
Universal Decimal Classification

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UDC 66/66.0 Chemical technology.
Chemical engineering, production and processing,
operations and plant

Classification Décimale Universelle
CDU 66/66.0 Technologie chimique. Science de l'ingénieur chimiste,
production et méthodes, opérations et installations

Dezimalklassifikation
DK 66/66.0 Chemische Technik. Chemie-Ingenieurwesen,
Produktion und Verfahren, Operationen und Anlagen

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Foreword

The English version of the Universal Decimal Classification (UDC) is being prepared and published as BS 1000 by the British Standards Institution (BSI) at the original joint request of the British Society for International Bibliography (BSIB) and the Association of Special Libraries and Information Bureaux (ASLIB), now amalgamated as Aslib. It has the approval of the Lake Placid Education Foundation, New York, proprietors of the Dewey Decimal Classification, from which the UDC derives. The English full edition of the UDC is authorized by the International Federation for Documentation (FID), PO Box 90402, 2509 LK The Hague, Netherlands.

This section is part of the English full edition. It should be used in conjunction with the Abridged English Edition, BS 1000A, which refers to many other subjects of interest

not listed in this schedule, and provides a conspectus of the whole scheme, together with an introduction to its use. For further practical information about the principles, application and utilization of the scheme, users should refer to BS 1000C.

This edition of BS 1000 [66/66.0], which supersedes BS 1000 [66/66.09] : 1971, includes modifications authorized in 'Extensions and Corrections to the UDC' (FID publication no. 248) up to and including Series 11, No. 2, dated April 1982. Subsequent issues of 'Extensions and Corrections to the UDC' should be consulted to keep the schedule up to date. British Standards related to this Part of BS 1000 are listed on the inside back cover.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Scope

Under 66 is classed information about the main branches of the chemical industry, the manufacture and processing of industrial chemicals and chemical products, except the processable materials included under 615 and certain other products listed under 'Related subjects' below.

Chemical engineering and technology in general, operations, processes and plant are classed under 66.0. Theoretical, experimental, analytical, inorganic and organic chemistry are classed under 54, the subdivisions of which may be freely combined by colon with the subdivisions of 66 to denote details of composition, properties etc. not adequately provided for within 66.

Principal divisions of UDC 66

- 661 Chemical products
- 662 Explosives. Fuels
- 663 Industrial microbiology. Industrial mycology.
Fermentation industry. Beverage industry.
Stimulant industry
- 664 Manufacture and preservation of solid foods
- 665 Oils. Fats. Waxes. Polishes. Adhesives. Gums and
natural resins
- 666 Glass. Ceramics. Enamels. Artificial stone. Cements
- 667 Colour industries
- 669 Metallurgy

Related subjects

- 340.64 Forensic chemistry. Forensic toxicology
- 53 Physics
- 54 Chemistry
- 550.84 Chemical and physical-chemical methods of
geological investigation and exploration.
Geochemical methods
- 577.1 Chemical bases of life. Biochemistry and
bio-organic chemistry generally
- 58.04 Chemical effects. Effect of anaesthetics, of
poisons – Botany
- 581.19 Chemical constituents of plants
- 591.04 Physics and chemistry of cells and organisms in
general. Absorption
- 591.05 Physiological chemistry and metabolism in
general. Composition of the body – Zoology
- 612.015 Physiological chemistry
- 615 Pharmaceuticals. Therapeutics. Toxicology
- 621.35 Electrochemical technology
- 621.794 Chemical finishing and surface treatments
- 622.791 Chemical treatment. Weathering. Corrosion –
Treatment of minerals
- 623.459 Chemical weapons. War gases. Detection,
protection, decontamination
- 628.34 Chemical treatment of sewage
- 631.8 Fertilizers and manures. Growth substances
- 632.95 Plant protection preparations. Pesticides

- 678 Industries based on macromolecular materials.
Rubber industry. Plastics industry
- 77 Photography and similar processes

Auxiliary signs and subdivisions

Full information about the common and special auxiliary signs and subdivisions (often abbreviated to 'common and special auxiliaries') will be found in BS 1000A and BS 1000C.

Colon sign of relation. For the classification of information for the public, as in abstracts and bibliographies, maximum use of colon combination rather than of common or special auxiliaries is recommended. The use of the colon sign of relation is preferable for multiple entry systems, as it will help prevent the concealment of information. This usually results in longer notation, however, and for information for more restricted use, the application of auxiliaries, where available, may be simpler and more convenient provided that there is an adequate alphabetical subject index.

Common auxiliaries. The common auxiliaries of language = . . . , form (0 . . .), place (1/9), race and nationality (= . . .), time " . . . ", point of view . 00 . . . , materials –03 . . . and persons –05 . . . are applicable throughout the UDC. However, they should be used mainly to express concepts not otherwise provided for in the schedules.

Special auxiliaries. The .0 special auxiliaries are applicable throughout 66; they may be detached and applied to any subdivision where the result forms a meaningful combination, e.g.

- 66.049.1 Evaporation processes for concentrating
liquids
- 66.833.321 Sodium chloride. Rock salt (production)
- 661.833.321.049.1 Production of sodium chloride by
evaporation processes

The –2 and –4/–8 (listed in full under 62) and –9 special auxiliaries are also applicable throughout 66, but they should be used only for concepts not adequately designated by the ordinary decimal divisions. There are no –1 or –3 special auxiliaries corresponding to those listed under 62, but –1 and –3 special auxiliaries are used within some sections of 66 with different meanings, e.g. at 662.2–3, 666.9–1, 667–12, 669–1.

Typographic presentation

Small type is used for cancelled numbers and text. The arrow → means either 'see' or 'see also' according to the context. The symbol ≡ 'subdivide as' means that the number preceding it may be subdivided in the same way as, and with meanings analogous to the subdivisions of, the number which follows it.

