
Universal Decimal Classification

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UDC 678 Industries based on macromolecular materials. Rubbers. Plastics

Classification Décimale Universelle
CDV 678 Industrie des matières macromoléculaires.
Caoutchouc. Matières plastiques

Dezimalklassifikation
DK 678 Industrie der makromolekularen Stoffe.
Kautschuk. Kunststoffe

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678—1 Properties and composition of specific materials	2	678.5	Plastics, especially semi-synthetic plastics based on cellulose, proteins and other natural macromolecular materials containing carbon, hydrogen and oxygen or other elements		10
678—2 Machine components	2	678.6	Synthetic polycondensation products. Polycondensates. Synthetic resins. Synthetic fibres etc.		11
678—4 External shape and form of products	2	678.7	Synthetic polymerization products. Polymerizates. Synthetic rubbers		14
678—5/—8 Details of machinery and plant	2	678.8	Various macromolecular materials not included in 678.4/7		16
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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 30115, 2500 GC, 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.

The BSI committee responsible for UDC 678 agreed to the publication of this section primarily because, since publication of the 1954 edition, there has been a considerable amount of revision of the schedule. However, in the course of its work it became aware of imperfections and omissions. The committee hopes that these will be remedied by international agreement and, to this end, is at present involved in drafting a fundamental revision of the schedule.

This edition of BS 1000 [678] includes modifications authorized in 'Extensions and Corrections to the UDC' (FID publication no. 248) up to and including Series 11, No. 1, dated April 1981. 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.

Scope

Under 678 is classed information about macromolecular materials (rubbers and plastics), including the processes, machinery and equipment associated with these materials.

Related subjects

- 539.2 Properties and structure of molecular systems
- 541.6 Chemical structure in general. Chemical structure in relation to the properties of substances. Chemistry of high polymers
- 543 Analytical chemistry
- 547 Organic chemistry
- 620.1 Materials testing. Defects of materials. Protection of materials
- 621.7 Plastic or chipless working, forming and treatment of materials
- 621.9 Working, machining with chip formation
- 633.91 Rubber plants
- 66.0 Process technology. Chemical engineering. Production and processes, basic operations, reactions and plant
- 665 Oils. Fats. Waxes. Adhesives. Gums. Resins
- 667.6 Coatings and coating technique. Paints. Varnishes. Lacquers
- 676.872 Articles of vulcanized fibre
- 677 Textile industry
- 691.17 Rubber, plastics and similar materials — Building

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 —1/—9 and .01/.07 special auxiliaries listed under 678 are applicable throughout the schedule. They may be detached and applied to any subdivision of 678 where the result forms a meaningful combination, e.g.

- 678—418 Tape
- 678.743.22 Polyvinyl chloride
- 678.743.22—418 Tape of polyvinyl chloride
- 678.027.3 Extrusion
- 678.743.41 PTFE
- 678.743.41.027.3 Extrusion of PTFE

There are '0/7 special auxiliaries given under 678.6, where their use is explained in detail.

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 $\cong$ 'subdivide as' means that the number preceding it may be divided in the same way as, and with meanings analogous to the subdivisions of, the number which follows it.

Abbreviations for plastics and rubber

Some of the plastics and rubbers given in the schedule (and a number which are not) are commonly abbreviated. Some of these abbreviations are given in the alphabetical subject index. A more complete list of abbreviations and their meanings will be found in BS 3502 : Part 1 and BS 3502 : Part 3.

