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## Sandwich-Systems in Poland in the Years 1970–1985

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### Summary :

In the report, the division of sandwich-panel houses in Poland after the year 1970 becomes, with the characteristic of the material- and construction solutions, declared. At that residences, that were handed over in the years 1970 - 1985, anomalies and technological mistakes appeared. This makes at these days a redevelopment of approximately 60 million m<sup>2</sup> facade screens by eliminating leaky positions and frost damages necessary by means of insulation. Out of consideration for the technical condition of the sandwich-panels, about 30 million m<sup>2</sup> should be secured before insulated.

### Description of the panel-systems and their technological mistakes

Since the year 1970 the increase of the flat-housing in Poland leans on the industrial technology, mainly on the panel-sandwich-constructions. The construction of the panel-systems based on big reinforced steel-concrete-slabs in the screen of 60x60 cm as well as 60x120 cm. The material-solution was virtually standardized, that means

- the prefabricated parts were manufactured from concrete of the class B20, and
- in the joints on-site concrete of at least the class B15 was used.

The prefabricated parts became reinforced with steel-fences from 34GS and 18G2 as well as St0 and St0S. The concrete-stacking of the outside-walls were connected until 1983 with help of anchors from usual steel as St0S or St3SCU. Only after the year 1983 stainless steel for example H13N4G9 was used.

In the single panel-systems different solutions for outside-walls existing, but they have a common characteristic in

- the interior concrete-wall (bearing)
- the external concret-wall (rain-screen) and
- the insulation lying between from polystyrene or mineral-wool of the thickness 60 mm, after the year 1982 even 120 mm.

The rain-screen and the internal (bearing) wall were connected with steel anchors. From the start the anchors were made from usual steel-types like St0 or St3SCu with a corrosion-protection-layer. First in the year 1983, the standard BN-79/8812-01 and the catalogue of the company METALPLAST specified the use of solid stainless-steel for the anchors. They should be manufactured from corrosion-constant materials with a comparable lifespan as the total outside-wall-element.

The technological mistakes of the outside-walls were caused by the unreasonable quality of the used materials and the not competent production. After the year 1980, the negative appearances were added by the leakages in the joints and windows, just as frost-damages caused by thermal-bridging.

The observation and examination of the ITB shows, that the anchors of the outside-walls show a row of mistakes, which also influence the constancy and stability of the panel-constructions. To the determined mistakes of the anchors belong

- the use of not to the standard corresponding steel-sorts,
- the lacking bracing in the rain-screen,
- the too thin layer of the corrosion-protection and from it following cracks in the rain screen,
- the visuable corrosion of the anchors in the area of the insulation.

## **Redevelopment of panel-constructions**

The in the years 1980–1990 enforced redevelopments of the slab-constructions, existed predominantly in the removal of the frost damages and leaks, mainly by insulation. The endangering by the corroded anchors in the sandwich-panels of not redeveloped houses still remains as a problem. An additional insulation could decrease the corrosion of the anchors considerably.

## **Summary and proposals**

At the in the years 1970-85 completed slab-constructions approximately 30 Mill m<sup>2</sup> surface of the outside-walls remains for redevelopment by insulating (render-systems or ventilated systems).

Not regulated remains the judgement of the condition of the connections (anchors) between the rain-screen (external wall) and the bearing wall (internal) in the sandwich-panels. The problem necessitates a complex editing of test-procedures for the anchors and possibly also administrative decisions.

Presently the rain-screens of the sandwich-panels will not be secured before insulating, although there are admitted systems with the segment-anchors of the type SLR and the EJOT Wetter-Schalen-Sicherung WSS.