SCHEDULE

66 CHEMICAL TECHNOLOGY. CHEMICAL AND RELATED INDUSTRIES

Special auxiliary subdivisions

66-2	FIXED AND MOVABLE COMPONENTS OF MACHINES, APPARATUS AND EQUIPMENT 66-2 ≈ 62-2	66-931	Processes, plant and equipment according to directness
		.2	Direct
		.4	Indirect
66-4	STATE, CONDITION, FORM OF MATERIALS, SURFACES, OBJECTS AND PRODUCTS 66-4 ≈ 62-4	-932	Processes, plant and equipment according to continuity
		.2	Continuous
		.3	Semi-continuous
66-5	OPERATION AND CONTROL OF MACHINES AND PROCESSES 66-5 ≈ 62-5	.4	Discontinuous
		-933	[cancelled] ... 62-932.3
		-934	[cancelled] ... 62-932.4
		-935	Related or interdependent processes
66-6	FUEL AND OTHER HEAT SOURCE CHARACTERISTICS OF MACHINERY AND INSTALLATIONS 66-6 ≈ 62-6, e.g. 66-69 Heating devices 66-69 ≈ 662.9	.2	Related or interdependent processes with the same primary or raw material
		.3	Related or interdependent processes with the same end products
		.4	Processes with reclamation, recovery, regeneration
		.5	Processes with enrichment, concentration, refining
66-7	SERVICING, MAINTENANCE, PROTECTION OF MACHINES, APPARATUS, PLANT AND EQUIPMENT 66-7 ≈ 62-7	-936	Processes according to the ambient or phase conditions
		.1	Processes in the dry
		.2	Processes in the wet
66-8	MOTIVE FORCE OR MOTIVE POWER CHARACTERISTICS OF MACHINES AND APPARATUS 66-8 ≈ 62-8	.3	Reactions between gases and vapours
		.4	Reactions between gases and liquids
		.5	Reactions between liquids
		.6	Reactions between gases and solids
		.7	Reactions between liquids and solids
		.8	Reactions between solids
66-9	PROCESS, PLANT OPERATING CHARACTERISTICS AND CONDITIONS		
66-91	MATERIAL STATE CHARACTERISTICS AND VARIABLES	66-94	DIRECTION AND VELOCITY (RATE) OF PROCESSES ETC.
-911	State of aggregation 62-911.3/.6 ≈ 54-13/-16, e.g. 62-911.3 Gaseous		—62-185 Characterization according to speed. Speed of rotation in general
	.38 Colloid with gaseous dispersion medium. Aerosols, smokes	-942	Parallel processes
	.4 Liquid	-944	Opposed, reversed processes. Counterflow processes
	.41 Mobile	-946	Processes with or without agitation
	.42 Viscous	.1	Processes without agitation
	.45 Solutions	.3	Processes with agitation
	.48 Colloid with liquid dispersion medium. Emulsions. Gels.	.32	Processes with agitation of solids
	Foams	.34	Processes with agitation of liquids. Agitation by ultrasonic means
	.6 Solid		—66.084 Operations involving vibrations, e.g. ultrasonic processes
	.61 Amorphous	-947	Very rapid. Rapid. Accelerated. Short (duration)
	.62 Crystalline	.1	Very rapid
	.65 Solid solutions	.2	Rapid
	.68 Colloid with solid dispersion medium	.3	Accelerated
-912	Processes in the fluidized state —66.096.5 Fluidization in general	.5	Short (duration)
-913	State of humidity	-948	Slow. Prolonged, extended. Retarded, delayed. Long-lasting
.1	Dry	.1	Slow
.2	Damp. Humid. Moist	.2	Prolonged, extended
.3	Wet	.3	Retarded, delayed
-914	Concentration characteristics —66.082 Operations affecting concentration	.5	Long-lasting
.3	Low concentration	66-95	SIMPLE AND MULTIPLE PROCESSES. SINGLE-STAGE AND MULTI-STAGE PROCESSES
.5	Medium concentration	-951	Simple, simplified processes
.7	High concentration	-952	Multiple, complex, repeated processes
-915	pH value characteristics	-953	Single-stage processes
.1	Acid	-954	Multi-stage processes
.2	Neutral	-956	Single-bath processes
.3	Alkaline	-957	Multi-bath processes
-916	rH value characteristics		
.1	Oxidizing	66-96	PROCESSES ASSOCIATED WITH PURIFICATION AND REFINING
.2	Reducing	-962	Processes without purification or refining
66-93	PROCESSES, MACHINES AND EQUIPMENT ACCORDING TO MODE OF WORKING, CONTINUITY, ASSOCIATIONS, MEDIA	-963	Processes with purification or refining