SCHEDULE

678 INDUSTRIES BASED ON MACROMOLECULAR MATERIALS. RUBBER INDUSTRY. PLASTICS INDUSTRY

Special auxiliary subdivisions

678-1	PROPERTIES AND COMPOSITION OF SPECIFIC MATERIALS <i>Further particulars may be denoted by colon combination with the subdivisions of 53 or 54</i>	678-47	Perforated objects. Sieves made of perforated plate. Annular objects Objects with holes, bores <i>[cancelled]</i> use 678-472 <i>[cancelled]</i> — 62-254 Annular objects. Rings <i>[cancelled]</i> — 62-272, 678-44
-13	Copolymers <i>For details — 678.7-13</i>	-472	Forms and make-up of fibrous materials and products 678-48 ≈ 677-48
-19	Mixtures of macromolecular materials	-473	Objects with shapes other than those listed above <i>[cancelled]</i> — 678-431, 678-436
678-2	MACHINE COMPONENTS <i>Used chiefly with 678.05</i> 678-2 ≈ 62-2	-476	Powders. Grains
678-4	EXTERNAL SHAPE AND FORM OF PRODUCTS 678-4 ≈ 62-4, e.g.	-477	Powders
-40	<i>[cancelled]</i> — 678-405	-48/-484.9	Grains. Granules. Crumbs
-403	Gaseous state. Vapour state	-48	Small objects of irregular shape. Splinters.
-404	Liquid state	-49	Shavings. Chips etc.
.1	Mobile	-491	Objects made of irregular fibres
.2	Viscous	-492	<i>[cancelled]</i> — 678-405.8
.8	Colloidal state in the liquid phase. Gels.	.2	<i>[cancelled]</i> — 678-403/-404
.9	Foams	.3	DETAILS OF MACHINERY AND PLANT 678-5/-8 ≈ 62-5/-8 —678.05 Plant, machinery and equipment
-405	Semi-colloidal state. Pastes. Mashcs. Doughs	-493	
	Solid state <i>To be used only when it is necessary to emphasize the contrast with gaseous and liquid states</i>	-494	DERIVATIVES OBTAINED BY FURTHER TREATMENT 678-9 ≈ 66.09, e.g. 678-92 Decomposition products
-41	Flat objects, e.g. blocks, plate, sheet, strip	-496/-496.8	-941 Reduction products.
-412	Forms for further processing. Slabs	-498/-498.8	Hydrogenated derivatives
-413	Thick plate and sheet	678-5/-8	-943 Oxidation products.
-415	Thin plate and sheet	678-9	Oxygenated derivatives
-416	Very thin flat objects. Foil		-944 Halogenation products.
-417	Non-uniform flat objects		Chlorinated derivatives
.2	Corrugated sheet		-952 Isomerization products, e.g. cyclo-products
.3	<i>[cancelled]</i> — 678-417.4		
.4	Expanded sheet	678.0	GENERAL INFORMATION. PROPERTIES. ANALYSIS AND TESTING.
-418	Strip. Band. Ribbon. Tape		MANUFACTURING PROCESSES, PLANT AND EQUIPMENT. PRODUCTS AND THEIR APPLICATIONS <i>It is recommended that the following .0 special auxiliaries be not combined with main numbers. Colon combination is preferred, e.g.</i> 678.057.5:678.743.22 Plant for film casting of polyvinyl chloride
-419	Multilayer sheet, strip. Laminated sheet, strip	678.01	PROPERTIES. DEFECTS. CONSTITUTION. SERVICEABILITY. SAMPLING. ANALYSIS. TESTING <i>Further particulars may be denoted by colon combination, e.g.</i>
-42	Profiled objects. Sectional material	.01:53	Physical properties
-422	Solid sections	:531.7	Measurement of geometrical and mechanical quantities
.1	With curved boundaries. Round	:531.71	Linear measurement
.2	With straight boundaries in general. Beams. Posts	:532.61	Surface tension. Interfacial tension
.3	Triangular	:532.696.1	Wetting capacity
.4	Quadrangular	:532.73	Solubility
.5	Pentagonal	:532.78	Crystallization
.6	Hexagonal	:534	Acoustic properties
-423	Sections with shaped profiles, e.g. U-sections, T-section, Z-sections	:535	Optical properties
-426	Threads. Filaments. Fibres	:535.312	Reflection
-427	Objects made from threads. Rope. Yarn.	:535.32	Refraction. Refractive index
	Laces. Nets. Bundles	:535.34	Absorption
-428	Helical, spiral and twisted objects, e.g. screw-shaped objects. Coils	:535.37	Luminescence. Fluorescence
-43	Solid objects of various shapes	:535.6	Colours
-431	Short prismatic objects. Bricks. Tiles. Cubes	:535.68	Influences on the colour of bodies
-433	Edge shapes. Chamfers. Bevels. Mouldings. Roundings	:536	Thermal properties
-434	Short cylindrical and conical objects	:536.2	Heat conduction
-436	Spherical objects. Spheroidal objects	:536.413	Thermal expansion
-437	Streamlined objects		
-44	Shaped mouldings, including serrated mouldings. Mitres. Dovetails		
-45	Slotted objects. Grooved objects. Splined objects		
-46	Hollow objects. Material of hollow section		
-461	Open hollow sections		
-462	Closed hollow sections. Pipes. Tubes. Hose		
-465	Hemispherical objects. Cylindrical objects. Similar open hollow objects. Tubs. Beakers. Pots. Bottles. Barrels		
-467	<i>[cancelled]</i> — 678-46		

