

**CPC****COOPERATIVE PATENT CLASSIFICATION****G02B**

**OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS** ( [G02F](#) takes precedence; measuring-instruments, see the relevant subclass of [G01](#) , e.g. optical rangefinders [G01C](#) ; testing of optical elements, systems, or apparatus [G01M 11/00](#) ; spectacles [G02C](#) ; sound lenses [G10K 11/30](#) ; electron and ion "optics" [H01J](#) ; X-ray "optics" [H01J](#) , [H05G 1/00](#) ; optical elements structurally combined with electric discharge tubes [H01J 5/16](#) , [H01J 29/89](#) , [H01J 37/22](#) ; microwave "optics" [H01Q](#) ; combination of optical elements with television receivers [H04N 5/72](#) ; heating arrangements specially adapted for transparent or reflecting areas [H05B 3/84](#) ; { optical apparatus [42H](#) } )

**NOTE**

In this subclass, the following terms are used with the meanings indicated :

- "simple lens or prism" means a single lens or prism;
- "compound lens or prism" means an optical member, the constituents of which either are close together without air-space or (except in group [G02B 11/00](#) ) are "in broken contact", i.e. with the air-space between the constituents having no essential optical influence;
- "objective" means a lens or an optical system designed to produce a real image of a real object;
- "eyepiece" means a lens or an optical system designed to produce a virtual image for viewing by the eye or by another optical system;
- "front" or "rear" is determined by looking from the more distant conjugate.

**WARNING**

The following IPC groups are not used in the CPC classification system. Subject matter covered by these groups is classified in the CPC groups:  
[G02B 11/00](#) - [G02B 11/34](#) covered by [G02B 9/00](#) and subgroups and [G02B 13/00](#) and subgroups

**Guidance heading:****G02B 1/00**

**Optical elements characterised by the material of which they are made** ( compositions of optical glasses [C03C 3/00](#) ; cements for glass [C03C 27/00](#) )

**G02B 1/002**

- . { made of materials engineered to provide properties not available in nature, e.g. metamaterials }

**G02B 1/005**

- .. { made of photonic crystals or photonic band gap materials ( photonic band-gap structures or photonic lattices in integrated optics [G02B 6/1225](#) ; photonic band-gap structures or photonic lattices in optical fibres [G02B 6/02295](#) ) }

**G02B 1/007**

- .. { made of negative effective refractive index materials }

**G02B 1/02**

- . made of crystals, e.g. rock-salt, semi-conductors ( [G02B 1/08](#) takes precedence )

**G02B 1/04**

- . made of organic materials, e.g. plastics ( [G02B 1/08](#) takes precedence )

**NOTE**

In this group the use of specific polymers is indicated using the relevant subdivision of [C08L](#) preceded by a plus sign

- G02B 1/041 . . { Lenses }
- G02B 1/043 . . . { Contact lenses }
- G02B 1/045 . . { Light guides }
- G02B 1/046 . . . { characterised by the core material }
- G02B 1/048 . . . { characterised by the cladding material }
  
- G02B 1/06 . made of fluids in transparent cells
  
- G02B 1/08 . made of polarising materials
  
- G02B 1/10 . { Coatings produced by application to, or surface treatment of, optical elements, e.g. anti-reflection coatings ( [G02B 1/08](#) takes precedence; reflecting coatings [G02B 5/08](#) ; coating of glass in general [C03C 17/00](#) ) }
- G02B 1/105 . . { Protective coatings ( anti-fouling arrangements [G02B 27/00 C](#) ) }
- G02B 1/11 . . Anti-reflection coatings
- G02B 1/111 . . . { using one or more layers comprising organic material ( [G02B 1/118](#) takes precedence ) }
- G02B 1/113 . . . { using one or more layers comprising inorganic material only ( [G02B 1/118](#) takes precedence ) }
- G02B 1/115 . . . . { Multilayers }
- G02B 1/116 . . . . . { including one or more conducting layers }
- G02B 1/118 . . . { having sub-wavelength surface structures designed to provide an enhanced transmittance, e.g. moth-eye structures ( anti-glare structures [G02B 5/02](#) , surface plasmon devices [G02B 5/008](#) ) }
- G02B 1/12 . . by surface treatment, e.g. by irradiation { surface treatment of glass by irradiation [C03C 23/0005](#) }
  
- G02B 3/00** **Simple or compound lenses** ( artificial eyes [A61F 2/14](#) ; spectacle lenses or contact lenses for the eyes [G02C](#) ; watch or clock glasses [G04B 39/00](#) )
  
- G02B 3/0006 . { Arrays ( [G02B 3/02](#) , [G02B 5/188](#) take precedence ) }
- G02B 3/0012 . . { characterised by the manufacturing method }
- G02B 3/0018 . . . { Reflow, i.e. characterized by the step of melting microstructures to form curved surfaces, e.g. manufacturing of moulds and surfaces for transfer etching }
- G02B 3/0025 . . . { Machining, e.g. grinding, polishing, diamond turning, manufacturing of mould parts }
- G02B 3/0031 . . . { Replication or moulding, e.g. hot embossing, UV-casting, injection moulding }
- G02B 3/0037 . . { characterized by the distribution or form of lenses }
- G02B 3/0043 . . . { Inhomogeneous or irregular arrays, e.g. varying shape, size, height }
- G02B 3/005 . . . { arranged along a single direction only, e.g. lenticular sheets ( [G02B 3/0043](#) takes precedence ) }
- G02B 3/0056 . . . { arranged along two different directions in a plane, e.g. honeycomb }

- arrangement of lenses ( [G02B 3/0043](#) takes precedence; miniaturised objectives for electronic devices employing wafer level optics [G02B 13/0085](#) ) }
- G02B 3/0062 . . . { Stacked lens arrays, i.e. refractive surfaces arranged in at least two planes, without structurally separate optical elements in-between }
- G02B 3/0068 . . . . { arranged in a single integral body or plate, e.g. laminates or hybrid structures with other optical elements ( [G02B 5/1885](#) , [G02B 17/002](#) , [G02B 27/2214](#) take precedence ) }
- G02B 3/0075 . . { characterized by non-optical structures, e.g. having integrated holding or alignment means }
- G02B 3/0081 . { having one or more elements with analytic function to create variable power ( variable magnification in general [G02B 15/00](#) ) }
- G02B 3/0087 . { with index gradient }
- G02B 3/02 . with non-spherical faces ( [G02B 3/10](#) takes precedence )
- G02B 3/04 . . with continuous faces that are rotationally symmetrical but deviate from a true sphere, { e.g. so called "aspheric" lenses }
- G02B 3/06 . . with cylindrical or toric faces
- G02B 3/08 . . with discontinuous faces, e.g. Fresnel lens { ( diffractive Fresnel lenses [G02B 5/18 Z](#) ) }
- G02B 3/10 . Bifocal lenses ; Multifocal lenses
- G02B 3/12 . Fluid-filled or evacuated lenses
- G02B 3/14 . . of variable focal length
- G02B 5/00** **Optical elements other than lenses** ( light guides [G02B 6/00](#) ; optical logic elements [G02F 3/00](#) )
- G02B 5/001 . { Axicons, waxicons, reflexicons }
- G02B 5/003 . { Light absorbing elements }
- G02B 5/005 . { Diaphragms ( for cameras [G03B 9/02](#) ) }
- G02B 5/006 . . { cooled }
- G02B 5/008 . { Surface plasmon devices ( diffractive gratings with a pitch less than or comparable to the wavelength [G02B 5/1809](#) ; surface plasmons in integrated optics [G02B 6/1226](#) ; optical analysis of materials by means of surface plasmons [G01N 21/553](#) ) }
- G02B 5/02 . Diffusing elements ; Afocal elements
- G02B 5/0205 . . { characterised by the diffusing properties }
- G02B 5/021 . . . { the diffusion taking place at the element's surface, e.g. by means of surface roughening or micro-prismatic structures }
- G02B 5/0215 . . . . { the surface having a regular structure }
- G02B 5/0221 . . . . { the surface having an irregular structure ( [G02B 5/0226](#) takes precedence ) }
- G02B 5/0226 . . . . { having particles on the surface }
- G02B 5/0231 . . . . { the surface having micro-prismatic or micro-pyramidal shape ( macroscopic

- prism arrays [G02B 5/045](#) ) }
- G02B 5/0236 ... { the diffusion taking place within the volume of the element }
- G02B 5/0242 .... { by means of dispersed particles }
- G02B 5/0247 .... { by means of voids or pores }
- G02B 5/0252 ... { using holographic or diffractive means }
- G02B 5/0257 ... { creating an anisotropic diffusion characteristic, i.e. distributing output differently in two perpendicular axes }
- G02B 5/0263 ... { with positional variation of the diffusing properties e.g. gradient or patterned diffuser }
- G02B 5/0268 .. { characterized by the fabrication or manufacturing method }
- G02B 5/0273 .. { characterized by the use }
- G02B 5/0278 ... { used in transmission }
- G02B 5/0284 ... { used in reflection }
- G02B 5/0289 ... { used as a transflector }
- G02B 5/0294 ... { adapted to provide an additional optical effect e.g. anti-reflection or filter }
  
- G02B 5/04 . Prisms
- G02B 5/045 .. { Prism arrays }
- G02B 5/06 .. Fluid-filled or evacuated prisms
  
- G02B 5/08 . Mirrors { ( [vehicle mirrors involving special optical features B60R 1/08](#) ) }
- G02B 5/0808 .. { having a single reflecting layer ( [G02B 5/0883](#) , [G02B 5/0891](#) take precedence ) }
- G02B 5/0816 .. { Multilayer mirrors, i.e. having two or more reflecting layers ( [G02B 5/0883](#) , [G02B 5/0891](#) take precedence ) }
- G02B 5/0825 ... { the reflecting layers comprising dielectric materials only }
- G02B 5/0833 .... { comprising inorganic materials only }
- G02B 5/0841 .... { comprising organic materials, e.g. polymers }
- G02B 5/085 ... { at least one of the reflecting layers comprising metal }
- G02B 5/0858 .... { the reflecting layers comprising a single metallic layer with one or more dielectric layers }
- G02B 5/0866 ..... { incorporating one or more organic, e.g. polymeric layers }
- G02B 5/0875 .... { the reflecting layers comprising two or more metallic layers }
- G02B 5/0883 .. { with a refractive index gradient ( [rugate filters G02B 5/289](#) ) }
- G02B 5/0891 .. { Ultraviolet ( UV ) mirrors ( apparatus for microlithography exposure [G03F 7/70](#) ; X-ray multilayer structures [G21K 1/06](#) ) }
- G02B 5/09 .. Multifaceted or polygonal mirrors { , e.g. polygonal scanning mirrors; Fresnel mirrors }
- G02B 5/10 .. with curved faces
  
- G02B 5/12 . Reflex reflectors
- G02B 5/122 .. cube corner, trihedral or triple reflector type
- G02B 5/124 ... plural reflecting elements forming part of a unitary plate or sheet
- G02B 5/126 .. including curved refracting surface
- G02B 5/128 ... transparent spheres being embedded in matrix
- G02B 5/13 ... plural curved refracting elements forming part of a unitary body

- G02B 5/132 . . . with individual reflector mounting means
- G02B 5/134 . . . . including a threaded mounting member
- G02B 5/136 . . plural reflecting elements forming part of a unitary body ( [G02B 5/124](#) takes precedence )
  
- G02B 5/18 . Diffraction gratings { ( holographic optical elements [G02B 5/32](#) , [G03H](#) ; integrally combined with optical fibres [G02B 6/02](#) G; for coupling light guides [G02B 6/34](#) ; integrally combined with optical integrated light guides [G02B 6/12](#) ; grating systems [G02B 27/44](#) ) }
- G02B 5/1809 . . { with pitch less than or comparable to the wavelength }
- G02B 5/1814 . . { structurally combined with one or more further optical elements, e.g. lenses, mirrors, prisms or other diffraction gratings ( [G02B 5/189](#) takes precedence ) }
- G02B 5/1819 . . . { Plural gratings positioned on the same surface, e.g. array of gratings ( plural diffractive elements positioned sequentially along the optical path [G02B 27/4272](#) ) }
- G02B 5/1823 . . . . { in an overlapping or superposed manner }
- G02B 5/1828 . . { having means for producing variable diffraction ( controlling the direction of light by means of one or more diffracting elements [G02B 26/0808](#) ; acousto-optical elements [G02F 1/11](#) , [G02F 1/33](#) ; electro- or magneto-optical diffraction [G02F 1/292](#) , [G02F 1/2955](#) ) }
- G02B 5/1833 . . { comprising birefringent materials ( birefringent elements per se [G02B 5/3083](#) ) }
- G02B 5/1838 . . { for use with ultraviolet radiation or X-rays }
- G02B 5/1842 . . { Gratings for image generation ( [G02B 5/1847](#) takes precedence ) }
- G02B 5/1847 . . { Manufacturing methods }
- G02B 5/1852 . . . { using mechanical means, e.g. ruling with diamond tool, moulding }
- G02B 5/1857 . . . { using exposure or etching means, e. g. holography, photolithography, exposure to electron or ion beams }
- G02B 5/1861 . . { Reflection gratings characterised by their structure, e.g. step profile, contours of substrate or grooves, pitch variations, materials ( [G02B 5/1809](#) , [G02B 5/1828](#) , [G02B 5/1833](#) , [G02B 5/1838](#) and [G02B 5/1847](#) take precedence ) }
- G02B 5/1866 . . { Transmission gratings characterised by their structure, e.g. step profile, contours of substrate or grooves, pitch variations, materials ( [G02B 5/1809](#) , [G02B 5/1828](#) , [G02B 5/1833](#) , [G02B 5/1838](#) and [G02B 5/1847](#) take precedence ) }
- G02B 5/1871 . . . { Transmissive phase gratings }
- G02B 5/1876 . . { Diffractive Fresnel lenses; Zone plates; Kinoforms ( [G02B 5/18 L](#) , [G02B 5/1847](#) take precedence; optical systems having diffractive correction means [G02B 27/0037](#) ; Fresnel lenses operating by refraction [G02B 3/08](#) ) }
- G02B 5/188 . . . { Plurality of such optical elements formed in or on a supporting substrate }
- G02B 5/1885 . . . . { Arranged as a periodic array }
- G02B 5/189 . . . { Structurally combined with optical elements not having diffractive power }
- G02B 5/1895 . . . . { such optical elements having dioptric power }
  
- G02B 5/20 . Filters ( polarising elements [G02B 5/30](#) ; { manufacturing optical filters by photographic processes [G03C 7/12](#) , by lithographic processes [G03F 7/0007](#) ) }
- G02B 5/201 . . { in the form of arrays }
- G02B 5/202 . . { comprising a gas or vapour }
- G02B 5/203 . . { having holographic or diffractive elements ( diffraction gratings per se [G02B 5/18](#) ; holographic elements per se [G02B 5/32](#) ; generating the spectrum using diffraction elements [G01J 3/18](#) ) }

- G02B 5/204 .. { in which spectral selection is performed by means of a conductive grid or array, e.g. frequency selective surfaces ( for use with wavelengths longer than the infra-red light [H01Q 15/0006](#) ) }
- G02B 5/205 .. { Neutral density filters }
- G02B 5/206 .. { comprising particles embedded in a solid matrix }
- G02B 5/207 .. { comprising semiconducting materials }
- G02B 5/208 .. { for use with infra-red or ultraviolet radiation, e.g. for separating visible light from infra-red and/or ultraviolet radiation }
- G02B 5/22 .. Absorbing filters { ( [G02B 5/201](#) to [G02B 5/208](#) take precedence ) }
- G02B 5/223 ... { containing organic substances, e.g. dyes, inks or pigments }
- G02B 5/226 ... { Glass filters }
- G02B 5/23 ... Photochromic filters
- G02B 5/24 ... Liquid filters ( [G02B 5/23](#) takes precedence )
- G02B 5/26 .. Reflecting filters ( [G02B 5/28](#) takes precedence )
- G02B 5/265 ... { involving total internal reflection }
- G02B 5/28 .. Interference filters
- G02B 5/281 ... { designed for the infra-red light }
- G02B 5/282 .... { reflecting for infra-red and transparent for visible light, e.g. heat reflectors, laser protection }
- G02B 5/283 ... { designed for the ultraviolet }
- G02B 5/284 ... { of etalon type comprising a resonant cavity other than a thin solid film, e.g. gas, air, solid plates ( etalons for fibre optic multiplexing [G02B 6/29358](#) ; etalons for spectral measurement [G01J 3/26](#) ) }
- G02B 5/285 ... { comprising deposited thin solid films ( [G02B 5/281](#) to [G02B 5/289](#) take precedence; multilayered film filters for fibre optic multiplexing [G02B 6/29361](#) ) }
- G02B 5/286 .... { having four or fewer layers, e.g. for achieving a color effect }
- G02B 5/287 .... { comprising at least one layer of organic material }
- G02B 5/288 .... { comprising at least one thin film resonant cavity, e.g. in bandpass filters }
- G02B 5/289 ... { Rugate filters }
- G02B 5/30 . Polarising elements ( light-modulating devices [G02F 1/00](#) )
- G02B 5/3008 .. { comprising dielectric particles, e.g. birefringent crystals embedded in a matrix }
- G02B 5/3016 .. { involving passive liquid crystal elements ( optical properties of liquid crystals [G02F 1/0063](#) ; polarising elements associated with active liquid crystal devices [G02F 1/133528](#) ) }
- G02B 5/3025 .. { Polarisers, i.e. arrangements capable of producing a definite output polarisation state from an unpolarised input state ( [G02B 5/3008](#) , [G02B 5/3016](#) take precedence ) }
- G02B 5/3033 ... { in the form of a thin sheet or foil, e.g. Polaroid }
- G02B 5/3041 .... { comprising multiple thin layers, e.g. multilayer stacks }
- G02B 5/305 ..... { including organic materials, e.g. polymeric layers }
- G02B 5/3058 ... { comprising electrically conductive elements, e.g. wire grids, conductive particles }
- G02B 5/3066 ... { involving the reflection of light at a particular angle of incidence, e.g. Brewster's angle }
- G02B 5/3075 ... { for use in the UV ( [G02B 5/3066](#) takes precedence ) }



