

Universal Decimal Classification —

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**UDC 681.7 Optical apparatus and
instruments**

UDC 025.45:681.7

Co-operating organizations

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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), 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.

Optical instruments and apparatus were previously classed in UDC 535 and UDC 681.4, but they have been brought together at UDC 681.7, this edition of which includes modifications authorized in “Extensions and Corrections to the UDC” 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 schedules up to date. Further information about this and other UDC publications is given on page 22. British Standards related to this part of BS 1000 are listed on the inside back cover.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Scope

Under 681.7 is classed information about optical instruments and apparatus, including the manufacture and construction details of optical elements. The theoretical aspects of optics come under 535.

Related subjects

- 159.937.51 Perception of colours. Colour as a visual sensation. Psychological theory of colour
- 159.937.52 Perception of space and extent. Localization of objects. Psychological optics other than colour theory
- 52 Astronomy. Astrophysics. Space research. Geodesy
- 53 Physics
- 543.4 Optical methods of analysis
- 611.84 The eye — Anatomy
- 612.84 Physiological optics. Vision
- 614.893 Protection of the eyes
- 617.7 Ophthalmology
- 621.3 Electrical engineering
- 628.9 Lighting. Illuminating engineering
- 666.22 Optical glasses
- 681.2 Instrument making. Instrumentation. Measuring instruments and their manufacture
- 7.017 Various optical effects — The arts
- 77 Photography

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 combinations 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 .01/.08 special auxiliary subdivisions listed at 681.7 are applicable throughout the schedule. They may be applied to any subdivision of 681.7 where the result forms a meaningful combination,

e.g.

681.7.023.7 Grinding and polishing

681.735 Contact lenses

681.735.023.7 Grinding and polishing of contact lenses

The –1/– 9 special auxiliary subdivisions listed at the beginning of UDC 62 are also applicable to this section.

Typographic presentation

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 subdivided in the same way as, and with meanings analogous to the subdivisions of, the number which follows it.

SCHEDULE

UDC 681.7 Optical apparatus and instruments

Special auxiliary subdivisions for 681.7

681.7-1/-9	PARTS AND DETAILS OF OPTICAL INSTRUMENTS <i>The special auxiliary subdivisions -1/-9 are listed in full under 62</i>	681.7.022 .6	Chemical processes
		.7	Sagging
		.8	Trimming (scoring and breaking)
681.7.01	THEORY, GENERAL CHARACTERISTICS OF OPTICAL INSTRUMENTS	681.7.023	MACHINING (WITH CHIP FORMATION)
		.2	Cutting
		.3	Drilling. Boring
		.4	Milling
681.7.012	ABERRATIONS	.42	Of plane and spherical surfaces
.1	Monochromatic aberrations	.43	Of toric, aspherical and other special faces
.2	Chromatic aberrations	.5	Edge shaping
.3	Aberrations of the third order (Seidel's aberrations)	.52	With any desired cross-section
		.53	With circular cross-section (rounding), without reference to the optical axis
681.7.013	CHARACTERISTICS AND PERFORMANCE OF OPTICAL INSTRUMENTS	.54	With circular cross-section (centring of lenses and mirrors) with reference to the optical axis
.1	Ray path	.55	Chamfering. Beveling
.2	Light-gathering power	.7	Grinding and polishing →666.1.053.525 Grinding optical glasses
.22	Aperture	.72	Of plane and spherical surfaces
.24	Luminous intensity	.73	Of toric, aspherical and other special faces
.25	Light transmittance		
.3	Field of vision. Vignetting	681.7.024	ASSEMBLY OF OPTICAL GLASSES. BONDING
.5	Focal length	.2	Fine cementing
.6	Image scale	.3	Optical contacting. Wringing
.62	Magnification (or reduction)	.4	Fusion
.622	Constant magnification	.5	Soldering
.624	Variable magnification	.6	Welding
.63	Image ratio 1 : 1		
.7	Depth of focus	681.7.025	MOUNTING AND RETENTION FOR WORKING
.8	Quality of the image	.2	Coarse cementing
.82	Resolving power. Separation of lines. Optical transfer function	.22	Block cementing
.84	Image contrast. Degree of freedom from reflection. Ghosts. Double images. Brilliance	.23	Patch cementing
681.7.014	METHODS OF USE OF OPTICAL INSTRUMENTS	.3	Mechanical clamping
.2	Visual method	4	Pneumatic clamping
.3	Electrical, electronic image processing	.5	Optical contacting. Wringing
.7	Photographic recording	681.7.026	OTHER PROCESSES IN OPTICAL MANUFACTURE
681.7.015	WAVELENGTH RANGE OF OPTICAL INSTRUMENTS	.2	Decementing
.2	Infra-red light	.3	Cleaning
.3	Visible light	.4	Varnishing. Lacquering
.4	Ultra-violet light	.5	Lettering. Graduation marking. Graticules
681.7.02	METHODS OF PRODUCTION OF OPTICAL ELEMENTS	.52	Engraving
		.53	Etching
		.54	Photographic methods
681.7.022	CHIPLESS WORKING	.6	Thin-film processes
.2	Casting	681.7.027	SELECTION. PRESCRIPTION. ASSEMBLY
.3	Moulding	.2	Selection and fitting of lenses
.32	Directly from the molten glass	.4	Selection of frame
.33	After resoftening of prepared pieces of glass	.5	Fitting of frame
.4	Rolling	.6	Insertion of lenses into the frame. Final working of complete spectacles
.5	Evaporation		

