Translation of original document

Wolfgang Sorge
Engineering Office for construction physics
Emil-Ueberall-Str. 21
01159 Dresden
GERMANY

November 28, 1994

S T A T E M E N T

Examinations regarding heat and dew protection of 2 exterior construction parts with inner coating of SONASPRAY K-13

1. Task

According to the assignment of October 13, 1994, the following calculations were to be performed:

- Calculation of the heat transit coefficient and calculation of dew protection using the „Glaser procedure“ in accordance with DIN 4108 – thermal protection in building construction – for the exterior component constructions below, which satisfy the minimum requirements to thermal protection in accordance with DIN 4108 – warmth protection in building construction.

  - ceiling with floating floor above and exterior air boundaries (e.g. underground car park)

  - sheet steel with exterior thermal insulation

  Respectively with single-sided coating of the constructions with SONASPRAY K-13, 40 mm thick.

- Information on reduction of transfer heat losses with the coating of SONASPRAY K-13 40 mm thick.

2. Examination results

All calculations are done with boundary conditions in accordance with DIN 4108
– thermal protection in building construction –

2.1 Storey ceiling over underground car park

Thermal protection

Minimum requirements according to DIN 4108:	$k_{DL} < 0.51$ W/m²K
Structure (annex 1) without SONASPRAY K-13:	$k_{DL\ without} = 0.51$ W/m²K
Structure (annex 2) with SONASPRAY K-13 (40 mm):	$k_{DL\ with} = 0.32$ W/m²K
Reduction of transfer heat losses through the storey ceiling compared with normal climatic conditions and a 40 mm coating of SONASPRAY K-13:	•$Q_T = 37\%$

Dew protection

Quantity of dew in the dew period:	$W_T = 0.077$ kg/m²
Quantity of evaporation:	$W_V = 0.346$ kg/m²

No dew remains inside the component.

2.2 Outer sheet steel wall

Thermal protection

Minimum requirements according to DIN 4108 (light component): * for components that are not ventilated	$k_{W,erf} < 0.51/0.52^*$ W/m²K
Structure (annex 3) without SONASPRAY K-13:	$k_{W,without} = 0.46$ W/m²K
Structure (annex 4) with SONASPRAY K-13 (40 mm):	$k_{W,with} = 0.30$ W/m²K
Reduction of transfer heat losses through the outer wall compared with normal climatic conditions with SONASPRAY K-13, 40 mm thick:	•$Q_T = 35\%$

Dew protection

Case 1: boundary conditions according to DIN 4108

Quantity of dew in dew period: W_T = 1.439 kg/m²

Quantity of evaporation: W_V = 15.162 kg/m²

No water remains inside the component, but in the dew period the quantity of dew exceeds the tolerated value of 1.0 kg/m² according to DIN 4108.

Case 2: boundary conditions for a slightly heated hall

	Warm side	Cold side
Air temperature	10° C	- 10° C
Relative humidity	50%	80%

The result is absence of dew for the construction.

3. Summary and assessment

3.1 Transfer heat losses

Through application of 40 mm of SONASPRAY K-13 it is possible to attain a reduction of transfer heat losses of 35% to 37% for the calculated constructions.

3.2 Dew protection

3.2.1 Storey ceiling over exterior air

No disadvantages result from the application of 40 mm of SONASPRAY K-13 in the area of the bottom side of the component compared with the component without SONASPRAY K-13.

3.2.2 Outer steel sheet wall

No disadvantages result from the application of 40 mm of SONASPRAY K-13 as an effective interior insulation compared with the component without SONASPRAY for slightly heated halls. In normally heated halls, the exterior heat insulation would have to be increased correspondingly to ensure absence of dew.

It is to be noted that the calculations for dew protection are conducted without paying attention to the capillarity of SONASPRAY K-13, so that in practice there will be generally be smaller amounts of dew than when calculated according to the “Glaser procedure“.