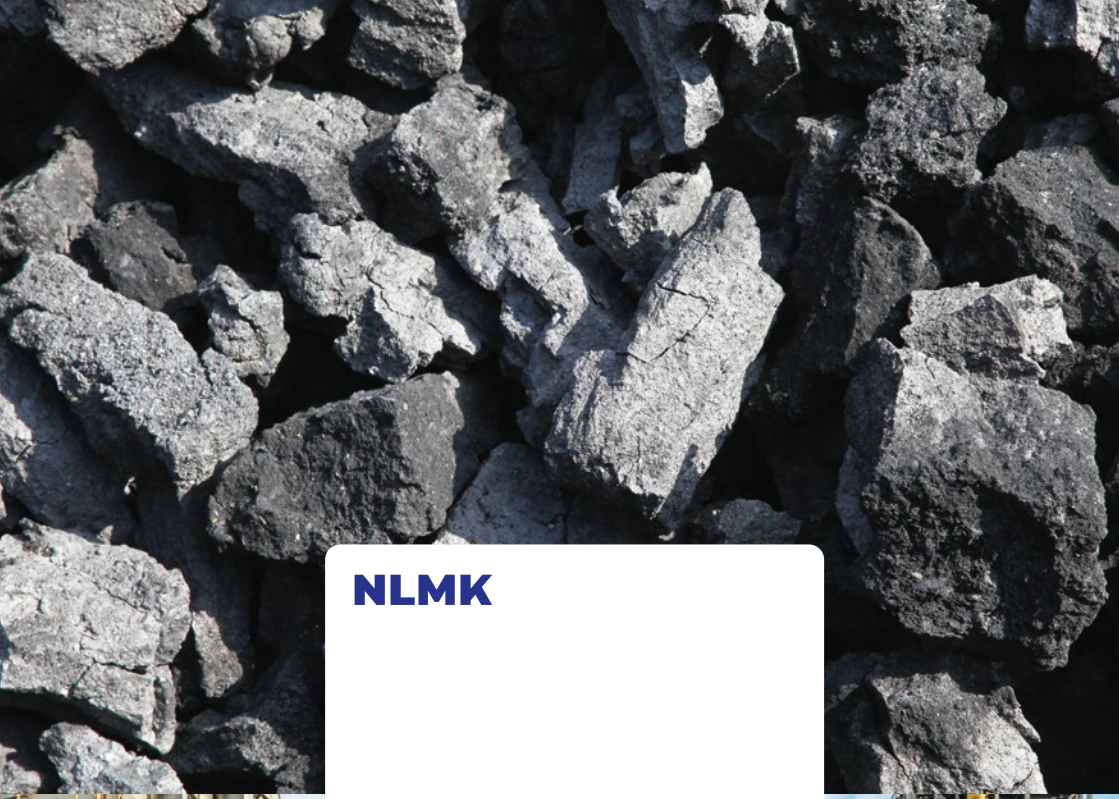

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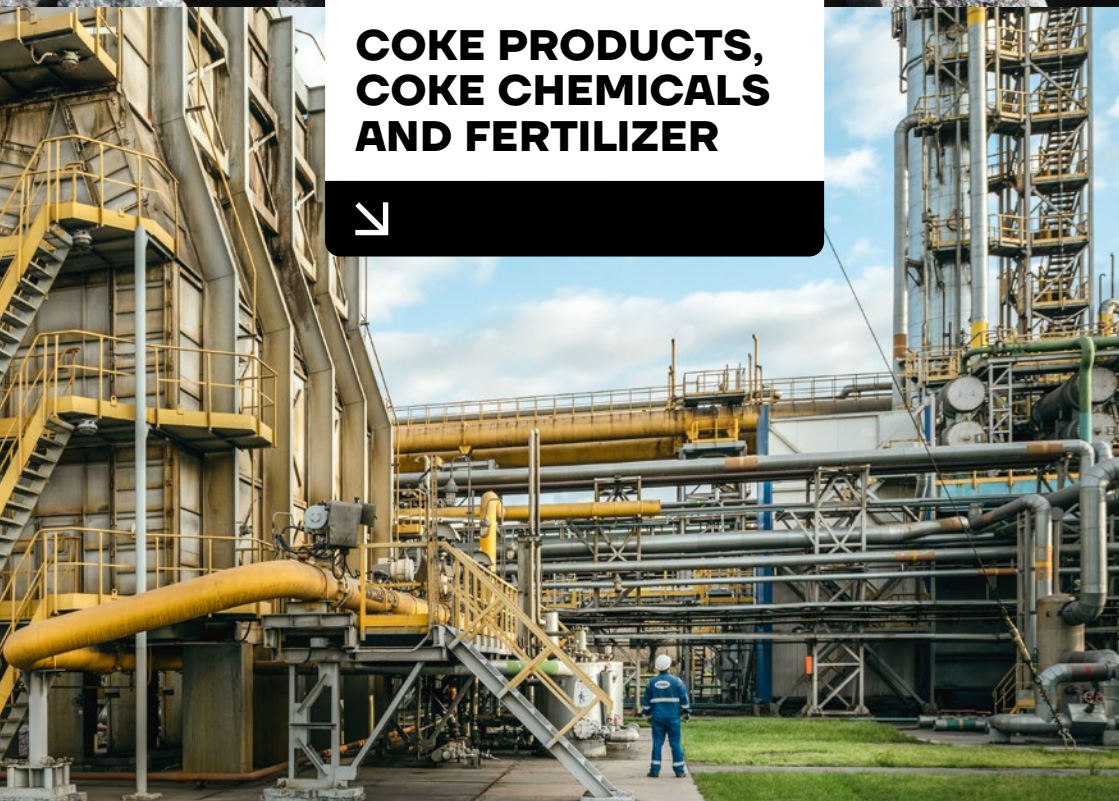
COKE PRODUCTS, COKE CHEMICALS AND FERTILIZER