G02B 5/3083      ..      { Birefringent or phase retarding elements ( [G02B 5/3008](#) , [G02B 5/3016](#) take precedence; systems for polarisation control [G02B 27/286](#) ; manufacturing phase modulating patterns by lithographic processes [G03F 7/001](#) ) }

G02B 5/3091      ...      { for use in the UV }

G02B 5/32      .      { Birefringent or phase retarding elements ( [G02B 5/3008](#) , [G02B 5/3016](#) take precedence; systems for polarisation control [G02B 27/286](#) ; manufacturing phase modulating patterns by lithographic processes [G03F 7/001](#) ) }

## G02B 6/00

### Light guides

G02B 6/0001      .      { specially adapted for lighting devices or systems ( lighting or signalling on vehicles using light guides [B60Q 1/00](#) ; lighting devices for vehicle interior using light guides [B60Q 3/002](#) ; lighting devices mounted on the vehicle rear part using light guides [F21S 48/2225](#) ; lighting devices for vehicle dashboards [B60Q 3/04](#) ; measuring arrangements having light conducting pointers [G01D 13/265](#) ; illumination of liquid crystal displays [G02F 1/13357](#) ; illuminated signs [G09F 13/00](#) ) }

G02B 6/0003      ..      { the light guides being doped with fluorescent agents }

G02B 6/0005      ..      { the light guides being of the fibre type ( [G02B 6/0003](#) takes precedence ) }

G02B 6/0006      ...      { Coupling light into the fibre ( in general [G02B 6/4298](#) ) }

G02B 6/0008      ...      { the light being emitted at the end of the fibre }

G02B 6/001      ...      { the light being emitted along at least a portion of the lateral surface of the fibre }

G02B 6/0011      ..      { the light guides being planar or of plate-like form }

G02B 6/0013      ...      { Means for improving the coupling-in of light from the light source into the light guide ( coupling light into light guides in general [G02B 6/42](#) ) }

G02B 6/0015      ....      { provided on the surface of the light guide or in the bulk of it }

G02B 6/0016      .....      { Grooves, prisms, gratings, scattering particles or rough surfaces }

G02B 6/0018      .....      { Redirecting means on the surface of the light guide }

G02B 6/002      .....      { by shaping at least a portion of the light guide, e.g. with collimating, focussing or diverging surfaces }

G02B 6/0021      .....      { for housing at least a part of the light source, e.g. by forming holes or recesses }

G02B 6/0023      ....      { provided by one optical element, or plurality thereof, placed between the light guide and the light source, or around the light source }

G02B 6/0025      .....      { Diffusing sheet or layer; Prismatic sheet or layer }

G02B 6/0026      .....      { Wavelength selective element, sheet or layer, e.g. filter or grating }

G02B 6/0028      .....      { Light guide, e.g. taper }

G02B 6/003      .....      { Lens or lenticular sheet or layer }

G02B 6/0031      .....      { Reflecting element, sheet or layer }

G02B 6/0033      ...      { Means for improving the coupling-out of light from the light guide }

G02B 6/0035      ....      { provided on the surface of the light guide or in the bulk of it }

G02B 6/0036      .....      { 2-D arrangement of prisms, protrusions, indentations or roughened surfaces }

G02B 6/0038      .....      { Linear indentations or grooves, e.g. arc-shaped grooves or meandering grooves, extending over the full length or width of the light guide }

G02B 6/004      .....      { Scattering dots or dot-like elements, e.g. micro-beads, scattering particles, nano-particles }

G02B 6/0041	.....	{ provided in the bulk of the light guide }
G02B 6/0043	.....	{ provided on the surface of the light guide }
G02B 6/0045	.....	{ by shaping at least a portion of the light guide }
G02B 6/0046	.....	{ Tapered light guide, e.g. wedge-shaped light guide }
G02B 6/0048	.....	{ with stepwise taper }
G02B 6/005	....	{ provided by one optical element, or plurality thereof, placed on the light output side of the light guide }
G02B 6/0051	.....	{ Diffusing sheet or layer }
G02B 6/0053	.....	{ Prismatic sheet or layer; Brightness enhancement element, sheet or layer }
G02B 6/0055	.....	{ Reflecting element, sheet or layer }
G02B 6/0056	....	{ for producing polarisation effects, e.g. by a surface with polarizing properties or by an additional polarizing elements }
G02B 6/0058	....	{ varying in density, size, shape or depth along the light guide }
G02B 6/006	.....	{ to produce indicia, symbols, texts or the like }
G02B 6/0061	.....	{ to provide homogeneous light output intensity }
G02B 6/0063	....	{ for extracting light out both the major surfaces of the light guide }
G02B 6/0065	...	{ Manufacturing aspects; Material aspects }

**NOTE**

When classifying in this group, classification must also be made in one or more of the groups of [G02B 6/0013](#) or [G02B 6/0033](#) for the related device aspects

G02B 6/0066	...	{ characterised by the light source being coupled to the light guide }
G02B 6/0068	....	{ Arrangements of plural sources, e.g. multi-colour light sources }
G02B 6/007	....	{ Incandescent lamp or gas discharge lamp }
G02B 6/0071	.....	{ with elongated shape, e.g. tube }
G02B 6/0073	....	{ Light emitting diode (LED) }
G02B 6/0075	...	{ Arrangements of multiple light guides ( <a href="#">G02B 6/0028</a> takes precedence ) }
G02B 6/0076	....	{ Stacked arrangements of multiple light guides of the same or different cross-sectional area }
G02B 6/0078	....	{ Side-by-side arrangements, e.g. for large area displays }
G02B 6/008	.....	{ of the partially overlapping type }
G02B 6/0081	...	{ Mechanical or electrical aspects of the light guide and light source in the lighting device peculiar to the adaptation to planar light guides, e.g. concerning packaging }
G02B 6/0083	....	{ Details of electrical connections of light sources to drivers, circuit boards, or the like }
G02B 6/0085	....	{ Means for removing heat created by the light source from the package ( <a href="#">heat extraction or cooling elements for semiconductor light sources in general H01L 33/64</a> ) }
G02B 6/0086	....	{ Positioning aspects }
G02B 6/0088	.....	{ of the light guide or other optical sheets in the package }
G02B 6/009	.....	{ of the light source in the package ( <a href="#">G02B 6/0021</a> takes precedence ) }
G02B 6/0091	.....	{ of the light source relative to the light guide ( <a href="#">G02B 6/0021</a> takes



		precedence ) }
G02B 6/0093	....	{ Means for protecting the light guide }
G02B 6/0095	....	{ Light guides as housings, housing portions, shelves, doors, tiles, windows, or the like }
G02B 6/0096	..	{ the lights guides being of the hollow type }
G02B 6/02	.	Optical fibre with cladding { with or without a coating } ( <a href="#">mechanical structures for providing tensile strength and external protection G02B 6/44</a> )
G02B 6/02004	..	{ characterised by the core effective area or mode field radius }
G02B 6/02009	...	{ Large effective area or mode field radius, e.g. to reduce nonlinear effects in single mode fibres }
G02B 6/02014	....	{ Effective area greater than 60 square microns in the C band, i.e. 1530-1565 nm }
G02B 6/02019	.....	{ Effective area greater than 90 square microns in the C band, i.e. 1530-1565 nm }
G02B 6/02023	....	{ Based on higher order modes, i.e. propagating modes other than the LP01 or HE11 fundamental mode ( <a href="#">mode converters G02B 6/14</a> ) }
G02B 6/02028	...	{ Small effective area or mode field radius, e.g. for allowing nonlinear effects ( <a href="#">non-linear optical waveguide devices G02F 1/365</a> ) }
G02B 6/02033	..	{ Core or cladding made from organic material, e.g. polymeric material ( <a href="#">G02B 1/04 takes precedence</a> ) }
G02B 6/02038	...	{ with core or cladding having graded refractive index }
G02B 6/02042	..	{ Multicore optical fibres }
G02B 6/02047	..	{ Dual mode fibre ( <a href="#">G02B 6/105 takes precedence</a> ) }
G02B 6/02052	..	{ comprising optical elements other than gratings, e.g. filters ( <a href="#">comprising gratings G02B 6/02 G</a> ) }
G02B 6/02057	..	{ comprising gratings }
G02B 6/02061	...	{ Grating external to the fibre and in contact with the fibre, e.g. evanescently coupled, gratings applied to the fibre end ( <a href="#">mechanically induced in the fibre G02B 6/02071</a> , <a href="#">surface relief on the fibre G02B 6/02066</a> ) }
G02B 6/02066	...	{ Gratings having a surface relief structure, e.g. repetitive variation in diameter of core or cladding }
G02B 6/02071	...	{ Mechanically induced gratings, e.g. having microbends ( <a href="#">G02B 6/02066 takes precedence</a> ; <a href="#">mode converters G02B 6/14</a> ) }
G02B 6/02076	...	{ Refractive index modulation gratings, e.g. Bragg gratings }
G02B 6/0208	....	{ characterised by their structure, wavelength response ( <a href="#">G02B 6/02114</a> , <a href="#">G02B 6/02171</a> , <a href="#">G02B 6/02195</a> take precedence; multiple layer cores or claddings <a href="#">G02B 6/036</a> , <a href="#">protective coverings G02B 6/4429</a> ) }
G02B 6/02085	.....	{ characterised by the grating profile, e.g. chirped, apodised, tilted, helical }
G02B 6/02095	.....	{ Long period gratings, i.e. transmission gratings coupling light between core and cladding modes }
G02B 6/021	.....	{ characterised by the core or cladding or coating, e.g. materials, radial refractive index profiles, cladding shape }
G02B 6/02104	.....	{ characterised by the coating external to the cladding, e.g. coating influences grating properties }
G02B 6/02109	.....	{ having polarization sensitive features, e.g. reduced photo-induced birefringence }
G02B 6/02114	....	{ characterised by enhanced photosensitivity characteristics of the fibre, e.g.

		hydrogen loading, heat treatment ( treatment of glass fibres by ion diffusion, implantation, radiation, <a href="#">C03C 25/60</a> , <a href="#">C03C 25/62</a> ) }
<a href="#">G02B 6/02119</a>	.....	{ Photosensitivity profiles determining the grating structure, e.g. radial or longitudinal }
<a href="#">G02B 6/02123</a>	....	{ characterised by the method of manufacture of the grating ( photolithography <a href="#">G03F 7/0005</a> ) }
<a href="#">G02B 6/02128</a>	.....	{ Internal inscription, i.e. grating written by light propagating within the fibre, e.g. "self-induced" }
<a href="#">G02B 6/02133</a>	.....	{ using beam interference }
<a href="#">G02B 6/02138</a>	.....	{ based on illuminating a phase mask }
<a href="#">G02B 6/02142</a>	.....	{ based on illuminating or irradiating an amplitude mask, i.e. a mask having a repetitive intensity modulating pattern }
<a href="#">G02B 6/02147</a>	.....	{ Point by point fabrication, i.e. grating elements induced one step at a time along the fibre, e.g. by scanning a laser beam, arc discharge scanning ( <a href="#">G02B 6/02133</a> and <a href="#">G02B 6/02142</a> take precedence ) }
<a href="#">G02B 6/02152</a>	.....	{ involving moving the fibre or a manufacturing element, stretching of the fibre ( <a href="#">G02B 6/02147</a> takes precedence ) }
<a href="#">G02B 6/02171</a>	....	{ characterised by means for compensating environmentally induced changes }
<a href="#">G02B 6/02176</a>	.....	{ due to temperature fluctuations }
<a href="#">G02B 6/0218</a>	.....	{ using mounting means, e.g. by using a combination of materials having different thermal expansion coefficients }
<a href="#">G02B 6/02185</a>	.....	{ based on treating the fibre, e.g. post-manufacture treatment, thermal aging, annealing ( annealing glass fibres <a href="#">C03B 37/15</a> ) }
<a href="#">G02B 6/0219</a>	.....	{ based on composition of fibre materials }
<a href="#">G02B 6/02195</a>	....	{ characterised by means for tuning the grating }
<a href="#">G02B 6/022</a>	.....	{ using mechanical stress, e.g. tuning by compression or elongation, special geometrical shapes such as "dog-bone" or taper ( <a href="#">G02B 6/02204</a> takes precedence; optical modulation using photo-elastic effect <a href="#">G02F 1/0131</a> ) }
<a href="#">G02B 6/02204</a>	.....	{ using thermal effects, e.g. heating or cooling of a temperature sensitive mounting body ( optical modulation using thermo-optic effect <a href="#">G02F 1/0147</a> ) }
<a href="#">G02B 6/02209</a>	....	{ Mounting means, e.g. adhesives, casings ( <a href="#">G02B 6/02171</a> and <a href="#">G02B 6/02195</a> take precedence ) }
<a href="#">G02B 6/02214</a>	..	{ tailored to obtain the desired dispersion, e.g. dispersion shifted, dispersion flattened }
<a href="#">G02B 6/02219</a>	...	{ Characterised by the wavelength dispersion properties in the silica low loss window around 1550 nm, i.e. S, C, L and U bands from 1460-1675 nm }
<a href="#">G02B 6/02223</a>	....	{ Dual window fibres, i.e. characterised by dispersion properties around 1550 nm and in at least another wavelength window, e.g. 1310 nm }
<a href="#">G02B 6/02228</a>	....	{ Dispersion flattened fibres, i.e. having a low dispersion variation over an extended wavelength range }
<a href="#">G02B 6/02233</a>	.....	{ having at least two dispersion zero wavelengths }
<a href="#">G02B 6/02238</a>	.....	{ Low dispersion slope fibres }
<a href="#">G02B 6/02242</a>	.....	{ having a dispersion slope <0.06 ps/km/nm <sup>2</sup> }
<a href="#">G02B 6/02247</a>	....	{ Dispersion varying along the longitudinal direction, e.g. dispersion managed fibre }
<a href="#">G02B 6/02252</a>	....	{ Negative dispersion fibres at 1550 nm }

G02B 6/02257	.....	{ Non-zero dispersion shifted fibres, i.e. having a small negative dispersion at 1550 nm, e.g. ITU-T G.655 dispersion between - 1.0 to - 10 ps/nm.km for avoiding nonlinear effects }
G02B 6/02261	.....	{ Dispersion compensating fibres, i.e. for compensating positive dispersion of other fibres }
G02B 6/02266	....	{ Positive dispersion fibres at 1550 nm }
G02B 6/02271	.....	{ Non-zero dispersion shifted fibres, i.e. having a small positive dispersion at 1550 nm, e.g. ITU-T G.655 dispersion between 1.0 to 10 ps/nm.km for avoiding nonlinear effects }
G02B 6/02276	....	{ Dispersion shifted fibres, i.e. zero dispersion at 1550 nm }
G02B 6/0228	...	{ Characterised by the wavelength dispersion slope properties around 1550 nm ( <a href="#">G02B 6/02228</a> takes precedence ) }
G02B 6/02285	...	{ Characterised by the polarisation mode dispersion ( <a href="#">PMD</a> ) properties, e.g. for minimising PMD ( <a href="#">fabrication methods for minimising PMD</a> <a href="#">C03B 37/02745</a> ) }
G02B 6/0229	..	{ characterised by nanostructures, i.e. structures of size less than 100 nm, e.g. quantum dots }
G02B 6/02295	..	{ Microstructured optical fibre ( <a href="#">polarisation properties thereof</a> <a href="#">G02B 6/105</a> and <a href="#">G02B 6/024</a> ) }
G02B 6/023	...	{ having different index layers arranged around the core for guiding light by reflection, i.e. 1D crystal, e.g. omniguide }
G02B 6/02304	....	{ Core having lower refractive index than cladding, e.g. air filled, hollow core }
G02B 6/02309	...	{ Structures extending perpendicularly or at a large angle to the longitudinal axis of the fibre, e.g. photonic band gap along fibre axis }
G02B 6/02314	...	{ Plurality of longitudinal structures extending along optical fibre axis, e.g. holes }
G02B 6/02319	....	{ characterised by core or core-cladding interface features }
G02B 6/02323	.....	{ Core having lower refractive index than cladding, e.g. photonic band gap guiding }
G02B 6/02328	.....	{ Hollow or gas filled core }
G02B 6/02333	.....	{ Core having higher refractive index than cladding, e.g. solid core, effective index guiding }
G02B 6/02338	.....	{ Structured core, e.g. core contains more than one material, non-constant refractive index distribution in core, asymmetric or non-circular elements in core unit, multiple cores, insertions between core and clad }
G02B 6/02342	....	{ characterised by cladding features, i.e. light confining region }
G02B 6/02347	.....	{ Longitudinal structures arranged to form a regular periodic lattice, e.g. triangular, square, honeycomb unit cell repeated throughout cladding }
G02B 6/02352	.....	{ Complex periodic lattices or multiple interpenetrating periodic lattices, e.g. unit cell having more than two materials, partially internally coated holes, for multiple bandgaps }
G02B 6/02357	.....	{ Property of longitudinal structures or background material varies radially and/or azimuthally in the cladding, e.g. size, spacing, periodicity, shape, refractive index, graded index, quasiperiodic, quasicrystals }
G02B 6/02361	.....	{ Longitudinal structures forming multiple layers around the core, e.g. arranged in multiple rings with each ring having longitudinal elements at substantially the same radial distance from the core, having rotational symmetry about the fibre axis }
G02B 6/02366	.....	{ Single ring of structures, e.g. "air clad" }