66-965	Particulars of processes associated with the form or condition of the material to be treated	66.012 (cont'd)	66.012-52 Automatic process control
.1	Loose. Flocculent. In the form of flakes	.1	Measurement. Control. Instrumentation
.2	Coiled (in the form of a coil)		<i>Further particulars may be denoted by colon combination with the subdivisions of 53 or 681.2</i>
.3	In the form of a hank or skein	.2	Consumption of raw materials and auxiliary materials
.4	In the form of ribbons or tapes		Consumption of raw materials
.6	According to condition of stress or tension	.22	Consumption of auxiliary materials, e.g. fuels
.61	Stressed. Under tension	.23	<i>The kind of fuel may be denoted by the -6 special auxiliaries listed under 62</i>
.62	Unstressed. Not under tension. Slack. Limp	.24	Consumption per unit of product or plant
.8	Open, closed (e.g. in dyeing apparatus)	.3	Heat consumption. Power consumption
.81	Open, uncovered	.32	Heat consumption
.82	Closed, covered	.34	Heat balance
-966	Processes associated with durability, e.g. permanence or fastness of colours		—662.614 Heat balance - Fuels
.1	Durable, e.g. wash-resistant	.37	Power consumption
.2	Not durable	.4	Capacity. Throughput
.5	Fast (of colours)	.42	Capacity
-967	Processes associated with the liquor ratio	.43	Output from point of view of quality of product
.1	Low liquor ratio	.44	Output or operating capacity per unit of plant
.2	Medium liquor ratio	.45	Preparatory work
.3	High liquor ratio	.452	Duration of preparatory operations
66-97	THERMAL CHARACTERISTIC DATA.	.454	Time up to beginning of reaction
	TEMPERATURE OR TEMPERATURE RANGE	.46	Throughput
	<i>Specific temperatures in recognized temperature scales may be denoted by -97 together with an appropriate addition, e.g.</i>	.462	Rate of throughput
	66-97CO Freezing point of water	.464	Duration of throughput
	-97F32 = 0°C = 32°F = 273 K	.47	Duration of discharging operations. Duration of finishing operations
	-97K273	.48	Total production of plant over an extended period of time, e.g. annual production
	-97C100 Boiling point of water	.49	Other matters
	-97F212 = 100°C = 212°F = 373 K	.492	Length of period of production. Campaign (working life) of an installation (e.g. of a furnace)
	-97K373		Yield. Output
-971	Thermodynamic characteristic data	.5	Process efficiency. Engineering economics.
.2	Exothermic	.7	Productivity
.4	Endothermic		Comparison with other processes
-973	Very low temperature	.77	Chemical works generally: plant and equipment, auxiliary services etc.
-974	Low temperature	.013	<i>For administrative and management aspects — 658.2</i>
-975	Room temperature (20 ± 2°C)		<i>For architectural aspects — 725.4</i>
-976	Medium or moderate temperature		Plant layout and construction
-977	High temperature	.5	66.013.5 ≈ 669.013.5
-978	Very high or extremely high temperature		<i>Further particulars may be denoted by colon combination with the subdivisions of 69</i>
66-98	PRESSURE CHARACTERISTICS, VARIABLES, LEVEL, RANGE		<i>For vessels and piping — 66.02</i>
	—66.083 Operations involving pressure	.6	Power supply: generation, mains supply etc.
-982	Vacuum. In vacuo		—658.26 Power sources. Power, heating and water services
-983	Very low pressure		<i>Further particulars may be denoted by colon combination, e.g.</i>
-984	Low pressure		66.013.6:621.039 Nuclear power supply
-985	Atmospheric (normal) pressure		:621.18 Steam power supply
-986	Medium or moderate pressure		:621.22 Water power supply
-987	High pressure. Elevated pressure		:621.311 Electricity power supply
-988	Very high or extremely high pressure		Chemical processing services: steam, water, gas
66.0	CHEMICAL ENGINEERING, PRODUCTION AND PROCESSING, OPERATIONS AND PLANT		<i>Further particulars may be denoted by colon combination, e.g.</i>
66.01	CHEMICAL ENGINEERING AND PROCESSING PRINCIPLES. PROCESS DESIGN AND CONTROL. PLANT LAYOUT AND SERVICES. MATERIALS, PROPERTIES ETC.	.7	66.013.7:621.18 Steam for processing
	<i>For specific processing operations and relevant plant, special chemical processes and treatments — 66.02/.09</i>		:622.76 Gas for processing
.011	Process design: principles and practice, flow charts, new features in processing and plant etc.	.8	:663.6 Water for processing
	—66.021 Unit operations and processes in general		Industrial sanitation, hygiene and other accessory services
.012	Production and process control, regulation and supervision. Efficiency. Chemical engineering economics		<i>Further particulars may be denoted by colon combination, e.g.</i>
	<i>Further particulars may be denoted by colon combination with the subdivisions of 658.5 or by the -5 special auxiliaries listed under 62, e.g.</i>	.014	66.013.8:628.5 Dust, fumes, smoke and effluent disposal and treatment
			:628.8 Indoor climate. Air conditioning etc.
			Chemical composition and properties

