SCIENTIFIC PROOF

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Testing of the Elpan Modular System

As agreed with the Danish firm ELPAN, the Technological Institute, Copenhagen, has tested the Elpan Modular System in its radiator room in the course of November and December, 1975 plus January, 1976.

Summary.

The backgroundof the test work was primarily a wish to check whether the Elpan Modular System was able to provide, the same temperature anywhere in the test room under different working conditions - but always with clearly defined premises.

Consequently the aim of the work was to define the characteristics of the Elpan Modular System under different working conditions, based upon the thermal qualities of the system including heat supply, heat distribution, heat regulation, radiation, and convection. Furthermore to check the surface temperatures of the modules and the air circulation and air temperatures at the vent holes.

The test workwas carried through in the radiator test room of the Technological Institute; this toon complies with the international standards (ISO/DIS 3149).

The Elpan modules were mounted as panels near the floor along the four walls of the room, The system was tested under varying working conditions both with and without thermostats. During the test period the four walls of the test room as well as its floor and ceiling were controlled, first to assume and keep the same temperature and afterwards to assume and keep different temperatures.

The temperatures of the walls and the air were measured at 30 radiation-protected locations of measurement and there was a current collection of data by printer and precision potentiometer. The printer registers a vertical temperature field exactly in the middle of the room and with three points of measurement: at the ceiling, in the middle of the room, and at the floor.

The resultsof the temperature field measurements (the heat distribution measurements) of the different tests showed that the Elpan Modular System was able to provide a high degree of uniformity in the heat distribution of the test room with a variation of the temperatures at the floor and at the ceiling of ab. *% °C*, equivalent to a temperature gradient of ab. 0.2 °C/m.

The resultsof the comfort temperature experiment shows that the so-called comfort temperature (i.e. the average of the air temperature and the average radiation temperature) has a deviation of less than % °C in the vertical field from the floor to the ceiling in the middle of the room.

By way of comparison: reference test material from the test work with traditional water radiators, and a few tests of traditional electrical radiators, all of which were checked in the sane test room and under the same working conditions, shows that the traditional heating systems display differences between floor temperatures and ceiling temperatures of ab. 4.5 °C, equivalent to a temperature gradient of ab. 1.7 °C/m.

Supplements. All the data of the test work (measurements, recordings, tables, diagrams, etc.) are collected and systematized as supplements to the report.

Heating Department
Erik Eckert
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EVALUATION OF THE ELPAN MODULAR SYSTEM ON THE BASIS OF A REPORT FROM THE TECHNOLOGICAL INSTITUTE, COPENHAGEN

THERMAL COMFORT

It is generally known that the following variable factors determine the level of a person's thermal comfort:

PHYSICAL ACTIVITY (generation of body heat)
CLOTHING (insulating capacity of clothes)
AIR TEMPERATURE
MEAN RADIANT TEMPERATURE
RELATIVE AIR VELOCITY
RELATIVE AIR HUMIDITY

THE ELPAN MODULAR SYSTEM

Owing to its physical construction and design the system ensures heat envelopment of the room. The result of this heat envelopment is an even heat distribution which is unique, so that the same temperature is achieved everywhere in the room. The report of the Technological Institute shows that the ELPAN system ensures better heating of our living rooms, from a hygienic as well as an economic point of view.

On the basis hereof I can say the following:

It is my impression that, owing to its excellent heat distributing and regulating qualities, the ELPAN system is highly suited for modern well insulated homes. With this system it will really be possible to utilize free sources of heat with resulting economy and comfort.

It is my impression that the ELPAN system will really make it possible to lower the room temperature to 21°C, whereby a higher relative humidity is achieved leading to increased heating comfort.

It is my impression that the velocity of air in the open space of a room is minimal as the system envelops the entire room and operates at a very low rate of heat emission per square meter of wall surface.

It is my impression that the basic idea of the ELPAN system "HEAT ENVELOPMENT" is right and ideal from a physiological point of view.

E. 0. Errebo-Knudsen

THE ION CONTENTS OF THE AIR

It is commonly known that the ion research is, and ought to be made subject to a medical-hygienic point of view. In principle, all that influences man is bound to cause damages when carried to excess. Ions make no exception. Today, we known of damages caused by ion generators which were used without medical instructions. As drugs are prescribed, limited and forbidden by doctors, so supervision of the utilization of artificially produced ions ought to belong to doctors and health authorities. Especially ion generators, which are simultaneously developing ozone, are considered apt to cause damages by excessive use.

The utilization of ion generators is called “active ion technique” and is recommended as a remedy for sufferings such as hay fever and asthma.

It is a proven fact that construction material, ventilation systems and textiles, etc. influence the balance between positive and negative ions of the air. F. inst. It has turned out that the filament of traditional electric radiators works as step 1 in a ion generator in which a considerable amount of positive and negative ions are produced. As step 2 is missing to absorb the positive ions, these will cause discomfort. During tests carried out in schools with traditional radiators, Mr. Worden, an American doctor, found that the children became sleepy owing to the high number of positive ions in the air.

PASSIVE ION TECHNIQUE

Generally speaking, it is always correct to seek to obtain a minimum of disadvantages through “passive technique”.

The ELPAN system can be regarded as a contribution to “passive ion technique”, as the air in an ELPAN heated room does not pass heating elements which can be characterized as filaments (temp.> 300°C), and thus the heating system does not influence the existing balance and contents of negative and positive ions in the air. This is desirable as the ionizing of the air is a medical concern in connection with allergic diseases.

The contribution of ELPAN to “passive technique” is of high quality owing to high values in:

AIR HUMIDITY
TRANSPORTATION OF DUST (AIR VELOCITY)
AIR TEMPERATURE
MEAN RADIANT TEMPERATURE

- these are all factors of great importance to the ion contents of the air.

The research work in the field being far from satisfactory, an attempt to seek a 1st class ”passive ion technique” must be considered extremely correct and only in cases of disease, active ion technique should be used (ion generators).

E. Keldmann
LB
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