278. Diagnostic researches of resistance of fire-prevention valves to temperature influence

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Abstract

Fire-prevention valves of old and new development construction are researching in the paper experimentally. Constructions of fire-prevention valves are describing shortly and prime parameters are giving.

It is describing methodology of experimental researches. Principal scheme of temperature measurements is getting.

Experimental researches of temperature parameters of fire-prevention valves are doing. Getting results are paralleling in inter and it is doing it's analyze and are formulating conclusions of researches.

Keywords: fire-prevention valve, temperature researches, temperature transducer.

1. Introduction

All rooms have been ventilating, systems of delivery of atmosphere – air ducts are assembling in the industrial rooms [1].

Airing systems of rooms and especially in which are using combustible and explosive materials have not to make fire and to help to spread of fire [2, 3]. Position of air ducts, type of installations and material depend upon insecurity of production in side of fire and burst. Sets of production and systems of ventilation have functioned, that fire and burst do not rising or happening it damage should be the minimal.

Purpose of fire-prevention valves – to stop spread of flame in air ducts. For using fire-prevention valves as yet the most attention had ticket to save rooms during fire that is so as light over stalls not warp to other rooms [4]. But doing analyze it can see, that these fire-prevention valves are not undersell perfect construction, but they are refractory shortly and to temperature effect.

Fire-prevention valves of common construction are not painting with paint that is stopping fire. Following paint are necessary that to enlarge resistance of valve to fire, that they standing high temperature during fire [5, 6].

Ones high attention must been given to coating of valve with paint that are enlarging resistance for temperature effect, because coating with paint that are fireproof, it is protecting not only walls of valve from effect of high temperature, but and is elongating its time of service.

Trying to ascertain points of fire-prevention valves that are coating with paint and are hardy to temperature effect must be doing researches.

2. Object of temperature researches – fire-prevention valve

Purpose of fire-valve is to work effectively in case of fire, that is close down and hinder fare from spread, but this valve have not to block normal work of ventilating system.

Fire-prevention valves of old construction are not painting with paint that is stopping fire. Old valve is making from small elastic zinc steel, that thickness is 1,2 mm.

Fire-prevention valves of new development construction are perfecting not only construction ally, but they are paint with special paint yet. This paint is necessary, that enlarging resistance of valve to fire, that during fire they are standing high temperature.

Fire-prevention valves of new development construction had painted with paint that are fireproof: „PYRO – SAFE FLAMMOPLAST – SPA". It is white, scentless, viscous, ecologically clean mass, which is not isolating noxious substances in the effect of fire. Wanting to get other paint or lay over carpet it is using special polish SP – 2.

These paint resistance to fire of fire-prevention valves are enlarging to 90 min. When $T > 250\ ^0C$, it is doing thermo chemistry reaction and SPA paint, with these laying over construction, it helps to save construction from direct effect of fire and thermal effect.

Fire-prevention valves during fire for effect of high temperature (when $T > 500\ ^0C$) are losing its rigidity of construction, are deforming.

Laying over 1 kg/ m^2, thickness of dry coat of paint 0,55 – 0,60 mm, term of fire stop -to 1 hour.

Wanting to calculate output true, must been know perimeter of fire-prevention valve.

3. Researches of temperature

Experiment of fire-prevention valves in high temperature is doing wanting to ascertain is valve of development construction refract rest than stock fire-prevention valve.

Must been given a dust and adipose materials from covered surface. It is recommending surface to cover anticorrosive materials or coating before painting (it is fitting different coatings for this point). It is recommending lying over paint passing 24 hours after first-coat.

It is not necessary to use special protective implements during painting. It is painting with brush, roller or airless jet with not les how two coatings, theretofore to cream paint good. First coating is drying 12 hours. It can paint to water down with water some. It can to paint being lower than + 5 ^{0}C.

Experiment is doing fixing its in the special furnace, temperature is standing to 200 ^{0}C and is keeping in it 120 min. Principal scheme of measurement has given in Fig. 1.