678.01:536.42	Change of state	678.017	Mechanical test methods
:536.468	Flammability. Combustibility		678.017 $\approx$ 620.17, e.g.
:536.485	Resistance to cold		678.017.2 Tensile tests
:536.495	Heat resistance		.3 Compression tests. Pressure tests
:536.63	Specific heat		.4 Bending strength tests
:537	Electrical properties. Magnetic properties		.5 Torsional strength tests
:537.226	Dielectric properties. Dielectric constant		.8 Hardness tests
:537.311	Electrical conduction		<i>Alternatively, colon combination with the subdivisions of 620.17 may be used</i>
:537.52	Electric discharges. Arc resistance		Material defects. Resistance to attack
:539	Properties associated with molecular structure	.019	678.019 $\approx$ 620.19
:539.2	Molecular structure		<i>Alternatively, colon combination with the subdivisions of 620.19 may be used</i>
:539.3	Elasticity. Deformation. Mechanics of elastic solids		Defects visible chiefly on the surface
	—678.017 Mechanical test methods	.1	Macroscopic irregularities
:539.32	Elasticity moduli	.13	Surface moulding faults
:539.37	Deformation in general. Deformability	.131	—678.028.4 Faults and difficulties in vulcanization and curing
:539.389	Relaxation properties. Recovery. Hysteresis		Cracks. Tears
:539.4	Strength		Blisters. Bubbles. Orange peel effect
:539.411	Compressive strength	.133	Roughness. Folds. Ripples
:539.411.5	Impact resistance	.134	Pitting. Knife lines. Sink marks
:539.412	Resistance to tension	.135	Warping
:539.412.1	Tear resistance	.136	Other macroscopic irregularities
:539.413	Flexural strength	.138	Microscopic irregularities
:539.414	Torsion strength	.139	Reflection faults. Surface dullness. Loss of gloss or lustre
:539.415	Shear strength	.14	Colour changes. Colour irregularities.
:539.416	Resistance to folding, winding, curving	.15	Discoloration. Tinge. Yellowing. Bloom.
:539.42	Tensile strength		Chalking. Segregation
:539.43	Resistance to repeated stresses. Fatigue resistance	.17	Spots. Specks
:539.433	Vibration resistance		Stains. Burn marks. 'Mica'. Silver streaking
:539.434	Creep strength	.172	Cloudiness
:539.5	Properties influencing deformability	.173	Internal defects
:539.52	Ductility	.174	Changes of consistency. Thickening.
:539.53	Hardness. Softness. Resistance to penetration. Resistance to wear	.2	Softening
:54	Chemical properties	.22	Alteration of homogeneity by liquid constituents. Sweating. Bleeding. Migration
:541.11	Thermochemical properties	.232	Alteration of homogeneity by gaseous constituents. Permeation. Gas development
:541.14	Photochemical properties		Structural defects
:541.18	Colloidal properties	.234	Solid impurities. Inclusions
:541.24	Molecular weight. Degree of polymerization		Internal cracks
:543	Chemical analysis	.24	Porosity
:543.061	Qualitative analysis	.245	Delamination
:543.062	Quantitative analysis	.246	Volume changes
:543.21	Gravimetric analysis	.247	Shrinkage
:543.24	Volumetric analysis. Titrimetric analysis	.249	Swelling
:543.41	Colour reactions. Flame coloration	.25	Physical action. Chemical and biological attack, damage and destruction. Resistance to attack
:543.42	Spectral analysis. Spectroscopy.	.252	Mechanical action. Erosion. Mechanical damage or destruction. Resistance to mechanical action
	Spectrometry	.253	Effect of atmospheric conditions. Moisture etc. Resistance to weathering
:543.426	Fluorescence analysis	.3	Effect of oxidizing agents (other than atmospheric)
:543.43	Colorimetric analysis		Chemical action (other than the above).
:543.54	Chromatography		Chemical corrosion
:543.81	Water content	.31	Effect of hot gases, hot vapours
:543.85	Saponification value		Effect of radiation, including light
:543.871	Saturation. Unsaturation		<i>Further particulars may be denoted by colon combination with 535—1/—3 or the subdivisions of 539.12</i>
:543.872	Oxidizability	.32	—678.01:535.68 Influences on the colour of bodies
	—678.019.391 Effect of time. Premature and natural ageing	.33	Effect of electric currents, discharges
:543.873	Flammability. Flash point		—678.01:537 Electrical properties.
:543.874	Combustibility. Ignition temperature	.34	Magnetic properties
:543.9	Biological analysis. Biological reactions		Effect of biological agents (microorganisms, moulds, plants, insects etc.)
:543.92	Organoleptic reactions	.35	Effect of time
:543.926	Characteristic smell	.36	<i>For resistance to atmospheric conditions and oxidizing agents — 678.019.32/.33</i>
:543.927	Characteristic taste		Premature and natural ageing
:548	Crystalline structure		Effect of storage conditions
.011	Manufacturing variables and other factors affecting properties		
.012	Chemical analysis. Determination of constituents, molecular complexity etc.	.37	
	<i>Chemical constituents may be denoted by colon combination with the subdivisions of 546/547</i>	.38	
.4	Molecular complexity. Molecular weight distribution. Chain length	.391	
.5	[cancelled] — 678.012		
.8	[cancelled] — 678.012		
.016	Serviceability tests (under practical conditions)	.8	
	678.016 $\approx$ 620.16	.396	
	<i>Alternatively, colon combination with the subdivisions of 620.16 may be used</i>		

678.02	MANUFACTURING PROCESSES AND OPERATIONS	678.021.7	Coagulation by drying
	<i>Principles and methods of macromolecular synthesis may be denoted by colon combination with the subdivisions of 542.9 or 66.09, e.g.</i>	.71	—678.021.96 Heat coagulation
	678.02:66.095.2 Polymerization. Addition polymerization	.712	Coagulation by spray drying
	:66.095.3 Condensation	.714	Without special additions. Hopkinson process. Krause process
	:66.097 Catalysis. Initiation. Inhibition	.72	With precautions against conglomeration of rubber particles
.021	Processes prior to compounding and/or forming	.73	Coagulation by drying in thin films
.1	Precoagulation processes. Treatment of latex	.8	Coagulation by mechanical drying
.12	Preservation	.82	Coagulation by biological methods
.122	Prevention of coagulation. Stabilization	.83	Coagulation by bacteria
	—678.041.3 Antiseptics. Antimicrobials	.832	Coagulation by enzymes not produced by bacteria
.123	Prevention of mould infection	.833	Coagulation by latex enzymes
	—678.041.2 Anticoagulants. Stabilizers	.9	Coagulation by papain
.124	Bleaching. Prevention of blackening or formation of black slabs	.92	Coagulation by other processes
	—678.041.7 Bleaching agents		Electrical coagulation
.13	Handling. Purifying		—621.359.3 Electrical precipitation from liquids — Electrical engineering
.131	Removal of monomers. Removal of low molecular weight fractions. Fractionation	.94	66.087.9 Electrocapillary applications. Electroprecipitation — Chemical technology
.132	Transfer, e.g. to coagulating tanks	.96	Ultrasonic coagulation
.133	Screening. Sieving	.97	Heat coagulation
.134	Skimming. Precoagulation. Purifying	.98	Coagulation by freezing out
.135	Determination of rubber content	.022	Agglomeration. Aggregation
	<i>Further particulars may be denoted by colon combination with the subdivisions of 531.756 or 543</i>		Treatment of coagulates
.14	Dilution with water	.1	<i>For untreated coagulates — 678.032</i>
.15	Concentration	.2	<i>For plant and machinery — 678.052</i>
.152	Concentration by evaporation	.22	Treatment of coherent coagulates in general
.153	Concentration by creaming agents	.23	Treatment before rolling out or sheeting
	—678.041.1 Creaming agents	.24	Removal of serum. Separation of suspensions and latices
.154	Concentration by centrifuging	.25	Storing of coagulum
.16	Homogenization. Blending	.26	Washing. Purifying
.17	Compounding	.3	Pressing
.172	Thickening	.4	Mechanical working-up for preparation of crepe
	—678.041.4 Thickening agents	.5	Crepe rolling process
.174	Sensitizing	.7	Preparation of double, four-ply and sole crepes
	—678.041.5 Sensitizers	.8	Drying of crepes
.18	Artificial dispersion. Redispersion	.9	Sheet rolling process
.2	Coagulation. Spontaneous coagulation	.023	Smoking of the sheets
.21	Coagulation theory		Treatment of incoherent coagulates, pearls etc.
.22	Coagulation in air		Size reduction. Compounding. Kneading. Separation. Screening
.23	Coagulation with exclusion of air. MCT process	.1	—678.04 Accessory materials. Additives
.3	Coagulation by mechanical processes	.2	Kneading. Masticating
.5	Coagulation by smoking		Pulverizing. Grinding. Separation. Screening
.52	Smoking by hand		—621.92 Abrasive materials and tools.
.522	Production of Para balls		Grinding and allied techniques.
.523	Production of Java Para		Crushing. Separation. Mixing
.53	Mechanical smoking. Byrne process	.22	Grinding
.6	Coagulation by addition of chemical products or natural materials containing such products	.23	Mechanical softening. Opening
	—678.041.6 Coagulants	.24	Pulverizing
.61	Addition of inorganic compounds in general	.26	Separation. Screening
.62	Addition of mineral acids	.262	Screening
.621	Addition of sulphuric acid	.263	Grain-size classification
.628	Addition of natural acidic products. Water from volcanic soils	.264	Grain-size averaging
.63	Addition of salts	.3	Mixing. Blending
.632	Addition of fluorides. Addition of fluorosilicates	.32	In powder form or other dry solid form
.636	Addition of alum	.33	In plastic form
.65	Addition of organic compounds in general	.332	On mills or other open apparatus
.66	Addition of acyclic organic acids	.334	In internal mixers. In Banbury mixers. In Werner-Pfleiderer mixers
.661	Addition of formic acid	.336	In extruders
.662	Addition of acetic acid	.35	In emulsion or suspension (colloidal state)
.67	Addition of other organic chemicals	.36	In solution
.671	Addition of alcohols	.024	Conversion into preforms, blanks etc. for moulding and forming
.672	Addition of sugar	.1	—678.027 Forming operations
.673	Addition of tanning materials. Tannic acid. Gambier	.2	Tableting. Pelletting. Briquetting etc.
.674	Addition of liquids containing acetic acid	.3	Granulating
.675	Addition of extracts, saps or other plant or fruit products. Assam. Coconut. Coffee. Cocoa	.4	Chipping
		.6	Block slicing
		.8	Cutting out and stamping of blanks or slugs
			Reworking, e.g. of rejects, scraps
			—678.028.6 Recycling processes
			Reclaiming processes

