

## HOW TO DIAGNOSE BUILDINGS AND STRUCTURES WITH A THERMAL IMAGER

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### ABSTRACT

Thermal imaging diagnostics are carried out to detect defects and damage (usually not obvious) of the objects being examined. Timely identification and elimination of defects requires significantly lower costs than in the case when an existing defect leads to an emergency situation at the facility. Based on the results of thermal imaging, a map of identified defects and damage to the inspected object is necessarily compiled, the need for preventive or emergency repairs is determined, and subsequent inspections are planned.

**Keywords:** Interpanel seams, roof leakage, thermal rehabilitation, MKD, ETL

### INTRODUCTION

In the conditions of constant growth of energy prices, more attention is being paid to the quality of thermal insulation of building structures. The fastest way to carry out such an inspection is to conduct a thermal image inspection of buildings, where up to 90% of defects are caused by freezing and excessive moisture.

It is worth noting that the need for such diagnostics arises when inspecting both old buildings and new buildings, many parts of which often do not comply with SNiP standards.

This review examines the possibilities of thermographic inspection of buildings and structures and describes what conditions must be met for the results of such inspection to be legally binding.

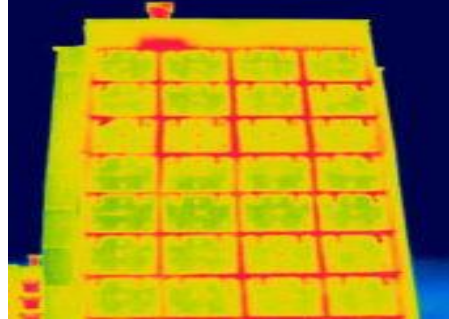
#### **What problems does thermal diagnostics of buildings detect?**

to explain how thermal imaging can be useful, it is necessary to list the types of construction defects that directly or indirectly affect the thermal balance of a building.

Residential buildings made of individual reinforced concrete blocks are most sensitive to them. Even if all norms and rules are followed during the construction phase, partial or complete destruction of inter-panel joints occurs over time due to temperature deformations.

can pass through "transparent" microchannels for water and air.

The use of a thermal imager to determine heat loss in inter-panel seams of MKD can significantly reduce the cost of restoration work, since in this case it is possible to accurately localize wall networks with significant heat transfer indicators.



**Figure 1. Heat loss through seams**

Unfortunately, the list of operational defects does not end only with interpanel seams. The consequences of temperature changes and shifts in the foundation may also be:

- obvious and hidden cracks in the walls;
- violation of the waterproofing of the foundation (this immediately deteriorates the quality of its thermal insulation);
- cracking of the roofing pie (roof leak);
- breaking the geometry of window openings;
- delamination of components of sandwich panels (insulation is removed from the body).

can be determined using a thermal image. In addition, professional thermography allows you to identify areas that are dangerous prerequisites for future defects that cannot be detected by any other method. Assembly

It's no secret that the most valuable resource for construction contractors is time, and in order to comply with the schedule, they can sometimes "rationalize" one or another technological process, which leads to a deterioration in the quality of thermal insulation. facade or other element of the surrounding structure.

conducting thermal diagnostics at the stage of acceptance tests.

### **Structural**

In recent years, such an event as thermal rehabilitation of buildings has become popular, the essence of which is that through a certain reconstruction of the facade, almost any architectural object can be brought to a completely new level of energy saving.

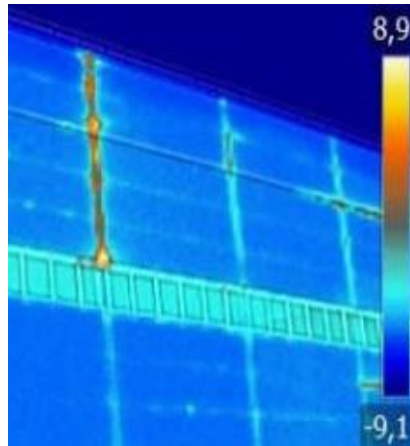


Figure 2. Losses in joints between sandwich panels

- thirdly, complex geometry of buildings and large heights of MKD do not allow full use of contact reference points, so only the equipment set for conducting such tests includes all the necessary additional equipment (remote pyrometers, hygrometers) should use the ETLs obtained. , laser rangefinders, etc.) .d.).

### CONCLUSION

The price of thermal imagers on the market is different, but for medium and small enterprises, the purchase of a device can in most cases lead to high costs, since in addition to the device itself, the staff must include a thermal imaging specialist . at best, its non-destructive laboratory control.

The purchase and use of thermal imagers is not a direct energy saving measure, and therefore it is not easy to calculate the cost-effectiveness of the purchase of the device.

Thermal imaging is designed to identify areas with excessive energy losses, but without appropriate funding for measures to eliminate or repair such areas, there will be no energy-saving effect. And vice versa - regular identification and elimination of the causes of excessive heat losses will have a significant effect and cover the costs of conducting surveys.

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