66.014 (cont'd)	<i>Further particulars may be denoted by colon combination with the subdivisions of 54, especially 543</i>	66.022.33	Additives affecting colour
.016	[cancelled]	.34	Additives affecting hygroscopicity
.017	Properties of materials <i>For testing methods, apparatus and equipment — 620.1</i>	.35	Additives affecting solubility
.018	Resistance of materials to external effects and actions 66.018 ≈ 669.018, e.g. 66.018.2 Resistance to mechanical effects .4 Resistance to thermal effects .5 Resistance to electrical and magnetic effects .6 Resistance to physical effects .64 Resistance to acoustic effects .65 Resistance to optical effects .8 Resistance to corrosion, wear and other destructive influences 66.018.8 ≈ 620.193 .83 Resistance to oxidation .86 Resistance to radiation	.37/.372 .373 .38 .39 .392 .393 .4	[cancelled] — 66.097.6/.8 Additives for decreasing reactivity. Stabilizers. Passivators Additives affecting other physical properties <i>Further particulars may be denoted by colon combination with the subdivisions of 53</i> Additives affecting biological properties Additives affecting organoleptic reactions 66.022.392 ≈ 543.92, e.g. 66.022.392.6 Additives affecting smell .7 Additives affecting taste .8 Additives affecting feel
.019	Defects of materials 66.019 ≈ 620.19 <i>The type of defect may be denoted by colon combination with the subdivisions of 620.19</i>		Denaturation Impregnation —620.197.7 Protection by impregnation, by additives 674.048 Impregnation of wood 676.266 Wet strength paper. Impregnated paper etc. 677.027.62 Chemical finishing including impregnating and modification - Textiles 678.026 Impregnation, coating and cladding with macromolecular compound 678.029.6 Impregnation, coating and cladding with protective materials - Rubber and plastics industry
66.02/.09	PROCESSING OPERATIONS AND RELEVANT PLANT. SPECIAL CHEMICAL PROCESSES AND TREATMENTS		
66.02	CHEMICAL PROCESSING OPERATIONS AND PLANT GENERALLY	.023	Containers, vessels for chemical reactions
.021	Unit operations and processes in general <i>Further particulars may be denoted by the .022/.099 special auxiliaries, e.g.</i> 66.021.022 Preparation. Size reduction etc. .04 Heating, thermal processing .06 Working with liquids: mixing, separation, purification etc. .07 Working with gases	.2 .22 .23 .24 .3 .6 .7	Various vessels Vats Towers Stoneware vessels Lining, coating and cladding of vessels. Devices for improving fluid distribution. Raschig rings etc. —66.074.513 Wash tower packing Acid-resistant vessels Vessels resistant to other types of chemical action
.2	Momentum transfer, fluid flow and mixing <i>Further particulars may be denoted by the .022/.099 special auxiliaries, e.g.</i> 66.021.2.063 Mixing, homogenization of liquids .073 Supply, mixing of gases	.024 .025	Mountings for vessels. Stands. Supports etc. Fittings for vessels. Closures, seals. Manholes. Inspection windows. Connections for instruments. Inlets. Outlets <i>Further particulars may be denoted by colon combination with the subdivisions of 621.183</i>
.3	Mass transfer <i>Further particulars may be denoted by the .022/.099 special auxiliaries, e.g.</i> 66.021.3.048 Distillation. Fractionation etc. .06 Handling, processing, purification of liquids .081 Sorption processes	.026	Pipes. Conduits. Packings <i>Further particulars may be denoted by colon combination with the subdivisions of 621.6</i> —62-762 Fluid-tight (pressure-tight) joints and protective jointings. Packings. Glands. Seals
.4	Heat transfer <i>Further particulars may be denoted by the .022/.099 special auxiliaries, e.g.</i> 66.021.4.046 Heat treatment. Cooling. Heating. Melting	.6 .7 .028	Acid-resistant pipes etc. Resistant to other types of chemical action Introduction of material. Proportioning. Proportioning devices
.022	Preparation of raw materials; methods, plant and equipment <i>For working, treatment of materials with or without chip formation — 621.7, 621.9</i>		
.1	Pretreatment in general	66.03	MATERIALS, PROCESSES AND EQUIPMENT FOR SPECIFIC INDUSTRIES <i>For further details — 663, 664, 666, 667 etc.</i>
.2	Pretreatment without additives, e.g. reduction, crushing, milling		
.3	Pretreatment with additives		
.31	General matters		
.311	Additives according to solubility	66.04	HEAT TREATMENT OPERATIONS —536.2 Heat conduction. Heat transfer 662.9 Furnace and combustion engineering
.2	Soluble additives		
.3	Insoluble additives		
.312	Inorganic additives		
.2	Soluble additives	.040	Heat treatment according to physical state of material treated Heat treatment of materials in the solid phase Heat treatment while remaining in the solid phase
.3	Insoluble additives	.2 .22/.25	
.313	Organic additives		
.2	Soluble additives		
.3	Insoluble additives		
.32	Bulking materials. Filling materials		

66.040.22	Heat treatment without intentional alteration of degree of solidification 66.040.22 $\approx$ 66.040.26	66.041-987 (cont'd)	621.783 Furnaces, baths and other devices for heating and soaking 662.741 High-temperature carbonization 669.162.2 Blast furnaces. Operation of blast furnaces
.24	Heat treatment with lowering of degree of solidification 66.040.24 $\approx$ 66.040.26	.1	Processes preliminary to furnace treatment
.25	Heat treatment with increase of degree of solidification 66.040.25 $\approx$ 66.040.26	.13	Preparation of materials for treatment
.26	Heat treatment with solid-liquid phase change	.14	Preheating
.261	Without intentional physical/chemical alteration of the material	.2	Generalities on furnaces
.262	With intentional physical/chemical alteration of the material	.22	Furnace atmospheres
.1	Without being influenced by the surrounding medium and without addition of auxiliary material	.222	Special atmospheres
.2	With addition of solid auxiliary material	.24	Heating and cooling of the furnace
.3	With addition of liquid auxiliary material	.3	Types and methods of heating
.4	With addition of gaseous auxiliary material	.34	Externally-heated furnaces
.5	By means of electrolysis	.35	Internally-heated furnaces. Internal heating by pipes and flues
.263	With complete physical/chemical alteration of material 66.040.263 $\approx$ 66.040.262	.351	Vertical flues
.27	Heat treatment with solid-gas phase change 66.040.27 $\approx$ 66.040.26	.352	Horizontal flues
.286	Heat treatment in which material remains partly in the solid phase and partly changes to the liquid phase 66.040.286 $\approx$ 66.040.26	.353	Inclined flues
.287	Heat treatment in which the material remains partly in the solid phase and partly changes to the gas phase 66.040.287 $\approx$ 66.040.26	.354	Combined vertical and horizontal flues
.3	Heat treatment of materials in the liquid phase	.36	Furnaces in which heating gas passes through the charge
.32	Heat treatment in which material remains in the liquid phase 66.040.32 $\approx$ 66.040.26	.37	Furnaces with direct contact between charge and heat transfer liquid
.36	Heat treatment with liquid-solid phase change 66.040.36 $\approx$ 66.040.26	.375	Furnaces with heat transfer liquid passing through the charge
.37	Heat treatment with liquid-gas phase change 66.040.37 $\approx$ 66.040.26	.38	Electric furnaces —621.365 Electric heating. Heat generation by electricity. Electric furnaces. Electric heating apparatus
.386	Heat treatment in which material remains partly liquid and partly becomes solid 66.040.386 $\approx$ 66.040.26	.4	Batch-type (discontinuous) furnaces
.387	Heat treatment in which material remains partly liquid and partly becomes gaseous 66.040.387 $\approx$ 66.040.26	.41	Furnaces with open receptacles, pots, cauldrons
.4	Heat treatment of materials in the gas phase	.43	Reverberatory furnaces. Open-hearth furnaces
.42	Heat treatment in which material remains in the gas phase 66.040.42 $\approx$ 66.040.26	.431	Furnaces without chimney
.46	Heat treatment with gas-solid phase change 66.040.46 $\approx$ 66.040.26	.432	Furnaces with chimney
.47	Heat treatment with gas-liquid phase change 66.040.47 $\approx$ 66.040.26	.435	Regenerative furnaces. Recuperative furnaces
.486	Heat treatment in which material remains partly in the gas phase and partly becomes solid 66.040.486 $\approx$ 66.040.26	.44	Shaft furnaces with single charge. Cupola furnaces
.487	Heat treatment in which material remains partly in the gas phase and partly becomes liquid 66.040.487 $\approx$ 66.040.26	.441	Combustion equipment for shaft or cupola furnaces
.041	Furnaces. Ovens <i>The fuel or heat source may be denoted by the -6 special auxiliaries listed under 62</i> <i>Further particulars may be denoted by the -1 and -9 special auxiliaries listed under 62 and 66 respectively, e.g.</i> 66.041-182.3 Movable furnaces -982 Vacuum furnaces -987 High-pressure furnaces —621.365 Electric heating. Heat generation by electricity. Electric furnaces. Electric heating apparatus 621.745.3 Furnaces - Foundry work	.442	Shaft or cupola furnaces without blast
		.443	Shaft or cupola furnaces with blast
		.45	Drying stoves. Oven-type (semi-muffle) and muffle furnaces. Crucible furnaces
		.453	Drying stoves or ovens
		.454	Oven-type (semi-muffle) furnaces
		.455	Muffle furnaces
		.456	Crucible furnaces —669.186.3 Crucible furnaces
		.3	Single-crucible furnaces
		.4	Multi-crucible furnaces
		.5	Crucible furnaces below ground level
		.6	Crucible furnaces above ground level
		.458	Combined crucible and cauldron furnaces
		.46	Retorts
		.464	Vertical retorts
		.465	Horizontal retorts
		.466	Inclined retorts
		.47	Heating chambers
		.474	Vertical chambers
		.475	Horizontal chambers
		.476	Inclined chambers
		.477	Skep furnaces
		.48	Kiln driers
		.49	Rotary furnaces. Rocking furnaces. Tilting furnaces
		.491	Rotary furnaces in general
		.494	Rotary furnaces with vertical axis
		.495	Rotary furnaces with horizontal axis
		.496	Rotary furnaces with inclined axis
		.497	Tilting furnaces. Rocking furnaces
		.498	Converters —669.184 Converter process. Principles of converting
		.5	Continuous (charge) furnaces

