

SPECIFICATIONS OF STEAM BOILERS FOR DISINFECTION CHAMBERS AND APPARATUSES

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At the present time the disinfecting chambers installed in hospitals and other institutions generally receive their heat-supply from Lechapelle type boilers, with heating areas of 4 m² (type KL-4) or 6 m² (type KL-6). Mobile disinfecting apparatuses are supplied with steam from either a Ryabov type steam-coil (APK, DPK) or a combined Ryabov-Ignatohkin type boiler. These various systems and types mean the construction of boilers of three different designs each in five sizes.

This variety of types and designs has built up in the course of time. Some boilers have been specially designed for disinfection, while others have been selected from among those used in various branches of industry. The Lechapelle boilers, for example, were developed in the nineteenth century, and the most recent were developed twenty years ago. It will be readily understood, therefore, why some of the designs do not comply with modern technical and economic requirements. Nor do all these boilers satisfy contemporary demands of technical esthetics.

This variety of types, designs, and sizes affects boiler production adversely: serial production numbers are reduced; cost of production is increased; standardization of parts is made more difficult; and so on. These are the reasons why there was need for reexamination of the existing designs of the steam boilers used for the supply of heat to disinfecting chambers and apparatuses. This has led to the formulation of a new system of boiler type specification.

The type specification of steam boilers for disinfecting chambers and apparatuses, produced by the Central Design and Technological Office of Mechanization in conjunction with the Central Research Institute of Disinfection, has been approved by the Ministry of Health and the Ministry of Biomedical Engineering of the USSR (Table 1).

Boilers for mobile disinfecting apparatuses are designated by the letters KPP (boiler, steam, mobile), and boilers permanently installed, by the letters KPS (boiler, steam, stationary).

Boiler sizes are denoted by numbers which represent output, the numbers being placed after the letters. A mobile steam boiler with an output of 60 kg/h will therefore be designated KPP-60, and a stationary boiler with an output of 150 kg/h, by KPS-150. This type designation will ultimately apply to mobile boilers with outputs of, 30, 60, 90, 200, 300, 400, and 500 kg/h, and stationary boilers of 90, 150, and 300 kg/h. The KPP-30, KPP-60, and KPP-90 mobile boilers are intended for disinfecting chambers with capacities of from 1 to 3 m³, mounted on lorries and trailers, and the larger boilers from KPP-200 upwards for the supply of both disinfecting and shower installations.

The KPS boilers with outputs of 90, 150, and 300 kg/h will supply institutional disinfecting chambers with capacities of 3, 5, and 10 m³ respectively. It is reckoned, however, that when KPS-150 and KPS-300 boilers are installed, some of the steam will be used to heat the other rooms of the disinfection center and for the hot water supply to its shower and laundry rooms.

The specification for each model gives its working pressure, minimum heating surface (structurally), maximum permissible weight, main type of fuel, and maximum fuel consumption, in addition to its steam production, incorporated in its type designation.

Working Steam Pressure. Heat is supplied to disinfecting chambers in the form of saturated water vapor at a working pressure of 0.7 to 8.0 atm. This wide pressure range requires some explanation. Articles can be heated to maximum temperature (98°C) in the disinfecting chamber at atmospheric pressure (without expulsion of air). On the other hand, the heat content of steam varies little with pressure, and pressure does not therefore have much effect on the time that articles require to be heated. The decisive factor

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TABLE 1. Type Specification of Steam Boilers for Disinfecting Chambers and Plants

Type of boiler	Main parameters					
	Output (kg/h)	Working pressure of steam (atm)	Construc-tional heating surface (m ²): not more than	Weight (kg): not more than	Main type of fuel	Fuel con-sumption (kg): not more than
Mobile KPP-30	30	0.7-3	1.3	100-150	Wood	14
Mobile KPP-60	60	4	2.3	200	Solar oil	6
Mobile KPP-90	90	4	3.5	350	Solar oil	9
Mobile KPP-200	200	4	6.5	600	Solar oil	18
Mobile KPP-300	300	4	10.0	900	Solar oil	28
Mobile KPP-400	400	4	13.0	1, 200	Solar oil	36
Mobile KPP-500	500	4	16.0	1, 400	Solar oil	45
Fixed KPS-90	90	4	3.5	400	Coal	12
Fixed KPS-150	150	4	7.0	900	Coal	20
Fixed KPS-300	300	4	14.0	1, 800	Coal	40

in this respect is the quantity of steam (heat) introduced into the chamber. The conclusion to be drawn from all this is that the working pressure of steam in boilers designed for disinfecting chambers should not exceed 0.7 atm. Boilers with this pressure are less dangerous in operation, and do not have to be registered with the inspection authorities. The working pressure of all these typed boilers, with the exception of KPP-30, has however, been fixed at 4 atm. In doing so, the authorities have been guided by the following requirements and considerations.

A boiler should be capable of meeting other requirements (ablution room, laundry room, etc.) as well as the disinfecting chamber and its own requirements (water supply, creation of draught, atomization of liquid fuel).

A normal supply of water to a boiler by means of an injector (the simplest and most reliable type of feed) is insured by a steam pressure of 3 to 4 atm. In the case of liquid fuel, the higher the steam pressure, the finer will be the atomization, and there will be more complete combustion. The booster motive draught created by the steam siphon, will also depend directly on pressure. If a boiler is called on to supply, say, the disinfecting chamber and shower-rooms simultaneously, pressure in the boiler will fall sharply, and its efficiency will suffer (draught strength will be reduced, and combustion will deteriorate); in practice, therefore, multiple loads on the boiler should be avoided as far as possible. The minimum steam pressure in such boilers should be 4 atm. Higher pressures (6-8 atm) would enable all demands to be met simultaneously, but, of course, higher pressures demand thicker boiler walls. This involves increase of weight, and weight must be strictly controlled, particularly in the case of mobile boilers.

In the case of KPP-30 boilers, which must be of the simplest construction possible as they are intended for small disinfecting chambers, the working steam pressure has been fixed at 0.7-3.0 atm.

Heating Surface. The specification for each boiler type gives the maximum permissible heating surface, the calculation of which is based on a yield of steam of not less than 22 kg/h per 1 m² of heating surface with wood fuel of average dampness or 27 kg/h with diesel oil.

Fuel. The main type of fuel specified for mobile boilers is liquid fuel (diesel oil, solar oil). It has a high caloric value, and requires only about one-sixth of the space of wood, which is particularly advantageous when it has to be transported in mobile disinfecting installations with tanks of limited capacity.

Provisions has, however, been made for wood as an alternative fuel for mobile boilers, as wood is available almost everywhere in the USSR.

The fire-chambers of mobile steam boilers must therefore be suitable for either liquid or wood fuel.

Coal may be regarded as the standard fuel for fixed boiler installations. Provision should however, be made for the burning of wood, liquid fuel or gas, depending on local conditions.

Weight of Boiler. As weight is of considerable practical importance, particularly when the boiler is mounted on a movable base, maximum permissible weights have been prescribed for each type. This should not exceed 3-4 kg for mobile and 6 kg for fixed boilers per kilogram of steam generated per hour.

Fuel Consumption. Maximum permissible consumption rates are specified; they represent minimum efficiency coefficients of 50 per cent for mobile and 70 per cent for fixed boilers.

Serial production of this range of boilers will begin in 1970-1972.