SAFETY DATA SHEET OF CHEMICAL PRODUCT

Entered in Safety Data Sheet Register

Registration No 1 3 6 5 7 8 4 2 . 2 0 . 8 8 5 3 0 dated «27» April 2024

Valid until «27» April 2029

Association Non-commercial Partnership
Coordination and Information Centre of CIS member-states
for alignment of regulatory practices

NAME

technical (as per regulatory document)	**Ammonium sulphate – by-product (grade B)**
chemical (as per IUPAC)	**Diammonium sulphate**
commercial	Ammonium sulphate – by-product, grade B
synonyms	**Ammonium sulfate, Sulfuric acid diammonium salt**

OKPD 2 Code 2 0 . 1 5 . 3 2 . 0 0 0

EAEU HS Code 3 1 0 2 2 1 0 0 0 0

Reference designation and name of the regulatory, technical or information document for the product (GOST, TU, OST, STO, (M)SDS)

TU 113-03-625-90 Ammonium sulphate – by-product

HAZARD STATEMENT

Signal word: **None**

Brief (word) **description**: Ammonium sulphate is a moderately hazardous substance by impact on the body according to GOST 12.1.007. May cause respiratory system, skin and eyes irritation under mechanical impact. May pollute the environment.

Detailed description: in 16 sections of the enclosed Safety Data Sheet

MAIN HAZARDOUS INGREDIENTS	MAC w.z., mg/m³	Hazard category	CAS No.	EC No.
Diammonium sulphate	10	3	7783-20-2	231-984-1

APPLICANT: JSC Ural Steel, (name of organization) Novotroitsk (city)

Applicant type: manufacturer, ~~supplier, seller, exporter, importer~~ (strike out whichever is not applicable)

OKPO Code: 1 3 6 5 7 8 4 2

Emergency telephone: **(3537) 66-65-88, 66-46-22**

Chief engineer of JSC Ural Steel _____ / **A.I. Bedrinov** /
(signature) (full name)

stamp here

Safety Data Sheet (SDS) complies with UN recommendations ST/SG/AC.10/30 GHS

IUPAC	–	International Union of Pure and Applied Chemistry
GHS	–	UN recommendations ST/SG/AC.10/30 Globally Harmonized System of Classification and Labelling of Chemicals
OKPD 2	–	Russian Classification of Products by Economic Activities
OKPO	–	Russian Classifier of Enterprises and Organizations
HS Code	–	Foreign Economic Activity Commodity Nomenclature
CAS No.	–	substance number in the Register of Chemical Abstracts Service
EC No.	–	substance number in the Register of European Chemicals Agency
MAC w.z.	–	Maximum allowable concentration of chemical substance in the air of working zone, mg/m^3
Signal word	–	a word used for drawing attention to the hazardous level of the chemical product and chosen in accordance with GOST 31340

1 Identification of chemical product and information about manufacturer and/or supplier

1.1 Identification of chemical product

1.1.1 Technical name	Ammonium sulphate – by-product (B grade) (hereinafter referred to as ammonium sulphate, product). [1]
1.1.2 Brief recommended use (including restrictions on use)	For use in the chemical industry and for export. Use restrictions - do not use on agricultural land. [1]

1.2 Information about the manufacturer and/or supplier

1.2.1 Full legal company name	Joint Stock Company Ural Steel (JSC Ural Steel)
1.2.2 Address (postal and legal)	1, Zavodskaya str., Novotroitsk, Orenburg region, 462353
1.2.3 Tel., incl. for emergency consultations and hours of work	(3537) 66-65-88, 66-46-22 (from 06.15 to 15.15 Moscow time)
1.2.4 E-mail	m.mishchenko@uralsteel.com

2 Hazard(s) identification

2.1 Hazard level of chemical product in general (information on hazard classification in accordance with the RF laws (GOST 12.1.007-76) и GHS (GOST 32419, GOST 32423, GOST 32424, GOST 32425)	Moderately hazardous substance in terms of impact on the human body in accordance with GOST 12.1.007, hazard category: 3. [1,2,3,5] Not classified according to GHS. [8]

