AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Business Management, Economics and Banking
ISSN (E): 2832-8078 Volume 12, | May, 2023

AUTOCLAVE FOR MODERN BUILDING MATERIALS WORKING IN THE METHOD

Kurbanov A. T.
Termiz State University

ABSTRACT

For the fast and high-quality production of modern construction materials, it is necessary to use different heat treatment devices for various structural elements, because they are required to serve for a long time without losing their strength under the influence of external forces. The article presents calculations on the methods of heat treatment of building materials by the autoclave method.

KEYWORDS

avnoclave, structure, operation, constructive calculation, heat calculation, heat consumption, lost heat, heat balance.

Introduction:

The autoclave method is a special method of heat treatment of concrete, which is used to accelerate the hardening of concrete. In contrast to the steaming method, the hardening of concrete in autoclaves occurs at a pressure of 0.9-1.3 MPa and in saturated steam conditions of 175-191 °C. Later, it was confirmed that the efficiency is even higher when the temperature of water vapor rises to 200-225 0C. To increase the temperature, instead of water vapor, heated steam and steam-gas environment can be used. In the conditions of the climate of Uzbekistan, the autoclave method is widely used in the preparation of cellular concrete.

As a result of the autoclave treatment, the hardening of concrete is accelerated due to the acceleration of the hydration of the binding elements, and in addition, new cementing substances are formed: - calcium and magnesium hydrosilicates. In conditions of high temperature and high vapor pressure, synthesis of these compounds is formed, and in other cases they do not combine with each other. Lime-silica binders are often autoclaved. Also, lime-slag, lime-ash and other chemically active substances are processed by autoclave technology.

Initial data for calculation

- annual productivity of the workshop, year m³; - volumetric density of dry concrete.kg/m³; - working pressure of the autoclave, Mpa; - temperature, T °C; - initial temperature of products, tn, °C; - the number of products in the wagon, pcs

- product volume Em, m³; - mass heat capacity of dry concrete. - Ccb, kj/kg K; - heat capacity of water Cc = 1 kcal/kg.-4,168 kJ / kg K; (1 cal=4.1868 joules. water vapor 0.36; air 0.31; kcal / (m3 °C)); - initial humidity of products, Wn; - final humidity of products, Wk; - temperature in the workshop, tu, °C

Design Calculation of the Device

In order to calculate the design of the device, according to the manufacturer's information, we accept an autoclave operating on the basis of the technology with the following technical characteristics:

- working length, l, m. - diameter d, m. - working pressure P, MPa. - the mass of the autoclave in kg. - width of wagon wheels mm. - the number of wagons in one autoclave, pcs. - the number of products in the wagon n, pieces

General dimensions of the autoclave:

- length mm. - width mm. - height mm.

The number of wagons in the autoclave, pcs

n = L avt / 1V

where Lavt is the length of the autoclave, m

lv– length of the wagon, m

Autoclave capacity, m3

Ea=Ev·n

Here, Ev is the capacity of the wagon, m3

n – the number of wagons in the autoclave, units.

Filling the autoclave with products

K=(Ea /Vavt)100%

Here, Vavt is the capacity of the autoclave, m3

Watt =(p ·D2 /4)L, m3

Here, D is the diameter of the autoclave, m

L is the working length of the autoclave, m

The number of autoclaves that ensure the annual productivity of the workshop

m =(Ryil tts / T·S·Ea·Kisp),

Here is the annual productivity of Ryil Workshop.

Ts is the duration of the autoclave, 8-24 hours.

C - number of shifts per day C, 2-3

T– the number of working days per year, T=249 days

Kf – level of autoclave use, Kf=0.9–0.95

Ts = t1 + t2 + t3+ tsq

Here

tqosh - autoclave loading, unloading, cleaning time, min.

We take 3 autoclaves to ensure the specified work.

Heat calculation of the device

In order to calculate the heat of the autoclave, it is necessary to determine the heat and steam consumption of cellular products. It consists of inlet and outlet parts and is determined by the solution of the heat balance equation. The heat balance of the autoclave is determined for its service life and the entire mass of loaded products.

Heat input, kj / period

- Steaming

Q = Dist·h"

Here h"- enthalpy of working steam kj /kg;

Dist – steam consumption for the period, kg / period; since its value is unknown, it is determined from the heat balance equation.

Heat consumption, kj / period - to increase the dry mass of concrete from the initial temperature to the maximum

Q1=Mq. Squr. (short–tb)

Here is Mqur. - the mass of dry concrete in the autoclave, kg

Squr. - mass heat capacity of dry concrete, kj / kg K

Squr = 0.75 kj / kg K,

Tyuk is the maximum temperature of heating products, °C

tb – initial temperature of products, °C

Mqur= Yqur·n·V, kg

Here n is the number of products in the autoclave, pieces

V - volume of one product, m3

Yqur is the density of dry concrete, kg/m3

References

1. Перегудов В.В. Теплотехника и теплотехническое оборудование М: Стройиздат, 1990.

2.Махмудова Н.А. Методические указание для выполнения курсовой работы по предмету тепдотехника и теплотехнические установки teplotex. ТАСИ. Т., 2016.

3. Maxmudova N.A. Issiqlik texnikasi va issiqlik texnik uskunalari fanidan kurs loyihasini bajarish uchun uslubiy ko’rsatma. TAQI. T., 2016.

4. UzRST 17177-94 Issiqlikni saqlovchi qurilish ashyolari va buyumlari.

5. UzRST 686-96 Qurilish. Issiqlik muhofazolovchi ashyolar va buyumlar.

6.Abduhalimzoda, Abdurahimov Abdukarim. "TECHNOLOGY OF PREPARATION, TRANSFER AND PLACEMENT OF FILLING MIXTURES." *Galaxy International Interdisciplinary Research Journal* 10.11 (2022): 1098-1101.

7.Абдуҳалимзода, Абдураҳимов Абдукарим. "СУПЕРПЛАСТИФИКАТОР ҚЎЛЛАБ ТЎЛҒАЗУВЧИ ҚОРИШМАЛАРНИНГ ХОССАЛАРИНИ ЯХШИЛАШ." *Spectrum Journal of Innovation, Reforms and Development* 8 (2022): 250-254.