G02B 6/02371	.....	{ Cross section of longitudinal structures is non-circular }
G02B 6/02376	.....	{ Longitudinal variation along fibre axis direction, e.g. tapered holes }
G02B 6/0238	.....	{ Longitudinal structures having higher refractive index than background material, e.g. high index solid rods }
G02B 6/02385	....	{ Comprising liquid, e.g. fluid filled holes }
G02B 6/0239	....	{ Comprising means for varying the guiding properties, e.g. tuning means }
G02B 6/02395	..	{ Glass optical fibre with a protective coating, e.g. two layer polymer coating deposited directly on a silica cladding surface during fibre manufacture ( <a href="#">G02B 6/02052</a> , <a href="#">G02B 6/02057</a> , <a href="#">G02B 6/105</a> , <a href="#">G02B 6/024</a> , <a href="#">G02B 6/032</a> , <a href="#">G02B 6/14</a> take precedence; optical cables, i.e. comprising protective structures external to the protective coating such as a jacket or plural coated optical fibres <a href="#">G02B 6/44</a> ; coating on fibre gratings <a href="#">G02B 6/02104</a> ; coating of glass to obtain optical fibres <a href="#">C03C 25/104</a> ; multilayer core or cladding <a href="#">G02B 6/036</a> ; reinforcing splice joints <a href="#">G02B 6/2558</a> ) }
G02B 6/024	..	with polarisation maintaining properties
G02B 6/028	..	with core or cladding having graded refractive index { ( <a href="#">G02B 6/02033</a> , <a href="#">G02B 6/02295</a> take precedence ) }
G02B 6/0281	...	{ Graded index region forming part of the central core segment, e.g. alpha profile, triangular, trapezoidal core ( <a href="#">G02B 6/0288</a> , <a href="#">G02B 6/0286</a> take precedence ) }
G02B 6/0283	...	{ Graded index region external to the central core segment, e.g. sloping layer or triangular or trapezoidal layer ( <a href="#">G02B 6/0288</a> , <a href="#">G02B 6/0286</a> take precedence ) }
G02B 6/0285	....	{ Graded index layer adjacent to the central core segment and ending at the outer cladding index }
G02B 6/0286	...	{ Combination of graded index in the central core segment and a graded index layer external to the central core segment ( <a href="#">G02B 6/0288</a> takes precedence ) }
G02B 6/0288	...	{ Multimode fibre, e.g. graded index core for compensating modal dispersion }
G02B 6/032	..	with non solid core or cladding { <a href="#">G02B 6/02295</a> takes precedence }
G02B 6/036	..	core or cladding comprising multiple layers { ( <a href="#">multicore optical fibres G02B 6/02042</a> ; microstructured properties <a href="#">G02B 6/02295</a> ; omniguide fibres <a href="#">G02B 6/023</a> ) }
G02B 6/03605	...	{ Highest refractive index not on central axis }
G02B 6/03611	....	{ Highest index adjacent to central axis region, e.g. annular core, coaxial ring, centreline depression affecting waveguiding }
G02B 6/03616	...	{ Optical fibres characterised both by the number of different refractive index layers around the central core segment, i.e. around the innermost high index core layer, and their relative refractive index difference }

**NOTE**

A layer is characterised by an abrupt change in refractive index gradient, e.g. by the layer having a maximum or minimum or the layer being between two points of inflexion, such that a graded boundary as in a trapezoidal core is not counted as a separate layer. 2. The innermost high index core layer is the first layer starting from the central core after which the refractive index decreases. 3. + and - refer respectively to the relative refractive index difference increase/decrease of adjacent layers starting from the innermost highest index core layer and continuing in a radially outward direction

G02B 6/03622	....	{ having 2 layers only }
G02B 6/03627	.....	{ arranged - + }

- G02B 6/03633 . . . . . { arranged - - }
- G02B 6/03638 . . . . { having 3 layers only }
- G02B 6/03644 . . . . . { arranged - + - }
- G02B 6/0365 . . . . . { arranged - - + }
- G02B 6/03655 . . . . . { arranged - + + }
- G02B 6/03661 . . . . { having 4 layers only }
- G02B 6/03666 . . . . . { arranged - - + }
- G02B 6/03672 . . . . . { arranged - - + - }
- G02B 6/03677 . . . . . { arranged - + + - }
- G02B 6/03683 . . . . . { arranged - - + + }
- G02B 6/03688 . . . . { having 5 or more layers }
- G02B 6/03694 . . . { Multiple layers differing in properties other than the refractive index, e.g. attenuation, diffusion, stress properties }
  
- G02B 6/04 . . . formed by bundles of fibres ( [G02B 6/24](#) takes precedence )
- G02B 6/06 . . . the relative position of the fibres being the same at both ends, e.g. for transporting images
- G02B 6/065 . . . { with dynamic image improvement }
- G02B 6/08 . . . with fibre bundle in form of plate
  
- G02B 6/10 . . . of the optical waveguide type ( [G02B 6/02](#) , [G02B 6/24](#) take precedence; devices or arrangements for the control of light by electric, magnetic, electro-magnetic or acoustic means [G02F 1/00](#) ; transferring the modulation of modulated light [G02F 2/00](#) ; optical logic elements [G02F 3/00](#) ; optical analogue/digital converters [G02F 7/00](#) ; stores using opto-electronic devices [G11C 11/42](#) , { using electro-optical elements [G11C 13/047](#) } ; electric waveguides [H01P](#) ; transmission of information by optical means [H04B 10/00](#) ; multiplex systems [H04J 14/00](#) )
  
- G02B 6/102 . . . { for infra-red and ultra-violet radiation }
- G02B 6/105 . . . { having optical polarisation effects }
- G02B 6/107 . . . { Subwavelength-diameter waveguides, e.g. nanowires }
- G02B 6/12 . . . of the integrated circuit kind ( production or processing of single crystals [C30B](#) ; electric integrated circuits [H01L 27/00](#) { coupling fibres and integrated optical circuits [G02B 6/30](#) } )
  
- G02B 6/12002 . . . { Three-dimensional structures }
- G02B 6/12004 . . . { Combinations of two or more optical elements }
- G02B 6/12007 . . . { forming wavelength selective elements, e.g. multiplexer, demultiplexer }
- G02B 6/12009 . . . . { comprising arrayed waveguide grating [AWG] devices, i.e. with a phased array of waveguides }
  
- G02B 6/12011 . . . . . { characterised by the arrayed waveguides, e.g. comprising a filled groove in the array section }
- G02B 6/12014 . . . . . { characterised by the wavefront splitting or combining section, e.g. grooves or optical elements in a slab waveguide }
- G02B 6/12016 . . . . . { characterised by the input or output waveguides, e.g. tapered waveguide ends, coupled together pairs of output waveguides }
- G02B 6/12019 . . . . . { characterised by the optical interconnection to or from the AWG devices, e.g. integration or coupling with lasers or photodiodes ( coupling integrated waveguide to fibre [G02B 6/30](#) , to optoelectronic element [G02B 6/42](#) ; monolithic integration of integrated waveguides with other

		optical elements <a href="#">G02B 6/12004</a> ) }
<a href="#">G02B 6/12021</a>	.....	{ Comprising cascaded AWG devices; AWG multipass configuration; Plural AWG devices integrated on a single chip }
<a href="#">G02B 6/12023</a>	.....	{ characterised by means for reducing the polarisation dependence, e.g. reduced birefringence }
<a href="#">G02B 6/12026</a>	.....	{ characterised by means for reducing the temperature dependence }
<a href="#">G02B 6/12028</a>	.....	{ based on a combination of materials having a different refractive index temperature dependence, i.e. the materials are used for transmitting light }
<a href="#">G02B 6/1203</a>	.....	{ using mounting means, e.g. by using a combination of materials having different thermal expansion coefficients }
<a href="#">G02B 6/12033</a>	.....	{ characterised by means for configuring the device, e.g. moveable element for wavelength tuning ( switching <a href="#">G02B 6/35</a> ; thermo-optic devices <a href="#">G02F 1/0147</a> ) }
<a href="#">G02B 6/122</a>	...	basic optical elements, e.g. light-guiding paths
<a href="#">G02B 6/1221</a>	....	{ made from organic materials }
<a href="#">G02B 6/1223</a>	....	{ high refractive index type, i.e. high-contrast waveguides }
<a href="#">G02B 6/1225</a>	....	{ comprising photonic band-gap structures or photonic lattices }
<a href="#">G02B 6/1226</a>	....	{ involving surface plasmon interaction }
<a href="#">G02B 6/1228</a>	....	{ Tapered waveguides, e.g. integrated spot-size transformers ( for coupling with fibres <a href="#">G02B 6/305</a> ) }
<a href="#">G02B 6/124</a>	....	Geodesic lenses or integrated gratings
<a href="#">G02B 6/1245</a>	.....	{ Geodesic lenses }
<a href="#">G02B 6/125</a>	....	Bends, branchings or intersections
<a href="#">G02B 6/126</a>	...	using polarisation effects { ( <a href="#">G02B 6/1226</a> takes precedence ) }
<a href="#">G02B 6/13</a>	...	Integrated optical circuits characterised by the manufacturing method
<a href="#">G02B 6/131</a>	....	by using epitaxial growth ( epitaxial growth for semiconductors <a href="#">H01L 21/36</a> )
<a href="#">G02B 6/132</a>	....	by deposition of thin films
<a href="#">G02B 6/134</a>	....	by substitution by dopant atoms
<a href="#">G02B 6/1342</a>	.....	{ using diffusion ( diffusion in single crystals <a href="#">C30B 31/00</a> ; diffusion in glass <a href="#">C03C 23/00</a> ) }
<a href="#">G02B 6/1345</a>	.....	{ using ion exchange ( ion exchange in glass <a href="#">C03C 21/00</a> ) }
<a href="#">G02B 6/1347</a>	.....	{ using ion implantation ( ion implantation in glass <a href="#">C03C 23/0055</a> ; ion implantation in general <a href="#">C23C</a> ) }
<a href="#">G02B 6/136</a>	....	by etching
<a href="#">G02B 6/138</a>	....	by using polymerisation
<a href="#">G02B 6/14</a>	..	Mode converters
<a href="#">G02B 6/24</a>	.	Coupling light guides ( for electric waveguides <a href="#">H01P 1/00</a> )
<a href="#">G02B 6/241</a>	..	{ Light guide terminations }
<a href="#">G02B 6/243</a>	...	{ as light absorbers }
<a href="#">G02B 6/245</a>	..	Removing protective coverings of light guides before coupling
<a href="#">G02B 6/25</a>	..	Preparing the ends of light guides for coupling, e.g. cutting
<a href="#">G02B 6/255</a>	..	Splicing of light guides, e.g. by fusion or bonding
<a href="#">G02B 6/2551</a>	...	{ using thermal methods, e.g. fusion welding by arc discharge, laser beam, plasma torch ( making optical fibres with heat application <a href="#">C03B 37/15</a> ) }



G02B 6/2552	...	{ reshaping or reforming of light guides for coupling using thermal heating, e.g. tapering, forming of a lens on light guide ends }
G02B 6/2553	...	{ Splicing machines, e.g. optical fibre fusion splicer }
G02B 6/2555	...	{ Alignment or adjustment devices for aligning prior to splicing }
G02B 6/2556	....	{ including a fibre supporting member inclined to the bottom surface of the alignment means }
G02B 6/2557	....	{ using deformable flexure members, flexible hinges or pivotal arms }
G02B 6/2558	...	{ Reinforcement of splice joint }
G02B 6/26	..	Optical coupling means ( <a href="#">G02B 6/36</a> , <a href="#">G02B 6/42</a> take precedence )
G02B 6/262	...	{ Optical details of coupling light into, or out of, or between fibre ends, e.g. special fibre end shapes or associated optical elements }
G02B 6/264	...	{ with optical elements between opposed fibre ends which perform a function other than beam splitting ( having lens focusing means <a href="#">G02B 6/32</a> ; utilising prism or grating <a href="#">G02B 6/34</a> ) }
G02B 6/266	....	{ the optical element being an attenuator }
G02B 6/268	...	{ for modal dispersion control, e.g. concatenation of light guides having different modal dispersion properties ( graded index multimode fibres <a href="#">G02B 6/0288</a> ; multimodal transmission systems <a href="#">H04B 10/13</a> ) }
G02B 6/27	...	with polarisation selective and adjusting means ( { for wavelength selection <a href="#">G02B 6/29302</a> ; of the integrated waveguide kind <a href="#">G02B 6/126</a> } ; polarisation; polarisation systems in general <a href="#">G02B 27/28</a> ; optical polarisation multiplex systems <a href="#">H04J 14/06</a> )
G02B 6/2706	....	{ as bulk elements, i.e. free space arrangements external to a light guide, e.g. polarising beam splitters }
G02B 6/2713	.....	{ cascade of polarisation selective or adjusting operations }
G02B 6/272	.....	{ comprising polarisation means for beam splitting and combining }
G02B 6/2726	....	{ in or on light guides, e.g. polarisation means assembled in a light guide }
G02B 6/2733	.....	{ Light guides evanescently coupled to polarisation sensitive elements }
G02B 6/274	.....	{ based on light guide birefringence, e.g. due to coupling between light guides ( <a href="#">G02B 6/105</a> , <a href="#">G02B 6/024</a> take precedence; mechanically induced birefringence <a href="#">G02F 1/02M2C</a> ) }
G02B 6/2746	....	{ comprising non-reciprocal devices, e.g. isolators, FRM, circulators, quasi-isolators ( magneto-optic non-reciprocal devices <a href="#">G02F 1/093</a> ) }
G02B 6/2753	....	{ characterised by their function or use, i.e. of the complete device }
G02B 6/276	.....	{ Removing selected polarisation component of light, i.e. polarizers }
G02B 6/2766	.....	{ Manipulating the plane of polarisation from one input polarisation to another output polarisation, e.g. polarisation rotators, linear to circular polarisation converters }
G02B 6/2773	.....	{ Polarisation splitting or combining }
G02B 6/278	.....	{ Controlling polarisation mode dispersion [PMD] , e.g. PMD compensation or emulation ( PMD minimised transmission systems <a href="#">H04B 10/18P</a> ) }
G02B 6/2786	.....	{ Reducing the polarisation degree, i.e. depolarisers, scramblers, unpolarised output }
G02B 6/2793	.....	{ Controlling polarisation dependent loss, e.g. polarisation insensitivity, reducing the change in polarisation degree of the output light even if the input polarisation state fluctuates }
G02B 6/28	...	having data bus means, i.e. plural waveguides interconnected and providing an inherently bidirectional system by mixing and splitting signals