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COKE PRODUCTS

SECTION 2

APPLICATIONS OF COKE PRODUCTS

Steelmaking

Group	Process that uses the product	End product	End-product application examples	Coke product type	Lump size, mm	GOST	Specification of GOST parameters in TU
Ferroalloys	Carbothermal ferroalloy production	Ferrosilicon	Production of electrical steel	Coke nut	10–25	GOST 8935-2020	TU 0762-214-00190437[3]
Ferrous industry	Carburization of steel melt	Steel	Commercial slabs	Coke dust	–	n/a	TU 0763-199-00190437
	Reduction of iron in blast furnaces	Pig iron	Steelmaking	BF coke	25–40	n/a	TU 19.10.10-159-00190437[1]
Non-ferrous metallurgy	Reduction melting of calcined concentrate	Zinc	Anti-corrosion coating production	BF coke	25–40	n/a	TU 19.10.10-159-00190437[1]
	Reduction melting of calcined concentrate	Nickel	Stainless steel production	BF coke	25–40	n/a	TU 19.10.10-159-00190437[1]
	Pyro-metallurgical processing of calcined concentrate	Copper	Cable product manufacturing	BF coke	25–40	n/a	TU 19.10.10-159-00190437[1]
Carbon-containing materials	Packing material for graphitization furnaces	Graphite electrodes	Steelmaking	Coke breeze	0–10	n/a	TU 0763-199-00190437
	Core material for structural graphites	Graphite electrodes	Steelmaking	Coke nut	10–25	GOST 8935-2020	TU 0762-214-00190437[3]

Construction

Group	Process that uses the product	End product	End-product application examples	Coke product type	Lump size, mm	GOST	Specification of GOST parameters in TU
Thermal insulation materials	Material smelting in cupolas	Thermal insulation materials	Thermal insulation production	Foundry coke	60–80	n/a	TU 19.10.10-288-00190437[2]
Refractory materials	Refractory mortar preparation	Liquid refractory mortar	Production of silica mortars	Coke dust	–	n/a	TU 0763-199-00190437

Industrial

Group	Process that uses the product	End product	End-product application examples	Coke product type	Lump size, mm	GOST	Specification of GOST parameters in TU
Casting for machines and mechanisms	Casting of wear-resisting components	Cast elements and components	Production of high-strength mechanisms and units	Foundry coke	40–60	n/a	TU 19.10.10-288-00190437[2]
Phosphorous materials	Reduction of phosphate rock	Phosphate rock	Production of mineral fertilizers	Coke nut	10–25	GOST 8935-2020	TU 0762-214-00190437[3]
Anti-corrosion equipment	Packing material within carbonaceous backfill	Anode beds	Manufacture of trunk pipelines	Coke breeze	0–10	n/a	TU 0763-199-00190437

[1] There is no GOST standard that regulates BF coke. This item is specified by TU 19.10.10-159-00190437-2017

[2] Foundry coke is specified by TU 19.10.10-288-00190437-2022 due to higher parameters for ash content and mass fraction of undersized lumps, and to lower parameters for mass fraction of total moisture and M40 mechanical strength M40 relative to GOST

[3] Coke nut is specified by TU 0762-214-00190437-2006 due to higher parameters for ash content and mass fraction of <10 mm lumps relative to GOST

SECTION 2.1

Ferrosilicon

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke nut	10–25	GOST 8935-2020	–	10	15	13	20
		TU 0762-214-00190437*	–	10	15	15	20

Recommended coke product

* Coke nut is specified by TU 0762- 214-00190437-2006 due to higher parameters for ash content and mass fraction of <10 mm lumps relative to GOST

SECTION 2.2

Steel

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke dust	–	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	–	1	–	23	1

Recommended coke product

SECTION 2.3

Pig iron

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke dust	–	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	–	1	–	23	1
Coke breeze	0–10	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	4.2	8	–	20	24
BF Coke	25–40	GOST n/a	–	–	–	–	–
		TU 19.10.10-159-00190437*	0.8	–	8	13.6	14

Recommended coke product

* There is no GOST standard that regulates BF coke. This item is specified by TU 19.10.10-159-00190437

SECTION 2.4

Zinc

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke breeze	0–10	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	4.2	8	–	20	24
BF Coke	25–40	GOST n/a	–	–	–	–	–
		TU 19.10.10-159-00190437*	0.8	–	8	13.6	14

Recommended coke product

* There is no GOST standard that regulates BF coke. This item is specified by TU 19.10.10-159-00190437

SECTION 2.5

Nickel

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke breeze	0–10	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	4.2	8	–	20	24
BF Coke	25–40	GOST n/a	–	–	–	–	–
		TU 19.10.10-159-00190437*	0.8	–	8	13.6	14

Recommended coke product

* There is no GOST standard that regulates BF coke. This item is specified by TU 19.10.10-159-00190437

SECTION 2.6

Copper

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke breeze	0–10	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	4.2	8	–	20	24
BF Coke	25–40	GOST n/a	–	–	–	–	–
		TU 19.10.10-159-00190437*	0.8	–	8	13.6	14