66.041.53	Blast furnaces. Shaft furnaces (continuous type)	66.042.35	Steam blast
	—669.162.2 Blast furnaces. Operation of blast furnaces	.36	Air and steam blast
.531	With high shaft	.39	Blasts of other gases
.532	With low shaft	.4	Closing devices for furnaces etc.
.54	Vertical or inclined furnaces with continuous operation other than blast furnaces	.5	Discharging installations for solid materials
.544	Tubular furnaces with continuous operation	.51	For horizontal furnaces and retorts
.545	Retorts with continuous operation	.52	For vertical furnaces and retorts
.546	Chamber furnaces with continuous operation	.53	For inclined furnaces and retorts
.548	Vertical columns with continuous operation. Crucible furnaces	.56	Precautions against oxidation of product as discharged
.55	Tunnel furnaces. Kilns	.57	Cooling of products as discharged
.553	With screw gear	.6	Discharging devices for liquid materials
.554	With endless chain	.7	Discharging devices for gaseous materials
.555	With conveyor belts	.8	Fixed parts of the furnace
.556	With propelling blades	.81	Combustion space separated from the gas generator. Combustion space for gas production for distillation
.557	With trucks	.82	Combustion space forming part of the gas generator
.56	Furnaces with mechanical propulsion. Cascade furnaces	.83	Grates
.569	Various types of furnace with mechanical propulsion. Furnaces with charging ramps etc.	.84	Hearths
.57	Rotary tube furnaces	.85	Furnace walls. Shafts. Tunnels
.571	Charge inside the rotating member	.86	Devices for collection and handling of ashes, clinker etc.
.572	Charge outside the rotating member	.861	For collection and handling of ashpits
.58	Furnaces in which the charge is fed in by pneumatic, mechanical or other means	.864	For removal of clinker. For cleaning, raking out etc.
.59	Other types of continuous furnace	.87	Furnace roof
.6	Intermittently-operated furnaces	.875	Furnace crown
.64	Annular furnaces	.877	Suspended roof
.65	Screen furnaces. Shelf furnaces	.88	Recuperators. Regenerators
.67	Chamber furnaces		—66.045 Heat transfer. Heat exchange. Cooling and coolers etc.
.8/.84	[cancelled] — 66.041-182.3, 66.041-98	.882	Recuperators
.042	Furnace ancillary equipment	.2	Types of construction
.1	Charging installations and plant	.4	Elements and parts. Recuperator bricks and flues
.11	For horizontal furnaces and retorts	.8	Soot and slag formation
.12	For vertical furnaces and retorts	.886	Regenerators
.13	For inclined furnaces and retorts	.2	Types of construction
.15	Devices for combined charging and discharging	.4	Grating and chequerwork
.17	Devices for mechanical charging	.46	Brickwork
.171	Devices with channels, troughs	.8	Processes in the grating or chequerwork.
.172	Trough charging devices. Trough charging cranes	.893	Soot and slag formation. Cleaning
.173	Devices with tipping skips or tubs etc.	.9	Anchorage
.174/.175	[cancelled, superfluous]	.92	Other elements. Servicing, control, distributing, safety devices
.177	With cages	.93	Servicing and maintenance items. Ladders.
.18	Hand charging	.931	Platforms. Gangways
.2	Charge handling and distributing devices		Cocks. Valves
.21	Crucibles		Air cocks, valves
.212	Types of crucible		—621.646 Devices for opening and closing pipes. Valves.
.2	Aluminium or clay crucibles		Regulating and safety devices
.3	Graphite crucibles	.932	Water cocks, valves
.9	Other types of crucible	.933	Steam cocks, valves
.214	Refractory materials	.934	Oil cocks, valves
	—666.76 Refractory bodies and products	.935	Gas cocks, valves
.217	Design and dimensions of crucibles	.937	Change-over or reversing cocks, valves
.218	Operations in crucibles	.94	Ducts, pipes and flues
.22	Saggars (saggers, seggers)		—621.643 Fluid distribution and transport devices. Conduits. Pipes. Pipe fittings
.23	Trolleys. Pivoted trucks	.941	Air ducts and pipes
.24	Built-in (refractory) units	.942	Water pipes
.26	Handling and conveying devices	.943	Steam pipes
.262	Scoops, ladles etc.	.944	Oil pipes
.263	Chain conveyors	.945	Gas pipes
.27	Compression and tapping devices. Devices to ensure homogeneous distribution of the material	.946	Flues
.272	Compression devices. Rams	.947	Precautions against choking or blocking of ducts and flues. Cleaning
.273	Mechanical treatment of the charge in the chamber. Distributors. Equalizers	.95	Pressure regulation
.28	Retaining devices. Devices to prevent too rapid progression of the materials		<i>The level or range may be denoted by addition of the -98 special auxiliaries listed under 66</i>
.3	Air, steam and gas supply		—62-531.8 Control of pressures, forces
	—66.042.93 Cocks. Valves		66.073.4 Pressure and flow regulation
.31	Air blast and blowers in general		66.083-53 Pressure regulation
.32	Draught in general. Natural draught		
.33	By blast or suction (under moderate or high pressures)		