2.2 Information on the warning marking as per GOST 31340

2.2.1 Signal word	The criteria are not subject to GOST 31340-2022. Warning marking is not required. [11]
2.2.2 Hazard symbols	
2.2.3 Brief description of hazard (H-phrases)	

3 Composition (information on ingredients)

3.1 Сведения о продукции в целом

3.1.1 Chemical name (as per IUPAC)	diAmmonium sulfate [9]
3.1.2 Chemical formula	$H_8N_2O_4S$ [9]
3.1.3 General description of composition (taking into account the product range; producing method)	Ammonium suplphate – sulphuric acid neutral ammonium salt. Ammonium sulfate (B grade) is a by-product of coke and by-product plant and is formed during the recovery (absorption) of ammonia from coke oven gas by sulfuric acid solution. [1,6,12]

3.2 Ingredients

(name, CAS and EC numbers, weight percentage (must be 100% in total), MAC w.z. or ASLI w.z. (Approximately Safe Level of Impact in the working zone), hazard categories, references to data sources)

Table 1 [1, 4, 12, 13]

Ingredients (name)	Weight percentage, %	Hygienic standards in the air of working zone		CAS No.	EC No.
		MAC w.z., mg/m^3	Hazard category		
diAmmonium sulfate (ammonium sulphate)	≤ 99	10 (a)	3	7783-20-2	231-984-1
Water	≤ 0,3	not identified	none	7732-18-5	231-791-2
Free sulfuric acid	≤ 0,05	1 (a)	2	7664-93-9	231-639-5
Ammonium sulfate as impurities contains: toxic substances, mg/kg (% wt.): mercury – 0,003-0,009 ($3\cdot 10^{-7}$-$9\cdot 10^{-7}$); arsenic – 0,5-0,9 (0,00005-0,00009); lead – 1,2-1,8 (0,00012-0,00018); cadmium – 0,13-0,31 (0,000013-0,000031); trace elements, mg/kg (% wt.), not more: zinc – 55 (0,0055); copper – 33 (0,0033); cobalt – 5,0 (0,005); manganese – 1500 (0,15); nickel – 4,0 (0,0004); chromium – 6,0 (0,0006); hexavalent chromium – 0,05 ($5\cdot 10^{-6}$). The rest are unidentified compounds up to 100%.					
Note: (a) – aerosol; (v) – vapours					

4 First aid measures

4.1 Symptoms

4.1.1 In case of inhalation — Tickling, sore throat, cough, irregular respiratory rhythm, dyspnea, dizziness, vomiting. [9]

4.1.2 In case of skin contact — Redness, irritation. [9]

4.1.3 In case of eye contact — Tearing, redness. [9]

4.1.4 In case of ingestion — Loginess, headache, nausea, vomiting, stomach pain, diarrhea. [9]

4.2 First aid measures for the injured persons

4.2.1 In case of inhalation — Remove the victim to fresh air, loosen tight clothing, keep the affected person warm and still. If necessary, seek medical attention. [10]

4.2.2 In case of skin contact — Remove contaminated clothing and wash the skin with running water. and wash the skin with running water. [10]

4.2.3 In case of eye contact — Remove any contact lenses, flush eyes (if possible) and continue to rinse with plenty of water while opening the eyelids widely. Get medical attention. [10]

4.2.4 In case of ingestion — Rinse mouth with water. Immediately drink 1-2 glasses of water with a suspension of enterosorbent (activated charcoal, Enterumin, Polysorb, etc.). Induce vomiting by irritation of the root of the tongue, then again drink 1-2 glasses of water with a suspension of sorbent. Seek medical attention. [1, 2, 7-10]

