

FERRARI

Low Emissivity "LowE"

Composite  
Textiles  
& Membranes

Low Emissivity "LowE"

- Material surface property - ranging from 0 to 1  
Expression of a material's capacity to reflect and emit heat
  - A material with an emissivity of 0 has no exchange with its environment  
It reflects everything it receives
  - A material with an emissivity of 1 exchanges a great deal with its environment  
It emits what it receives

FERRARI

Solar Spectrum

Solar range 250-2500 nm    Thermal range 10 µm

Spectral distribution (Wm<sup>-2</sup> nm<sup>-1</sup>)

Wavelength (micron)

Solar spectrum

Sensitivity of human eye

Black body emission at 25°C

Ts-Rs-As    E

UV   Visible   Solar infrared   Long infrared

FERRARI

Winter - Flask Effect

Heat → LowE treatment .....

FERRARI

Summer - Screen Effect

Heat → LowE treatment .....



FERRARI

Summer - Screen Effect

Heat → LowE treatment .....

FERRARI



### Internal Air-conditioning - Mirror Effect



Heat → Air-conditioning → LowE treatment ----

FERRARI

### Internal Air-conditioning - Mirror Effect



Heat → Air-conditioning → LowE treatment ----

FERRARI

### Situation scenario

Fabric configuration	Ext./int. arrangement	U (W/m <sup>2</sup> .K)	Int. surface emissivity
1002 T2	I	5,6	0,90
1002 LowE	I	4,7	0,55
1002 opaque LowE	I	4,1	0,30
Double membrane 1002 T2 + 702 S	I I	2,9	0,90
Double membrane 1002 T + 702 LowE	I I	2,6	0,55
Double membrane 1002 LowE + 702 LowE	I I	2,4	0,55
Double membrane 1002 opaque LowE + 702 opaque LowE	I I	2	0,30

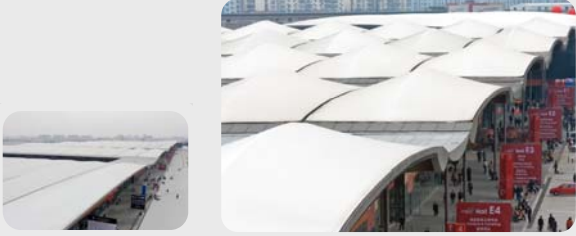
In the above calculations, the fabric shown as LowE has an emissivity of 0.55.

Material	Emissivity
Aluminium	0,15
Concrete	0,90
Glass window	0,84
Soltis*	0,90
Soltis* 86 LowE	0,45
Soltis* 92 LowE	0,35
Soltis* 99 LowE	0,35

Emissivity of 0 - no exchange with its environment  
Emissivity of 1 - emits what it receives

FERRARI


### Realisations



> Shanghai Messe - Shanghai, China

FERRARI

### Realisations



digital Gateway

> Digital Gateway @Centerpoint Siam Square - Bangkok, Thailand

FERRARI

### PRECONTRAI

#### TexTherm VE2

Outside temperature (°C) 35  
Relative humidity (%) 65  
Solar radiation CAMBERRA Latitude (°) -35 Altitude (m) 560

Single membrane 1002 T2 blanc Double membrane  
Roof membrane surface (m<sup>2</sup>) 2000  
Wall insulation Very low (single skin membrane) (u=5)  
Wall surface (m<sup>2</sup>) 900

Inside temperature (°C) 20  
Relative humidity (%) 65  
Activity Exhibitions Number of people 200

#### Preliminary calculation for AC units

Situation: Cooling  
Solar gain Human activity ☒ City

Air conditioning unit (kW): 271  
kW/h level 6.18  
Hour cost: 48.7

Heat sources breakdown (kW)  
Fabric conduction 198  
Fabric radiation 215  
Human activity 49  
Wall conduction 68

Help and recommendations Membranes

FERRARI

TexTherm VE2

PRECONSTRAINT

OUTSIDE

Outside temperature (°C)  
35

Relative humidity (%)  
65

Solar radiation  
CAMBERRA

Latitude (°)  
-35

Altitude (m)  
560

ENVELOPE

Single membrane  
1002 opaque

Double membrane

Roof membrane surface (m²)  
2000

Wall insulation  
Very low (single skin membrane) U=5

Wall surface (m²)  
900

INSIDE

Inside temperature (°C)  
20

Relative humidity (%)  
65

Activity  
Exhibitions

Number of people  
200

Preliminary calculation for AC units

TexTherm VE2

Situation: Cooling

☐ solar gain ☐ human activity ☒ kWh

Air conditioning unit (kW): 240

W/h cost: 0.18

Hour cost: 43.2

> Heat sources breakdown: (kW)

Fabric conduction: 102  
Fabric radiation: 151  
Human activity: 40  
Wall conduction: 68

Help and recommendations

Membranes

FERRARI

TexTherm VE2

PRECONSTRAINT

OUTSIDE

Outside temperature (°C)  
35

Relative humidity (%)  
65

Solar radiation  
CAMBERRA

Latitude (°)  
-35

Altitude (m)  
560

ENVELOPE

Single membrane  
1002 Level opaque

Double membrane

Roof membrane surface (m²)  
2000

Wall insulation  
Very low (single skin membrane) U=5

Wall surface (m²)  
900

INSIDE

Inside temperature (°C)  
20

Relative humidity (%)  
65

Activity  
Exhibitions

Number of people  
200

Preliminary calculation for AC units

TexTherm VE2

Situation: Cooling

☐ solar gain ☐ human activity ☒ kWh

Air conditioning unit (kW): 198

W/h cost: 0.18

Hour cost: 35.4

> Heat sources breakdown: (kW)

Fabric conduction: 117  
Fabric radiation: 86  
Human activity: 40  
Wall conduction: 68

Help and recommendations

Membranes

FERRARI

TexTherm VE2

PRECONSTRAINT

OUTSIDE

Outside temperature (°C)  
35

Relative humidity (%)  
65

Solar radiation  
CAMBERRA

Latitude (°)  
-35

Altitude (m)  
560

ENVELOPE

Single membrane

Double membrane  
1002 + 702 blanc

Roof membrane surface (m²)  
2000

Wall insulation  
Very low (single skin membrane) U=5

Wall surface (m²)  
900

INSIDE

Inside temperature (°C)  
20

Relative humidity (%)  
65

Activity  
Exhibitions

Number of people  
200

Preliminary calculation for AC units

TexTherm VE2

Situation: Cooling

☐ solar gain ☐ human activity ☒ kWh

Air conditioning unit (kW): 176

W/h cost: 0.18

Hour cost: 31.6

> Heat sources breakdown: (kW)

Fabric conduction: 87  
Fabric radiation: 95  
Human activity: 40  
Wall conduction: 68

Help and recommendations

Membranes

FERRARI

