation yields three possible products.

Descriptions

SUPERLON

SUPERLON ® is a flexible and lightweight elastomeric nitrile foam material designed primarily for thermal insulation. *SUPERLON* ® insulation is black in colour and is available either in tubing or sheet form. The extruded flexible tubing is specially designed to fit the standard diameters of steel and copper pipings. Sheets are available in standard precut sizes or in rolls.

SUPERLON ® 's expanded closed cell structure provides an efficient vapour barrier for the prevention of condensation or frost formation on cooling systems, chilled water and refrigerator lines.

SUPERLON ® also retards heat loss for hot water plumbing and heating, dual temperature piping and solar systems. It protects pipes against corrosion and acts as a vibration damper.

SUPERLON ® 's inherent flexibility makes it ideally suited to the insulation of large surface areas such as tanks, irregularly shaped vessel, air-ducts and large diameter pipes.

INSULAIR

Nanoporous insulation is the latest technology in the fields of hot and cold insulation. URETECH utilises Insulair® – nanoporous technologies. Insulair® materials are flexible nanoporous insulation blankets designed for both high and low temperature applications. The unique properties of very low thermal conductivity, high temperature resistance, good flexibility and ease of use, have made Insulair® products essential for those seeking the ultimate in thermal protection.
Nanoporous insulation offers the industry the following benefits when compared to traditional insulation:

Lightweight.

- Thinner than traditional insulation, with applications utilising Insulair® of 6mm instead of 60mm.
- Superior insulating characteristics.
- Designed for Cryogenic industries.
- Fireproof rated.
- 100% Hydrophobic.

METALTEC TC

Metaltec TC is a general-purpose liquid insulation, consisting of a complete mixture of various silicon and ceramic beads blended into a high quality acrylic polymer. Metaltec TC is designed to provide both thermal and acoustical insulation for a variety of industrial applications, providing an effective, inexpensive alternative to the high cost of typical insulation systems. Due to its excellent reflectivity and emissivity, Metaltec TC excels at insulating structures and equipment from radiant energy gain. 99% of the radiant energy that comes in contact with Metaltec TC is either reflected or re-emitted, meaning only 1% of the radiant energy is

absorbed. Metaltec TC also performs very well at protecting personnel from burn hazards on hot or cold structures or equipment. Because it physically adheres to the surface, Metaltec TC significantly reduces corrosion and rust formation. Metaltec TC is extremely lightweight and pliable, therefore, it expands and contracts with the surface to which it is applied. The use of Metaltec TC is effective at providing insulation while at the same time eliminating corrosion under insulation (CUI).

Standard color is white or black

Passes ASTM C1055-99 standard for protection from burn injuries.

- Excellent radiant reflectivity and emissivity properties – significantly reduces radiant energy gain
- Low thermal conductivity – good conductive insulation properties
- Very good burn safety characteristics – excellent for personnel protection
- Light weight – less weight than other insulations
- Good adhesion – bonds well to a variety of substrates
- Moisture resistant – helps to prevent corrosion and rust formation
- Easy application/installation – installs in much less time than other insulations
- Eliminates CUI
- Reduces or eliminates condensation

Overall Heat Transfer Coefficient

1. Superlon at 0.04 W/mK
2. Insulair at 0.02 W/mK
3. MetalTec TC at 0.0017 W/mk

This means that 2mm thick Metaltec TC will give the same resistance to heat flow as 24mm thick Insulair and 50mm thick Superlon

Cost per m2

1. Superlon at R 1991.48/m2 (Vapour seal required cost not included)
2. Insulair at R 1019.36/m2 (Vapour seal required cost not included)
3. MetalTec TC at R 758.94/m2 (Vapor seal not required)

Installation

1. Superlon must be installed by outside expert company. The installation time 70 working days.
2. Insulair must be installed by outside expert company. The installation time 50 working days.
3. MetalTec TC can be installed with in-house skills as it only sprayed on similar to paint. The first coats will be done under supervision of the OEM to sustain the guarantee of 5 years. Installation period 35 working days.

Availability

1. Superlon supplied by local company with vendor number. Delivery 4 weeks.
2. Insulair supplied by local company without vendor number. Delivery 4 weeks.
3. MetalTec TC must be imported from Belguim. MetalTec company has been register in South-Africa and vendor application is pending. Mentor freight (vendor company) indicated that they will import the Metaltec TC on behalf of Harmony.
4. Delivery 4 weeks.

Recommendation

Technical Enquiries

If you require any further information, please don't hesitate to contact me.

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