4.2.5 Contraindications — None. [1, 2, 7-10]

5 Measures and means of fire and explosion safety

5.1 General characteristic of fire and explosion hazards (as per GOST 12.1.044-89)	Non- combustible substance. When mixed with oxidizing agents 〖KNO〗_3 or 〖KNO〗_2, presents an explosion hazard in fire. [1, 14-16]
5.2 Indices of fire and explosion hazards (list of indices as per GOST 12.1.044-89)	Not achieved. [14]
5.3 Hazards caused by combustion products and/or thermal decomposition products	Decompose upon heating: – to 100 ºC - beginning of ammonia release; – up to 235 ºC - for ammonia and ammonium hydrosulfate (sulfuric acid sulfate); – p to 513 ºC to ammonia, water, sulfur (VI) oxide and sulfuric acid (complete decomposition)). Poisoning by toxic thermal decomposition products causes suffocation. [1,12,16]
5.4 Suitable extinguishing media	Fire extinguishing at the main source of ignition. [15]
5.5 Unsuitable extinguishing media	There is no unsuitable extinguishing media. [16]
5.6 Personal protective equipment for fire-fighting (PPE of fire-fighters)	Firefighter's bunker gear (jacket and trousers with detachable heat-insulating lining) complete with firefighting rescue belt, gloves, fire helmet, special protective footwear, breathing apparatus with compressed air. [17-21]
5.7 Special firefighting procedures	In the fire point, paper or polymer packaging may be involved in the combustion process, leading to thermal decomposition of the substance. [7-10, 15,16]

6 Accidental release measures

6.1 Precautions against Harmful Effects on People, Environment, Buildings, Structures etc. in Case of Emergencies

6.1.1 General emergency response measures	Isolate the hazardous zone. Keep unauthorized people away. Correct the above distance on the basis of the results of chemical monitoring. Enter the hazardous zone using protective equipment. Give first aid to the injured. [22]
6.1.2 Personal protective equipment in emergency situations (PPE of emergency response teams)	For chemical reconnaissance and incident commander – Protective breathing device PDU-3 (for 20 min). For emergency response teams – insulating protective clothing KIKH-5 complete with self-contained gas mask IP-4M or breathing apparatus ABC--2. In case of fire - fire retardant clothing complete with self-rescuer SPI-20. In case of absence of the specified samples: military protective clothing L-1 or L-2 complete with industrial gas mask of the RPG brand with cartridges A, E.

	In case of low concentrations in the air (exceeding the MAC up to 100 times) – protective clothing, industrial gas mask of small size PFM- 1 with a universal protective cartridge PZU, a self-contained protective individual equipment with forced supply of purified air to the breathing zone. Protective glasses, protective gloves, protective clothing, protective footwear. [22]

6.2 Emergency Response Procedure

6.2.1 Response to spillage, leakage, overflow (including response measures and precautions for environment protection)	Report to the sanitary and epidemiological inspection bodies. Collect the product spillage using PPE in accordance with safety precautions. Return the uncontaminated part to the technological cycle, collect the contaminated product and use it as intended. Wash the product spillage areas with plenty of water. Do not allow the product to get into sources of domestic and drinking water supply, rainwater and floodwater collection systems. [22]
6.2.2 Fire response procedure	If the product is in the fire zone, enter the accident area wearing protective clothing and breathing apparatus. Call the fire department and remove people from the fire zone, start extinguishing the fire with all available means. After extinguishing the fire to measure MAC for ammonia content. [22]

7 Handling and Storage

7.1 Safety Precautions for Handling Chemical Products

7.1.1 Systems of engineering safety measures	Mechanization and automation of production processes. Equipping production facilities with supply and exhaust ventilation, and places of the highest dust content - shelters with local ventilation system. Compliance with fire and industrial safety measures. Workplaces shall be equipped with primary fire extinguishing equipment. [1,23,26,34,35]
7.1.2 Measures on environmental protection	Sealing of process equipment and transport containers. Control of specified maximum permissible emissions, control of waste disposal. Elimination of product spillage. Arrangement of a drainless water supply system, environmental control systems with the use of modern equipment. Exclusion of wastewater entering the drainage system. [1,23]
7.1.3 Recommendations on safe handling and transportation	The product is transported in bulk and packaged. Packaged ammonium sulphate is transported by all types of transport, except aviation, in covered vehicles. By rail, the product is transported by single wagon load. Special soft containers are transported by open trucks, by rail - in open-top wagons and on platforms.

