CRYOSAUNA

Bilous D.Yu., Rudenko M.Z., Chichibaba I.A.
National Technical University
«Kharkiv Polytechnic Institute», Kharkiv

One of the most common methods of prevention, treatment and health maintenance in the history of mankind was considered cold. The latest clinical studies show that with a short-term effect (1–3 minutes) of cold static air at a temperature of −100°C to −150°C on the human body, its immunity increases dramatically, metabolism is activated, hormonal levels are normalized, and various pains are eliminated [1]. In this regard, in recent years, the use of cryotherapy with exposure to artificial cold in special thermally insulated chambers – cryosaunas has become much more widespread. The health course is at least 10–15 sessions. If there are indications, the number of sessions can be increased to 25–30. A repeated course can be completed in two to three months.

Cryogenic temperatures can be obtained by gasification of liquid air or nitrogen, or using cascade refrigeration machines. There are two types of cryosaunas − individual (for one person) and group (for cryotherapy of several people).

In an individual cryosauna (which is equipped with a regulating floor), the patient is lifted into the cabin so that only the body is cooled, while the head remains outside. In this way, he can breathe air from the main room. This solution also helps people who suffer from claustrophobia.

A group cryosauna is a block consisting of two separate rooms − a preliminary chamber and a main chamber. The temperature in the first is maintained in the range from −40°C to −60°C, and in the second from −100°C to −150°C. The refrigeration unit supplies cooled, dried atmospheric air into the interior of the cryoprocedure cabin in the form of a laminar flow. The humid exhaled air is constantly sucked away.

The choice of an economical cooling system and effective thermal insulation is the main problem in the development of such cryogenic installations.

Sandwich panels are most often used for thermal insulation of the cryosauna. In general, sandwich panels are a three-layer structure. Insulation is placed between two thin sheets of metal or plastic. During installation, these simple structures are securely connected to each other with special locking joints, which ensure ease of installation and a high level of tightness. Calculation of the thermal efficiency of various thermal insulation materials showed that the best indicators are provided by polyurethane foam with a thickness of 140 – 160 mm.

The consumption of liquid nitrogen for cooling and operation of an individual cryosauna should be about 30 liters per working day, and for a group cryosauna (3 people) − 100 liters, respectively.

References:

1. Bouzigon R, Grappe F, Ravier G, Dugue B .J. Whole- and partial-body cryostimulation/cryotherapy: Current technologies and practical applications. *Journal of Thermal Biology*. 2016. Vol. 61. P. 67-81.