G02B 6/2804	....	{ forming multipart couplers without wavelength selective elements, e.g. "T" couplers, star couplers }
G02B 6/2808	.....	{ using a mixing element which evenly distributes an input signal over a number of outputs }
G02B 6/2813	.....	{ based on multimode interference effect, i.e. self-imaging }
G02B 6/2817	.....	{ using reflective elements to split or combine optical signals }
G02B 6/2821	.....	{ using lateral coupling between contiguous fibres to split or combine optical signals }
G02B 6/2826	.....	{ using mechanical machining means for shaping of the couplers, e.g. grinding or polishing ( <a href="#">grinding</a> , <a href="#">polishing in general B24</a> ) }
G02B 6/283	.....	{ couplers being tunable or adjustable }
G02B 6/2835	.....	{ formed or shaped by thermal treatment, e.g. couplers }
G02B 6/2843	.....	{ the couplers having polarisation maintaining or holding properties ( <a href="#">polarisation preserving light guides G02B 6/105</a> ) }
G02B 6/2848	.....	{ having refractive means, e.g. imaging elements between light guides as splitting, branching and/or combining devices, e.g. lenses, holograms }
G02B 6/2852	.....	{ using tapping light guides arranged sidewardly, e.g. in a non-parallel relationship with respect to the bus light guides ( <a href="#">light extraction or launching through cladding, with or without surface discontinuities, bent structures</a> ) }
G02B 6/2856	.....	{ formed or shaped by thermal heating means, e.g. splitting, branching and/or combining elements }
G02B 6/2861	.....	{ using fibre optic delay lines and optical elements associated with them, e.g. for use in signal processing, e.g. filtering ( <a href="#">delay lines in general H03H</a> , <a href="#">H01P 9/00</a> ; <a href="#">optical computing devices G06E</a> ) }
G02B 6/287	....	Structuring of light guides to shape optical elements with heat application ( <a href="#">G02B 6/255</a> takes precedence )
G02B 6/293	....	with wavelength selective means ( { <a href="#">G02B 6/02052</a> , <a href="#">G02B 6/02057</a> take precedence } ; for optical elements in use, see the relevant subgroups of this subclass; <a href="#">optical wavelength-division multiplexing systems H04J 14/02</a> ; { in or associated with an integrated waveguide arrangement <a href="#">G02B 6/12007</a> ; <a href="#">mode multiplexing G02B 6/14</a> } )
G02B 6/29301	.....	{ based on a phased array of light guides ( <a href="#">integrated arrayed waveguide gratings G02B 6/12009</a> ) }
G02B 6/29302	.....	{ based on birefringence or polarisation, e.g. wavelength dependent birefringence, polarisation interferometers }
G02B 6/29304	.....	{ operating by diffraction, e.g. grating ( <a href="#">G02B 6/29301</a> takes precedence; <a href="#">spectrometers using gratings G01J 3/18</a> ) }
G02B 6/29305	.....	{ as bulk element, i.e. free space arrangement external to a light guide }
G02B 6/29307	.....	{ components assembled in or forming a solid transparent unitary block, e.g. for facilitating component alignment }
G02B 6/29308	.....	{ Diffractive element having focusing properties, e.g. curved gratings ( <a href="#">Rowland circle spectrometers G01J 3/20</a> ) }
G02B 6/2931	.....	{ Diffractive element operating in reflection }
G02B 6/29311	.....	{ Diffractive element operating in transmission }
G02B 6/29313	.....	{ characterised by means for controlling the position or direction of light incident to or leaving the diffractive element, e.g. for varying the wavelength response ( <a href="#">switching G02B 6/35</a> ) }
G02B 6/29314	.....	{ by moving or modifying the diffractive element, e.g. deforming }

		}
G02B 6/29316	.....	{ Light guides comprising a diffractive element, e.g. grating in or on the light guide such that diffracted light is confined in the light guide ( <a href="#">G02B 6/02057</a> , <a href="#">G02B 6/29332</a> , <a href="#">G02B 6/29356</a> take precedence ) }
G02B 6/29317	.....	{ Light guides of the optical fibre type }
G02B 6/29319	.....	{ With a cascade of diffractive elements or of diffraction operations ( forming interferometer by splitting and recombining <a href="#">G02B 6/29347</a> - <a href="#">G02B 6/29358</a> ) }
G02B 6/2932	.....	{ comprising a directional router, e.g. directional coupler, circulator }
G02B 6/29322	.....	{ Diffractive elements of the tunable type ( <a href="#">G02B 6/02195</a> takes precedence; optical modulation devices based on a change of the optical properties of the medium <a href="#">G02F 1/00</a> ) }
G02B 6/29323	.....	{ Coupling to or out of the diffractive element through the lateral surface of the light guide ( evanescent grating couplers <a href="#">G02B 6/29332</a> ) }
G02B 6/29325	.....	{ of the slab or planar or plate like form, i.e. confinement in a single transverse dimension only ( integrated circuit planar waveguide arrangements <a href="#">G02B 6/12007</a> ; specially adapted for lighting <a href="#">G02B 6/0011</a> ) }
G02B 6/29326	.....	{ Diffractive elements having focusing properties, e.g. curved gratings ( Rowland circle spectrometers <a href="#">G01J 3/20</a> ) }
G02B 6/29328	.....	{ Diffractive elements operating in reflection }
G02B 6/29329	.....	{ Diffractive elements operating in transmission }
G02B 6/29331	.....	{ operating by evanescent wave coupling }
G02B 6/29332	.....	{ Wavelength selective couplers, i.e. based on evanescent coupling between light guides, e.g. fused fibre couplers with transverse coupling between fibres having different propagation constant wavelength dependency ( non wavelength-selective light guide couplers <a href="#">G02B 6/28</a> ) }
G02B 6/29334	.....	{ Grating-assisted evanescent light guide couplers, i.e. comprising grating at or functionally associated with the coupling region between the light guides, e.g. with a grating positioned where light fields overlap in the coupler }
G02B 6/29335	.....	{ Evanescent coupling to a resonator cavity, i.e. between a waveguide mode and a resonant mode of the cavity ( wavelength selective means based on resonator cavity coupled non-evanescently <a href="#">G02B 6/29356</a> , <a href="#">G02B 6/29358</a> ) }
G02B 6/29337	.....	{ Cavities of the linear kind, e.g. formed by reflectors at ends of a light guide }
G02B 6/29338	.....	{ Loop resonators }
G02B 6/2934	.....	{ Fibre ring resonators, e.g. fibre coils }
G02B 6/29341	.....	{ Loop resonators operating in a whispering gallery mode evanescently coupled to a light guide, e.g. sphere or disk or cylinder ( evanescent coupling for sensing fluorescence <a href="#">G01N 21/648</a> ) }
G02B 6/29343	.....	{ Cascade of loop resonators }
G02B 6/29344	.....	{ operating by modal interference or beating, i.e. of transverse modes, e.g. zero-gap directional coupler, MMI }
G02B 6/29346	.....	{ operating by wave or beam interference ( interferometers for measuring <a href="#">G01B 9/02</a> ) }

G02B 6/29347	.....	{ Loop interferometers, e.g. Sagnac, loop mirror }
G02B 6/29349	.....	{ Michelson or Michelson/Gires-Tournois configuration, i.e. based on splitting and interferometrically combining relatively delayed signals at a single beamsplitter }
G02B 6/2935	.....	{ Mach-Zehnder configuration, i.e. comprising separate splitting and combining means }
G02B 6/29352	.....	{ in a light guide }
G02B 6/29353	.....	{ with a wavelength selective element in at least one light guide interferometer arm, e.g. grating, interference filter, resonator }
G02B 6/29355	.....	{ Cascade arrangement of interferometers }
G02B 6/29356	.....	{ Interference cavity within a single light guide, e.g. between two fibre gratings ( <a href="#">G02B 6/29347</a> - <a href="#">G02B 6/2935</a> take precedence; evanescent coupling to a resonator cavity <a href="#">G02B 6/29335</a> ) }
G02B 6/29358	.....	{ Multiple beam interferometer external to a light guide, e.g. Fabry-Pérot, etalon, VIPA plate, OTDL plate, continuous interferometer, parallel plate resonator ( <a href="#">G02B 6/29347</a> , <a href="#">G02B 6/29349</a> , <a href="#">G02B 6/2935</a> , <a href="#">G02B 6/29361</a> take precedence; resonator evanescently coupled to light guide <a href="#">G02B 6/29335</a> ) }
G02B 6/29359	.....	{ Cavity formed by light guide ends, e.g. fibre Fabry Pérot (FFP) }
G02B 6/29361	.....	{ Interference filters, e.g. multilayer coatings, thin film filters, dichroic splitters or mirrors based on multilayers, WDM filters }
G02B 6/29362	.....	{ Serial cascade of filters or filtering operations, e.g. for a large number of channels }
G02B 6/29364	.....	{ Cascading by a light guide path between filters or filtering operations, e.g. fibre interconnected single filter modules }
G02B 6/29365	.....	{ in a multireflection configuration, i.e. beam following a zigzag path between filters or filtering operations }
G02B 6/29367	.....	{ Zigzag path within a transparent optical block, e.g. filter deposited on an etalon, glass plate, wedge acting as a stable spacer }
G02B 6/29368	.....	{ Light guide comprising the filter, e.g. filter deposited on a fibre end ( <a href="#">G02B 6/29359</a> takes precedence ) }
G02B 6/2937	.....	{ In line lens-filtering-lens devices, i.e. elements arranged along a line and mountable in a cylindrical package for compactness, e.g. 3- port device with GRIN lenses sandwiching a single filter operating at normal incidence in a tubular package }
G02B 6/29371	.....	{ operating principle based on material dispersion }
G02B 6/29373	.....	{ utilising a bulk dispersive element, e.g. prism }
G02B 6/29374	.....	{ in an optical light guide ( <a href="#">G02B 6/02214</a> takes precedence ) }
G02B 6/29376	.....	{ coupling light guides for controlling wavelength dispersion, e.g. by concatenation of two light guides having different dispersion properties ( <a href="#">dispersion managed optical transmission systems H04B 10/18D2M</a> ) }
G02B 6/29377	.....	{ controlling dispersion around 1550 nm, i.e. S, C, L and U bands from 1460-1675 nm }
G02B 6/29379	.....	{ characterised by the function or use of the complete device }
G02B 6/2938	.....	{ for multiplexing or demultiplexing, i.e. combining or separating wavelengths, e.g. 1xN, NxM }
G02B 6/29382	.....	{ including at least adding or dropping a signal, i.e. passing the majority of signals }

G02B 6/29383	.....	{ Adding and dropping }
G02B 6/29385	.....	{ Channel monitoring, e.g. by tapping ( channel monitoring in optical transmission systems <a href="#">H04B 10/08</a> ) }
G02B 6/29386	.....	{ Interleaving or deinterleaving, i.e. separating or mixing subsets of optical signals, e.g. combining even and odd channels into a single optical signal }
G02B 6/29388	.....	{ for lighting or use with non-coherent light }
G02B 6/29389	.....	{ Bandpass filtering, e.g. 1x1 device rejecting or passing certain wavelengths ( <a href="#">G02B 6/2938</a> takes precedence ) }
G02B 6/29391	.....	{ Power equalisation of different channels, e.g. power flattening }
G02B 6/29392	.....	{ Controlling dispersion ( <a href="#">G02B 6/02214</a> takes precedence; modal dispersion control <a href="#">G02B 6/268</a> ) }
G02B 6/29394	.....	{ Compensating wavelength dispersion ( <a href="#">G02B 6/29376</a> takes precedence; dispersion compensated optical transmission systems <a href="#">H04B 10/18</a> ) }
G02B 6/29395	.....	{ configurable, e.g. tunable or reconfigurable ( switching <a href="#">G02B 6/35</a> ) }
G02B 6/29397	.....	{ Polarisation insensitivity }
G02B 6/29398	.....	{ Temperature insensitivity }
G02B 6/30	...	for use between fibre and thin-film device
G02B 6/305	....	{ and having an integrated mode-size expanding section, e.g. tapered waveguide }
G02B 6/32	...	having lens focusing means { positioned between opposed fibre ends ( with lens being an integral part of the single fibre end <a href="#">G02B 6/262</a> ) }
G02B 6/322	....	{ and having centering means being part of the lens for the self-positioning of the lightguide at the focal point, e.g. holes, wells, indents, nibs }
G02B 6/325	....	{ comprising a transparent member, e.g. window, protective plate }
G02B 6/327	....	{ with angled interfaces to reduce reflections }
G02B 6/34	...	utilising prism or grating { ( <a href="#">G02B 6/293</a> takes precedence ) }
G02B 6/35	...	having switching means ( optical switching in general <a href="#">G02B 26/08</a> ; by changing the optical properties of the medium <a href="#">G02F 1/00</a> )
G02B 6/3502	....	{ involving direct waveguide displacement, e.g. cantilever type waveguide displacement involving waveguide bending, or displacing an interposed waveguide between stationary waveguides }
G02B 6/3504	.....	{ Rotating, tilting or pivoting the waveguides, or with the waveguides describing a curved path ( rotary joint <a href="#">G02B 6/3628</a> ) }
G02B 6/3506	.....	{ Translating the waveguides along the beam path, e.g. by varying the distance between opposed waveguide ends, or by translation of the waveguide ends }
G02B 6/3508	.....	{ Lateral or transverse displacement of the whole waveguides, e.g. by varying the distance between opposed waveguide ends, or by mutual lateral displacement of opposed waveguide ends }
G02B 6/351	....	{ involving stationary waveguides with moving interposed optical elements ( <a href="#">G02B 6/3538</a> takes precedence; interposed waveguides <a href="#">G02B 6/3502</a> ) }
G02B 6/3512	.....	{ the optical element being reflective, e.g. mirror }
G02B 6/3514	.....	{ the reflective optical element moving along a line so as to translate into and out of the beam path, i.e. across the beam path }
G02B 6/3516	.....	{ the reflective optical element moving along the beam path, e.g. controllable diffractive effects using multiple micro-mirrors within the beam }



G02B 6/3518	.....	{ the reflective optical element being an intrinsic part of a MEMS device, i.e. fabricated together with the MEMS device ( <a href="#">MEMS devices in general B81B</a> ; manufacture of MEM devices in general <a href="#">B81C</a> ; micromechanical devices controlling the direction of light <a href="#">G02B 26/0833</a> ) }
G02B 6/352	.....	{ the reflective optical element having a shaped reflective surface, e.g. a reflective element comprising several reflective surfaces or facets that function together }
G02B 6/3522	.....	{ the optical element enabling or impairing total internal reflection ( using evanescent coupling <a href="#">G02B 6/3536</a> ) }
G02B 6/3524	.....	{ the optical element being refractive }
G02B 6/3526	.....	{ the optical element being a lens }
G02B 6/3528	.....	{ the optical element being a prism }
G02B 6/353	.....	{ the optical element being a shutter, baffle, beam dump or opaque element ( <a href="#">absorbers on light guide termination G02B 6/243</a> ) }
G02B 6/3532	.....	{ the optical element being a wavelength independent filter or having spatially dependent transmission properties, e.g. neutral filter or neutral density wedge substrate with plurality of density filters }
G02B 6/3534	.....	{ the optical element being diffractive, i.e. a grating }
G02B 6/3536	.....	{ involving evanescent coupling variation, e.g. by a moving element such as a membrane which changes the effective refractive index ( <a href="#">mode converters G02B 6/14</a> ; adjustable lateral coupling between waveguides <a href="#">G02B 6/283</a> ; electro- optical refractive index variations <a href="#">G02F 1/0118</a> ) }
G02B 6/3538	.....	{ based on displacement or deformation of a liquid ( <a href="#">controlling the intensity of light by displacement or deformation of a fluid in general G02B 26/004</a> ; fluid-filled lens of variable focal length <a href="#">G02B 3/14</a> ) }
G02B 6/354	.....	{ Switching arrangements, i.e. number of input/output ports and interconnection types }
G02B 6/3542	.....	{ Non-blocking switch, e.g. with multiple potential paths between multiple inputs and outputs, the establishment of one switching path not preventing the establishment of further switching paths }
G02B 6/3544	.....	{ 2D constellations, i.e. with switching elements and switched beams located in a plane }
G02B 6/3546	.....	{ NxM switch, i.e. a regular array of switches elements of matrix type constellation }
G02B 6/3548	.....	{ 1xN switch, i.e. one input and a selectable single output of N possible outputs }
G02B 6/355	.....	{ 1x2 switch, i.e. one input and a selectable single output of two possible outputs }
G02B 6/3552	.....	{ 1x1 switch; e.g. on/off switch }
G02B 6/3554	.....	{ 3D constellations, i.e. with switching elements and switched beams located in a volume }
G02B 6/3556	.....	{ NxM switch, i.e. regular arrays of switches elements of matrix type constellation }
G02B 6/3558	.....	{ 1xN switch, i.e. one input and a selectable single output of N possible outputs }
G02B 6/356	.....	{ in an optical cross-connect device, e.g. routing and switching aspects of interconnecting different paths propagating different wavelengths to ( re ) configure the various input and output links ( <a href="#">switching polarized beams G02B 6/3594</a> ; power equalizers <a href="#">G02B 6/356</a> and <a href="#">G02B 6/3594</a> ; path selecting means <a href="#">H04Q 11/0001</a> ) }