Ammonium sulphate in bulk is transported in special wagons, in covered wagons, as well as in covered trucks. [1,28]

7.2 Storage Precautions

7.2.1 Safe storage life and conditions: (including guaranteed shelf life, expiry date; substances and materials incompatible for storing)

Packed product is stored at ambient temperature in closed warehouses, excluding ingress of pollutants and moisture, equipped with natural ventilation and protecting the product from direct sunlight. Containers are stored in open platforms.
The guaranteed shelf life of the product is 6 months from the date of shipment to the consumer.
Store separately from combustible substances, alkalis, mineral acids, organic substances, powdered metals, pesticides, strong oxidizing agents and bases, nitrites, chlorides, potassium hypochlorate, food and drinking water. [1, 9]

7.2.2 Containers and packing (including materials they are manufactured from)

Four, six-ply paper bags, except for HM, polyethylene bags, special soft containers.
When transported in bulk, open-top wagon shall be covered with polyethylene film from the inside, open trucks shall be equipped with a tarp cover. [1,40]

7.3 Household precautions

Ammonium sulphate is not used in the household. [1]

8 Exposure Controls and Personal Protection

8.1 Working zone exposure limits subject to obligatory control (MAC w.z. or ASLI w.z.)

MAC w.z. = 10 mg/m^3, (diAmmonium sulfate, aerosol).[4]

8.2 Measures aimed at keeping harmful substances within the exposure limits

Arrangement of dust suppression systems that ensure removal of hazardous substances and dust from the places of their emission. Continuous or periodic removal of dust from dedusting devices. Fulfillment of sanitary norms of microclimate, taking into account the peculiarities of the work performed. Daily cleaning of the rooms. [1]

8.3 Personal protective equipment for personnel

8.3.1 General recommendations

Provide personnel with PPE. PPE shall be washed and replaced on a weekly basis. Dust removal of PPE shall be carried out on a daily basis. Repair, centralized washing of protective clothing, only in production conditions, within specified time limits. Exclude direct contact with the product. Do not smoke and do not eat in places where the product is used and stored. Wash hands thoroughly before eating. Workplaces and conditions of production training for persons under 18 years of age shall comply with hygienic regulations. Take a shower after work. Conduct preliminary (pre-employment) and periodic (annual) medical examinations of personnel involved in work.

	There shall be sanitary and amenity facilities for eating and personal hygiene of employees, as well as drinking water supply, water supply, sewerage and heating facilities [1,23-26,37,46]
8.3.2 Respiratory protection (types of respiratory protective equipment)	At moderate concentrations - respirators (half-masks) filtering particulate air (aerosol respirator). If the MAC w.z. is exceeded - isolating-filtering self-contained breathing apparatus (gas masks). When working in a confined space - fresh-air self-contained breathing apparatus (gas masks) on compressed air with supply on demand. [27,29,30,31]
8.3.3 Respiratory protection (types of respiratory protective equipment) (protective clothing, protective footwear, hand protection, eye protection)	**Protective clothing:** protective clothing against general production pollution. [45] **Foot protection:** special footwear with protection against general production pollution. [32] **Hand protection:** knitted gloves against abrasion; Protective and preventive dermatological products. [36,44] **Eye protection:** safety goggles. [33]
8.3. Personal protective equipment for household use	Ammonium is not used in the household. [1]