Recommended coke product

* There is no GOST standard that regulates BF coke. This item is specified by TU 19.10.10-159-00190437

SECTION 2.7

Graphite electrodes

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke breeze	0–10	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	4.2	8	–	20	24
Coke nut	10–25	GOST 8935-2020	–	10	15	13	20
		TU 0762-214-00190437*	–	10	15	15	20

Recommended coke product

* Coke nut is specified by TU 0762- 214-00190437-2006 due to higher parameters for ash content and mass fraction of <10 mm lumps relative to GOST

SECTION 2.8

Thermal insulation materials

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Foundry coke	60–80	GOST n/a	0.60	–	20	13	5
		TU 19.10.10-288-00190437	0.85	–	20	13	5

Recommended coke product

SECTION 2.9

Refractory mortar

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke dust	–	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	–	1	–	23	1

Recommended coke product

SECTION 2.10

Pipe component casting

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Foundry coke	40–60	GOST 3340-88	0.60	–	20	13	5
		TU 19.10.10-288-00190437	0.85	–	20	13	5

Recommended coke product

SECTION 2.11

Phosphate rock

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke nut	10–25	GOST 8935-2020	–	10	15	13	20
		TU 0762-214-00190437*	–	10	15	15	20

Recommended coke product

* Coke nut is specified by TU 0762- 214-00190437-2006 due to higher parameters for ash content and mass fraction of <10 mm lumps relative to GOST

SECTION 2.12

Anode beds

TYPES OF COKE PRODUCTS IN THE CATEGORY

Coke product type	Lump size, mm	Value	Total sulphur content, mass %	Lumps above max threshold, mass %	Lumps below min threshold, mass %	Ash content, %	Total moisture, mass %
Coke breeze	0–10	GOST n/a	–	–	–	–	–
		TU 0763-199-00190437	4.2	8	–	20	24

Recommended coke product

Product technical properties

	Foundry coke			Metallurgical coke		Coke nut	Coke breeze	Coke dust
Standard	TU 19.10.10-288-00190437			TU 19.10.10-159-00190437		TU 0762-214-00190437	TU 0763-199-00190437	TU 0763-199-00190437
Lump size, mm	≥40	≥60	≥80	≥25	25–40	10–25	0–10	0–6
Ash content (Ad), %	≤13.0	≤13.0	≤13.0	≤13.6	≤13.6	≤15.0	≤20.0	≤23.0
Total moisture mass fraction (Wtr), %	≤5.0	≤5.0	≤3.0	≤6.0	≤14.0	≤20.0	≤24.0	≤1.0
Total sulphur mass fraction (Sdt), %	≤0.85	≤0.85	≤0.85	≤0.8	≤0.8	–	–	–
Phosphorous mass fraction (Pd), %	–	–	≤0.06	–	–	–	–	–
Mechanical strength (M40), %	≥72	≥73	≥75	–	–	–	–	–
Mechanical strength (M25), %	–	–	–	≥82	–	–	–	–
Mass fraction of >25 mm lumps, %	–	–	–	–	–	≤10	–	≤1
Mass fraction of <10 mm lumps, %	–	–	–	≤4	≤8	≤15	–	–
Mass fraction of >6 mm lumps, %	–	–	–	–	–	–	≤8	–
Lumps below min threshold, mass %	≤6	≤20	≤27	–	–	–	–	–
Volatile-matter yield (Vdaf), %	–	–	–	≤1.2	≤1.5	–	–	–

COKE CHEMICALS AND FERTILIZER

SECTION 4

APPLICATIONS OF COKE CHEMICALS

Industry

Group	Process that uses the product	End product	End product application	Type of NLMK product	Grade	GOST	Specifications of GOST parameters in TU
Chemical industry	Production of cumene and phenol	Phenol-formaldehyde resin	Escalator steps	Coal benzene	BS-1	n/a	TU 20.14.12-167-00190437-2021[1]
	Monomer polarization for plastics	Polyamide, polyacrylic resin, polycarbonate	Polycarbonate lunchboxes	Coal benzene	BS-1	n/a	TU 20.14.12-167-00190437-2021[1]
	Fraction refinement and separation	Pentaphthalic enamel	Coats for metal fabrications	Coal benzene	BS-1	n/a	TU 20.14.12-167-00190437-2021[1]
	Production of ethylbenzene	Synthetic rubber	Tires	Coal benzene	BS-1	n/a	TU 20.14.12-167-00190437-2021[1]
	Production of diethyl benzene	Resin exchanger	Water treatment reagents	Coal benzene	BS-1	n/a	TU 20.14.12-167-00190437-2021[1]
	Production of surfactant components	Surfactants	Synthetic detergents	Coal benzene	BS-1	n/a	TU 20.14.12-167-00190437-2021[1]
	Coal tar distillation	Pitch	Graphite electrodes	Coal tar	A	n/a	TU 19.10.20-269-00190437-2020[2]
	Thermal decomposition of hydrocarbons	Carbon black	Packing material for synthetic rubber	Coal tar	A	n/a	TU 19.10.20-269-00190437-2020[2]
	Production of super plasticizing agents	Super plasticizing agents for concrete	Commercial concrete	Naphthalene fraction		n/a	TU 1104-245733-395-173-2001[3]
	Production of pigments and alkyd resins	Phthalic anhydride	Paints and varnishes	Naphthalene fraction		n/a	TU 1104-245733-395-173-2001[3]
	Production of treatment compounds	Wood preservative	Wood treatment	Medium oil for timber oiling	V1	GOST 2770-74	TU 20.14.73-005-00188110-2021[4]
	Coal benzene recovery	Coal benzene	Polyamide, polyacrylic resin, polycarbonate	Medium oil (absorption)	V	GOST 30142-91	TU 20.14.73-005-00188110-2021[5]
	Production of fire-retardants	Fire-retardant	Fire extinguisher mixture	Crystalline ammonium sulphate		GOST 9097-82	TU 14-106-399-91[6] TS 113-03-625-90[6]

