FlexiTex Products Pty Ltd
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SUPPLEMENTARY HEAT LOAD CALCULATION GUIDELINE FOR ARCHITECTS & ENGINEERS

Flexitex Product'sunique Elastomeric Radiation Control Coatings for roofs and walls is without doubt the coating material of' the future.

Flexitex System Thermal's high thermal reflective properties are due to millions of hollow ceramic beads that cluster together and provide dead air space. When applied, this liquid acrylic emulsion dries and forms an elastomeric heat shield. Because of this, it reduces inside temperatures very dramatically.

Flexitex System Thermal is available in a variety of pastel colours and are identified according to their product application.

The American Standard Testing Method has verified thatFlexitex SystemThermal is extremely resistant to fire, wind, rain. chemicals, abrasions and fungal growth. Envelon 2000 Thermal is also highly adhesive, flexible, waterborne, non-toxic AND environment friendly. Because of Flexitex Systems insulation properties, the application possibilities of this product are endless.

Due to its super effective radiant heat barrier properties. Flexitex Systems Thermal is without doubt
today's most revolutionary hi-tech coatings product in the world because it :-

- Reduces temperatures dramatically by up to 45% ;
- Cuts air conditioning and refrigeration equipment running costs:
- Stops thermal ageing and thermal shock by reducing heat load. Ultra Violet
- penetration and degradation:
- Reduces roof maintenance by up to 80%;
- Protects by eliminating blistering, peeling, cracking and fading;
- Converts rust and increases metal life;
- Reduces the risk of serious burns caused by high surface temperatures on metals;
- The most advanced radiant barrier insulating coating available, and has waterproofing
- properties.

Flexitex Systems Thermal is Australia's foremost ceramic based total solution liquid thermal coating
which offers>

- Reduced capital investment in cooling equipment;
- Low maintenance costs; and
- A better working and living environment in Australia, where many happy clients already exist.

With respect to the running and maintenance costs of refrigeration and air-conditioning units, please refer to the attached worksheets.

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ANSFER CALCULATION GUIDELINES

Another way to calculate beat leakage is to first determine the thermal resistance of the total structure, then use this value to compute the amount of heat leakage. Thermal resistance is known as the R-Value. It is the reciprocal of conductance (C) or the overall heat transfer (U).

Since there are three general conductivity conditions, the following terms are used>

a) The letter "K" represents the amount of watts that will be transmitted through 1m^2 wall (or surface) if there is a temperature difference of 1^{o}C, if the material is 1m thick.
The unit of "K" is w/m°C,

b) The letter "C" conductivity is used 10 indicate heat transfer through a wall or roof made of different substances.

$$\frac{1}{C} = \frac{XI + X2 + X3}{KI\ K2\ K3}$$

OR

$$C = \frac{1}{\frac{X1}{KI} + \frac{X2}{K2} + \frac{X3}{K3}}$$

"X" is thickness of material in meters)

c) The letter "U" is used to represent heat leakage from the air on one side of the wall to the air on the other side of the wall or roof. This air film that clings to the outer and inner surface, adds to the insulation value.

The formula for "U" factor for heat leakage is as follows:

$$U = \frac{1}{\frac{1}{Fo} + \frac{X1}{K1} + \frac{X2}{K2} + \frac{X3}{K3} + \frac{1}{Fi}}$$

Where: Fo = Outside Air film (m2 Deg. C/w)
Fi = Inside Air film (m2 Deg. C/w)

This document reflects the calculations on various composite roof structures for this exercise steel sheets, Polyurethane insulation boards and Flexitex Systems Thermal's radiant heat barrier coating have been utilised.

The effect of the airspace between the steel sheets and the insulation layer was simulated by artificially increasing the insulation layer thickness.

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Following assumptions have been made:

- Ambient temperature: 32^0C
- Solar radiation intensity: 1000 w/m^2
- Inside room temperature: 25^0C
- Steel sheet K-value: 43 w/m^0C
- Steel sheet thickness 0.6mm
- Insulation material and air space K-value: 0.038 w/m^2 Deg. C.
- Only heat exchange through the roof was taken into account

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CALCULATION RESULTS:

Parameter	Steel Sheet	Steel Sheet + 25mm insulation	Flexitex Thermal coated steel sheet + 25mm insulation	Steel Sheet with 100mm Styrofoam (extruded)	Steel Sheet with Flexitex Thermal Coating
	(1)	(2)	(3)	(4)	(5)
Solar radiation	1000	1000	1000	1000	1000
Solar absorbtivity, as	0.4	0.4	0.19	0.4	0.19
Absorbed solar radiation, W/m^2	400	400	190	400	190
Roof outer temperature, ^0C	64.7	80.2	48.4	86	37
Roof inner temperature, ^0C	64.7	41.3	33.0	30	37
Natural convection heat loss, W/m^2	149.0	250.7	59.7	280.8	65
Radiation heat loss, W/m^2	56.8	90.2	107.3	101.2	107
Heat Flow into building	193.6	59.1	23.0	18.0	18.0

- A plain steel sheet roof is shown in Column (I).
- A roof consisting of steel sheet and a 25mm. layer of insulation (2) allows a heat flow of 59.1 W/m^2 through the roof.
- Coating the roof with a O.5mm layer of Flexitex Systems Thermal (3) reduces the heal flow into the room to 23.0 W/m^2.
- The thickness of the insulation material would have to be increased to 100mm (4) to reduce the heat transmission to the same value achievable with no insulation and a Flexitex Systems Thermal coating of 0.5mm. thick (5).

  However. we must remember that if we use this product as a RADIATION CONTROL COATING, its other thermophysical properties will come into play and will give a much higher R-value equivalent.

  Metric conversions: For R-values $\frac{Ft^{20}f}{BTU}$ to metric formal of r-value. multiply as per following example.

  R-value 40 $\frac{Ft^{20}F}{BTU}$ X .01761 + R-value 7.044 $\frac{m^2,{}^oC}{w}$

- Referring to the above Revalue of 40 per inch as per test ASTM C518/85 of the Singapore Institute of Standards and Industrial Research, one must take in to consideration that this value reflects only a comparison of pure insulation and is not truly representative of the coating's ability as referred to in the Results Summary under point number 3 in this document.
- Our ceramic coating's effective efficient capability to re-radiate. i.c. reflect solar spectrum energy. e.g UV, Visible, Near Infra-red and Fa- Infra-red wave lengths will increase the usable Revalue with which to calculate heat loads on buildings to R-20^0 $\frac{ft,^2 F}{BTU}$