66.043	Furnace constructional materials. Linings	66.046.46	Heating with simultaneous reduction
	—66.045 Heat transfer. Heat exchange. Cooling and coolers etc.		—669.046.46 Heating with simultaneous reduction - Metallurgy
.1	Refractories. Furnace lining in general	.5	Fusion. Melting. Smelting
.12	Metal	.51	General processes
.13	Non-metal, e.g. fireclays, silica	.511	Charging. Starting up
	—666.76 Refractory bodies and products	.2	Charging
.2	Heat-insulating materials	.3	Starting up
	—662.998 Industrial heat insulation and insulators. Heat loss	.512	Melting process. Melting period
.3	Heat-storing materials	.514	Tapping of slag
.4	Heat-transfer materials	.515	Leaving to stand
.42	Heat-radiating materials	.516	Control of composition. Alloying. Alloying time
.43	Heat-conducting materials	.517	Degassing the melt
.5	Furnace materials according to chemical properties		—66.083.8 Degassing in vacuo
.52	Basic furnace materials	.518	Tapping
.54	Acidic furnace materials	.52	Additions, e.g. fluxes
.7	Furnace materials resistant to waste gases	.522	Solid additions
.8	Materials for furnace accessories	.523	Fluid additions
.9	Other constructional materials	.53	Melt vessels
.044	Furnace upkeep and repair	.54	Oxidation during melting. Refining
.2	Repair		66.046.54 $\approx$ 669.046.54
.22	Manual repair		—66.094.3 Oxidation
.24	Mechanical repair. Torkret machines	.55	Deoxidation during melting (particularly metal refining processes)
.28	Mending and patching materials		66.046.55 $\approx$ 669.046.55
.045	Heat transfer. Heat exchange. Cooling and coolers etc.	.56	Carburization. Decarburization
	<i>The shape of passage or surface may be denoted by addition of -4 special auxiliaries listed under 62 and temperature level or range by addition of the -97 special auxiliaries listed under 66</i>	.562	Carburization
	<i>Specific thermal processes and operations may be denoted by colon combination with the subdivisions of 66.046/.049</i>	.2	Carburization in the furnace
	—536.2 Heat conduction. Heat transfer	.4	Carburization in the ladle
	66.046 Thermal processes and plant	.564	Decarburization
.1	Heat exchangers: design, performance	.5	Decarburization with oxygen lance or jet
.2	Heat transfer and temperature regulation	.58	Slag: formation and properties
.3	Heat insulation, storage and transfer media		—662.613.2 Clinker. Slag. Combustion residues containing unburnt fuel
	66.045.3 $\approx$ 66.043	.581	Slagging materials. Slag formation
.5	Cooling. Coolers and cooling towers	.2	Slagging materials. Lime. Bauxite. Fluorspar.
	—66.046.3 Cooling processes	.4	Sand. Gravel-like materials
.53	Natural draught cooling towers	.582	Slag formation
.54	Mechanical draught cooling towers	.2	Reactions between slag and bath
.57	Open deck or cascade coolers	.3	Equilibrium between slag and bath
.6	Spray ponds	.5	Reactivity of slag
.7	Gas humidification and cooling	.584	Viscosity of slag
.046	Thermal processes and plant	.1	Components of slag
	—66.045 Heat transfer. Heat exchange. Cooling and coolers etc.	.2	Neutral or amphoteric oxides. Heavy metal oxides
	<i>Temperature may be denoted by addition of the -97 special auxiliaries listed under 66</i>	.5	Bases. Basicity of slag
.1	Preliminary treatment (involving heat). Preheating	.6	Acids. Acid-forming oxides
.3	Cooling processes	.585	Metal taken up from bath
	—66.045.5 Cooling. Coolers and cooling towers		Slags according to mode of formation
	664.8.037 Preservation by refrigeration etc.		66.046.585 $\approx$ 669.046.585
	<i>Refrigeration engineering details may be denoted by colon combination with the subdivisions of 621.56/.57</i>		<i>For blast furnace slags — 669.162.275.2</i>
.4	Heating of solids. Burning. Firing. Calcination. Roasting	.587	<i>For slags from direct processes — 669.181.28</i>
	—622.78 Heat treatment of ores and minerals	.588	<i>For puddling slags — 669.182.738</i>
	669.046.4 Heating processes in the solid state	.59	<i>For open hearth slags — 669.183.28</i>
.41	Roasting without oxidizing or reducing agents. Calcination	.591	<i>For basic open hearth slags — 669.183.48</i>
.42	Oxidizing roasting	.592	<i>For acid Bessemer slags — 669.184.18</i>
	—669.046.42 Oxidizing roasting - Metallurgy	.593	<i>For basic Bessemer slags — 669.184.28</i>
.44	Heating with simultaneous sintering. Sinter roasting	.594	<i>For crucible slags — 669.186.58</i>
	—669.046.44 Heating with simultaneous sintering - Metallurgy	.597	<i>For electric steel slags — 669.187.28</i>
		.6	Slags according to composition
		.7	66.046.586 $\approx$ 669.046.586
		.71	Slags according to function. Protecting slags. Conducting slags. Active slags etc.
			66.046.587 $\approx$ 669.046.587
			Irregularities in working of slag
			Various matters connected with melting
			Ash
			Waste products, losses
			Solid residues
			Vaporization of metals and non-metals
			Gaseous products
			66.046.597 $\approx$ 669.015.7
			Heat treatment of fluids without phase change
			Boiling in general. Boiling without distillation or concentration. Heating to boiling point
			Methods of preventing retarded boiling

