

DETERIORATION OF HISTORICAL BUILDING MATERIALS CAUSED BY SALTS AND IT'S PREVENTION

SĀĻU IZRAISĪTĀ KOROZIJA UN TĀS NOVĒRŠANA VĒSTURISKAJOS CELTNIECĪBAS MATERIĀLOS

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Salts and moisture are the key factors causing deterioration of historical building materials. The causes of decay are related to the quality of environment, used building materials, building technology and failures in maintenance.

In Riga the disintegration of stone materials due to the influence of soluble salts is one of the greatest threat to the historical building materials. This phenomenon has been observed for Riga Dome Cathedral, Monument to Freedom, Riga Brethren's Cemetery, e.t.c.

The salts may be derived from many sources, including sea-spray, soil water, air pollution, cleaning materials, de-icing materials and building materials themselves. One of the most insidious sources is the reaction between acidic air pollutants and calcerous materials such as limestone and dolomite leading to the formation of calcium sulphate (1).

High content of sodium chloride (9,7 – 21,3%) on the brick walls of Riga Dome Cathedral is the result of salt spreading on the streets during winter for de-icing purposes. In many historical buildings, like Riga Castle, National Opera and National Theater analyses of salt efflorescences as well as mortars and plasters show the dominance of magnesium sulphate. Magnesium sulphate is related to dolomitic lime used for buildings over centuries in Latvia. By XRD and chemical analyses were determined $MgSO_4 \cdot 7H_2O$, $MgSO_4 \cdot 6H_2O$ and $MgSO_4 \cdot 4H_2O$. Reversibility of the dehydration and hydration processes are connected with the changes in volume and lead to deterioration of mortars and renders (2).

There are different desalination methods in order to prevent stone materials from damaging salts. As more practical and effective for stone restores in Latvia are found to be the following: water-wool-cotton poultice, clay poultice, lime poultice, multi layer porous render and dray removal of salts. Desalination with water-wool-cotton and lime poultices are described in (2,3).

With good results the application of clay poultice in order to desalinate the stone from copper salts is used in Latvia. In this way the green copper stains from the surface of travertine of Monument to Freedom was removed. In this case the solution of NH_4OH and/or EDTA is added to the clay and poultice is applied in traditional way followed by application of wool-cotton-ammonia or wool-cotton-water poultices in order to desalinate the stone from the products of reaction. According to literature the wetting and poulticing cycle is normally repeated three or four times while any useful reduction in salt concentration is achieved (4,5).

References

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