[1] There is no GOST standard that regulates coal benzene. TU has been developed to enable sales to third parties

[2] There is no GOST standard that regulates coal tar. TU has been developed to enable sales to third parties

[3] There is no GOST standard that regulates the naphthalene fraction. TU has been developed to enable sales to third parties

[4] Specified by TU 20.14.73-005-00188110-2021 due to lack of norms for grade B1 medium oil composition (timber treatment), unlike GOST

[5] Specified by TU 20.14.73-005-00188110-2021 due to additional parameters for grade B medium oil that are not regulated by GOST: density at 20°C, volume content of water, naphthalene mass fraction

[6] Specified by TU 14-106-399-91 and TU 113-03-625-90 due to variation in water and sulphur mass fraction

SECTION 4

APPLICATIONS OF COKE CHEMICALS

Agriculture

Group	Process that uses the product	End product	End product application	Type of NLMK product	Grade	GOST	Specifications of GOST parameters in TU
Crop production	Admixture into soils during spring and autumn	Mineral fertilizers	Increasing grain yields	Granulated ammonium sulphate		GOST 9097-82	TU 20.15.32-001-41598162-2022[7]

Steelmaking

Group	Process that uses the product	End product	End product application	Type of NLMK product	Grade	GOST	Specifications of GOST parameters in TU
Ferrous industry	Preparation and mixing of the ground mass	Graphite electrodes	Electric-arc furnace	Granulated coal pitch	B	GOST 10200-2017	STO 00188110-003-2018[8]
Non-ferrous metallurgy	Production of anode paste	Anodes	Electrolytic reduction of aluminium oxide	Granulated coal pitch	B	GOST 10200-2017	STO 00188110-003-2018[7]

[7] Specified by TU 20.15.32-001-41598162-2022 due to additional parameters that are not regulated by GOST: sulphur mass fraction on dry basis, particle size distribution, static strength

[8] Specified by STO due to variation in certain quality parameters of coal pitch relative to GOST based on customer requests (contract specifications)

SECTION 4.1

Phenol-formaldehyde resin

PRODUCTS

Product	Grade	Manufacturer	Value	Distillate content to 180°C, mass %	Temperature at the end of 97 % sample stripping, °C	Density at 20°C, kg/m³
Benzene	BS	NLMK	GOST n/a	–	–	–
			TU 1104-241419-395-167	≥91	–	880–890
Benzene	BS-1	Altai Koks	GOST n/a	–	–	–
			TU 20.14.12-167-00190437	–	≤140	870–880

Recommended product

SECTION 4.2

Polyamide, polyacrylic resin, polycarbonate

PRODUCTS

Product	Grade	Manufacturer	Value	Distillate content to 180°C, mass %	Temperature at the end of 97 % sample stripping, °C	Density at 20°C, kg/m³
Benzene	BS	NLMK	GOST n/a	–	–	–
			TU 1104-241419-395-167	≥91	–	880–890
Benzene	BS-1	Altai Koks	GOST n/a	–	–	–
			TU 20.14.12-167-00190437	–	≤140	870–880

Recommended product

SECTION 4.3

Pentaphthalic enamel

PRODUCTS

Product	Grade	Manufacturer	Value	Distillate content to 180°C, mass %	Temperature at the end of 97 % sample stripping, °C	Density at 20°C, kg/m³
Benzene	BS	NLMK	GOST n/a	–	–	–
			TU 1104-241419-395-167	≥91	–	880–890
Benzene	BS-1	Altai Koks	GOST n/a	–	–	–
			TU 20.14.12-167-00190437	–	≤140	870–880

Recommended product

SECTION 4.4

Synthetic rubber

PRODUCTS

Product	Grade	Manufacturer	Value	Distillate content to 180°C, mass %	Temperature at the end of 97 % sample stripping, °C	Density at 20°C, kg/m³
Benzene	BS	NLMK	GOST n/a	–	–	–
			TU 1104-241419-395-167	≥91	–	880–890
Benzene	BS-1	Altai Koks	GOST n/a	–	–	–
			TU 20.14.12-167-00190437	–	≤140	870–880

Recommended product

SECTION 4.5

Resin exchanger

PRODUCTS

Product	Grade	Manufacturer	Value	Distillate content to 180°C, mass %	Temperature at the end of 97 % sample stripping, °C	Density at 20°C, kg/m³
Benzene	BS	NLMK	GOST n/a	–	–	–
			TU 1104-241419-395-167	≥91	–	880–890
Benzene	BS-1	Altai Koks	GOST n/a	–	–	–
			TU 20.14.12-167-00190437	–	≤140	870–880