678.025	Intermediate operations	678.027.943	Pressing-in, e.g. reinforcement of asbestos goods
.1	Weighting. Metering	.95	Powder sintering moulding. Engels method
.2	Preheating. Drying	.96	Moulding of foam articles
.3	Cooling	.962	With press
.4	Purification. Filtration. Straining	.963	Without press
	For details — 66.06	.968	Foaming
.5	Transportation	.97	Skiving
.6	Assembly prior to forming or vulcanization, e.g. assembly of tyres, hoses, belts, conveyor belts	.98	Orientation
.7	Solvent recovery	.028	Curing. Vulcanizing. Reclaiming. Other chemical operations during or after forming
.026	Impregnation, coating and cladding with macromolecular compound. Reinforcing. Proofing. Bonding. Cementing. Decorating etc.		—678.043 Vulcanizing agents.
	—678.029.4 Joining, reinforcing, strengthening of surfaces	.1	Theory
	678.029.6 Impregnation, coating and cladding with protective materials	.2	Processes
.2	Impregnation	.22	Hot curing in sulphur bath
.3	Coating. Cladding	.24	Vulcanization in sulphur monochloride solution. Cold curing
.32	Immersion. Dipping	.25	Steam vulcanization
	—678.027.6 Dipping (forming operations)	.252	Hot air-steam vulcanization
.33	Varnishing. Lacquering	.253	Autoclave vulcanization. Pan vulcanization
.34	Spraying	.2	Water cures
.342	Air spraying	.4	Lead press cures
.343	Centrifugal spraying	.255	Steam vulcanization without mould. Open steam cure
.344	Dip-coating in powder. Fluidized-bed coating	.256	Continuous steam vulcanization
.345	Flame spraying	.26	Vulcanization with colloidal sulphur. Peachey process
.346	Electrostatic coating	.27	Dry-heat vulcanization
.36	Spreading. Spread coating	.271	Drum cures
.37	Electrodeposition	.273	Press cures. Mould cures
.38	Cladding	.274	Vacuum vulcanization
.027	Forming operations	.275	Hot air cures. Vulcanization without press
	—678.029 Machining. Fabricating.	.276	Continuous hot air cures
	Finishing	.277	High-frequency vulcanization.
	Special forms may be denoted by the —4 special auxiliaries	.278	Ultrahigh-frequency vulcanization
.2	Calendering	.28	Infra-red vulcanization
.22	Sheeting	.28	Self-cures. Vulcanization at room temperature
.23	Doubling	.292	Vulcanization and curing in solution
.24	Lining	.293	Vulcanization and curing with inorganic materials (other than sulphur or sulphur compounds mentioned above)
.25	Frictioning	.294	Vulcanization and curing with organic materials
.26	Profiling. Stamping	.295	Solarization. Vulcanization and curing by means of light
.3	Extrusion	.296	Radiation vulcanization. Radiation curing
.32	Extrusion and stretching	.2	Gamma vulcanization
.34	Extrusion coating	.3	Electron vulcanization
.36	Extrusion and blowing	.5	Thermoradiation vulcanization
.37	Extrusion and press moulding	.297	High-speed vulcanization
.38	Extrusion and casting	.298	Post-vulcanization
.39	Extrusion and other methods of moulding	.3	Rate and state of vulcanization and curing
.4	Spinning	.31	Technical factors and their effect on rate of cure
.42	Spinning and stretching	.32	Relationship between temperature and reaction velocity. Temperature coefficient
.5	Film casting		—541.127.3 Relationship between temperature and reaction velocity. Van't Hoff's law.
.6	Dipping		Temperature coefficient — Chemistry
	For dip coating — 678.026.32	.33	Volume changes after vulcanization and curing
.7	Moulding. Press moulding. Casting (in moulds)	.35	Mechanical criteria of vulcanization and curing
.72	Compression moulding. Premoulding. Breathing	.4	Faults and difficulties in vulcanization and curing
.73	Transfer moulding		—678.019 Material defects. Resistance to attack
.74	Injection moulding. Jet moulding. Offset injection moulding	.41	Gas development during vulcanization
.75	Cold moulding	.42	Appearance of shrinkage spots during vulcanization and curing
.76	Blow moulding. Fluid-pressure forming	.44	Crystallization of sulphur after vulcanization.
.77	Casting (in moulds)		Blooming
	—678.027.5 Film casting		—678.019.17 Colour changes. Colour irregularities. Discoloration.
.774	Hollow casting. Centrifugal casting		Tinge. Yellowing. Bloom.
.776	Polymerizing in moulds		Segregation
.78	Explosion moulding		
.9	Special non-plastic forming operations		
.92	Deep drawing		
.93	Low-pressure moulding		
.94	Lay-up methods		
.942	Laminating		
.2	Contact lay-up moulding		
.3	Flexible bag moulding		
.4	Vacuum injection process		