681.7.028	TESTING. ADJUSTMENT OF OPTICAL APPARATUS	681.7.052 .5	Equipment for depositing thin films
.1	Combinations of lenses, including experimental combinations	.6	Furnaces. Kilns
.12	Accessories	.62	Cementing kilns
.13	Pairing of optical elements	.63	Hotplates
.2	Correction. Adjustment	.64	Drying kilns
.22	Adjustment devices	.65	Annealing, tempering furnaces
.24	Adjustment methods	681.7.053	MACHINERY
681.7.03	MATERIALS FOR THE MANUFACTURE OF OPTICAL APPARATUS <i>Alternatively, the common auxiliaries of materials (Table I(k) –03) may be used instead of the subdivisions of .03</i>	.2	General production and preparation machinery
.031	Optical glasses. Glass for spectacles. Coloured glass. Filter glass	.22	Cutting machines
.032	Mirror glass. Plate glass	.23	Drilling machines. Boring machines
.033	Technical glass	.24	Edge-forming machines
.034	Quartz glass	.3	Machinery for producing plane and spherical surfaces
.035	Glass ceramics	.32	Machine tools
.036	Crystals	.33	Milling machines for individual optical elements
.037	Plastics	.34	Blockholder milling machines
.038	Metal	.35	Grinding and polishing machines. Lapping machines
681.7.04	AUXILIARY MATERIALS FOR THE MANUFACTURE OF OPTICAL APPARATUS <i>Alternatively, the common auxiliaries of materials (Table I(k) –03) may be used instead of the subdivisions of .04</i>	.36	Centring machines
.042	Abrasives. Grinding materials	.37	Chamfering machines
.2	Natural abrasives, e.g. diamond, silica sand, natural corundum	.4	Machinery for producing other surfaces
.3	Artificial abrasives, e.g. electrocorundum, carborundum, boron carbide, synthetic diamonds	.42	Machine tools
.043	Polishing agents, e.g. rouge, chromium oxide, rare earth oxides	.44	Blockholder milling machines
.044	Carriers, media for polishing agents	.45	Grinding and polishing machines. Lapping machines
.2	Pitch	.46	Centring machines
.3	Textiles	681.7.054	TOOLS AND EQUIPMENT
.4	Plastics	.2	Tools for working the optical surfaces
.045	Cements	.22	Carriers. Cementing supports. Cementing equipment. Lens holders. Supports for optical contacting, wringing
.2	Coarse cements for mounting and retention of glass for working	.23	Grinding tools, e.g. discs, wheels
.3	Fine cements for bonding optical elements	.24	Polishing tools
.046	Solvents, e.g. spirit, acetone, benzene, ether	.25	Pressure tools
.047	Coatings. Varnishes. Lacquers	.26	Setting, adjusting devices and tools
.2	Auxiliary coatings (which do not remain on the optical element)	.3	Diamond tools
.3	Optical coatings (which remain on the optical element)	.4	Machine tools
.048	Coolants. Lubricants (oils etc)	.42	Chucks. Carrier pegs, pins. Ball, base-plate sockets
.049	Optical cloths, textiles for cleaning, e.g. abrasive, polishing, wiping cloths, wadding etc	.43	Grinding spindles
681.7.05	EQUIPMENT, PLANT, MACHINERY, TOOLS, INSTRUMENTS FOR MANUFACTURE OF OPTICAL INSTRUMENTS	.5	Centring clamps. Centring chucks for cementing
681.7.052	PLANT. INSTALLATIONS	.6	Washing frames
.2	Cleaning plant	681.7.055	MEASURING AND TESTING TOOLS. TESTING EQUIPMENT
.3	Ventilation plant	.2	Apparatus for measuring or testing distances, diameters and centring
.4	Coolant pumps	.22	Length and thickness measuring apparatus
		.23	Limit gauges
		.24	Concentricity testing devices
		.3	Surface quality testing apparatus using interference
		.32	Trial glasses
		.33	Apparatus for measuring and testing plane surfaces. Apparatus for measuring and testing spherical surfaces. Spherometers
		.34	Apparatus for measuring and testing aspherical surfaces
		.4	Apparatus for measuring properties of materials