66.046.72	Methods of preventing loss by evaporation.	66.047.6 (cont'd)	66.047.61/.63 $\approx$ 66.047.1/.3
.74	Collection and return of condensed vapour	.64	In drying cabinets
.8	Methods of preventing frothing. Devices and processes to prevent froth formation during clarification etc.	.65	In shelf driers
.9	Heating and pressure	.66	In double-chambered driers
.047	Heat treatment of gases and gaseous mixtures	.67	In driers with adjacent chambers
.1	Drying	.68	In driers with compartments and drawers
.132	Drying with air or other gases	.7	Drying from the point of view of the stock to be dried
.134	Preliminary heating of the material		<i>Each of the .71/.78 subdivisions may be further subdivided as 66.047.1/.6, e.g.</i>
.14	Preliminary heating of the air		66.047.726.4 Drying of crystalline substances in drying cabinets
.15	Drying by parallel flow		<i>For drying of gases — 66.074.31</i>
.16	Drying by counterflow	.71	Large lumps
.17	Heating and reheating of the air during drying process	.72	Crystalline substances
.18	Cooling the air current	.73	Agglomerates. Mixtures
.2	Return of the saturated air in the driers	.74	Materials in the plastic state
.25	Drying under reduced pressure. Vacuum drying	.75	Powders
.3	Vacuum drying after freezing. Freeze drying	.76	Flakes and fibres
.31	High temperature drying. Drying by heat alone. Evaporative driers	.77	Piece goods, e.g. textiles, leather
.312	Drying by conduction of heat	.78	Finished articles, e.g. clothes, hollow vessels
.313	Direct conduction of heat	.79	Liquids
.35	Indirect conduction of heat	.791	Liquids containing solids in solution or in dispersion. Spray drying
.352	Drying by radiant heat	.1	By dispersion of liquid and extraction of the dissolved solid in powder form
.353	Direct radiant heat	.12	Without special additions. Hopkinson and Krause processes
.354	Indirect radiant heat	.14	With precautions against agglomeration of solid. Stam process
.355	High frequency drying	.2	Drying in thin films. Emka process
.37	Infra-red drying	.8	Drying by chemical or colloid-chemical processes
.372	Drying by convection	.82	By mixing with water absorbents or adsorbents
.373	Natural convection	.84	By treatment with substances which decompose water, e.g. sodium
.38	Forced convection	.88	Indirect drying by chemical means, e.g. by treating the air used for drying with some hygroscopic substance
.4	Drying by simultaneous conduction, radiation and convection	.9	Other matters
.44	Batch drying	.92	Drying accessories
.45	66.047.41/.43 $\approx$ 66.047.1/.3	.922	Drying screens, sieves
.46	In the open air	.923	Charging and discharging devices
.47	In drying cupboards or cabinets	.048	Distillation
.48	In drying stoves, ovens		—66.082 Operations affecting concentration
.49	In drying rooms, chambers and tunnels	.1	66.083 Operations involving pressure
.494	In kilns, tunnel ovens	.2	Simple distillation. Elementary processes
.495	On drying stands or supports	.28	Condensation in general
.5	On non-rotating drying stands or supports	.3	Condensers
.54	On rotating drying stands or supports	.32	Fractional distillation. Fractionation
.544	Continuous drying	.33	Discontinuous fractionation
.545	66.047.51/.53 $\approx$ 66.047.1/.3	.34	Semi-continuous fractionation
.55	In vertical shafts or inclined tunnels	.36	Continuous fractionation
.554	In vertical shafts	.37	Dephlegmators
.555	With tilting trays or rollers	.375	Distillation (fractionating) columns and towers
.556	With endless conveyors	.4	Packings and fillings
.557	In drying pipes	.5	Complete distillation followed by fractional condensation
.56	In horizontal tunnels	.52	Distillation and evaporation under reduced pressure. Vacuum distillation
.564	With endless chain	.53	With surface evaporation. Methods of increasing the surface area
.565	With endless conveyors	.54	With circulation
.567	With push-plates	.541	Single or multiple effect evaporation
.569	With trolley	.542	Single effect
.57	Tray driers. Cascade driers	.543	Double effect
.574	With fixed trays	.544	Triple effect
.575	With movable trays	.55	Multiple effect
.576	With shuttered trays	.57	Fractionation in a vacuum
.577	Other types of tray and cascade driers		Various means of promoting satisfactory ebullition
.58	Rotary driers (drum driers) in which the stock passes within the revolving drum	.58	66.048.57 $\approx$ 66.046.7
.584	Without a helical vane or other means of propulsion	.59	Heating units
.585	With a helical vane or other means of propulsion	.6	Accessory devices
.59	In which the stock passes radially through, without built-in compartments	.63	Distillation with the aid of a special medium.
.592	In which the stock passes radially through, with built-in compartments		Steam distillation
.594	Rotary driers (drum driers) in which the stock passes on the outside of the drum or drums		Azeotropic distillation
.595	Other types of continuous drier		
.596	Pan driers		
.597	Without rotary agitation		
.598	With rotary agitation		
.599	Intermittent drying		