678.028.46	Prevulcanization of stock or mixing on rolls or during storage. Scorching. Bin curing	678.029.82	Dyeing
.47	Under-vulcanization. Partial vulcanization. Different degrees of vulcanization of parts of an object. Under-curing	.83	—678.047 Colouring materials. Dyes
.48	Over-vulcanization. Over-curing	.84	Printing. Decalcomania. Transfer printing
.5	Devulcanization	.86	Etching
.6	Recycling processes. Reclaiming processes	.87	Painting
	<i>For reclaimed rubber as filler — 678.046.1</i>	.93	Varnishing. Lacquering
	<i>For reclaimed rubber — 678.46</i>	.931	Dusting with powders
.029	Machining. Fabricating. Finishing	.932	Dusting with inorganic powders
.3	Machining. Fashioning	.933	Dusting with talc
	—678.027 Forming operations	.934	Dusting with mica
.34	Cutting. Routing. Drilling. Turning. Beveling. Profiling	.94	Dusting with organic powders, e.g. starch
	<i>Further particulars may be denoted by colon combination with the subdivisions of 621.9</i>	.98	Deodorization
.35	Sawing	.982	Final operations
.36	Punching. Stamping. Embossing	.983	Assembly
.37	Trimming. Burr removal	.984	Quality control
.38	Bending. Fashioning. Winding	.985	Sorting
.4	Joining, reinforcing, strengthening of surfaces		Packaging. Labelling
	<i>For reinforcing, cementing etc. with macromolecular compounds — 678.026</i>	678.03	RAW MATERIALS AND SEMI-PROCESSED MATERIALS (PRIMARIES AND INTERMEDIATES) FOR THE RUBBER AND PLASTICS INDUSTRIES
.42	Cementing		<i>For natural rubber-producing plants — 633.91</i>
	—621.792 Joining by adhesion or pressure. Bonding, gluing etc.	.031	<i>For finished products and articles — 678.06/.07</i>
.43	Welding		<i>For chemical raw materials — 66,678.4/.8</i>
	—621.791 Welding and allied techniques		Latex (crude latex)
.432	Hot air welding	.9	678.031 ≈ 678.021.1, e.g.
.433	Friction welding	.032	678.031.2 Preserved latex
.434	Press welding		.3 Purified latex
.436	Induction welding		.5 Concentrated latex
.437	High-frequency welding		.8 Artificial dispersions
.438	Ultrasonic welding		<i>For latex products — 678.061</i>
.44	Sewing. Stitching		Serum
.45	Mechanical attachment, e.g. with screws, rivets, staples	.1	Coagulates, e.g. raw, natural rubber (untreated, uncured), block, crepe, sheet
	<i>Further particulars may be denoted by colon combination with the subdivisions of 621.88</i>		Coagulum. Cup lumps. Untreated rubber
.46	Strengthening, mechanical reinforcing, e.g. with metal rivets, wires	.2	678.032.12/.19 ≈ 678.021.2/.9, e.g.
.5	Bonding. Combining with other materials	.24	678.032.15 Coagulum obtained by smoking
	678.029.5 ≈ 678.029.4	.27	.17 Spray-dried rubber
	<i>Materials may be denoted by colon combination, e.g.</i>	.3	Block rubber. Slabs. Worms
	678.029.5:669 Bonding with metal	.4	Purified
	:674 Bonding with wood	.5	Resin-free. Resin-poor
	:675 Bonding with leather	.51	Crepes
	:676 Bonding with paper	.52	Sole crepes
	:677 Bonding with textiles	.55	Dried crepes
.6	Impregnation, coating and cladding with protective materials	.6	First latex
	—678.026 Impregnation, coating and cladding with a macromolecular compound	.7	Blanket crepe
.64	Impregnation	.71	Smoked crepe
.65	Fireproofing	.75	Lower-grade crepes. Scrap rubber. Earth rubber. Compo. Skim rubber
.66	Coating. Cladding. Metallizing	.8	Sheet rubber (unsmoked)
.662	Painting	.033	<i>Further particulars may be denoted by the —4 special auxiliaries, e.g.</i>
.663	Spraying	.2	678.032.7 — 408.62 Flat sheet
.664	Hot pressing		.8 Ribbed sheet
.665	Electrochemically	.3	Standard sheets
.7	Finishing. Polishing. Surface hardening etc.		Off-quality sheets
.71	Baking. Drying	.034	Smoked sheets
.72	Seasoning		Compounded materials. Formulae
.73	Annealing		For impregnation, coating, cladding
.735	Flattening. Smoothing		678.033.2 ≈ 678.026
.74	Antistatic treatment		For moulding
.76	Polishing		678.033.3 ≈ 678.027
.762	Press polishing	678.04	Preforms of various shapes. Pellets. Tablets. Chips. Chunks etc.
.764	Mechanical polishing	.041	—678.024 Conversion into preforms, blanks etc. for moulding and forming
.77	Chemical polishing with solvents or vapours	.1	ACCESSORY MATERIALS. ADDITIVES
.78	Surface hardening		Latex additives
.8	Decorating. Bleaching. Dyeing. Colouring	.2	Creaming agents
	—667 Colour industries		—678.021.153 Concentration by creaming agents
.81	Bleaching		Anticoagulants. Stabilizers
	—678.041.7 Bleaching agents		—66.063.672 Stabilizing agents

