NORM TEKNOLOJİ MALZEMELERİ
İTHALAT İHRACAT PAZARLAMA TİCARET LTD.ŞTİ.

Çetin Emeç Bulvarı 77.Sokak No 3/3 A.Öveçler ANKARA
Tel : 312 – 4804183 Faks : 312 – 4796855 E-Mail : info@normteknoloji.com
Web : http://www.normteknoloji.com

TEST HOLD ON THE REQUEST OF SHELL TURKIYE

SUMMER TIME (IR RADIATION) :

White painted steel tank surface temperature : 40 deg C
Thermal Coat coated steel tank surface temperature : ?

From Boltzman Law we know :

$q = A\sigma \varepsilon T^4$ where ;

q is heat transfer rate
A is area
σ is constant
ε is emissivity
T is surface temperature in degree Kelvin

We are given as per DOE tests Thermal Coat reduces heat flux by 41%. And when we make the calculation for 1 sqm ; ($\varepsilon_1 = 0{,}93$ (white paint) $\varepsilon_2 = 0{,}85$ (Thermal Coat) T_1 (60 deg C in summer time)

$$\frac{q_1}{q2} = \frac{A_1 \sigma \varepsilon_1 T_1^4}{A_2 \sigma \varepsilon_2 T_2^4}$$

$$\frac{q_1 A_2}{q2 A_1} = \frac{\varepsilon_1 T_1^4}{\varepsilon_2 T_2^4}$$

$$\frac{1}{(1-0{,}41)} = \frac{0{,}93 \cdot (333)^4}{0{,}85 \cdot T_2^4},$$

$T_2 = 298$ deg K = 25,48 deg C

The result is ;

When the temperature of white painted surface reaches to 60 deg C, the surface temperature of the surface coated with Thermal Coat is 25,48 deg C.

NORM TEKNOLOJİ MALZEMELERİ
İTHALAT İHRACAT PAZARLAMA TİCARET LTD.ŞTİ.

Çetin Emeç Bulvarı 77.Sokak No 3/3 A.Öveçler ANKARA
Tel : 312 – 4804183 Faks : 312 – 4796855 E-Mail : info@normteknoloji.com
Web : http://www.normteknoloji.com

SUMMER TIME (CONDUCTIVE HEAT TRANSFER)

We now know that when the surface of the white paint reaches to 60 deg C, Thermal Coat surface is 25,50 deg C.

So for the 1 sqm of the surface the conductive heat transfer is ; (Inside surface temperature is 22 deg C, white painted steel white thickness of 2,5 cm)

$q = - K.A \ \Delta T / \Delta x$

$q = - 45. 1 . (-38) / 0,025 = 68400$ W So,

Heat gain = H = 68400 x 3600 = 246240 KJ (in 1 sqm, in an hour)

For 2 mm Thermal Coat coated surface;

$q = -0,08 .1.(-3,5) /0,002 = 140$ W So,

Heat gain to the system = 140 x 3600 = 504 KJ (in 1 sqm, in an hour)

WINTER TIME (CONDUCTIVE HEAT TRANSFER)

Inside surface temperature is 22 deg C, outside surface temperature is 0 deg C

For bare steel surface ;

$q = - 45 .1. 22 / 0,025 = - 39600$ W So,

Heat loss = 39600 x 3600 = 142560 KJ (in 1 sqm, in an hour)

For 2 mm Thermal Coat coated surface;

$q = - 0,08 . 1 . 22 / 0,002 = 880$ W

Heat loss = 880 x 3600 = 3168 KJ (in 1 sqm, in an hour)