

Quantitative infrared thermography in fire tests

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Abstract

The classification of fire resistant occurs with the aid of the results of fire tests. The criteria for the classification are determined in european standards. The use of infrared thermography not only for qualitative observation but also for quantitative measurement during fire tests of glasses and glazed elements makes it possible to check the demands of national or international standards as ISO 3009 and forthcoming EN 1364 more exactly.

1. Introduction

In Germany for example more than 500 people are killed every year by fire and in addition the fire damages costs the national economy about 5 billion Deutsche Mark [1]. Various efforts are to be done to reduce this threat of human life and the loss of property. The possibilities and capabilities for fire fighting and in addition the fire protection in buildings has to be improved.

Infrared radiation is a valuable tool to be used for these purposes.

2. Detecting of fire and fire fighting with thermography

In Germany already during World War II infrared devices have been developed not only for military purposes but also for early detecting of area fires up to a distance of one hundred kilometers [2]. This technology was later on perfected. In 1994 infrared thermography cameras installed on towers were used for example in France to set up an early warning system for forest fire in the area of Bordeaux [3].

In the Eighties hand held infrared thermography cameras were introduced to fire departments to enable the firemen to act in areas filled with smoke [4]. Localization and rescue of wounded or unconscious people was drastically improved by this technique.

In modern stationary fire fighting systems for example in industrial plants carbon dioxide is used as an extinguishing medium. Carbon dioxide is stored in metal bottles which are linked together with a piping system. In a regular manner these bottles have to be checked if they are still correctly filled. If the bottles are heated slightly with a hot air pistol, a thermal contrast is created between the liquid level and the gas in the bottle. That level can be seen with a infrared camera and the correct height of liquid in the bottle can be detected [5].

4. Fire tests

4.1. Fire tests and thermal radiation

In fire tests components to be tested as glazings are installed in front of an oven according to [6] (Fig.1) and exposed to a predefined fire action.

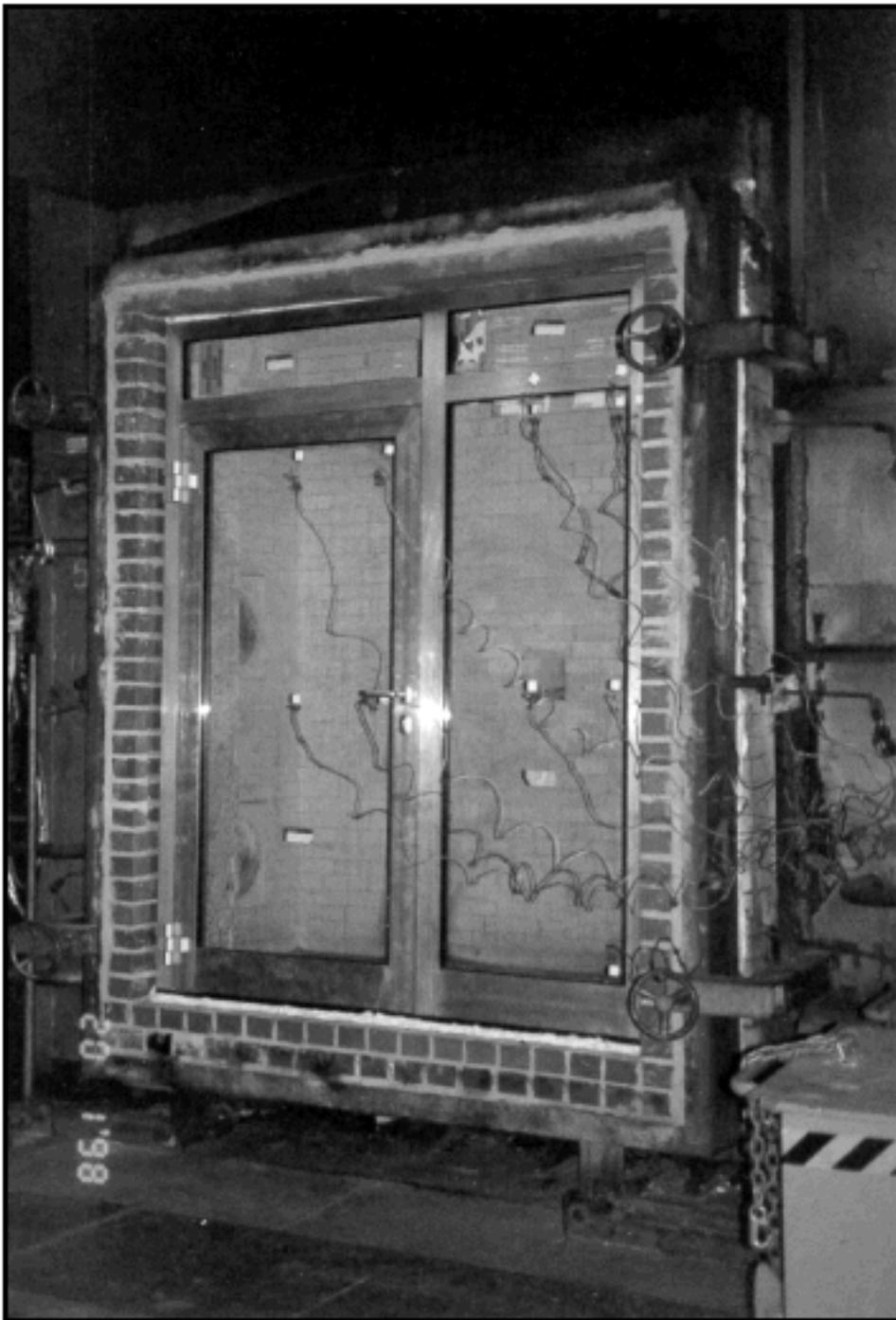


Fig.1. Glazed element mounted in front of an oven for fire tests

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