G02B 6/3562	.....	{ Switch of the bypass type, i.e. enabling a change of path in a network, e.g. to bypass a failed element in the network }
G02B 6/3564	....	{ Mechanical details of the actuation mechanism associated with the moving element or mounting mechanism details }
G02B 6/3566	.....	{ involving bending a beam, e.g. with cantilever }
G02B 6/3568	.....	{ characterised by the actuating force }
G02B 6/357	.....	{ Electrostatic force ( electrostatic forces controlling reflecting elements in general <a href="#">G02B 26/0841</a> ) }
G02B 6/3572	.....	{ Magnetic force ( magnetic forces controlling reflecting elements in general <a href="#">G02B 26/085</a> ; magneto-optic devices <a href="#">G02F 1/09</a> ) }
G02B 6/3574	.....	{ Mechanical force, e.g. pressure variations }
G02B 6/3576	.....	{ Temperature or heat actuation ( thermal forces controlling reflecting elements in general <a href="#">G02B 26/0866</a> ; thermo-optic devices <a href="#">G02F 1/0147</a> ) }
G02B 6/3578	.....	{ Piezoelectric force ( piezoelectric forces controlling reflecting elements in general <a href="#">G02B 26/0858</a> ; piezo-optic devices <a href="#">G02F 1/0131</a> ) }
G02B 6/358	.....	{ Latching of the moving element, i.e. maintaining or holding the moving element in place once operation has been performed; includes a mechanically bistable system }
G02B 6/3582	.....	{ Housing means or package or arranging details of the switching elements, e.g. for thermal isolation }
G02B 6/3584	.....	{ constructional details of an associated actuator having a MEMS construction; i.e. constructed using semiconductor technology such as etching ( MEMS per se <a href="#">B81B</a> , <a href="#">B81C</a> ) }
G02B 6/3586	....	{ Control or adjustment details, e.g. calibrating ( testing optical equipment <a href="#">G01M 11/00</a> ) }

**WARNING**

The scope of this group has been changed: for rotating, tilting or pivoting the waveguides, or with the waveguides describing a curved path see [G02B 6/3504](#)

G02B 6/3588	.....	{ of the processed beams, i.e. controlling during switching of orientation, alignment, or beam propagation properties such as intensity, size or shape }
G02B 6/359	.....	{ of the position of the moving element itself during switching; i.e. without monitoring the switched beams }
G02B 6/3592	....	{ Means for removing polarization dependence of the switching means, i.e. polarization insensitive switching ( light guides coupling with polarization selective and adjusting means <a href="#">G02B 6/27</a> ) }
G02B 6/3594	....	{ Characterised by additional functional means, e.g. means for variably attenuating or branching or means for switching differently polarized beams }
G02B 6/3596	....	{ With planar waveguide arrangement, i.e. in a substrate, regardless if actuating mechanism is outside the substrate }
G02B 6/3598	....	{ Switching means directly located between an optoelectronic element and waveguides, including direct displacement of either the element or the waveguide, e.g. optical pulse generation ( based on changing the optical properties of the medium <a href="#">G02F 1/00</a> ; optical pulse generation in optical transmitters <a href="#">H04B 10/155</a> ; optical pulse generation by controlling laser operation <a href="#">H01S 3/00</a> ) }

G02B 6/36	..	Mechanical coupling means ( { <a href="#">G02B 6/06</a> , <a href="#">G02B 6/30</a> , <a href="#">G02B 6/35</a> , <a href="#">G02B 6/38</a> } , <a href="#">G02B 6/255</a> , <a href="#">G02B 6/42</a> take precedence )
G02B 6/3604	...	{ Rotary joints allowing relative rotational movement between opposing fibre or fibre bundle ends }
G02B 6/3608	...	{ Fibre wiring boards, i.e. where fibres are embedded or attached in a pattern on or to a substrate, e.g. flexible sheets ( <a href="#">optical ribbon cables in support members G02B 6/4401</a> ) }
G02B 6/3612	....	{ Wiring methods or machines }
G02B 6/3616	...	{ Holders, macro size fixtures for mechanically holding or positioning fibres, e.g. on an optical bench ( <a href="#">supporting carriers of a micro-bench type G02B 6/3648</a> ; <a href="#">micromanipulators B25J 7/00</a> ; cassettes, bobbins <a href="#">G02B 6/4439</a> ) }
G02B 6/362	....	{ Vacuum holders for optical elements }
G02B 6/3624	....	{ Fibre head, e.g. fibre probe termination ( <a href="#">optical details of light guide terminations G02B 6/241</a> ; <a href="#">reshaping of light guides G02B 6/2552</a> ; <a href="#">optical details of coupling light into or out of fibre end G02B 6/262</a> ) }
G02B 6/3628	...	{ for mounting fibres to supporting carriers ( <a href="#">G02B 6/3608</a> , <a href="#">G02B 6/3616</a> take precedence ) }
G02B 6/3632	....	{ characterised by the cross-sectional shape of the mechanical coupling means }
G02B 6/3636	.....	{ the mechanical coupling means being grooves ( <a href="#">G02B 6/3652</a> takes precedence ) }
G02B 6/364	.....	{ inverted grooves, e.g. dovetails }
G02B 6/3644	....	{ the coupling means being through-holes or wall apertures }
G02B 6/3648	....	{ Supporting carriers of a micro-bench type, i.e. with micro-machined additional mechanical structures ( <a href="#">micro-structured devices per se B81B</a> ) }
G02B 6/3652	.....	{ the additional structures being prepositioning mounting areas, allowing only movement in one dimension, e.g. grooves, trenches or vias in the micro-bench surface, i.e. self aligning supporting carriers }
G02B 6/3656	.....	{ the additional structures being micro-positioning, with micro-actuating elements for fine adjustment, or restricting movement, into two dimensions, e.g. cantilevers, beams, tongues or bridges with associated MEMs }
G02B 6/366	.....	{ the additional structures allowing for adjustment or alignment in all dimensions, i.e. 3D micro-optics arrangements, e.g. free space optics on the micro-bench, micro-hinges or spring latches, with associated micro-actuating elements for fine adjustment or alignment }
G02B 6/3664	....	{ 2D cross sectional arrangements of the fibres }
G02B 6/3668	.....	{ with conversion in geometry of the cross section }
G02B 6/3672	.....	{ with fibres arranged in a regular matrix array }
G02B 6/3676	.....	{ Stacked arrangement }
G02B 6/368	....	{ with pitch conversion between input and output plane, e.g. for increasing packing density }
G02B 6/3684	....	{ characterised by the manufacturing process of surface profiling of the supporting carrier ( <a href="#">manufacturing micro-systems per se B81C 1/00015</a> ) }
G02B 6/3688	.....	{ using laser ablation }
G02B 6/3692	.....	{ with surface micro-machining involving etching, e.g. wet or dry etching steps ( <a href="#">surface micro-machining involving subtractive techniques B81C 1/00055</a> ) }
G02B 6/3696	.....	{ by moulding, e.g. injection moulding, casting, embossing, stamping, stenciling, printing, or with metallic mould insert manufacturing using

LIGA or MIGA techniques ( shaping the mould surface by machining [B29C 33/38](#) ; moulding techniques [B29C 39/00](#) , [B29C 43/00](#) , [B29C 45/00](#) , [B29C 47/00](#) , [B29C 59/00](#) ; stamping, printing or embossing techniques [B81C 1/00444](#) ; surface micro-machining using LIGA [B81C 2201/032](#) ) }

G02B 6/38	...	having fibre to fibre mating means
G02B 6/3801	....	{ Permanent connections, i.e. wherein fibres are kept aligned by mechanical means ( splices by bonding <a href="#">G02B 6/255</a> ; fusion splices <a href="#">G02B 6/2551</a> ) }
G02B 6/3802	.....	{ Assembly tools, e.g. crimping tool or pressing bench ( splicing machines <a href="#">G02B 6/2553</a> ) }
G02B 6/3803	.....	{ Adjustment or alignment devices for alignment prior to splicing }
G02B 6/3805	.....	{ with a fibre-supporting member inclined to the bottom surface of the alignment means }
G02B 6/3806	.....	{ Semi-permanent connections, i.e. wherein the mechanical means keeping the fibres aligned allow for removal of the fibres ( <a href="#">dismountable connectors G02B 6/3807</a> ) }
G02B 6/3807	....	{ Dismountable connectors, i.e. comprising plugs }
G02B 6/3809	.....	{ without a ferrule embedding the fibre end, i.e. with bare fibre end }
G02B 6/381	.....	{ of the ferrule type, e.g. fibre ends embedded in ferrules, connecting a pair of fibres }
G02B 6/3812	.....	{ having polarisation-maintaining light guides ( light guides having polarisation effects per se <a href="#">G02B 6/105</a> ) }
G02B 6/3813	.....	{ for transmission of high energy beam ( coupling high energy sources and light guides <a href="#">G02B 6/4296</a> ) }
G02B 6/3814	.....	{ with cooling or heat dissipation means }
G02B 6/3816	.....	{ for use under water, high pressure connectors ( provisionally see <a href="#">6/44C6B1</a> ) }
G02B 6/3817	.....	{ containing optical and electrical conductors ( cables including electrical and optical conductors <a href="#">H01B 11/22</a> ; <a href="#">G092B6/38D2H</a> takes precedence ) }
G02B 6/3818	.....	{ of a low-reflection-loss type ( <a href="#">G02B 6/3813</a> takes precedence ) }
G02B 6/382	.....	{ with index-matching medium between light guides ( provisionally see <a href="#">G02B 6/4212</a> ) }
G02B 6/3821	.....	{ with axial spring biasing or loading means ( <a href="#">G02B 6/3847</a> takes precedence ) }
G02B 6/3822	.....	{ with beveled fibre ends }
G02B 6/3823	.....	{ containing surplus lengths, internal fibre loops ( provisionally see also <a href="#">G02B 6/444</a> ) }
G02B 6/3825	.....	{ with an intermediate part, e.g. adapter, receptacle, linking two plugs }
G02B 6/3826	.....	{ characterised by form or shape }
G02B 6/3827	.....	{ Wrap-back connectors, i.e. containing a fibre having an U shape }
G02B 6/3829	.....	{ Bent or angled connectors ( <a href="#">G02B 6/3827</a> takes precedence ) }
G02B 6/383	.....	{ Hermaphroditic connectors, i.e. two identical plugs mating with one another, each plug having both male and female diametrically opposed engaging parts; electric hermaphroditic coupling <a href="#">H01R 24/84</a> , <a href="#">H01R 13/28</a> }
G02B 6/3831	.....	{ comprising a keying element on the plug or adapter, e.g. to forbid wrong connection ( keying element on the ferrule <a href="#">G02B 6/3851</a> ; keying element for electrical coupling <a href="#">H01R 13/64</a> ) }

G02B 6/3833	.....	{ Details of mounting fibres in ferrules; Assembly methods; Manufacture }
G02B 6/3834	.....	{ Means for centering or aligning the light guide within the ferrule }
G02B 6/3835	.....	{ using discs, bushings or the like }
G02B 6/3837	.....	{ forwarding or threading methods of light guides into apertures of ferrule centering means }
G02B 6/3838	.....	{ using grooves for light guides }
G02B 6/3839	.....	{ for a plurality of light guides }
G02B 6/3841	.....	{ using rods, balls for light guides }
G02B 6/3842	.....	{ for a plurality of light guides }
G02B 6/3843	.....	{ with auxiliary facilities for movably aligning or adjusting the fibre within its ferrule, e.g. measuring position or eccentricity ( <a href="#">testing the alignment of axes, including eccentricity, G01B 11/27</a> ) }
G02B 6/3845	.....	{ ferrules comprising functional elements, e.g. filters }
G02B 6/3846	.....	{ with fibre stubs }
G02B 6/3847	.....	{ with means preventing fibre end damage, e.g. recessed fibre surfaces }
G02B 6/3849	.....	{ using mechanical protective elements, e.g. caps, hoods, sealing membranes ( <a href="#">G02B 6/3816</a> takes precedence; provisionally see <a href="#">H01R 13/44</a> ) }
G02B 6/385	.....	{ Accessories for testing or observation of connectors ( means for centering or aligning the light guide within the ferrule with auxiliary facilities for movably aligning or adjusting the fibre within its ferrule, measuring position, eccentricity <a href="#">G02B 6/3843</a> ; mechanical features associated with the optical testing of optical fibres <a href="#">G01M 11/088</a> ) }
G02B 6/3851	.....	{ Ferrules having keying or coding means }
G02B 6/3853	.....	{ Lens inside the ferrule ( <a href="#">lensed connectors G02B 6/32</a> ) }
G02B 6/3854	.....	{ Ferrules characterised by materials }
G02B 6/3855	.....	{ characterised by the method of anchoring or fixing the fibre within the ferrule ( <a href="#">G02B 6/3854</a> takes precedence ) }
G02B 6/3857	.....	{ Crimping, i.e. involving plastic deformation }
G02B 6/3858	.....	{ Clamping, i.e. with only elastic deformation }
G02B 6/3859	.....	{ Ferrules characterised by use of shape memory material (SMM), e.g. heat recoverable polymers, Ti-Ni compounds ( chemical aspects of SMM see the relevant places under <a href="#">C08</a> and <a href="#">C22</a> ; SMM used for shaping by moulding <a href="#">B29C 61/00</a> ; SMM for electrical coupling <a href="#">H01R 4/01</a> , <a href="#">H01R 4/72</a> , <a href="#">H01R 12/856</a> , <a href="#">H02G 15/1806</a> ) }
G02B 6/3861	.....	{ Adhesive bonding ( <a href="#">adhesives in general C09J</a> ) }
G02B 6/3862	.....	{ radially-compressed, longitudinally-split ferrules consisting of a pair of identical matching halves }
G02B 6/3863	.....	{ fabricated by using polishing techniques ( <a href="#">grinding of the fibre ends B24B 19/226</a> ) }
G02B 6/3865	.....	{ fabricated by using moulding techniques ( <a href="#">shaping techniques of plastic materials in general B29C</a> ; producing plastic optical fiber connectors <a href="#">B29D 11/0075</a> ) }
G02B 6/3866	.....	{ Devices, tools or methods for cleaning connectors ( <a href="#">cleaning in general B08B</a> ) }
G02B 6/3867	.....	{ comprising air venting holes }

G02B 6/3869	.....	{ Mounting ferrules to connector body, i.e. plugs }
G02B 6/387	.....	{ Connector plugs comprising two complementary members, e.g. shells, caps, covers, locked together }
G02B 6/3871	.....	{ Ferrule rotatable with respect to plug body, e.g. for setting rotational position } ( <a href="#">adjusting fibre within the ferrule, G02B 6/3843</a> ) ; Fixation of ferrules after rotation
G02B 6/3873	.....	{ Connectors using guide surfaces for aligning ferrule ends, e.g. tubes, sleeves, V-grooves, rods, pins, balls }
G02B 6/3874	.....	{ using tubes, sleeves to align ferrules }
G02B 6/3875	.....	{ Floatingly supported sleeves }
G02B 6/3877	.....	{ Split sleeves }
G02B 6/3878	.....	{ comprising a plurality of ferrules, branching and break-out means }
G02B 6/3879	.....	{ Linking of individual connector plugs to an overconnector, e.g. using clamps, clips, common housings comprising several individual connector plugs }
G02B 6/3881	.....	{ using grooves to align ferrule ends }
G02B 6/3882	.....	{ using rods, pins or balls to align a pair of ferrule ends }
G02B 6/3883	.....	{ using rods, pins or balls to align a plurality of pairs of ferrule ends }
G02B 6/3885	.....	{ Multicore or multichannel optical connectors, i.e. one single ferrule containing more than one fibre, e.g. ribbon type ( <a href="#">optical ribbon cable G02B 6/4403</a> , <a href="#">G02B 6/448</a> ) }
G02B 6/3886	.....	{ Magnetic means to align ferrule ends }
G02B 6/3887	.....	{ Anchoring optical cables to connector housings, e.g. strain relief features, bending protection }

**WARNING**

Not complete. See also [G02B 6/4428](#)

G02B 6/3889	.....	{ encapsulating the tensile strength members in a bonding agent, e.g. adhesive, molding or casting resin }
G02B 6/389	.....	{ characterised by the method of fastening connecting plugs and sockets, e.g. screw- or nut-lock, snap-in, bayonet type }

**WARNING**

Not complete. See also groups [H01R 13/625](#) , [H01R 13/621](#) , [H01R 13/627](#)

G02B 6/3891	.....	{ Bayonet type }
G02B 6/3893	.....	{ Push-pull type, e.g. snap-in, push-on }
G02B 6/3894	.....	{ Screw-lock type }
G02B 6/3895	.....	{ identification of connection, e.g. right plug to the right socket or full engagement of the mating parts ( <a href="#">keying element on the plug or adapter G02B 6/3831</a> ; <a href="#">keying element on the ferrule G02B 6/3851</a> ; <a href="#">keying element for electrical connection H01R 13/64</a> ) }
G02B 6/3897	.....	{ Connectors fixed to housings, casings, frames, circuit boards }
G02B 6/3898	.....	{ Tools, e.g. handheld; Tuning wrenches; Jigs used with connectors, e.g.

for extracting, removing or inserting in a panel, for engaging or coupling connectors, for assembling or disassembling components within the connector, for applying clips to hold two connectors together or for crimping ( [tools for cleaning, G02B 6/3866](#) ; [tools in general B25B](#) ) }

- G02B 6/40           ...       having fibre bundle mating means
- G02B 6/403       ....       { of the ferrule type, connecting a pair of ferrules }
- G02B 6/406       ....       { of the ferrule type, connecting a plurality of pairs of ferrules }
- G02B 6/42       ..       Coupling light guides with opto-electronic elements

### **NOTE**

In this group, the following expression is used with the meaning indicated:

- "opto-electronic elements" includes light emitting elements, e.g. lasers or LED's, as well as light receiving elements, e.g. photodiodes or phototransistors