Recommended product

SECTION 4.6

Surfactants

PRODUCTS

Product	Grade	Manufacturer	Value	Distillate content to 180°C, mass %	Temperature at the end of 97 % sample stripping, °C	Density at 20°C, kg/m³
Benzene	BS	NLMK	GOST n/a	–	–	–
			TU 1104-241419-395-167	≥91	–	880–890
Benzene	BS-1	Altai Koks	GOST n/a	–	–	–
			TU 20.14.12-167-00190437	–	≤140	870–880

Recommended product

SECTION 4.7

Pitch

PRODUCTS

Product	Grade	Value	Quality tier	Density at 20°C, kg/m³	Water content, mass %	Toluene-insoluble substance content*, mass %	Quinoline-insoluble substance content*, mass %	Ash content, mass %
Coal tar	A	GOST n/a	–	–	–	–	–	–
		TU 19.10.20-269-00190437	1st	≤1200	≤3.0	≤8	≤3	≤0.08
Coal tar	A	GOST n/a	–	–	–	–	–	–
		TU 19.10.20-269-00190437	2nd	≤1220	≤4.0	≤11	≤4	≤0.10

Recommended product

* α fraction

SECTION 4.8

Carbon black

PRODUCTS

Product	Grade	Value	Quality tier	Density at 20°C, kg/m³	Water content, mass %	Toluene-insoluble substance content*, mass %	Quinoline-insoluble substance content*, mass %	Ash content, mass %
Coal tar	A	GOST n/a	–	–	–	–	–	–
		TU 19.10.20-269-00190437	1st	≤1200	≤3.0	≤8	≤3	≤0.08
Coal tar	A	GOST n/a	–	–	–	–	–	–
		TU 19.10.20-269-00190437	2nd	≤1220	≤4.0	≤11	≤4	≤0.10

Recommended product

Medium coal tar oil (anthracene fraction)	Value	
	GOST 11126-2019	TU 20.14.73-005-00188110*
Grade	D	D
Density at 20°C, g/cm³	≥1100	≥1100
Water content, volume %	≤1.0	≤1.0
Mechanical impurities, mass %	≤0.02	≤0.02
Sedimentation at 70°C	none	none
Sodium ion content, mass %	≤0.005	≤0.005
Potassium ion content, mass %	0.0005	0.0005
Coking capacity, %	≤1.5	≤1.5

Medium coal tar oil (combustible mixture)	Value	
	GOST n/a	TU 20.14.73-005-00188110*
Grade	B	B
Density at 20°C, kg/m³	–	1045
Relative viscosity at 80°C (RV80°C), in relative degrees	–	≤2.5
Flashpoint in open crucible, °C	–	≥65
Water content, volume %	–	≤2.0
Mechanical impurities, mass %	–	≤1

* Some quality parameters may differ from GOST based on consumer requests (contract specifications)

SECTION 4.9

Superplasticizing agents for concrete

PRODUCTS

Product	Value	Naphthalene content, mass %	Water content, mass %
Naphthalene fraction	GOST n/a	–	–
	TU 1104-245733-395-173	≥84	≤0.5

SECTION 4.10

Phthalic anhydride

PRODUCTS

Product	Value	Naphthalene content, mass %	Water content, mass %
Naphthalene fraction	GOST n/a	–	–
	TU 1104-245733-395-173	≥84	≤0.5

SECTION 4.11

Wood preservative

PRODUCTS

Medium coal tar oil for timber oiling	Value	
	GOST 2770-74	TU 20.14.73-005-00188110*
Grade	V1	V1
Density at 20°C, kg/m³	≥1090–1130	≥1090–1130
Toluene-insoluble substance content, mass %	≤0.3	≤0.3
Water content, volume %	≤1.5	≤1.5
Sediment in oil heated to 35°C	none	none
Viscosity at 80°C, in relative degrees	≤1.3	≤1.3
Flashpoint, °C	≥105	≥105
Fractional composition, volume fraction, %		
up to 210°C	≤3	–
up to 275°C	10–35	–
up to 315°C	30–50	–

Recommended product

* The GOST regulates the fractional composition that is not specified by NLMK's TU

SECTION 4.12

Coal benzene

PRODUCTS

Medium coal tar oil (absorption)	Value	
	GOST 30142-91	TU 20.14.73-005-00188110*
Grade	V	V
Density at 20°C, kg/m³	–	≥1055–1065
Water content, volume %	–	≤1.2
Phenol content, mass %	≤4.0	≤4.0
Naphthalene content, mass %	–	≤18.0

Recommended product

* The GOST regulates only the phenol mass fraction. TU additionally specifies the following parameters: density at 20°C, volume fraction of water, naphthalene mass fraction

SECTION 4.13

Fire-retardants

PRODUCTS

Crystalline ammonium sulphate	Value	
	GOST 9097-82	TU 14-106-399-91* TS 113-03-625-90*
Nitrogen mass fraction on dry basis, %	≥21	≥21
Sulphur mass fraction on dry basis, %	–	≥24
Water content, mass %	≤0.2	≤0.3
Sulphuric acid content, mass%	≤0.03	≤0.05
Friability, %	100	100
Content of >0.5 mm fraction, mass %	≥80	≥80
Content of <6 mm fraction, mass %	100	100
Share of insoluble impurities, %	≤0.02	≤0.02