9 Physical and chemical properties

9.1 Physical and chemical properties (aggregate state, colour, odour)	Solid slightly colored crystals. [1]
9.2 2 Parameters characterizing the product basic properties (temperature indicators, pH, solubility, n-octanol / water factor and other parameters specific to this type of product)	Boiling point: 280 ºC; Melting point: 350 ºC; Density: 1,769 g/cm^3. Solubility in water: at 25 ºC - 764000 mg/l; at 100 ºC - 1017000 mg/l. [9]

10 Stability and reactivity

10.1 Chemical stability (specify decomposition products for unstable products)	Stable subject to proper handling and storage conditions. [1,9]
10.2 Reactivity	Oxidizes, interacts with acids, alkalis, chlorides, nitrites. [9]
10.3 Conditions to Avoid (including hazardous manifestations upon contact with incompatible substances and materials)	High temperatures. The beginning of decomposition - at 100 °C; it decomposes at 280 °C into ammonia and acid salt - ammonium bisulfate, complete decomposition - at 513 °C. Incompatibility with substances - acids, alkalis, chlorides, nitrites, water. Dangerous decomposition products - ammonia, sulfur oxides, nitrogen oxides. [6,9]

11 Toxicological information

11.1 General description of effects (evaluation of a level of hazardous (toxic) effects on the body and the most typical manifestations of hazard)	Moderately hazardous substance (hazard category 3 substance) in terms of its effect on the body. Chronic rhinitis and pharyngitis, nosebleeds may occur.
11.2 2 Routes of exposure (inhalation, ingestion, skin contact and eye contact)	Inhalation, ingestion, skin contact and eye contact.
11.3 Target human organs, tissues and systems	Central nervous and respiratory systems, gastrointestinal tract, liver, kidneys, skin, eye ocular mucous membrane. [9]
11.4 Information on dangerous to health effects from direct exposure to the product, as well as consequences of this exposure: (irritation of upper respiratory tract, eyes, skin, including skin resorptive and sensitizing effects)	It may cause irritation of the upper respiratory tract, eyes and skin. Skin resorptive and sensitizing effects are not determined. [1,9]
11.5 Information on long-term dangerous to health effects from exposure to the product (influence on reproduction function, carcinogenicity, mutagenicity, cumulativeness and other chronic effects)	Ammonium sulphate does not affect reproductive function. It does not have carcinogenic and mutagenic effect. Cumulativity is weak. [4, 7-10, 37]

11.6 Values of acute toxicity

(DL_{50}, route of entry (intragastric, cutaneous), animal; CL_{50}, exposure time (h), animal)

Table 2 [9,10]

Substance	**Effect**	**Value, mg/kg**	**Route of entry**	**Animal species**
diAmmonium sulfate	DL_{50}	2410 – 4540	intragastric	Rats
		> 2000	cutaneous	Rats
	Effect	**Value, mg/m^3**	**Exposure time, h**	**Animal species**
	CL_{50}	1000 – 1200	8	Rats
		> 900	8	Guinea pigs

12 Ecological information

12.1 General description of effects on environment (air, water bodies, soil including observable symptoms of exposure)	In compliance with the conditions of production, storage, transportation and application does not have a negative impact on the environment, does not form dangerous metabolites. In case of violation of the usage and application rules is able to: – cause air pollution; – negatively affect the inhabitants of water bodies and change the composition of water; – acidify soils. [7]

12.2 Environmental exposure routes — Emergencies, violation of the handling, storage and transportation rules, improper storage and uncontrolled waste dumping. [1]

12.3 The most important characteristics of environmental impact

12.3.1 Hygienic regulations

(allowable concentrations in atmospheric air, water, including fishery water bodies, soil)

Table 3 [4,39]

Ingredients	MAC (maximum allowable concentration) in atm. air or ASLI (approximately safe level of impact) in atm. air, mg/m^3 (LHI [1], hazard category)	MAC in water[2] or Approximate Allowable Level in water, mg/l (LHI, hazard category)	MAC in fishery[3] or ASLI in fishery, mg/l (LHI, hazard category)		MAC in soil or Approximate Allowable Concentration in soil, mg/kg (LHI)
			Ammonium ion	Sulfate anion	
diAmmonium sulfate	0,2/0,1/- (res., 3)	nitrogen: 1 (org. taste, 3)	0,5 (tox., 4) For seawater: 2.9 at 13-34 % (tox., 4)	100 (s.-t.). For seawater: 3500 at 12-18 % (tox.)	NA

12.3.2 Ecotoxicity values

(SL, EC, NOEC, etc. for fish (96 h.), daphnia (48 h.), algae (72 or 96 h.), etc.)