681.7.055.42	Refractive index measuring apparatus	681.7.064.425	Liquids
.43	Schlieren testing apparatus	.426	Gases
.44	Strain testing apparatus	.43	Interference filters
.5	Angle measuring devices	.44	Polarization interference filters. Lyot filters
.6	Devices for measuring focal lengths	.45	Thin films for optical purposes
.7	Apparatus, <i>e.g.</i> cleaning cloths, magnifiers, for testing for surface defects (scratches etc)	.452	Full mirror coating
681.7.056	CONTROL TECHNIQUES	.453	Partial mirror coating
681.7.057	TRANSPORT EQUIPMENT. PACKAGING MATERIAL	.454	Antireflection films
.2	Transport vehicles <i>Further particulars may be denoted by colon combination with the subdivisions of 629</i>	.455	Electrically conducting films
.3	Transport containers	.456	Protective films
.5	Holding frames and protecting mats (wood and foam)	.458	Special films, <i>e.g.</i> phototropic films
.6	Packing (lining and wrapping) paper	.46	Wedge filters
681.7.06	OPTICAL ELEMENTS	.49	Other filters
681.7.062	MIRRORS	.5	Plates with aspherical surfaces
.1	Mirrors according to the position and curvature of the reflecting surface	.6	Plates with graduations
.12	Front surface mirrors	.62	Graticules
.122	Front surface mirrors, convex	.63	Measuring scales
.123	Front surface mirrors, concave	.64	Divided circles
.124	Front surface mirrors, plane	.7	Plates with various surface elements
.14	Rear surface mirrors	.8	Polarizers
.142	Rear surface mirrors, convex	.82	Polarization prisms made from crystalline material
.143	Rear surface mirrors, concave	.83	Reflection polarizers
.144	Rear surface mirrors, plane	.832	Sets of glass plates
.2	Plane mirrors	.833	Infra-red selenium polarizers
.3	Spherical mirrors	.84	Dichroic polarizers
.4	Aspherical mirrors other than plane mirrors	.842	Polarizers made from crystalline plates (tourmaline)
.42	Conic section mirrors (parabolic, elliptical, hyperbolic)	.844	Polarizers consisting of plastics foil with artificial dichroism
.43	Other aspherical mirrors. Axially symmetrical mirrors	681.7.065	PRISMS
.44	Cylindrical mirrors	.2	Prisms according to the type of surface and means for achieving reflection
.47	Elastically deformable mirrors	.22	Prisms with plane surfaces and completely reflecting coatings
.6	Liquid mirrors	.23	Prisms with plane surfaces, parts of whose surfaces are reflecting
.7	Polygonal mirrors (arranged parallel to axis). Pyramidal mirrors. Triple mirrors. Stepped mirrors. Honeycomb mirrors (hexagonal mirror arrays)	.25	Prisms with curved surfaces and completely reflecting coatings
.8	Mirrors for beam division	.26	Prisms with curved surfaces, parts of whose surfaces are reflecting
681.7.063	GRATINGS (WITH VARIOUS RULINGS ON VARIOUS SURFACES). CROSSED GRATINGS	.3	Prisms according to their function
681.7.064	APERTURES. PLATES. FILTERS. DIVIDED CIRCLES. DIVISIONS	.32	Reflecting single prisms
.2	Stops (diaphragms). Apertures	.33	Reflecting compound prisms
.3	Plane-parallel plates with special mechanical and geometrical-optical properties (with polished, matt coated surfaces)	.34	Reflecting prism combinations with beam splitting
.4	Plane-parallel plates with special transmission and electrical properties.	.35	Simple refracting prisms
.42	Filters	.36	Variable and non-variable refracting prism combinations
.422	Absorption filters	.37	Prisms with filter effect. Prisms with polarizing effect
.423	Coloured glass. Phototropic glass	681.7.066	LENSES
.424	Foils (films)	→681.735	Contact lenses
	Plastics		<i>The material may be denoted by colon combination, e.g.</i>
			681.7.066:678.746.22 Polystyrene lenses (<i>but see note under 681.7.03</i>)
			<i>The application may be denoted by adding .066 to the relevant main number, e.g. 681.732.066 Spectacle lenses</i>
		.2	Spherical lenses
		.22	Convex lenses. Converging lenses