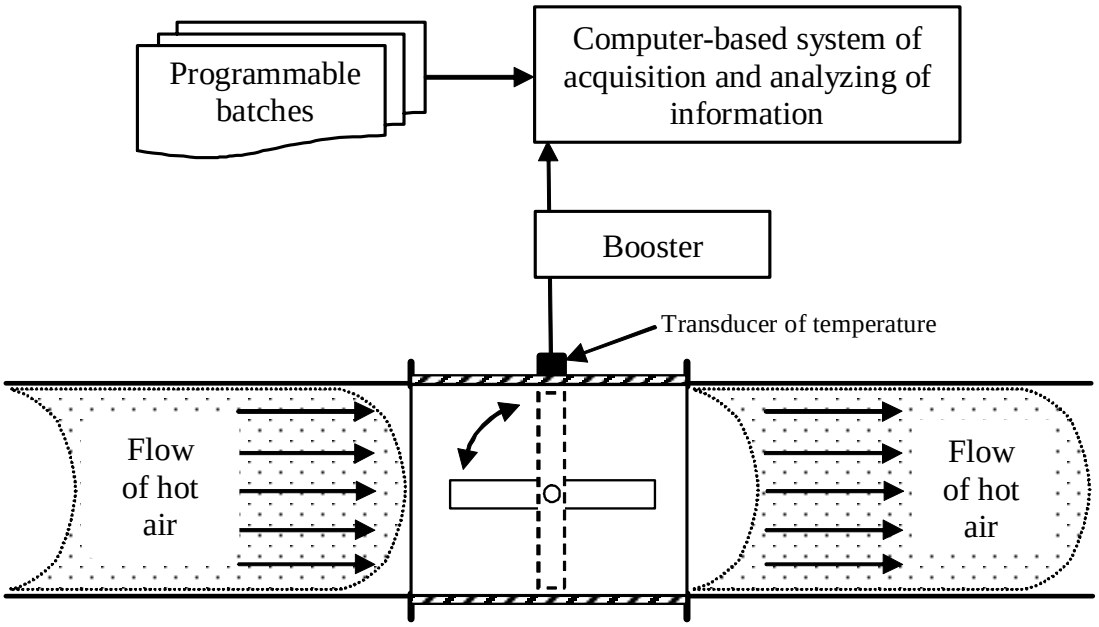

Fig. 1. Principal scheme of measurement
1 – fire-prevention valve, 2 – transducer of temperature measurement; 3 – opening; 4 - valve

4. Methodology of experimental researches

It is taking rectangular fire-prevention valve 200 (mm) x 200 (mm). It is embedding to furnace of experiments and it is actuating gassy torch, that heating valve of fire. When temperature is touching 70 ^{0}C, it is going off protector and it was closing protective flap (Fig. 2 b). Temperature is heightening as long is getting 200 ^{0}C.

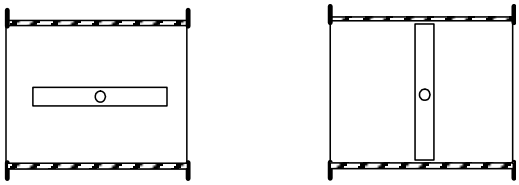

Fig. 2. Fire-prevention valve: a – open, temperature 0 - 70°C;
b – close, temperature 70 – 200 °C

Fire-prevention valve is keeping in furnace subject to its characteristics. If it is designed to save from spread of fire 30 min., then it in the furnace that much and is keeping namely. Passing space of term, valve of fire is taking out from furnace and is inspecting its construction. If construction is breaking down, that is fire-flap not was in a fit state to save from spread of fire, then it is wrong to use.

Doing experimental researches of valves of old and new development construction, results are leveling down and analyzing.

Experiments are doing with both fire-prevention valves that is with fire-prevention valve that is coated with protective coat and with fire-prevention valve that is not coated with protective coat.

Process of temperature researches has given in Fig. 3.

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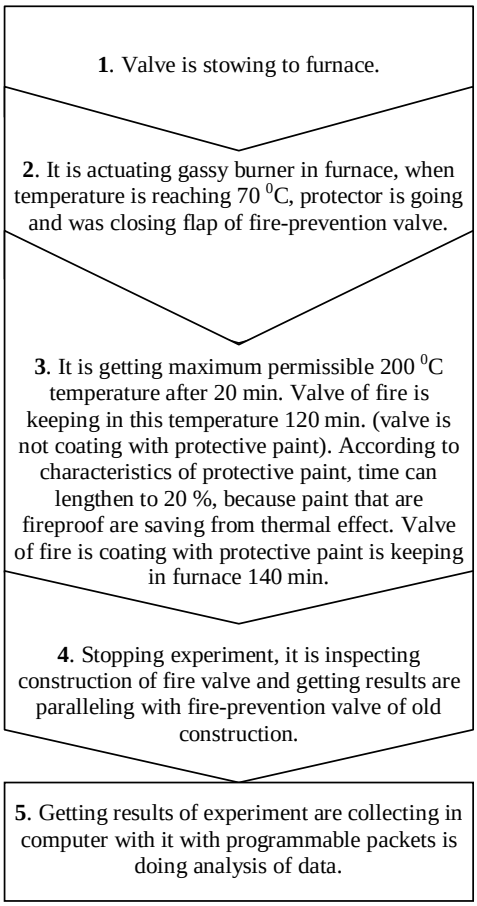

Fig. 3. Process of temperature researches

5. Results and its summation

According to getting results of research of temperature effect of fire-prevention valve it can see, that valve which is not laying out from fire with protective paint to 50 ^{0}C is heating after 28 min. roughly and valve which is painting with paint that are fireproofs to 50 ^{0}C is heating after 35 min. even (Fig. 4).