- G02B 6/4201       ...       { Packages, e.g. shape, construction, internal or external details }
- G02B 6/4202       ....       { for coupling an active element with fibres without intermediate optical elements, e.g. fibres with plane ends, fibres with shaped ends, bundles }
- G02B 6/4203       .....       { Optical features }
- G02B 6/4204       ....       { the coupling comprising intermediate optical elements, e.g. lenses, holograms ( [encapsulated active devices H01S 5/02208](#) , [H01L 33/00B2](#) , [H01L 33/00B6](#) ) }
- G02B 6/4206       .....       { Optical features ( [G02B 6/4207](#) , [G02B 6/421](#) take precedence ) }
- G02B 6/4207       .....       { with optical elements reducing the sensitivity to optical feedback ( [anti-reflection devices specially adapted for lasers, see H01S 3/0064](#) ) }
- G02B 6/4208       .....       { using non-reciprocal elements or birefringent plates, i.e. quasi-isolators ( [optical isolators per se G02F 1/093](#) , [G02F 1/0955](#) ) }
- G02B 6/4209       .....       { Optical features }
- G02B 6/421       ....       { the intermediate optical component consisting of a short length of fibre, e.g. fibre stub }
- G02B 6/4212       .....       { the intermediate optical element being a coupling medium interposed therebetween, e.g. epoxy resin, refractive index matching material, index grease, matching liquid or gel }
- G02B 6/4213       .....       { the intermediate optical elements being polarisation selective optical elements ( [G02B 6/27](#) takes precedence ) }
- G02B 6/4214       .....       { the intermediate optical element having redirecting reflective means, e.g. mirrors, prisms for deflecting the radiation from horizontal to down- or upward direction toward a device ( [G02B 6/4246](#) takes precedence ) }
- G02B 6/4215       .....       { the intermediate optical elements being wavelength selective optical elements, e.g. variable wavelength optical modules or wavelength lockers ( [G02B 6/4246](#) takes precedence ) }
- G02B 6/4216       ....       { incorporating polarisation-maintaining fibres ( [polarisation-maintaining fibres per se G02B 6/105](#) ) }
- G02B 6/4218       .....       { Optical features }
- G02B 6/4219       ....       { Mechanical fixtures for holding or positioning the elements relative to each other in the couplings; Alignment methods for the elements, e.g. measuring or observing methods especially used therefor }



G02B 6/422	.....	{ Active alignment, i.e. moving the elements in response to the detected degree of coupling or position of the elements ( <a href="#">G02B 6/4233</a> , <a href="#">G02B 6/4234</a> take precedence ) }
G02B 6/4221	.....	{ involving a visual detection of the position of the elements, e.g. by using a microscope or a camera }
G02B 6/4222	.....	{ by observing back-reflected light }
G02B 6/4224	.....	{ using visual alignment markings, e.g. index methods }
G02B 6/4225	.....	{ by a direct measurement of the degree of coupling, e.g. the amount of light power coupled to the fibre or the opto-electronic element }
G02B 6/4226	.....	{ Positioning means for moving the elements into alignment, e.g. alignment screws, deformation of the mount }
G02B 6/4227	.....	{ Active alignment methods, e.g. procedures and algorithms }
G02B 6/4228	.....	{ Passive alignment, i.e. without a detection of the degree of coupling or the position of the elements ( <a href="#">G02B 6/4234</a> takes precedence ) }
G02B 6/423	.....	{ using guiding surfaces for the alignment }
G02B 6/4231	.....	{ with intermediate elements, e.g. rods and balls, between the elements }
G02B 6/4232	.....	{ using the surface tension of fluid solder to align the elements, e.g. solder bump techniques ( <a href="#">flip-chip mounting techniques in assembly of semiconductor devices H01L 21/60C4</a> ) }
G02B 6/4233	.....	{ Active alignment along the optical axis and passive alignment perpendicular to the optical axis }
G02B 6/4234	.....	{ Passive alignment along the optical axis and active alignment perpendicular to the optical axis }
G02B 6/4236	.....	{ Fixing or mounting methods of the aligned elements }
G02B 6/4237	.....	{ Welding }
G02B 6/4238	.....	{ Soldering }
G02B 6/4239	.....	{ Adhesive bonding; Encapsulation with polymer material }
G02B 6/424	.....	{ Mounting of the optical light guide }
G02B 6/4242	.....	{ Mounting of the optical light guide to the lid of the package }
G02B 6/4243	.....	{ Mounting of the optical light guide into a groove ( <a href="#">mounting optical light guides into a groove in general G02B 6/3636</a> ) }
G02B 6/4244	.....	{ Mounting of the optical elements }
G02B 6/4245	.....	{ Mounting of the opto-electronic elements }
G02B 6/4246	....	{ Bidirectionally operating package structures }
G02B 6/4248	....	{ Feed-through connections for the hermetical passage of fibres through a package wall } ( <a href="#">see provisionally also G02B 6/4428</a> )
G02B 6/4249	....	{ comprising arrays of active devices and fibres }
G02B 6/425	.....	{ Optical features ( <a href="#">semiconductor laser arrays H01S 5/40</a> ; <a href="#">hybrid LED arrays H01L 25/0753</a> ; <a href="#">monolithic LED arrays H01L 27/153</a> ) }
G02B 6/4251	....	{ Sealed packages ( <a href="#">G02B 6/4248</a> takes precedence ) }
G02B 6/4253	.....	{ by embedding housing components in an adhesive or a polymer material ( <a href="#">G02B 6/4212</a> takes precedence ) }
G02B 6/4254	.....	{ with an inert gas, e.g. nitrogen or oxygen ( <a href="#">gas filled packages for semiconductor lasers H01S 5/0222</a> ) }
G02B 6/4255	....	{ Moulded or casted packages }
G02B 6/4256	....	{ Details of housings }

G02B 6/4257	.....	{ having a supporting carrier or a mounting substrate or a mounting plate ( <a href="#">G02B 6/3648</a> takes precedence ) }
G02B 6/4259	.....	{ of the transparent type }
G02B 6/426	.....	{ mounting, engaging or coupling of the package to a board, a frame or a panel }
G02B 6/4261	.....	{ Packages with mounting structures to be pluggable or detachable, e.g. having latches or rails }
G02B 6/4262	.....	{ characterised by the shape of the housing ( for semiconductor lasers <a href="#">H01S 5/02208</a> ) }
G02B 6/4263	.....	{ of the transistor outline [TO] can type }
G02B 6/4265	.....	{ of the Butterfly or dual inline package [DIP] type }
G02B 6/4266	....	{ Thermal aspects, temperature control or temperature monitoring ( thermal aspect of electrical circuits <a href="#">H05K 7/20</a> , <a href="#">H05K 5/0213</a> , temperature control in general <a href="#">G05D 23/19</a> ) }
G02B 6/4267	.....	{ Reduction of thermal stress, e.g. by selecting thermal coefficient of materials }
G02B 6/4268	.....	{ Cooling ( of semiconductor devices <a href="#">H01L 23/24</a> ; of electric apparatus <a href="#">H05K 7/20</a> ; of instruments <a href="#">G12B 15/00</a> ) }
G02B 6/4269	.....	{ with heat sinks or radiation fins }
G02B 6/4271	.....	{ with thermo electric cooling }
G02B 6/4272	.....	{ with mounting substrates of high thermal conductivity }
G02B 6/4273	.....	{ with heat insulation means to thermally decouple or restrain the heat from spreading }
G02B 6/4274	....	{ Electrical aspects ( <a href="#">G02B 6/4263</a> and <a href="#">G02B 6/4265</a> take precedence ) }
G02B 6/4275	.....	{ Protection against electrostatic discharge [ESD] }
G02B 6/4277	.....	{ Protection against electromagnetic interference [EMI], e.g. shielding means ( shielding of electric apparatus <a href="#">H05K 9/00</a> , of instruments <a href="#">G12B 17/00</a> ) }
G02B 6/4278	.....	{ related to pluggable or demountable opto-electronic or electronic elements }
G02B 6/4279	.....	{ Radio frequency signal propagation aspects of the electrical connection, high frequency adaptations }
G02B 6/428	.....	{ containing printed circuit boards [PCB] }
G02B 6/4281	.....	{ the printed circuit boards being flexible ( in general <a href="#">H05K 1/147</a> ) }
G02B 6/4283	.....	{ with electrical insulation means }
G02B 6/4284	.....	{ of optical modules with disconnectable electrical connectors ( latching arms for electrical connectors <a href="#">H01R 13/627</a> ) }
G02B 6/4285	....	{ Optical modules characterised by a connectorised pigtail }
G02B 6/4286	....	{ Optical modules with optical power monitoring }
G02B 6/4287	....	{ Optical modules with tapping or launching means through the surface of the waveguide ( <a href="#">G02B 6/2852</a> , <a href="#">G02B 6/4286</a> take precedence ) }
G02B 6/4289	.....	{ by inducing bending, microbending or macrobending, to the light guide }
G02B 6/429	.....	{ by surface irregularities on the light guide, e.g. by mechanical modification of the surface of the light guide on its exterior }
G02B 6/4291	.....	{ by accessing the evanescent field of the light guide }
G02B 6/4292	...	{ the light guide being disconnectable from the opto-electronic element, e.g. mutually self aligning arrangements }

- G02B 6/4293 . . . . { hybrid electrical and optical connections for transmitting electrical and optical signals }
- G02B 6/4295 . . . { coupling with semiconductor devices activated by light through the light guide, e.g. thyristors, phototransistors }
- G02B 6/4296 . . . { coupling with sources of high radiant energy, e.g. high power lasers, high temperature light sources }
- G02B 6/4298 . . . { coupling with non-coherent light sources and/or radiation detectors, e.g. lamps, incandescent bulbs, scintillation chambers ( coupling of solar energy into light guides [F24J](#) ) }
- G02B 6/43 . . . Arrangements comprising a plurality of opto-electronic elements and associated optical interconnections ( light-emissive or light-sensitive semiconductor devices [H01L 27/00](#) , [H01L 31/00](#) , [H01L 33/00](#) ) ; { Transmitting or receiving optical signals between chips, wafers or boards; Optical backplane assemblies }
- G02B 6/44 . Mechanical structures for providing tensile strength and external protection for fibres, e.g. optical transmission cables ( cables incorporating electric conductors and optical fibres { where features relating to the optical fibres are not of interest } [H01B 11/22](#) )
- G02B 6/4401 . . { Optical cables }
- G02B 6/4402 . . . { with one single optical waveguide ( [G02B 6/4429](#) , [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4403 . . . { with ribbon structure ( [G02B 6/4429](#) , [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4404 . . . . { Multi-podded }
- G02B 6/4405 . . . { with longitudinally spaced waveguide clamping ( [G02B 6/4429](#) , [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4407 . . . { with internal fluted support member ( [G02B 6/4429](#) , [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4408 . . . . { Groove structures in support members to decrease or harmonise transmission losses in ribbon cables }
- G02B 6/4409 . . . . { for ribbons }
- G02B 6/441 . . . { built up from sub-bundles ( [G02B 6/4429](#) , [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4411 . . . . { Matrix structure }
- G02B 6/4413 . . . . { Helical structure }
- G02B 6/4414 . . . . { with internal serpentine waveguides }
- G02B 6/4415 . . . { Cables for special applications ( [G02B 6/4429](#) , [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4416 . . . . { Heterogeneous cables }
- G02B 6/4417 . . . . . { High voltage aspects, e.g. in cladding }
- G02B 6/4419 . . . . . { Preventing corona discharge }
- G02B 6/442 . . . . . { Insulators }
- G02B 6/4421 . . . . . { Insulators with helical structure of optical fibre, e.g. fibres wound around insulators }
- G02B 6/4422 . . . . . { of the overhead type }
- G02B 6/4423 . . . . . { Electro-corrosion preventing means }
- G02B 6/4425 . . . . . { Suppression of galloping oscillation }
- G02B 6/4426 . . . . . { Reducing drag caused by wired, e.g. by oval cross-section }
- G02B 6/4427 . . . . { Pressure resistant cables, e.g. undersea cables }

G02B 6/4428	.....	{ Penetrator systems in pressure-resistant devices }
G02B 6/4429	...	{ Strengthening and protecting features ( <a href="#">G02B 6/4492</a> , <a href="#">G02B 6/4494</a> , <a href="#">G02B 6/4496</a> take precedence ) }
G02B 6/443	....	{ Protective covering }
G02B 6/4432	.....	{ with fibre reinforcements }
G02B 6/4433	.....	{ Double reinforcement laying in straight line with optical transmission element }
G02B 6/4434	....	{ Central member to take up tensile loads }
G02B 6/4435	....	{ Corrugated mantle }
G02B 6/4436	....	{ Heat resistant }
G02B 6/4438	....	{ facilitating insertion by fluid drag in ducts or capillaries }
G02B 6/4439	...	{ Auxiliary devices }
G02B 6/444	....	{ Systems and boxes with surplus length }
G02B 6/4441	.....	{ [Boxes] }
G02B 6/4442	.....	{ Cap coupling boxes }
G02B 6/4444	.....	{ Seals }
G02B 6/4445	.....	{ Divided base plates }
G02B 6/4446	.....	{ Cableboxes }
G02B 6/4447	.....	{ with divided shells ( <a href="#">G02B 6/4448</a> takes precedence ) }
G02B 6/4448	.....	{ electro-optic }
G02B 6/445	.....	{ with lateral pivoting cover }
G02B 6/4451	.....	{ underground connection boxes ( <a href="#">G02B 6/4448</a> takes precedence ) }
G02B 6/4452	.....	{ Distribution frames }
G02B 6/4453	.....	{ Cassettes }
G02B 6/4454	.....	{ with splices }
G02B 6/4455	.....	{ characterised by the way of extraction or insertion of the cassette in the distribution frame, e.g. pivoting, sliding, rotating, gliding }
G02B 6/4457	....	{ Bobbins; Reels }
G02B 6/4458	.....	{ coiled, e.g. extensible helix }
G02B 6/4459	....	{ Ducts; Conduits }
G02B 6/446	.....	{ Desiccating features }
G02B 6/4461	.....	{ articulated }
G02B 6/4463	....	{ Mechanical aspects of installing cables in ducts or the like ( methods or apparatus for laying electrical cables through tubing or conduit <a href="#">H02G 1/08</a> ) }
G02B 6/4464	.....	{ by fluid drag ( <a href="#">G02B 6/4466</a> takes precedence ) }
G02B 6/4465	.....	{ Pulling eyes ( <a href="#">G02B 6/4466</a> takes precedence ) }
G02B 6/4466	.....	{ for buildings }
G02B 6/4467	....	{ Repair sets }
G02B 6/4469	....	{ Security aspects }
G02B 6/447	....	{ locatable, e.g. magnetic means ( detection of buried cables <a href="#">G01V</a> ) }
G02B 6/4471	....	{ terminating, fan-out, clamping, strain-relieving or like devices ( demountable connectors <a href="#">G02B 6/3807</a> ) }
G02B 6/4472	.....	{ Manifolds }
G02B 6/4473	.....	{ Three-way systems }

- G02B 6/4475 ..... { with provision for lateral branching ( [G02B 6/4495](#) takes precedence ) }
- G02B 6/4476 ..... { with heat-shrinkable elements }
- G02B 6/4477 ..... { Strain-relieving to interior strengths element }
- G02B 6/4478 ..... { Bending relief }
- G02B 6/4479 ... { Fabrication methods }
- G02B 6/448 ..... { ribbon cables }
- G02B 6/4482 ..... { code or colour marking }
- G02B 6/4483 ..... { Injection or filling devices ( hydrogen absorbing materials [G02B 6/4492](#) ; water blocking or hydrophobic materials [G02B 6/4494](#) ) }
- G02B 6/4484 ..... { with desired surplus length between fibres and protection feature }
- G02B 6/4485 ..... { Installing in protective tubing by fluid drag }
- G02B 6/4486 ..... { protective covering }
- G02B 6/4488 ..... { with metallic tube }
- G02B 6/4489 ..... { of central supporting member of lobe structure }
- G02B 6/449 ..... { twisting }
- G02B 6/4491 ..... { in a lobe structure }
- G02B 6/4492 ... { provided with hydrogen absorbing materials ( [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4494 ... { provided with water blocking or hydrophobic materials ( [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4495 ... { with provision in the cable protection, e.g. weak line, for gaining access to one or more fibres, e.g. for branching or tapping ( break-out terminations [G02B 6/4439](#) ) }
- G02B 6/4496 ... { Freeze-prevention means ( [G02B 6/4439](#) , [G02B 6/4479](#) take precedence ) }
- G02B 6/4497 ... { Devices for opening or removing the mantle }
- G02B 6/4498 ..... { for ribbon cables }
  