ACCESSORY MATERIALS. ADDITIVES

Latex additives

Creaming agents

—678.021.153 Concentration by creaming agents

Anticoagulants. Stabilizers

—66.063.672 Stabilizing agents

678.021.122 Prevention of coagulation.

Stabilization

678.048 Antioxidants. Preservatives.

Stabilizers

678.041.3	Antiseptics. Antimicrobials	678.044.55	Furfural compounds
	—678.021.123 Prevention of mould infection	.6	Initiators
.4	Thickening agents	.7	Activators
	—678.021.172 Thickening	.8	Inorganic accelerators
.5	Sensitizers	.9	Other accelerators and catalysts
	—678.021.174 Sensitizing	.045	Vulcanization retarders. Polymerization inhibitors. Chain regulators
.6	Coagulants	.2	Vulcanization retarders. Polymerization inhibitors
	678.041.6 $\approx$ 678.021.6	.3	Chain regulators. Chain stoppers
.7	Bleaching agents	.046	Fillers. Extenders. Compounding ingredients exerting more than one action
	—678.021.124 Bleaching. Prevention of blackening or formation of black slabs		<i>For compounding and mixing — 678.023</i>
	678.029.81 Bleaching	.1	Rubber-containing materials, e.g. regenerated rubber
.8	Antifoam agents		—678.028.6 Recycling processes.
.042	Solvents		Reclaiming processes
	<i>Further particulars may be denoted by colon combination with the subdivisions of 546/547</i>		678.46 Regenerated sulphur derivatives.
.043	Vulcanizing agents. Cross-linking agents	.2	Reclaimed rubber
	—678.028 Curing. Vulcanizing. Reclaiming.	.3	Carbon black. Graphite
	Other chemical operations	.32	Mineral fillers. Inorganic fillers
	during or after forming	.34	Metals
.1	Sulphur	.36	Metal compounds, e.g. carbonates, sulphates
.3	Sulphur monochloride	.361	Silicon compounds
	—661.231 Sulphur chlorides — Chemical technology	.362	Silica gels. Alumogels. White black (aerosil)
.4	Peroxides	.363	Asbestos
.42	Inorganic peroxides	.364	Kaolin
.43	Organic peroxides, e.g. benzoyl peroxide	.365	Glass fillers. Quartzoid fillers
.5	Organo-element compounds.	.39	Mica
	Organo-metallic compounds	.5	Other mineral fillers
.52	Organo-tin compounds	.52	Vegetable fillers (other than rubber)
.53	Organo-silicon compounds	.53	Wood. Wood flour. Sawdust
.54	Organo-aluminium compounds	.54	Fruit husks. Nut shells. Peel etc.
.55	Organo-titanium compounds	.55	Cellulose
.59	Other organo-element compounds	.56	Cotton. Cotton linters. Rags. Cotton waste
.6	Selenium compounds	.58	Paper. Pulp
.7	Tellurium compounds	.6	Natural resins
.8	Metal oxides	.7	Animal fillers. Proteins. Leather waste, trimmings. Hide waste, trimmings. Wool
.9	Other vulcanizing and cross-linking agents	.72	Synthetic fillers
.91	Inorganic compounds	.73	Factice (brown or white)
.92	Organic compounds		Polysulphide rubbers and other synthetic rubbers
.93	Resins	.76	Synthetic fibres, synthetic fabrics, e.g. rayon, nylon
.044	Accelerators. Catalysts. Initiators. Activators	.78	Synthetic resins other than fibres or fabrics
	—66.097 Catalysis: accelerators, activators, stabilizers, inhibitors, retarders, carriers	.8	Additives with various actions
.1	Theory of the accelerating and retarding action of accelerators in curing	.82	Luminophores. Scintillators
.2	Amino compounds containing no sulphur	.83	Antistatic agents
.21	Amines	.84	Blowing agents. Porofor
.212	Aliphatic amines	.85	Antishrinkage agents
.213	Aromatic amines	.9	Other types of filler
.23	Guanidines	.047	Colouring materials. Dyes
.231	Diarylguanidines. Diphenylguanidine.		<i>For compounding and mixing — 678.023</i>
	Di-ortho-toluylguanidine	.2	<i>For decorating, dyeing and colouring — 678.029.8</i>
.232	Triarylguanidines		Dyes. Mordants
.27	Aldehyde-amines		<i>Further particulars may be denoted by colon combination with the subdivisions of 667.2</i>
.28	Aldehyde-ammonias	.6	Pigments, especially paint pigments
.281	Hexamethylenetetramine		<i>Further particulars may be denoted by colon combination with the subdivisions of 661.8 or 667.622</i>
.29	Alkaloids	.048	Antioxidants. Preservatives. Stabilizers
.3	Other nitrogen-containing compounds		—66.094.38 Retarded oxidation.
.32	Amides. Carbamides. Urea		Antioxidation
.35	Nitroso compounds		678.041.2 Anticoagulants. Stabilizers
.4	Sulphur compounds	.2	Amino compounds and other nitrogen-containing compounds
.41	Mercaptans	.21	Amines
.42	Thioacids	.212	Phenylamines. Diphenylamine etc.
.43	Thioamines	.213	Naphthylamines
.44	Thiocarbamates, e.g. zinc dimethyldithiocarbamate	.218	p-Nitrosodimethylaniline
.45	Thiocarbamides	.25	Aminophenol. Other aminohydroxy compounds
.452	Thiocarbanilide	.26	Aminoketone compounds
.46	Thiuramide sulphide. Other organic sulphides	.27	Aldehyde-amines
.47	Thiazoles. Thiazolines	.276	Aldehyde-naphthylamines
.472	Thiazylsulphides, e.g. benzothiazyl disulphide	.4	Sulphur-containing compounds. Thio compounds
.48	Xanthates. Xanthogenates		
.5	Oxygen compounds		
.54	Quinones, e.g. chloranil		

