

AIR PROTECTION FROM POWER INDUSTRY EMISSIONS

1.3. Sulfur oxide emission reduction

1.3.1. Formation mechanism and standards for sulfur oxide emissions

1.3.1.2. Specifications and sanitary requirements for SO₂ content in atmosphere and flue gases

Shmigol I.N., Open JSC "VTI"

According to the sanitary-hygienic legislation of Russia in the atmospheric air the following maximum permissible concentrations of sulfur dioxide should be met:

- maximum one-time concentration (for sampling time of 20 min - 0,5 mg/m³);
- daily average concentration is 0,05 mg/m³. In the air of working spaces the concentration of sulfur dioxides shouldn't exceed 10 mg/m³.

In 1995 GOST R 50831-95 "Boiler plants. Thermal and mechanical equipment. General technical requirements", M.: State Standard of Russia, 1995 has been issued. According to its requirements newly built and reconstructed boiler plants, starting from 01.01.2001, should provide specific emissions of sulfur dioxide, which depend on thermal capacity of boilers and reduced sulfur content of the combusted fuel (Table 1.14).

Since July 1, 2004 for the operating thermal power plants of the European part of Russia, regulations of the II Protocol to the International Convention on Transboundary Movements (ICTM) of sulfur dioxide have been introduced (table 1.15).

Each country which signed the Protocol and the International Convention may choose a limit of sulfur dioxide emissions as the concentration of this substance in flue gases from boilers or in the form of the purifying degree of flue gases of each boiler. In Russia concentrations of sulfur dioxide in flue gases of boilers are taken as limits.

For comparison, these standards and requirements of GOST 50831-95 are shown in Fig. 1.39.

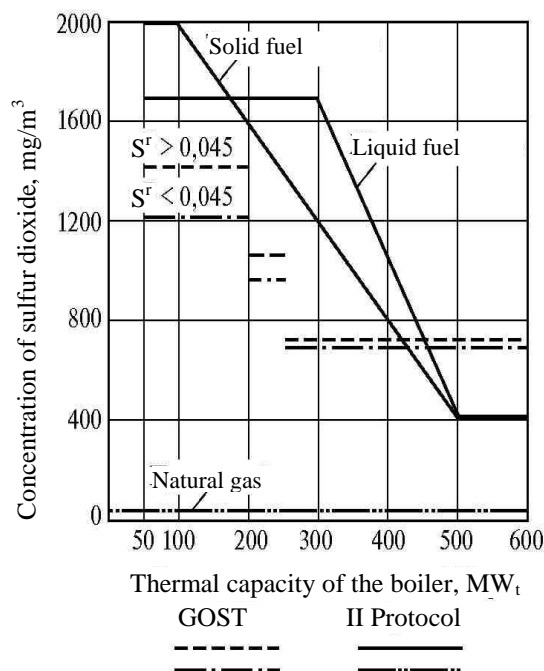


Fig. 1.39. SO₂ concentrations according to GOST P 50831—95 and the II Protocol to the International Convention on Transboundary Movement of sulfur dioxide

It is evident that these standards for boilers with capacity up to 450 MW are less strict. Only for boilers over 450 MW it's necessary to provide specific emissions of 0,175 g/MJ instead of 0,3 g/MJ.

Table 1.14. Sulfur dioxide emission standards in accordance with GOST R 50831-95

Thermal capacity of boiler plants, MW (steam consumption, t/h)	Specific emission, g/MJ		Estimated concentration, mg/m ³ (at α = 1,4)	
	S ^r < 0,045 %-kg/MJ	S ^r > 0,045 %- kg/MJ	S ^r < 0,045 %- kg/MJ	S ^r > 0,045 %- kg/MJ
To 199 (320)	0,5	0,6	1200	1400
200...249 (320...400)	0,4	0,45	950	1050
250...299 (400...420)	0,3	0,3	700	700
> 300 (> 420)	0,3	0,3	700	700

Table 1.15. Emission standards of sulfur dioxide according to the II Protocol to the ICTE

Fuel type	Thermal capacity, MW	Limiting value of concentration, g/m ³	Degree of sulfur dioxide capture,%
Solid fuel	50...100	2000	40 (for 100...167 MW)
	100...500	2000...400 (linear decrease)	40...90 (linear decrease for 167 ... 500 MW)
	> 500	400	90
Liquid fuel	50...300	1700	90
	300... 500	1700...400 (linear decrease)	90
	> 500	400	90
Natural gas	For any capacity	35	-