- G02B 6/46 . Processes or apparatus adapted for installing optical fibres or optical cables ( installation of cables containing electric conductors and optical fibres [H02G](#) )
- G02B 6/48 .. Overhead installation
- G02B 6/483 ... { Installation of aerial type }
- G02B 6/486 .... { by helical wrapping }
- G02B 6/50 .. Underground or underwater installation ; Installation through tubing, conduits or ducts
- G02B 6/502 ... { Installation methods in fluid conducts, e.g. pipelines }
- G02B 6/504 ... { Installation in solid material, e.g. underground }
- G02B 6/506 ... { Underwater installation }
- G02B 6/508 ... { Fixation devices in ducts for drawing cables }
- G02B 6/52 ... using fluids, e.g. air
- G02B 6/54 ... using mechanical means, e.g. pulling or pushing devices
  
- G02B 7/00** **Mountings, adjusting means, or light-tight connections, for optical elements**
- G02B 7/001 . { Counterbalanced structures, e.g. surgical microscopes }

- G02B 7/002 . { Mounting on the human body }
- G02B 7/003 . { Alignment of optical elements ( [G02B 7/001](#) , [G02B 7/002](#) take precedence; for mirrors [G02B 7/1822](#) ) }
- G02B 7/004 .. { Manual alignment, e.g. micromanipulators }
- G02B 7/005 .. { Motorised alignment }
- G02B 7/006 . { Filter holders }
- G02B 7/007 . { Pressure-resistant sight glasses }
- G02B 7/008 . { with means for compensating for changes in temperature or for controlling the temperature; thermal stabilisation }
- G02B 7/02 . for lenses { ( supports for magnifying lenses [G02B 25/002](#) ) }
- G02B 7/021 .. { for more than one lens }
- G02B 7/022 .. { lens and mount having complementary engagement means, e.g. screw/thread }
- G02B 7/023 .. { permitting adjustment }
- G02B 7/025 .. { using glue }
- G02B 7/026 .. { using retaining rings or springs ( [G02B 7/027](#) takes precedence ) }
- G02B 7/027 .. { the lens being in the form of a sphere or ball }
- G02B 7/028 .. { with means for compensating for changes in temperature or for controlling the temperature; thermal stabilisation }
- G02B 7/04 .. with mechanism for focusing or varying magnification
- G02B 7/06 ... Focusing binocular pairs
- G02B 7/08 ... adapted to co-operate with a remote control mechanism
- G02B 7/09 ... adapted for automatic focusing or varying magnification ( automatic generation of focusing signals [G02B 7/28](#) )
- G02B 7/10 ... by relative axial movement of several lenses, e.g. of varifocal objective lens
- G02B 7/102 .... { controlled by a microcomputer ( cameras with interchangeable lenses [G03B 17/14](#) ) }
- G02B 7/105 .... with movable lens means specially adapted for focusing at close distances
- G02B 7/12 .. Adjusting pupillary distance of binocular pairs
- G02B 7/14 .. adapted to interchange lenses { ( [G02B 7/027](#) takes precedence ) }
- G02B 7/16 ... Rotatable turrets
- G02B 7/18 . for prisms ; for mirrors
- G02B 7/1805 .. { for prisms ( [G02B 7/181](#) takes precedence ) }
- G02B 7/181 .. { with means for compensating for changes in temperature or for controlling the temperature; thermal stabilisation }
- G02B 7/1815 ... { with cooling or heating systems ( cooling arrangements for laser mirrors [H01S 3/0401](#) ) }
- G02B 7/182 .. for mirrors { ( [G02B 7/181](#) takes precedence; mounting of MEMS mirrors, e.g. DMDs, [G02B 26/0833](#) ) ; optical devices or arrangements using movable or deformable optical elements for controlling the intensity, colour, phase, polarisation or direction of light [G02B 26/00](#) ; { mirror arrangements in vehicles [B60R 1/02](#) ) }
- G02B 7/1821 ... { for rotating or oscillating mirrors }



- G02B 7/1822 . . . { comprising means for aligning the optical axis ( [G02B 7/1821](#) takes precedence ) }
- G02B 7/1824 . . . . { Manual alignment }
- G02B 7/1825 . . . . . { made by screws, e.g. for laser mirrors }
- G02B 7/1827 . . . . { Motorised alignment }
- G02B 7/1828 . . . . . { using magnetic means }
- G02B 7/183 . . . specially adapted for very large mirrors, e.g. for astronomy, { or solar concentrators }
- G02B 7/185 . . . with means for adjusting the shape of the mirror surface ( mirrors with curved faces [G02B 5/10](#) ) { not in use, see [G02B 26/06](#) , [G02B 26/0825](#) }
- G02B 7/188 . . . . Membrane mirrors { not in use, see [G02B 26/06](#) , [G02B 26/0825](#) }
- G02B 7/192 . . . with means for minimising internal mirror stresses { not in use }
- G02B 7/195 . . . . Fluid-cooled mirrors { not in use, see [G02B 7/181](#) }
- G02B 7/198 . . . with means for adjusting the mirror relative to its support { not in use, see [G02B 7/1822](#) and subgroups }
  
- G02B 7/20 . Light-tight connections for movable optical elements
- G02B 7/22 . . Extensible connections, e.g. bellows
- G02B 7/24 . . Pivoted connections
  
- G02B 7/28 . Systems for automatic generation of focusing signals ( measuring distance per se [G01C](#) , S; using such signals to control focus of particular apparatus, see the subclasses for the apparatus, e.g. [G03B](#) , [G03F](#) , { [H04N](#) } )
- G02B 7/282 . . { Autofocusing of zoom lenses }
- G02B 7/285 . . { including two or more different focus detection devices, e.g. both an active and a passive focus detecting device }
- G02B 7/287 . . { including a sight line detecting device }
- G02B 7/30 . . using parallax triangle with a base line
- G02B 7/305 . . . { using a scanner }
- G02B 7/32 . . . using active means, e.g. light emitter { ( including both an active and a passive focus detecting device [G02B 7/285](#) ; using ultrasound [G02B 7/40](#) ) }
- G02B 7/34 . . using different areas in a pupil plane
- G02B 7/343 . . . { using light beam separating prisms }
- G02B 7/346 . . . { using horizontal and vertical areas in the pupil plane, i.e. wide area autofocusing }
- G02B 7/36 . . using image sharpness techniques { , e.g. image processing techniques for generating autofocus signals ( in cameras having a solid state image sensor [H04N 5/23212](#) ; image data processing per se [G06T](#) ) }
- G02B 7/365 . . . { by analysis of the spatial frequency components of the image }
- G02B 7/38 . . . measured at different points on the optical axis { , e.g. focussing on two or more planes and comparing image data }
- G02B 7/40 . . using time delay of the reflected waves, e.g. of ultrasonic waves
  
- G02B 9/00** **Optical objectives characterised both by the number of the components and their arrangements according to their sign, i.e. + or - ( [G02B 15/00](#) takes precedence )**
  
- G02B 9/02 . having one + component only ( simple lenses [G02B 3/00](#) )

- G02B 9/04 . having two components only
- G02B 9/06 .. two + components
- G02B 9/08 ... arranged about a stop
- G02B 9/10 .. one + and one - component
  
- G02B 9/12 . having three components only
- G02B 9/14 .. arranged + - +
- G02B 9/16 ... all the components being simple
- G02B 9/18 ... only one component having a compound lens ( [G02B 9/30](#) takes precedence )
- G02B 9/20 .... the rear component having the compound
- G02B 9/22 .... the middle component having the compound
- G02B 9/24 ... two of the components having compound lenses ( [G02B 9/30](#) takes precedence )
- G02B 9/26 .... the front and rear components having compound lenses
- G02B 9/28 .... the middle and rear components having compound lenses
- G02B 9/30 ... the middle component being a - compound meniscus having a + lens
- G02B 9/32 .... the + lens being a meniscus
  
- G02B 9/34 . having four components only
- G02B 9/36 .. arranged + -- +

#### **NOTE**

In sub-groups [G02B 9/38](#) , [G02B 9/44](#) to [G02B 9/56](#) the first mentioned applicable sub-group takes precedence over later-mentioned sub-groups.

- G02B 9/38 ... both - components being meniscus
- G02B 9/40 .... one - component being compound
- G02B 9/42 .... two - components being compound
- G02B 9/44 ... both - components being biconcave
- G02B 9/46 .... one - component being compound
- G02B 9/48 .... two - components being compound
- G02B 9/50 ... both + components being meniscus
- G02B 9/52 ... the rear + component being compound
- G02B 9/54 ... the front + component being compound
- G02B 9/56 ... all components being simple lenses
- G02B 9/58 .. arranged - + + -
  
- G02B 9/60 . having five components only
  
- G02B 9/62 . having six components only
  
- G02B 9/64 . having more than six components

**G02B 13/00** Optical objectives specially designed for the purposes specified below ( with variable magnification { in general } [G02B 15/00](#) )

**NOTE**

Unless specified in the title of the subgroups, this group and its subgroups do not cover objectives comprising reflecting surfaces, which are covered by [G02B 17/06](#) , [G02B 17/08](#) and their subgroups

- G02B 13/0005 . { having F-Theta characteristic ( scanning systems employing movable or deformable optical elements [G02B 26/10](#) ) }
- G02B 13/001 . { Miniaturised objectives for electronic devices, e.g. portable telephones, webcams, PDAs, small digital cameras ( [G02B 23/243](#) takes precedence ) }
- G02B 13/0015 . . { characterised by the lens design }
- G02B 13/002 . . . { having at least one aspherical surface ( aspherical lenses per se [G02B 3/02](#) ) }

**NOTE**

When classifying in this group, a lens is deemed to be a simple lens or a compound lens

- G02B 13/0025 . . . . { having one lens only }
- G02B 13/003 . . . . { having two lenses }
- G02B 13/0035 . . . . { having three lenses }
- G02B 13/004 . . . . { having four lenses }
- G02B 13/0045 . . . . { having five or more lenses }
- G02B 13/005 . . . { having spherical lenses only }
- G02B 13/0055 . . { employing a special optical element }
- G02B 13/006 . . . { at least one element being a compound optical element, e.g. cemented elements }
- G02B 13/0065 . . . { having a beam-folding prism or mirror }
- G02B 13/007 . . . . { the beam folding prism having at least one curved surface }
- G02B 13/0075 . . . { having an element with variable optical properties }
- G02B 13/008 . . { designed for infrared light }
- G02B 13/0085 . . { employing wafer level optics ( lens arrays per se [G02B 3/0006](#) ) }
- G02B 13/009 . . { having zoom function ( zoom lenses per se [G02B15](#) ) }
- G02B 13/0095 . { Relay lenses or rod lenses ( in instruments for viewing the inside of hollow bodies [G02B 23/2446](#) ) }
- G02B 13/02 . Telephoto objectives, i.e. systems of the type + - in which the distance from the front vertex to the image plane is less than the equivalent focal length
- G02B 13/04 . Reversed telephoto objectives
- G02B 13/06 . Panoramic objectives ; So-called "sky lenses" { including panoramic objectives having reflecting surfaces }
- G02B 13/08 . Anamorphic objectives

- G02B 13/10 . . involving prisms ( [G02B 13/12](#) takes precedence )
- G02B 13/12 . . with variable magnification
- G02B 13/14 . for use with infra-red or ultra-violet radiation ( { [G02B 13/008](#) , } [G02B 13/16](#) take precedence )
- G02B 13/143 . . { for use with ultra-violet radiation }
- G02B 13/146 . . { with corrections for use in multiple wavelength bands, such as infra-red and visible light, e.g. FLIR systems }
- G02B 13/16 . for use in conjunction with image converters or intensifiers { , or for use with projectors, e.g. objectives for projection TV }
- G02B 13/18 . with lenses having one or more non-spherical face, e.g. for reducing geometrical aberration { ( [G02B 13/002](#) takes precedence ) }
- G02B 13/20 . Soft-focus objectives ( diffusing elements in general [G02B 5/02](#) )
- G02B 13/22 . Telecentric objectives or lens systems
- G02B 13/24 . for reproducing or copying at short object distances
- G02B 13/26 . . for reproducing with unit magnification
- G02B 15/00** **Optical objectives with means for varying the magnification ( anamorphic objectives [G02B 13/08](#) )**
- G02B 15/02 . by changing, adding, or subtracting a part of the objective, e.g. convertible objective
- G02B 15/04 . . by changing a part
- G02B 15/06 . . . by changing the front part
- G02B 15/08 . . . by changing the rear part
- G02B 15/10 . . by adding a part, e.g. close-up attachment
- G02B 15/12 . . . by adding telescopic attachments ( [G02B 15/14](#) takes precedence )
- G02B 15/14 . by axial movement of one or more lenses or groups of lenses relative to the image plane for continuously varying the equivalent focal length of the objective
- G02B 15/15 . . compensation by means of only one movement or by means of only linearly related movements, e.g. optical compensation
- G02B 15/155 . . . { Zoom lenses arranged symmetrically around a central plane, e.g. a diaphragm-containing plane }
- G02B 15/16 . . with interdependent non-linearly related movements between one lens or lens group, and another lens or lens group ( [G02B 15/22](#) takes precedence )
- G02B 15/161 . . . { Zoom lenses having only two lenses or lens groups }
- G02B 15/163 . . . having a first movable lens or lens group and a second movable lens or lens group, both in front of a fixed lens or lens group ( [G02B 15/177](#) takes precedence )
- G02B 15/167 . . . . having an additional fixed front lens or group of lenses
- G02B 15/17 . . . . . arranged +--
- G02B 15/173 . . . . . arranged ++
- G02B 15/177 . . . having a negative front lens or group of lenses

- G02B 15/20 . . . having an additional movable lens or lens group for varying the objective focal length
- G02B 15/22 . . with movable lens means specially adapted for focusing at close distances
- G02B 15/24 . . . having a front fixed lens or lens group and two movable lenses or lens groups in front of a fixed lens or lens group
- G02B 15/26 . . . . arranged +--
- G02B 15/28 . . . . arranged ++-
  
- G02B 17/00** **Systems with reflecting surfaces, with or without refracting elements** ( [microscopes G02B 21/00](#) ; [telescopes, periscopes G02B 23/00](#) ; for beam splitting or combining [G02B 27/10](#) ; for optical projection [G02B 27/18](#) )
  
- G02B 17/002 . { Arrays of reflective systems }
- G02B 17/004 . { Systems comprising a plurality of reflections between two or more surfaces, e.g. cells, resonators ( [multipass arrangements for optical cuvettes G01N 21/031](#) ; [laser resonators H01S 3/05](#) ) }
- G02B 17/006 . { Systems in which light light is reflected on a plurality of parallel surfaces, e.g. louvre mirrors, total internal reflection ( TIR ) lenses ( [Fresnel mirrors G02B 5/09](#) , [Fresnel lenses G02B 3/08](#) ) }
- G02B 17/008 . { Systems specially adapted to form image relays or chained systems }
- G02B 17/02 . Catoptric systems, e.g. image erecting and reversing system
- G02B 17/023 . . { for extending or folding an optical path, e.g. delay lines }
- G02B 17/026 . . { having static image erecting or reversing properties only ( [G02B 17/045](#) takes precedence; [optical derotators G02B 27/642](#) ; [optical devices for controlling the direction of light using movable or deformable optical elements G02B 26/08](#) ) }
- G02B 17/04 . . using prisms only
- G02B 17/045 . . . { having static image erecting or reversing properties only ( [optical derotators G02B 27/642](#) ; [optical devices for controlling the direction of light using movable or deformable optical elements G02B 26/08](#) ) }
- G02B 17/06 . . using mirrors only { i.e. having only one curved mirror ( [used in non-imaging applications G02B 19/00](#) ) }
- G02B 17/0605 . . . { using two curved mirrors ( [G02B 17/0668](#) , [G02B 17/0694](#) take precedence ) }
- G02B 17/061 . . . . { on-axis systems with at least one of the mirrors having a central aperture }
- G02B 17/0615 . . . . { off-axis or unobscured systems in wich all of the mirrors share a common axis of rotational symmetry }
- G02B 17/0621 . . . . { off-axis or unobscured systems in which not all of the mirrors share a common axis of rotational symmetry, e.g. at least one of the mirrors is warped, tilted or decentered with respect to the other elements }
- G02B 17/0626 . . . { using three curved mirrors ( [G02B 17/0668](#) , [G02B 17/0694](#) take precedence ) }
- G02B 17/0631 . . . . { on-axis systems with at least one of the mirrors having a central aperture }
- G02B 17/0636 . . . . { off-axis or unobscured systems in which all of the mirrors share a common axis of rotational symmetry }
- G02B 17/0642 . . . . { off-axis or unobscured systems in which not all of the mirrors share a common axis of rotational symmetry, e.g. at least one of the mirrors is warped, tilted or decentered with respect to the other elements }

G02B 17/0647	...	{ using more than three curved mirrors ( <a href="#">G02B 17/0668</a> , <a href="#">G02B 17/0694</a> take precedence ) }
G02B 17/0652	....	{ on-axis systems with at least one of the mirrors having a central aperture }
G02B 17/0657	....	{ off-axis or unobscured systems in which all of the mirrors share a common axis of rotational symmetry }
G02B 17/0663	....	{ off-axis or unobscured systems in which not all of the mirrors share a common axis of rotational symmetry, e.g. at least one of the mirrors is warped, tilted or decentered with respect to the other elements }
G02B 17/0668	...	{ having non-imaging properties }