678.048.47	Thiazole	678.053	Grinding plant. Mixing plant. Classifying plant
.5	Oxygen compounds containing no nitrogen		678.053 $\approx$ 678.023, e.g.
.6	Organophosphorus compounds		678.053.2 Grinding mills. Pulverizing mills
.7	Resins		.3 Mixers. Blenders
.8	Natural (serum) substances		
.9	Ultra-violet absorbers. Other substances	.054	Preforming plant and machinery
.049	Softeners. Plasticizers. Wetting agents. Lubricants. Other minor additives	.1	Tableting machines. Briquetting machines
.1	Softeners in general	.2	Granulators
	—661.7 Organic substances	.3	Cutting machines
.11	Hydrocarbons. Acetals. Ketals. Carbonyl compounds	.32	Bias-cutting machines
.111	Aliphatic hydrocarbons	.33	Tape-cutting machines
.112	Aromatic hydrocarbons. Hydroaromatic hydrocarbons	.34	Thread-cutting machines
.113	Acetals	.4	Block-cutting plant and machinery
.114	Ketals	.6	Blank-cutting plant and machinery.
.115	Carbonyl compounds		Punching plant and machinery
.12	Alcohols	.055	Plant and equipment for intermediate operations. Heating and drying plant
.13	Esters		678.055 $\approx$ 678.025, e.g.
.14	Waxes		678.055.2 Heating plant. Drying plant
	<i>For details — 665.1/.3, 665.772</i>	.056	678.055.2 $\approx$ 66.04
.16	Glues	.057	Dipping plant. Spraying plant
	<i>For details — 665.93</i>		678.056 $\approx$ 678.026
.167	Gelatin	.2	Forming plant. Extruding machines. Moulding machines
.17	Tars		Calenders. Doubling calenders. Doubling rollers
	<i>For tar distillation industry — 662.7</i>		678.057.2 $\approx$ 678.027.2
.172	Wood tar	.3	Extruders
.173	Coal tar	.31	Single-screw extruders
.18	Pitch	.32	Twin-screw extruders. Multi-screw extruders
.19	Antisofteners		Screwless extruders. Ram extruders
.2	Asphalts. Bitumens	.33	Main parts of extruders
	—665.775 Asphalt bitumens	.37	Barrels
.3	Other mineral oil products	.371	Screws
.32	Liquid paraffin	.372	Throttle devices. End seals
.36	Paraffins	.373	Extruder heads. Dies
.37	Petroleum jelly	.374	Straight extruder die
.4	Vegetable oils. Fatty acids and their derivatives. Soaps	.1	Angular extruder die
	—665.3 Vegetable oils, fats, waxes and phosphatides	.2	Oblique-angle extruder die
.5	Animal oils	.3	Round extruder die
	—665.21 Oils of animal origin	.5	Slot extruder die
.6	Resins. Resin oils. Abietic acid	.6	Profiled extruder die
.7	Wetting agents. Emulsifiers. Peptizers	.7	Extruder heating and cooling systems
	—66.063.52 Wetting agents	.375	Extruder heaters
	66.063.612 Emulsifying agents	.2	<i>The fuel or heat source may be denoted by the —6 special auxiliaries listed under 62</i>
	661.185 Surface-active agents.		
	Detergents. Wetting agents.	.3	Coolers
	Foaming agents. Emulsifying agents. Flotation agents	.376	Receiving devices. Take-off devices.
.8	Odorants		Haul-off devices
.9	Other minor additives	.4	Spinning plant. Drawing plant
.91	Fireproofing agents	.5	Film-casting plant, machines and equipment
	—678.029.65 Fireproofing	.7	—678.056 Dipping plant. Spraying plant
.92	Antifreezing agents		Moulding presses. Moulding machines
.93	Lubricants. Mould lubricants	.72	678.057.7 $\approx$ 678.027.7
.99	Other additives	.74	Moulding presses
		.74	Moulds
678.05	PLANT. MACHINERY. EQUIPMENT	.745	Injection moulding machines
	<i>Design and construction of plant, machinery and equipment are classed here</i>	.1	Main parts of injection moulding machines
	<i>For information concerning both processes and plant — 678.02</i>	.2	Extruder
	<i>The —2 and 5/—8 special auxiliaries listed under 62 are applicable here</i>	.3	Heating chamber
.051	Plant and equipment for processes prior to compounding	.4	Injection unit
.15	Concentrating plant	.5	Locking unit
.2	Coagulating plant: tanks, containers etc.	.53	Moulds
.052	Plant for treatment of coagulates, crude rubber etc.	.6	Runners
.2	Washing plant. Pressing plant. Purifying plant	.7	Ejection system
.22	Plant for separation of suspensions and latices	.9	Heaters. Coolers
.27	Plant for aggregation		Special forming plant and equipment
.3	Rolls. Crepe and sheet rolls		678.057.9 $\approx$ 678.027.9, e.g.
.5	Drying plant		678.057.93 Low-pressure moulders
	—66.047 Drying — Chemical technology	.058	.942 Laminating plant
		.1	Vulcanization plant. Curing plant
		.2	Vulcanization pans
		.3	Vulcanization autoclaves
		.32	Vulcanization presses
		.33	For curing long sheets individually
		.34	Autoclave presses
		.35	Trunk presses
			Vulcanization presses with heated plates