Table 4 [7,9]

Substance	Effect	Value, mg/l	Species	Exposure time, h
diAmmonium sulfate	CL_{50}	365	Atlantic salmon	96
	CL_{50}	45 – 141	Carp	96
	EC_{50}	169	daphnia Magna	48
	CL_{50}	129	daphnia Magna	48
	EC_{10}	5,29	Fish	30 d

12.3.3 Migration and transformation in the environment due to biodegradation and other processes (oxidation, hydrolysis or similar) — It hydrolyzes over the cation to form ammonium hydroxide and sulfuric acid. Oxidized. It migrates from soil to water bodies and is transformed into ammonia. [7-10]

13 Disposal considerations

13.1 Safety precautions for handling waste generated during use, storage, transportation — These are similar to those used when handling main products and set out in Sections 7 and 8 of Safety Data Sheet. [1]

13.2 Information on locations and methods of neutralization, recovery or disposal of waste, including containers (packing) — Waste may be stored only in specially designated areas, the location of which is coordinated with regional sanitary and environmental supervision authorities. Out of use product shall be collected in containers for inorganic solids that are clearly labeled with a description of their contents. The containers shall be transferred to an authorized company for disposal by dumping. Non-returnable or out of use containers shall be disposed of as basic waste. All actions are carried out in accordance with the requirements of SanPiN 2.1.3684-21. [38]

[1] LHI – limiting hazard index (tox. – toxicological; s.-t. – sanitary - toxicological; org. – organoleptic with indication of changes in organoleptic properties of water (od. – changes water odour, tur. – increases water turbidity, col. – colours water, foam – causes foaming, film – creates film on the water surface, taste – changes water flavour, op. – causes opalescence); refl. – reflective; res. - resorptive; refl.-res. - reflective-resorptive, fishery – fish industry (change of commercial qualities of aquatic organisms) ; gen. – general sanitary).

[2] Water of water bodies for household and community use

[3] Water of water bodies for fish industry (including seas)

13.3 Recommendations on disposal of waste from household use	It is not used in household. [1]

14 Transport information

14.1 UN number (according to UN Recommendations on the Transport of Dangerous Goods)	None. [41]
14.2 Proper shipping name and name while in shipment	Name while in shipment: Ammonium sulphate - by-product (grade B). [1]
14.3 Applicable means of transport	By rail, by road, by sea. Air transport is not used. [1]
14.4 Cargo hazard classification according to GOST 19433-88	Not classified as hazardous cargo. [42]
14.5 Cargo hazard classification according to the UN Recommendations on the Transport of Dangerous Goods	Not classified as hazardous cargo. [41]
14.6 Transport Labels (handling signs according to GOST 14192-96)	Handling label KEEP DRY. [43]
14.7 Emergency cards (if shipped by rail, sea etc.)	Emergency cards are not used. [22]

15 Regulatory Information

15.1 National Regulations

15.1.1 Russian Federation laws	On Environmental Protection, On Sanitary and Epidemiological Well-Being of Population, On Technical Regulation, on Occupational Safety and Health, On Production and Consumption Wastes, On Safe Handling of Pesticides and Agrochemicals.
15.1.2 Documentation regulating man safety and environmental protection requirements	Not required. [13]
15.2 International conventions and agreements (whether or not the product is regulated by the Montreal Protocol, Stockholm Convention etc.)	Not subject to the Montreal Protocol, the Stockholm Convention. [47,48]

16 Additional information

16.1 Information on SDS revision (re-edition) (the following is specified: “SDS is drawn up for the first time” or “SDS is re-registered upon expiry. Previous SDS registration number...” or “Amendments made in clauses…, amendment date…”)	SDS is re-registered upon expiry. Previous SDS registration No. 13657842.20.56815 dated 24.05.2019.