After 120 min. valve, which is not laying out from fire with protective paint is heating to 200 ^{0}C, and valve which is not laying out from fire with protective paint to 200 ^{0}C is heating after 140 min. only (Fig. 4). It can see, that coating of protective paint upgrading resistance of fire-prevention valve to temperature effect.

Valve of old construction is producing from lamina zinc steel, that thickness is only 1,2 mm. Thicknesses zinc steel help to save from high temperature much. Painting valve with fire-prevention paint its resistance is increasing 20 % even, beside it can decrease its thickness of steel of webs, decreasing productions cost.

Doing temperature experiment with valve of old construction it is taking no notice of deviations from norms. It done its function that is protective flap had saved from spread of fire.

Doing all these researches, it is ascertaining, that fire-prevention valve of new development construction is far better than last fire-prevention valve. New fire-prevention valve is transmitting windblasts better; it can be in high temperature longer and have better construction features.

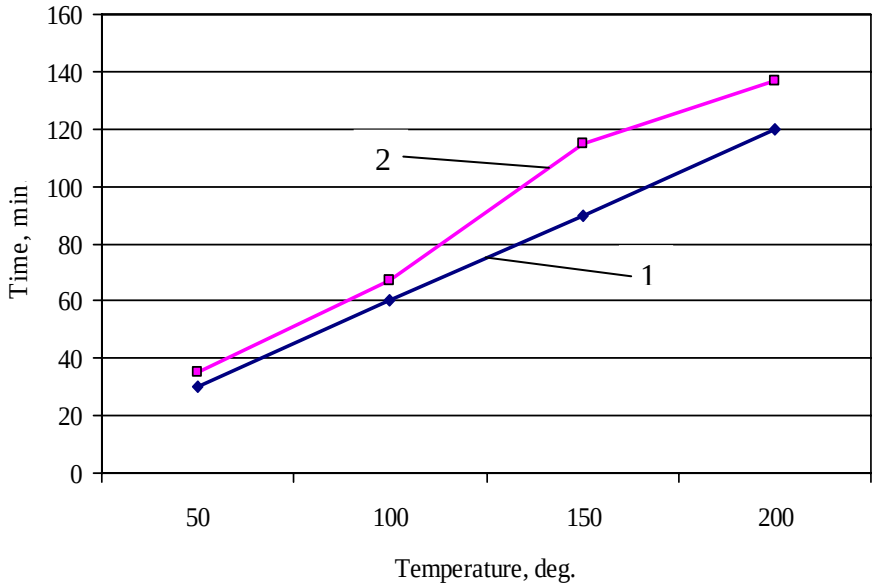

Fig. 4. Results of temperature researches of fire-prevention valves
1 – valve not laying over with fire-prevention protective cover, 2 - valve laying over with fire-prevention protective cover

6. Conclusions

1. Valve that is painting with protective paint to 50 ^{0}C is heating 7 min. longer even, than valve that is uncovered protective cover from temperature effect.
2. Fire-prevention valve that is covered protective cover from temperature effect is heating 20 min. longer even to 200 ^{0}C, than valve that is uncovered such protective cover.
3. Doing experiment, it is ascertaining, that valve which is covered protective cover to fire was far better its constructional features, because fireproofs paint was saving inside walls of valve from effect of high temperature. It is ascertaining that resistance of fire-prevention valve that painting with fire-proofs paint for temperature effect is enlarging about 20 %.
4. Painting valve with fire-prevention paint, it can to decrease thickness of construction, of zinc steel, of thickness of tin, that allow decreasing mass of construction and production costs.

7. References

[1] Langley, Billy C. Fundamentals of air conditioning systems. USA, Lilburn, The Fairmont Press, 2000. – 399 p.
[2] Bagdonas, E. Ventilator of buildings. Specifications of inside projecting of room. Analysis and aspects of realization. Vilnius, 2003, 226 p.
[3] Juodis, E. Ventilation. Vilnius. Encyclopedia. 1998, 351 p.
[4] Bagdonas, E. Ventilator of buildings, Vilnius, 1997. 162 p.
[5] Gedgaudas, M. Common heat technique, supply of heat gas and ventilation. Vilnius, Mokslas, 1995, 186 p.
[6] Tichomirov K. V., Sergenko E. S. Technique of heat, feed of heat and aeration. Moscow, Stroiizdat. 1991. 479 p.