Recommended product

* Specified by TS due to variation in water and sulphur mass fraction

SECTION 4.14

Mineral fertilizers

PRODUCTS

Granulated ammonium sulphate	Value	
	GOST 9097-82	TU 20.15.32-001-41598162*
Nitrogen mass fraction on dry basis, %	≥21	≥21
Sulphur mass fraction on dry basis, %	–	≥24
Water content, mass %	≤0.2	≤0.2
Sulphuric acid content, mass%	≤0.03	≤0.03
Friability, %	100	100
Content of >0.5 mm fraction, mass %	≥80	≥80
Content of <6 mm fraction, mass %	100	100
Particle size distribution, %		
≤1 mm	–	≤2
2–5 mm	–	96
≥6 mm	–	100
Static strength, MPa	–	3

Crystalline ammonium sulphate	Value	
	GOST 9097-82	TU 14-106-399-91* TS 113-03-625-90*
Nitrogen mass fraction on dry basis, %	≥21	≥21
Sulphur mass fraction on dry basis, %	–	≥24
Water content, mass %	≤0.2	≤0.3
Sulphuric acid content, mass%	≤0.03	≤0.05
Friability, %	100	100
Content of >0.5 mm fraction, mass %	≥80	≥80
Content of <6 mm fraction, mass %	100	100
Share of insoluble impurities, %	≤0.02	≤0.02

Recommended product

* TU additionally specifies the following parameters: sulphur mass fraction on dry basis, particle size distribution, static strength
** Specified by TU due to variation in water and sulphur mass fraction

SECTION 4.15

Graphite electrodes

PRODUCTS

Product	Grade	Value	Softening point, °C	Toluene insoluble substance content*, mass %	Quinoline-insoluble substance content*, mass %	Volatile-matter yield, %	Ash content, %	Coking capacity, %	Water content, mass %	Dynamic viscosity, sP at:		
										150 °C	155 °C	185 °C
Liquid coal-tar pitch	B	GOST 10200-2017	67–74	24–31	≤9	58–63	≤0.3	≥48.0	–	350–950	–	–
		typical	67–74	24–31	≤9	58–63	≤0.3	≥48.0	–	350–950	–	–
Liquid coal-tar pitch	B1	GOST 10200-2017	72–76	26–31	≤12	≤59	≤0.3	≥50.0	–	–	400–1500	100–300
		typical	72–80	24–31	≤10	≤61	≤0.3	≥50.0	–	–	400–1500	100–300
Liquid coal-tar pitch	V	GOST 10200-2017	85–92	≥31	≤14	53–57	≤0.3	≥56.0	–	–	1500–4500	300–950
		typical	85–92	≥31	≤12	53–57	≤0.3	≥55.0	–	–	1500–4500	300–600
Granulated coal-tar pitch	B	GOST 10200-2017	67–74	24–31	≤9	58–63	≤0.3	≥48.0	≤4.0	350–950	–	–
		STO 00188110-003-2018**	72–95	–	–	53–62	≤0.3	–	≤1.0	–	–	–
Granulated coal-tar pitch	B1	GOST 10200-2017	72–76	26–31	≤12	≤59	≤0.3	≥50.0	≤4.0	–	400–1500	100–300
		STO 00188110-003-2018**	72–95	–	–	53–62	≤0.3	–	≤1.0	–	–	–
Granulated coal-tar pitch	V	GOST 10200-2017	85–92	≥31	≤14	53–57	≤0.3	≥56.0	≤4.0	–	1500–4500	300–950
		STO 00188110-003-2018**	72–95	–	–	53–62	≤0.3	–	≤1.0	–	–	–

Recommended product

* α fraction
** Some quality parameters may differ from GOST 10200 based on consumer requests (contract specifications)

SECTION 4.16

Anodes

PRODUCTS

Product	Grade	Value	Softening point, °C	Toluene insoluble substance content*, mass %	Quinoline-insoluble substance content*, mass %	Volatile-matter yield, %	Ash content, %	Coking capacity, %	Water content, mass %	Dynamic viscosity, sP at:		
										150 °C	155 °C	185 °C
Liquid coal-tar pitch	B	GOST 10200-2017	67–74	24–31	≤9	58–63	≤0.3	≥48.0	–	350–950	–	–
		typical	67–74	24–31	≤9	58–63	≤0.3	≥48.0	–	350–950	–	–
Liquid coal-tar pitch	B1	GOST 10200-2017	72–76	26–31	≤12	≤59	≤0.3	≥50.0	–	–	400–1500	100–300
		typical	72–80	24–31	≤10	≤61	≤0.3	≥50.0	–	–	400–1500	100–300
Liquid coal-tar pitch	V	GOST 10200-2017	85–92	≥31	≤14	53–57	≤0.3	≥56.0	–	–	1500–4500	300–950
		typical	85–92	≥31	≤12	53–57	≤0.3	≥55.0	–	–	1500–4500	300–600
Granulated coal-tar pitch	B	GOST 10200-2017	67–74	24–31	≤9	58–63	≤0.3	≥48.0	≤4.0	350–950	–	–
		STO 00188110-003-2018**	72–95	–	–	53–62	≤0.3	–	≤1.0	–	–	–
Granulated coal-tar pitch	B1	GOST 10200-2017	72–76	26–31	≤12	≤59	≤0.3	≥50.0	≤4.0	–	400–1500	100–300
		STO 00188110-003-2018**	72–95	–	–	53–62	≤0.3	–	≤1.0	–	–	–
Granulated coal-tar pitch	V	GOST 10200-2017	85–92	≥31	≤14	53–57	≤0.3	≥56.0	≤4.0	–	1500–4500	300–950
		STO 00188110-003-2018**	72–95	–	–	53–62	≤0.3	–	≤1.0	–	–	–