16.2 List of information sources used to draw up the SDS

1 TU 113-03-625-90 Ammonium Sulphate - By-product. Technical Specification.
2 GOST 32423-2013 Mixtures classification of hazard for health.
3 GOST 12.1.007-76 Occupational safety standards system. Noxious substances. Classification and general safety requirements.
4 SanPiN 1.2.3685-21 Hygienic standards and requirements for ensuring safety and (or) harmlessness to humans from environmental factors.
5 GOST 32419-2022 Chemical hazard classification. General requirements.
6 Petrenko D.S. Ammonium sulphate production. - M.,: Metallurgy, 1966.
7 Data from information system ECHA (European Chemicals Agency). [Electronic source]: Available at – http://echa.europa.eu/.
8 PubChem [Electronic source]. – Available at: https://pubchem.ncbi.nlm.nih.gov/.
9 Information card of potentially hazardous chemical and biological substance. Ammonium sulphate. Certificate of State Registration AT No. 000072 . - M.: RPOKhV, 1994.
10 Information system on hazardous substances of the German Social Accident Insurance – GESTIS. Available at: https://gestis-database.dguv.de/search.
11 GOST 31340-2022 Labelling of chemicals. General requirements.
12 Shelkov A.K. Handbook of Coke Chemical Engineer. Vol.3 - M.,: Metallurgy,1966.
13 Uniform list of products (goods) subject to state sanitary and epidemiological supervision (control) at the customs border and customs territory of the Eurasian Economic Union (as amended as of 4.09.2020).
14 GOST 12.1.044-89 Occupational safety standards system. Fire and explosion hazard of substances and materials. Nomenclature of indices and methods of their determination.
15 Korolchenko A.Ya. Fire and explosion hazard of substances and materials and means of their extinguishing. Ref. ed. in 2 parts. - M.,: Association “Pozhnauka”, 2000, 2004.
16 Fire and explosion hazard of substances and materials and means of their extinguishing. Ref. under ed. of A.N. Baratov and others. - M., Chemistry, 1990.
17 GOST R 53257-2019 Fire fighting equipment. Face masks of personal respiratory protective devices. General technical requirements. Test methods.
18 GOST R 53264-2019 Fire equipment. Special protective clothing for fire-fighter. General technical requirements. Test methods.
19 GOST R 53269-2019 Fire equipment. Helmets for fire-fighters. General technical requirements. Test methods.
20 GOST R 53268-2009 Fire equipment. Fire safety belt. General technical requirements. Test methods.
21 GOST R 53265-2019 Fire equipment. Personal protective, means of fire-fighter's feet. General technical requirements. Test methods.
22 Emergency cards for hazardous cargoes transported by railways of the CIS, the Republic of Latvia, the Republic of Lithuania, the Republic of Estonia (approved by the Council on Railway Transport of the Commonwealth member states, Minutes of Meeting No. 48 dated May 30, 2008).
23 Order of the Federal Service for Environmental, Technological and Nuclear Supervision No. 512 dated 09.12.2020 On approval of Federal norms and regulations in the field of industrial safety “Safety rules for processes of obtaining and application of metals”.
24 Order of the Ministry of Labour and Social Protection of the Russian Federation No. 767n dated 29.10.2021 “On approval of the Uniform Standard Guidelines for issuing personal protective equipment and detergents”.