681.7.066.221	Single focus	681.7.067.26	Optical projection objectives
.222	Bifocal	681.7.067.26 $\cong$ 681.7.067.25	
.223	Trifocal	.27	Cinematographic objectives
.224	Multifocal	681.7.067.27 $\cong$ 681.7.067.25	
.23	Concave lenses. Diverging lenses	.28	Microscope objectives
	681.7.066.23 $\cong$ 681.7.066.22	.281	Dry objectives
.3	Aspherical lenses	.282	Immersion objectives
.32	Spherical-cylindrical lenses. Cylindrical lenses.	.2	For immersion in water
	Toric lenses	.3	For immersion in glycerol
	681.7.066.32 $\cong$ 681.7.066.2	.4	For immersion in oil
.35	Fresnel (echelon, step) lenses. Drum lenses.	.283	Mirror (catoptric) objectives
	Zone lenses	.285	Catadioptric objectives
	681.7.066.35 $\cong$ 681.7.066.2	.288	Special types of objective
.36	Prismatic lenses	.2	Contrast objectives. Phase-contrast objectives
	681.7.066.36 $\cong$ 681.7.066.2	.3	Interference microscope objectives
.4	Lenses without optical effect (without refracting power)	.4	Photomicrographic objectives
	<i>For spectacles without optical effect</i> $\rightarrow$ 681.738	.5	Objectives with a large working distance
.6	Protective lenses. Safety lenses	.6	Objectives for high-temperature, low-temperature investigations. Uncemented objectives for heated microscopes
	$\rightarrow$ 614.893 Protection of the eyes—	.3	Eyepieces (oculars)
	Accident prevention	.32	Eyepieces according to the number of components
	<i>For protective spectacles</i> $\rightarrow$ 681.738	.321	One component
.62	For protection against mechanical effects	.322	Two components
.63	For protection against radiation	.323	Three components
.8	Lenses with special effects	.324	Four or more components
.82	With special colour effect	.33	Huygens eyepieces
.83	For the correction of aniseikonia	.34	Ramsden eyepieces
681.7.067	LENS SYSTEMS. OBJECTIVES. OCULARS. INVERTING SYSTEMS. CONDENSERS	.35	Kellner eyepieces
	$\rightarrow$ 535.31 Geometrical optics	.36	Orthoscopic eyepieces. Compensating eyepieces. Periplanatic eyepieces
	771.351 Photographic camera objectives, lenses	.37	Projection eyepieces
.2	Objectives	.38	Quartz eyepieces. Measuring eyepieces. Special eyepieces
.22	Lens objectives in general	.381	Quartz eyepieces
.221	Simple converging lens objectives	.382	Measuring eyepieces
.222	Achromatic. Plane achromatic	.383	Ocular graticules, revolving
.2	Achromatic	.384	Microscope micrometers
.4	Plane achromatic	.385	Binocular tube attachments
.223	Apochromatic. Plane apochromatic	.386	Eyepieces for more than one observer. Eyepieces with pointers
.2	Apochromatic	.387	Eyepieces with aspherical lenses
.4	Plane apochromatic	.388	Autocollimation eyepieces
.224	Monochromatic	.5	Inverting systems, in particular for telescopes
.226	Fluorite objectives. Plane fluorite objectives	.52	Lens inverting systems
.2	Fluorite objectives	.53	Prism inverting systems
.4	Plane fluorite objectives	.54	Mirror inverting systems
.23	Mirror (catoptric) objectives in general	.55	Combined systems
.24	Telescope objectives	.7	Condensers
.242	Lens objectives	.72	Bright-field condensers
.243	Mirror (catoptric) objectives	.725	Bright-field condensers for azimuth illumination
.25	Photographic objectives	.73	Dark-field condensers
.252	Lens objectives	.735	Dark-field condensers for azimuth illumination
.2	Wide-angle lenses	.74	Mixed-light condensers with light of various colours
.3	Standard lenses	.745	Mixed-light condensers for azimuth illumination
.4	Telephoto lenses	.75	Change-over condensers
.5	Special lenses	.755	Change-over condensers for azimuth illumination
.6	Zoom lenses		
.253	Mirror (catoptric) objectives		
.254	Anamorphic lenses (anamorphotes)		