Recommended product

* α fraction
** Some quality parameters may differ from GOST 10200 based on consumer requests (contract specifications)

SECTION 5

Product technical properties

CRUDE BENZENE

Standard	TU 1104-241419-395-167-2001	TU 20.14.12-167-00190437-2021
Grade	BS	BS-1
Manufacturer	NLMK Lipetsk	Altai Koks
Distillate content to 150°C, mass %	–	–
Distillate content to 180°C, mass %	≥91	–
Distillate content to 200°C, mass %	–	–
Benzene content to 180°C, mass %	–	–
Temperature at the end of 97 % sample stripping, °C	–	≤140
Density at 20°C, kg/m³	880–890	870–880

COAL TAR

Standard	TU 19.10.20-269-00190437-2020	
Grade	A	A
Quality tier	1st	2nd
Density at 20°C, kg/m³	≤1200	≤1220
Water content, mass %	≤3.0	≤4.0
Toluene-insoluble substance content*, mass %	≤8	≤11
Quinoline-insoluble substance content*, mass %	≤3	≤4
Ash content, mass %	≤0.08	≤0.10

NAPHTALENE FRACTION

Standard	TU 1104-245733-395-173-2001
Naphthalene content, mass %	≥84
Water content, mass %	≤0.5

MEDIUM OIL FOR WOOD TREATMENT

Standard	TU 20.14.73-005-00188110-2021
Grade	V1
Water content, volume %	≤1.5
Toluene-insoluble substance content, mass %	≤0.3
Viscosity at 80°C, in relative degrees	≤1.3
Sediment in oil heated to 35°C	none
Flashpoint, °C	≥105
Density at 20°C, kg/m³	≥1090–1130

MEDIUM OIL (ABSORPTION)

Standard	TU 20.14.73-005-00188110-2021
Grade	V
Water content, volume %	≤1.2
Phenol content, mass %	≤4.0
Naphthalene content, mass %	≤18.0
Density at 20°C, kg/m³	≥1055–1065

MEDIUM OIL (ANTHRACENE FRACTION)

Standard	TU 20.14.73-005-00188110-2021
Grade	D
Water content, volume %	≤1.0
Mechanical impurities, mass %	≤0.02
Sedimentation at 70°C	none
Sodium ion content, mass %	≤0.005
Potassium ion content, mass %	0.0005
Coking capacity, %	≤1.5
Density at 20°C, g/cm³	≥1100

MEDIUM OIL (COMBUSTIBLE MIXTURE)

Standard	TU 20.14.73-005-00188110-2021
Grade	B
Water content, volume %	≤2.0
Mechanical impurities, mass %	≤1
Relative viscosity at 80°C (RV80°C), in relative degrees	≤2.5
Flash point in the open crucible, °C	≥65
Density at 20°C, kg/m³	1045

LIQUID COAL-TAR PITCH

Standard	GOST 10200-2017		
Grade	B	B1	V
Softening point, °C	67–74	72–76	85–90
Toluene-insoluble substance content*, mass %	24–31	26–31	≥31
Quinoline-insoluble substance content*, mass %	≤9	≤12	≤14
Volatile-matter yield, %	58–63	≤59	53–57
Ash content, %	≤0.3	≤0.3	≤0.3
Coking capacity, %	≥48	≥50	≥56
Dynamic viscosity, sP at:			
150 °C	350–950	–	–
180 °C	–	400–1500	1500–4500
185 °C	–	100–300	300–950

* α-фракция

GRANULATED COAL-TAR PITCH

Standard	STO 00188110-003-2018
Grade	V
Softening point, °C	72–95
Volatile-matter yield, %	53–62
Ash content, %	≤0.3
Water content, mass %	≤1.0

CRISTALLINE AMMONIUM SULPHATE

Standard	TU 14-106-399-91	TU 113-03-625-90
Manufacturer	NLMK Lipetsk	Altai Koks
Nitrogen mass fraction on dry basis, %	≥21	≥21
Sulphur mass fraction on dry basis, %	≥24	≥24
Water content, mass %	≤0.3	≤0.3
Sulphuric acid content, mass%	≤0.05	≤0.05
Friability, %	100	100
Content of >0.5 mm fraction, mass %	≥80	≥80
Content of <6 mm fraction, mass %	100	100
Share of insoluble impurities, %	≤0.02	≤0.02

GRANULATED AMMONIUM SULPHATE

Standard	TU 20.15.32-001-41598162-2022
Nitrogen mass fraction on dry basis, %	≥21
Sulphur mass fraction on dry basis, %	≥24
Water content, mass %	≤0.2
Sulphuric acid content, mass%	≤0.03
Friability, %	100
Content of >0.5 mm fraction, mass %	≥80
Content of <6 mm fraction, mass %	100
Particle size distribution, %	
≤1 mm	≤2
2–5 mm	96
≥6 mm	100
Static strength, MPa	3

SECTION 6

Products made by NLMK

Product	Manufacturer	Grade	Value	Distillate content to 150°C, mass %	Distillate content to 180°C, mass %	Distillate content to 200°C, mass %	Benzene content to 180°C, mass %	Temperature at the end of 97% sample stripping, °C	Density at 20°C, kg/m³
Crude benzene	NLMK Lipetsk	BS	GOST n/a	–	–	–	–	–	–
			TU 1104-241419-395-167-2001	–	≥91	–	–	–	880–890
			typical	–	94	–	–	–	881
	Altai Koks	BS-1	GOST n/a	–	–	–	–	–	–
			TU 20.14.12-167-00190437-2021	–	–	–	–	≤140	870–880
			typical	–	–	–	–	135	874