25 Order of the Ministry of Health of Russia No. 29n dated 28.01.2021 “On the approval of the Procedure for conducting mandatory preliminary and periodic medical examinations of employees, provided for in part four of Article 213 of the Labour Code of the Russian Federation, a list of medical contraindications to work with harmful and (or) hazardous production factors, as well as work in which mandatory preliminary and periodic medical examinations”.
26 GOST 12.4.021-75 Occupational safety standards system. Ventilation systems. General requirements.
27 GOST 12.4.246-2016 (EN 143:2000) Occupational safety standards system. Respiratory personal protective equipment. Particle filters. General specifications.
28 Rules for the transportation of dangerous goods by rail (put into effect at the 15th Meeting of the Council on Railway Transport of the Commonwealth of Independent States) (as amended as of 22.11.2021).
29 GOST 12.4.296-2015 Occupational safety standards system. Respiratory system protective devices. Filtering gas half masks. General specifications.
30 GOST 12.4.297-2015 Occupational safety standards system. Individual protective respiratory devices. Insulating-filtering autonomous protective respiratory devices. Technical requirements. Test methods. Marking. Sampling rules.
31 GOST 12.4.238-2015 Occupational safety standards system. Respiratory protective devices. Closed-circuit breathing apparatus compressed air type. Technical requirements. Test methods. Marking. Sampling rules.
32 GOST 12.4.103-2020 Occupational safety standards system. Special protective clothes, personal means of hands and feet protection. Classification.
33 GOST 12.4.253-2013 (EN 166:2001) Occupational safety standards system. Personal eyes and face protection means. General technical requirements.
34 Federal Law No. 116-FZ dated 21.07.1997 (edition as of 14.11.2023) “On industrial safety of hazardous production facilities”
35 Federal Law No. 123-FZ dated 22.07.2008 “Technical regulations for fire safety requirements”.
36 GOST R 12.4.301-2018 Occupational safety standards system. Dermatological personal protective products. General specifications.
37 Order of the Ministry of Labour and Social Protection of the Russian Federation, the Ministry of Health of the Russian Federation No. 988n/1420n dated 31.12.2020 "On approval of the list of harmful and (or) hazardous production factors and work, in the performance of which mandatory preliminary medical examinations are carried out upon admission to work and periodic medical examinations".
38 SanPiN 2.1.3684-21 Sanitary and epidemiological requirements for the maintenance of the territories of urban and rural settlements, for water bodies, drinking water and drinking water supply, atmospheric air, soils, residential premises, operation of industrial and public premises, organization and implementation of sanitary and anti-epidemic (preventive) measures.
39 Order of the Ministry of Agriculture of the Russian Federation No.552 dated 13.12.2016 Concerning Approval of Water Quality Standards for Commercial Fishery Water Bodies, including Standards for Maximum Permissible Concentrations of Harmful Substances in Waters of Commercial Fishery Water Bodies.
40 GOST 9097-82 Ammonium sulfate. Specifications
41 UN Recommendations on the Transport of Dangerous Goods. Orange book. Typical rules on the Transport of Dangerous Goods. Twenty-second revised edition. United Nations, New York and Geneva, 2023.
42 GOST 19433-88 Dangerous goods. Classification and marking.

43 GOST 14192-96 Marking of cargoes.
44 GOST 12.4.252-2013 Occupational safety standards system. Personal protective means of hands. Gloves. General technical requirements. Test methods
45 GOST 12.4.280-2014 Occupational safety standards system. Special clothing for mechanical action protection and general industrial contamination protection. General technical requirements
46 SP 2.2.3670-20 Sanitary and epidemiological requirements for working conditions.
47 The Montreal Protocol on Substances that Deplete the Ozone Layer was adopted on September 16, 1987, as amended by the Second Meeting of the Parties (London, 27-29 June, 1990) and the Fourth Meeting of the Parties (Copenhagen, 23-25 November, 1992), and further adjusted By the Meeting of the Parties (Vienna, 5-7 December, 1995) and with additional adjustments made by the Ninth Meeting of the Parties (Montreal, 15-17 September, 1997).
48 Stockholm Convention on Persistent Organic Pollutants. Ratified by the Federal Law No. 164-FZ dated 27.06.2011..