66.048.65	Extractive distillation	66.063.52	Wetting agents
.7	Distillation under pressure		—661.185 Surface-active agents.
.76	Fractionation under pressure		Detergents. Wetting agents.
.8	Molecular distillation		Foaming agents. Emulsifying agents. Flotation agents
.9	Products and stages of distillation		
.91	First traces	.6	Preparation of dispersions
.92	Tops	.61	Emulsification
.93	Middles	.612	Emulsifying agents
.94	Bottoms	.62	Preparation of suspensions
.95	Residue	.622	Dispersing agents for suspensions
.97	Topped distillates	.67	Stabilization of dispersions
.049	Other methods of thermal processing for phase separation	.672	Stabilizing agents
	—66.082 Operations affecting concentration	.7	Mixing and kneading of plastic substances
.1	Evaporation processes for concentrating liquids (not mentioned elsewhere)		—621.929 Mixing, blending of solids or semi-solids. Amalgamation of solids with liquids
.2	Separation of solid substances by evaporation of solutions, including measures to prevent incrustation	.72	Softeners, plasticizers and their use
	—66.065.511 Crystallization by evaporation of solvent		<i>Further particulars may be denoted by colon combination with the subdivisions of 547, e.g.</i>
.3	Recovery of two-phase or multi-phase liquids by distillation. Methods of separating these phases. Plates of special design	.725/.728.96	66.063.72:547.26 Alcohols (aliphatic)
	—66.048.63 Azeotropic distillation	.8	[cancelled] use 66.063.72:547
.4	Separation of phases by partial fusion	.86	Agitation of fluids. Homogenization. Stirring devices
	66.049.4 $\approx$ 669.049.4		Mixing and homogenization by introduction of gases
.5	Thermal separation of solid and liquid (non-metallic) phases. Sweating	.9	Other mixing and blending operations
	—669.049.5 Separation of solid and liquid non-metallic phases - Metallurgy	.93	Dilution
.6	Sublimation processes. Recovery of sublimates		—66.082.4 Dilution
.7	Volatilization of non-metallic phase (from metallic)	.932	Diluents
	—669.049.7 Volatilization of non-metallic phases - Metallurgy	.94	Thickening. Increasing the viscosity
		.942	—66.065.7 Mixing of liquids with other substances to obtain a solid or semi-solid mass
66.05	PROCESSES AND EQUIPMENT FOR SPECIFIC CHEMICAL INDUSTRIES	.064	66.082.2 Concentration
	—663, 664, 666, 667, 669	.065	Thickening agents
66.06	HANDLING, PROCESSING AND PURIFICATION OF LIQUIDS. TREATMENT WITH LIQUIDS		Dialysis. Dialysers
	<i>For reaction vessels, piping and containers</i>		Precipitation. Crystallization. Solidification. Thickening
	— 66.023 and 621.64	.2	—66.082.2 Concentration
	<i>For thermal treatment, drying, distillation etc. — 66.045/.049</i>		Precipitation in general. Flocculation
66.061	Solution, extraction and solvents		—66.087.9 Electrocaperillarity.
	<i>Specific solvents may be denoted by colon combination with the subdivisions of 546 or 547 with -145</i>	.3	Electroprecipitation
	—541.8 Generalities on solutions and solubility	.31	Processes tending to decrease the solubility
.1	Solution (dissolving) in general	.32	Salting out
.12	Solution of gases	.5	Thermal treatment. Cooling. Heating
.14	Solution of liquids	.51	Crystallization by concentration. Crystallizers
.16	Solution of solids	.511	Crystallization by concentration
.3	Extraction (selective solution) and solvent recovery	.512	Crystallization by evaporation of solvent
.34	Extraction from solids. Leaching etc.	.52	Crystallization by freezing out the solvent
.35	Extraction from liquids	.53	Crystallizers
.351	With a single solvent or miscible solvents	.54	Recrystallization
.352	With immiscible or partially miscible solvents	.55	Use of filters for separation
.353	Undissolved fraction	.56	Washing of crystals
.354	Dissolved fraction	.562	Coating
.38	Recovery of solvent		Coating by means of a centrifuge
.4/.49	[cancelled] — 66.061.34	.563	—66.067.5 Centrifuging
.5/.54	[cancelled] - 66.061.35/.354	.58	Coating without a centrifuge
.8	[cancelled] - 66.061.38	.581	Crystal form
.062/.062.88	[cancelled] use 66.061:546 or :547	.582	Large masses. Plates. Solidification in a mass
.063	Mixing of liquids. Dilution. Homogenization	.584	Large crystals. Accretions
.2	Diffusion mixing	.7	Small crystals
.4	Maceration. Steeping. Soaking		Mixing of liquids with other substances to obtain a solid or semi-solid mass
.5	Wetting	.8	—66.063.94 Thickening. Increasing the viscosity
		.066	Thickening
			Clarification. Decantation. Separation of liquids. Sedimentation. Screening
		.1	—620.168.32 Sieving. Screening
		.14	621.928 Separating, sorting, sifting, screening equipment
		.2	Clarification
		.3	Clarification by means of albumen
		.4	Decantation to separate liquids from solids
			Separation of immiscible liquids. Separation by coagulation
			Separation of liquids by centrifugal action