Product	Grade	Quality tier	Value	Density at 20°C, kg/m³	Water content, mass %	Toluene-insoluble substance content*, mass %	Quinoline-insoluble substance content*, mass %	Ash content, mass %
Coal tar	A	1st	GOST n/a	–	–	–	–	–
			TU 19.10.20-269-00190437-2020	≤1200	≤3.0	≤8	≤3	≤0.08
			typical	1183	2.0	7	3	0.011

Product	Value	Naphthalene content, mass %	Water content, mass %	Phenol content, mass %
Naphthalene fraction	TU 1104-245733-395-173-2001	≥84	≤0.5	–
	typical	84	0.2	3.5

Product	Grade	Value	Water content, volume %	Mechanical impurities, mass %	Sediment tion at 70°C	Sodium ion content, mass %	Potassium ion content, mass %	Coking capacity, %	Density at 20°C, g/cm³
Medium oil (anthracene fraction)	D	GOST 11126-2019	≤1.0	≤0.02	none	≤0.005	0.0005	≤1.5	≥1100
		TU 20.14.73-005-00188110-2021	≤1.0	≤0.02	none	≤0.005	0.0005	≤1.5	≥1100
		typical	0.8	none	none	0.0004	0.00004	1.4	1131

Product	Grade	Value	Water content, volume %	Mechanical impurities, mass %	Relative viscosity at 80°C (RV80°C), in relative degrees	Flashpoint in open crucible, °C	Density at 20°C, kg/m³
Medium oil (combustible mixture)	B	GOST n/a	–	–	–	–	–
		TU 20.14.73-005-00188110-2021	≤2.0	≤1	≤2.5	≥65	1045
		typical	0.6	none	1.4	77	1058

Product	Grade	Value	Water content, volume %	Toluene-insoluble substance content*, mass %	Viscosity at 80°C, in relative degrees	Sediment in oil heated to 35°C	Flashpoint, °C	Density at 20°C, kg/m³	Fractional composition, volume fraction, %		
										up to 275°C	up to 315°C
Medium oil for wood treatment	V1	GOST 2770-74	≤1.5	≤0.3	≤1.3	none	≥105	≥1090–1130	≤3	10–35	30–50
		TU 20.14.73-005-00188110-2021	≤1.5	≤0.3	≤1.3	none	≥105	≥1090–1130	–	–	–
		typical	0.5	0.2	1.2	none	108	1097	–	–	–

Product	Grade	Value	Water content, volume %	Phenol content, mass %	Naphthalene content, mass %	Density at 20°C, kg/m³
Medium oil (absorption)	V	GOST 30142-91	–	≤4.0	–	–
		TU 20.14.73-005-00188110-2021	≤1.2	≤4.0	≤18.0	≥1055–1065
		typical	0.8	1.4	18	1065

Product	Grade	Value	Softening point, °C	Toluene-insoluble substance content*, mass %	Quinoline-insoluble substance content*, mass %	Volatile-matter yield, %	Ash content, %	Coking capacity, %	Water content, mass %	Dynamic viscosity, sP at:		
										150 °C	155 °C	185 °C
Liquid coal-tar pitch	B	GOST 10200-2017	67–74	24–31	≤9	58–63	≤0.3	≥48.0	–	350–950	–	–
		typical	70	27	8	61	0.1	50	–	626	–	–
	B1	GOST 10200-2017	72–76	26–31	≤12	≤59	≤0.3	≥50.0	–	–	400–1500	100–300
		typical	78	28	6	60	0.1	51	–	–	839	138
	V	GOST 10200-2017	85–92	≥31	≤14	53–57	≤0.3	≥56.0	–	–	1500–4500	300–950
		typical	88	34	10	54	0.1	55	–	–	4188	521
Granulated coal pitch	V	GOST 10200-2017	85–92	≥31	≤14	53–57	≤0.3	≥56.0	≤4.0	–	1500–4500	300–950
		STO 00188110-003-2018	72–95	–	–	53–62	≤0.3	–	≤1.0	–	–	–
		typical	90	34	9	55	0.1	55	0.6	–	4188	521

Product	Value	Nitrogen mass fraction on dry basis, %	Sulphur mass fraction on dry basis, %	Sulphuric acid content, mass%	Water content, mass %	Friability, %	Content of >0.5 mm fraction, mass %	Content of <6 mm fraction, mass %	Share of insoluble impurities, %	Static strength	Particle size distribution, %		
											–	2–5 mm	≥6 mm
Crystalline ammonium sulphate	GOST 9097-82	≥21	–	≤0.03	≤0.2	100	≥80	100	≤0.02	–	–	–	–
	TU 14-106-399-91/TS 113-03-625-90	≥21	≥24	≤0.05	≤0.3	100	≥80	100	≤0.02	–	–	–	–
	typical	21	24	0.03	0.3	100	80	100	0.02	–	–	–	–
Granulated ammonium sulphate	GOST 9097-82	≥21	–	≤0.03	≤0.2	100	≥80	100	–	–	–	–	–
	TU 20.15.32-001-41598162-2022	≥21	≥24	≤0.03	≤0.2	100	≥80	100	–	3 MPa	≤2	96	100
	typical	21	24	0.03	0.2	100	80	100	–	3 MPa	2	96	100

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