678.058.36	Vulcanization presses with heated plates connected by flexible steam pipes	678.062	Uncured products. Unvulcanized products. Crude rubber products <i>For details — 678.032</i>
.39	Other types of vulcanization press		Uncurable products
.4	Hot-air stoves for vulcanization	.5	Cured products. Vulcanized products
.5	Vulcanizers for repairs, for used objects	.063	Curable products
.6	Recycling plant. Reclaiming plant	.5	Tyres. Tracks. Similar traction devices <i>For details — 629.11.012</i>
.059	Machining plant. Fabricating plant. Finishing plant	.065	Impregnated goods. Proofed goods. Fabrics etc.
	678.059 ≈ 678.029, e.g.	.066	Fabric-based goods, e.g. proofed fabrics
	678.059.3 Cutters. Saws. Fashioning machines	.2	Paper-based goods
	.4 Fabricating plant, e.g. for joining, welding	.3	Asbestos-based goods
	.5 Bonding plant	.4	Asbestos-rubber goods
	<i>For machinery details — 621.9</i>	.42	Asbestos-resin goods
		.43	Metal-based goods, e.g. rubberized, coated, lined goods
678.06	APPLICATIONS OF MACROMOLECULAR MATERIALS. FINISHED PRODUCTS <i>Under 678.06 are classed general applications and uses of rubber and plastic products, the details being denoted by colon combination, examples of which are given below</i> <i>Applications of particular materials may be denoted by adding the — 4 special auxiliaries to the appropriate subdivision of 678.4/.8, together with colon combination</i> <i>For primaries and intermediates — 678.03</i>	.6	Goods based on other materials
		.9	Formed objects and articles. Mouldings. Castings
678.06:542	Chemical laboratory apparatus and equipment	.067	Fabric-based goods
.615.4	Medical goods. Surgical goods	.2	Wood-particle plastics
.621	Engineering components	.3	Asbestos-based goods
.621—567	Shock absorbers	.4	Asbestos-rubber goods
.621—597	Brake blocks. Brake linings	.42	Asbestos-resin goods
.621—762	Pressure-tight joints. Jointings. Packings. Seals	.43	Asbestos-rubber-resin goods
		.45	Glass-based goods. Glass-fibre reinforced plastics
.621—315	Electric cables. Sheathing. Insulators	.5	Metal-based goods
.621.64	Fluid storage and distribution equipment	.6	Graphite-based goods
.621.643	Pipes. Hose	.7	Paper-based goods
.621.643.4	Pipe connections	.8	Goods based on other materials
.621.646	Pipe closures. Valves	.9	Decorated products. Painted products. Surface-finished products
.621.798	Packaging materials		
.621.825	Couplings	678.07	CLASSIFICATION ACCORDING TO SPECIAL CHARACTERISTICS
.621.852	Belt drives	.072	Thermosetting material in general
.621.867	Conveyor belting. Chutes		—678.6 Synthetic polycondensation products
.681.62	Printing presses. Rollers etc.	.073	Thermoplastic materials in general
.685.3	Footwear. Boots. Shoes		—678.5 Plastics, especially semi-synthetic plastics
.685.4	Gloves	.074	678.7 Synthetic polymerization products
.685.51	Luggage. Trunks. Bags		Elastomers. Rubber materials in general
.687	Clothing. Toilet requisites	.075	—678.4 Rubbers and other natural macromolecular materials
.687.9	Brushes. Brooms		678.7 Synthetic polymerization products
.688	Fancy goods. Toys	.076	Plastomers
.69.022	Walls	.077	—678.5 Plastics, especially semi-synthetic plastics
.69.024.1	Roofing	.078	Soft materials
.69.025.3	Flooring	.2	Hard materials. Rigid materials
.061	Latex products. Compositions and mixings, e.g. lubricants, greases, paints, lacquers, adhesives <i>For kinds of latex — 678.031</i>	.22	Stereo structure
		.23	Stereospecific polymers
		.24	Isotactic polymers
		.3	Syndiotactic polymers
			Stereoblock polymers
			Atactic polymers

Principal divisions

678.4	NATURAL RUBBER AND OTHER NATURAL MACROMOLECULAR MATERIALS CONTAINING CARBON AND HYDROGEN ONLY <i>For sampling, analysis, testing — 678.01</i> <i>For manufacturing processes and plant — 678.02/.05</i> <i>For elastomers, rubbery materials — 678.074</i> <i>For synthetic rubbers — 678.7</i>	678.4—4	Products of special shape or form 678.4—4 ≈ 678—4 <i>Further particulars may be denoted by colon combination, as under 678.06</i>
Special auxiliary subdivisions for 678.4		Principal divisions (continued)	
678.4—1	Properties. Composition <i>Further particulars may be denoted by colon combination with the subdivisions of 53 or 54, as under 678.01</i>	678.43	Low-sulphur-content derivatives. Soft vulcanized rubber <i>For compounding, processing etc. — 678.02</i>
		.44	High-sulphur-content derivatives. Hard vulcanized rubber. Ebonite. Vulcanite
		.46	Regenerated sulphur derivatives. Reclaimed rubber <i>For reclaiming processes — 678.028.6</i> <i>For reclaimed rubber as under — 678.036.1</i>