**WARNING**

This group and subgroups are no longer used for the classification of new documents as from May 1, 2012. The backlog is being continuously classified to [G02B 19/00](#) and subgroups

G02B 17/0673	....	{ for light condensing, e.g. for use with a light emitter ( details of lighting devices in general <a href="#">F21V</a> ; semiconductor devices with at least one potential-jump barrier or surface barrier specially adapted for light emission <a href="#">H01L 33/00</a> ) }
G02B 17/0678	.....	{ specially adapted to emit light in a 360° plane or hemisphere }
G02B 17/0684	....	{ for light collecting, e.g. for use with a detector }
G02B 17/0689	.....	{ specially adapted to receive light from a 360° plane or hemisphere }
G02B 17/0694	...	{ with variable magnification or multiple imaging planes, including multispectral systems ( systems with only refractive elements <a href="#">G02B 15/14</a> ) }
G02B 17/08	.	Catadioptric systems { ( used in non-imaging applications <a href="#">G02B 19/00</a> ) }
G02B 17/0804	..	{ using two curved mirrors ( <a href="#">G02B 17/0864</a> , <a href="#">G02B1708Z</a> takes precedence ) }
G02B 17/0808	...	{ on-axis systems with at least one of the mirrors having a central aperture }
G02B 17/0812	...	{ off-axis or unobscured systems in which all of the mirrors share a common axis of rotational symmetry }
G02B 17/0816	...	{ off-axis or unobscured systems in which not all of the mirrors share a common axis of rotational symmetry, e.g. at least one of the mirrors is warped, tilted or decentered with respect to the other elements }
G02B 17/082	..	{ using three curved mirrors ( <a href="#">G02B 17/0864</a> , <a href="#">G02B 17/0896</a> take precedence ) }
G02B 17/0824	...	{ on-axis systems with at least one of the mirrors having a central aperture }
G02B 17/0828	...	{ off-axis or unobscured systems in which all of the mirrors share a common axis of rotational symmetry }
G02B 17/0832	...	{ off-axis or unobscured systems in which not all of the mirrors share a common axis of rotational symmetry, e.g. at least one of the mirrors is warped, tilted or decentered with respect to the other elements }
G02B 17/0836	..	{ using more than three curved mirrors ( <a href="#">G02B 17/0864</a> , <a href="#">G02B 17/0896</a> take precedence ) }
G02B 17/084	...	{ on-axis systems with at least one of the mirrors having a central aperture }
G02B 17/0844	...	{ off-axis or unobscured systems in which all of the mirrors share a common axis of rotational symmetry }
G02B 17/0848	...	{ off-axis or unobscured systems in which not all of the mirrors share a common axis of rotational symmetry, e.g. at least one of the mirrors is warped, tilted or decentered with respect to the other elements }
G02B 17/0852	..	{ having a field corrector only }



- G02B 17/0856 . . { comprising a refractive element with a reflective surface, the reflection taking place inside the element, e.g. Mangin mirrors }
- G02B 17/086 . . . { wherein the system is made of a single block of optical material, e.g. solid catadioptric systems }
- G02B 17/0864 . . { having non-imaging properties }

### **WARNING**

This group and subgroups are no longer used for the classification of new documents as from May 1, 2012. The backlog is being continuously classified to [G02B 19/00](#) and subgroups

- G02B 17/0868 . . . { for light condensing, e.g. for use with a light emitter ( details of lighting devices in general [F21V](#) ; semiconductor devices with at least one potential-jump barrier or surface barrier specially adapted for light emission [H01L 33/00](#) ) }
- G02B 17/0872 . . . . { specially adapted to emit light in a 360° plane or hemisphere }
- G02B 17/0876 . . . { for light collecting, e.g. for use with a detector }
- G02B 17/088 . . . . { specially adapted to receive light from a 360° plane or hemisphere }
- G02B 17/0884 . . { having a pupil corrector }
- G02B 17/0888 . . . { the corrector having at least one aspheric surface, e.g. Schmidt plates }
- G02B 17/0892 . . { specially adapted for the UV }
- G02B 17/0896 . . { with variable magnification or multiple imaging planes, including multispectral systems ( systems with only refractive elements [G02B 15/14](#) ) }

**G02B 19/00** **Condensers**, { e.g. light collectors or similar non-imaging optics } ( for microscopes [G02B 21/08](#) )

### **WARNING**

This group and subgroups are not complete pending reclassification, see [G02B 17/0668](#) and subgroups

- G02B 19/0004 . { characterised by the optical means employed }
- G02B 19/0009 . . { having refractive surfaces only }
- G02B 19/0014 . . . { at least one surface having optical power }
- G02B 19/0019 . . { having reflective surfaces only ( e.g. louvre systems, systems with multiple planar reflectors ) }
- G02B 19/0023 . . . { at least one surface having optical power }
- G02B 19/0028 . . { refractive and reflective surfaces, e.g. non-imaging catadioptric systems }
- G02B 19/0033 . { characterised by the use }
- G02B 19/0038 . . { for use with ambient light ( [G02B 19/009](#) , [G02B 19/0095](#) take precedence ) }
- G02B 19/0042 . . . { for use with direct solar radiation }
- G02B 19/0047 . . { for use with a light source ( [G02B 19/009](#) , [G02B 19/0095](#) take precedence; details of lighting devices in general [F21V](#) ; non-semiconductor lasers having optical devices external to the laser cavity [H01S 3/005](#) ) }
- G02B 19/0052 . . . { the light source comprising a laser diode ( coupling into light guides using intermediate optical elements [G02B 6/4204](#) ; semiconductor lasers having optical devices external to the laser cavity [H01S 5/005](#) ) }

G02B 19/0057	....	{ in the form of a laser diode array, e.g. laser diode bar ( semiconductor laser arrays with beam combining arrangement <a href="#">H01S 5/4012</a> ) }
G02B 19/0061	...	{ the light source comprising a LED ( semiconductor devices with at least one potential-jump barrier or surface barrier specially adapted for light emission <a href="#">H01L 33/00</a> ) }
G02B 19/0066	....	{ in the form of an LED array }
G02B 19/0071	...	{ adapted to illuminate a complete hemisphere or a plane extending 360 degrees around the source }
G02B 19/0076	..	{ for use with a detector ( <a href="#">G02B 19/009</a> , <a href="#">G02B 19/0095</a> take precedence ) }
G02B 19/008	...	{ adapted to collect light from a complete hemisphere or a plane extending 360 degrees around the detector }
G02B 19/0085	..	{ for use with both a detector and a source ( e.g. in a transceiver, <a href="#">G02B 19/009</a> , <a href="#">G02B 19/0095</a> take precedence ) }
G02B 19/009	..	{ for use with infra-red radiation }
G02B 19/0095	..	{ for use with ultra-violet radiation }

**G02B 21/00**      **Microscopes** ( eyepieces [G02B 25/00](#) ; polarising systems [G02B 27/28](#) ; measuring microscopes [G01B 9/04](#) ; microtomes [G01N 1/06](#) ; scanning-probe techniques or apparatus [G01Q](#) )

G02B 21/0004	.	{ specially adapted for specific applications }
G02B 21/0008	..	{ Microscopes having a simple construction, e.g. portable microscopes }
G02B 21/0012	..	{ Surgical microscopes ( counterbalanced structures for surgical microscopes <a href="#">G02B 7/001</a> ) }
G02B 21/0016	..	{ Technical microscopes, e.g. for inspection or measuring in industrial production processes }
G02B 21/002	..	{ Scanning microscopes ( scanning near field optical microscopes <a href="#">G01Q 60/18</a> ) }
G02B 21/0024	...	{ Confocal scanning microscopes (CSOMs) or confocal "macroscopes"; Accessories which are not restricted to use with CSOMs, e.g. sample holders }

#### **NOTE**

Objective revolvers or the like are classified in other groups of [G02B 21/00](#)

G02B 21/0028	....	{ specially adapted for specific applications, e.g. for endoscopes, ophthalmoscopes, attachments to conventional microscopes }
G02B 21/0032	....	{ Optical details of illumination, e.g. light-sources, pinholes, beam splitters, slits, fibers ( <a href="#">G02B 21/0036</a> to <a href="#">G02B 21/008</a> ; means for illumination of specimens in general <a href="#">G02B 21/06</a> ) }
G02B 21/0036	....	{ Scanning details, e.g. scanning stages }
G02B 21/004	.....	{ fixed arrays, e.g. switchable aperture arrays }
G02B 21/0044	.....	{ moving apertures, e.g. Nipkow disks, rotating lens arrays }
G02B 21/0048	.....	{ scanning mirrors, e.g. rotating or galvanomirrors, MEMS mirrors }
G02B 21/0052	....	{ Optical details of the image generation }
G02B 21/0056	.....	{ based on optical coherence, e.g. phase-contrast arrangements, interference arrangements }
G02B 21/006	.....	{ focusing arrangements; selection of the plane to be imaged }
G02B 21/0064	.....	{ multi-spectral or wavelength-selective arrangements, e.g. wavelength fan-out, chromatic profiling ( <a href="#">G02B 21/0076</a> takes precedence ) }

- G02B 21/0068 . . . . . { arrangements using polarisation }
- G02B 21/0072 . . . . . { details concerning resolution or correction, including general design of CSOM objectives }
- G02B 21/0076 . . . . . { arrangements using fluorescence or luminescence }
- G02B 21/008 . . . . . { Details of detection or image processing, including general computer control }
- G02B 21/0084 . . . . . { time-scale detection, e.g. strobed, ultra-fast, heterodyne detection }
- G02B 21/0088 . . { Inverse microscopes }
- G02B 21/0092 . . { Polarisation microscopes }

### **WARNING**

Not complete, see also other subgroups of [G02B 21/00](#)

- G02B 21/0096 . { with photometer devices ( photometers per se [G01J](#) ) }
- G02B 21/02 . Objectives
- G02B 21/025 . . { with variable magnification ( variable magnification [G02B 15/00](#) ) }
- G02B 21/04 . . involving mirrors
- G02B 21/06 . Means for illuminating specimens
- G02B 21/08 . . Condensers
- G02B 21/082 . . . { for incident illumination only }
- G02B 21/084 . . . { having annular illumination around the objective }
- G02B 21/086 . . . { for transillumination only }
- G02B 21/088 . . . { for both incident illumination and transillumination }
- G02B 21/10 . . . affording dark-field illumination ( [G02B 21/14](#) { and [G02B 21/125](#) } take precedence )
- G02B 21/12 . . . affording bright-field illumination ( [G02B 21/14](#) takes precedence )
- G02B 21/125 . . . . { affording both dark- and bright-field illumination }
- G02B 21/14 . . . affording illumination for phase-contrast observation
- G02B 21/16 . . adapted for ultra-violet illumination; { Fluorescence microscopes ( [G02B 21/0076](#) takes precedence ) }
- G02B 21/18 . . Arrangements with more than one light path, e.g. for comparing two specimens
- G02B 21/20 . . . Binocular arrangements
- G02B 21/22 . . . Stereoscopic arrangements
- G02B 21/24 . . Base structure
- G02B 21/241 . . . { Devices for focusing ( focusing in general [G02B 7/28](#) ) }
- G02B 21/242 . . . { with coarse and fine adjustment mechanism }
- G02B 21/244 . . . { using image analysis techniques }
- G02B 21/245 . . . { using auxiliary sources, detectors }
- G02B 21/247 . . . . { Differential detectors }
- G02B 21/248 . . { objective ( or ocular ) turrets }

- G02B 21/26 . . Stages ; Adjusting means therefor
- G02B 21/28 . . with cooling device
- G02B 21/30 . . with heating device
  
- G02B 21/32 . Micromanipulators structurally combined with microscopes
  
- G02B 21/33 . Immersion oils, { or microscope systems or objectives for use with immersion fluids }
  
- G02B 21/34 . Microscope slides, e.g. mounting specimens on microscope slides ( preparing specimens for investigation [G01N 1/28](#) ; means for supporting the objects or the materials to be analysed in electron microscopes [H01J 37/20](#) )
  
- G02B 21/36 . arranged for photographic purposes or projection purposes ( [G02B 21/18](#) takes precedence ) { or digital imaging or video purposes including associated control and data processing arrangements ( image data processing per se [G06T](#) ) }
- G02B 21/361 . . { Optical details, e.g. image relay to the camera or image sensor ( [G02B 21/364](#) takes precedence; illumination details [G02B 21/06](#) and subgroups ) }
- G02B 21/362 . . { Mechanical details, e.g. mountings for the camera or image sensor, housings ( [G02B 21/364](#) takes precedence ) }
- G02B 21/364 . . { Projection microscopes }
- G02B 21/365 . . { Control or image processing arrangements for digital or video microscopes ( [G02B 21/361](#) , [G02B 21/362](#) take precedence ) }
- G02B 21/367 . . . { providing an output produced by processing a plurality of individual source images, e.g. image tiling, montage, composite images, depth sectioning, image comparison }
- G02B 21/368 . . { details of associated display arrangements, e.g. mounting of LCD monitor }
  
- G02B 23/00** **Telescopes, e.g. binoculars ; Periscopes ; Instruments for viewing the inside of hollow bodies ( diagnostic instruments [A61B](#) ) ; Viewfinders ( objectives [G02B 9/00](#) , [G02B 11/00](#) , [G02B 15/00](#) , [G02B 17/00](#) ; eyepieces [G02B 25/00](#) ) ; Optical aiming or sighting devices ( non-optical aspects of weapon aiming or sighting devices [F41G](#) )**
  
- G02B 23/02 . involving prisms or mirrors ( [G02B 23/14](#) takes precedence )
- G02B 23/04 . . for the purpose of beam splitting or combining, e.g. fitted with eyepieces for more than one observer ( [G02B 23/10](#) takes precedence )
- G02B 23/06 . . having a focussing action, e.g. parabolic mirror
- G02B 23/08 . . Periscopes { ( arrangements on floating structures of underwater viewing devices [B63C 11/49](#) ; arrangement of visual watch equipment on submarines [B63G 8/38](#) ) }
- G02B 23/10 . . reflecting into the field of view additional indications, e.g. from collimator ( collimators in general [G02B 27/30](#) ; graticules [G02B 27/34](#) )
- G02B 23/105 . . . { Sighting devices with light source and collimating reflector ( reflecting sights for small arms having light source [F41G 1/34](#) ) }
  
- G02B 23/12 . with means for image conversion or intensification ( objectives for image conversion or intensification [G02B 13/16](#) ; electrical image converters with optical input and optical output [H01J 31/50](#) )
- G02B 23/125 . . { head-mounted }
  
- G02B 23/14 . Viewfinders ( for photographic apparatus [G03B 13/02](#) )
- G02B 23/145 . . { Zoom viewfinders }

- G02B 23/16 . Housings ; Caps ; Mountings ; Supports, e.g. with counterweight ( [cases or receptacles A45C](#) { ; for submarine periscopes [G02B 23/08](#) } )
- G02B 23/165 .. { [Equatorial mounts](#) }
- G02B 23/18 .. for binocular arrangements { ( [focusing binocular pairs G02B 7/06](#) ; [adjusting pupillary distance of binocular pairs G02B 7/12](#) ) }
- G02B 23/20 .. Collapsible housings ( [G02B 23/18](#) takes precedence )
- G02B 23/22 .. Underwater equipment { ( for submarine periscopes [G02B 23/08](#) ; [arrangements on floating structures of underwater viewing devices B63C 11/49](#) ; [arrangement of visual watch equipment on submarines B63G 8/38](#) ) }

**NOTE**

This group covers housings, mountings, supports or the like for underwater equipment other than periscopes

- G02B 23/24 . Instruments { or systems } for viewing the inside of hollow bodies, e.g. fibrescopes
- G02B 23/2407 .. { [Optical details](#) }
- G02B 23/2415 ... { [Stereoscopic endoscopes](#) }
- G02B 23/2423 ... { [of the distal end](#) }
- G02B 23/243 .... { [Objectives for endoscopes](#) }
- G02B 23/2438 ..... { [Zoom objectives](#) }
- G02B 23/2446 ... { [of the image relay \( G02B 23/26 takes precedence \)](#) }
- G02B 23/2453 ... { [of the proximal end](#) }
- G02B 23/2461 ... { [Illumination](#) }
- G02B 23/2469 .... { [using optical fibres](#) }
- G02B 23/2476 .. { [Non-optical details, e.g. housings, mountings, supports](#) }
- G02B 23/2484 ... { [Arrangements in relation to a camera or imaging device \( processing or control of video signals generated by an endoscope H04N 5/232 , H04N 5/235 \)](#) }
- G02B 23/2492 ... { [Arrangements for use in a hostile environment, e.g. a very hot, cold or radioactive environment](#) }
- G02B 23/26 .. using light guides { ( for illumination [G02B 23/2469](#) ) }

**G02B 25/00 Eyepieces ; Magnifying glasses ( simple lenses [G02B 3/00](#) )**

- G02B 25/001 . { [Eyepieces](#) }
- G02B 25/002 . { [Magnifying glasses](#) }
- G02B 25/004 .. { [having binocular arrangement](#) }
- G02B 25/005 .. { [with means for adjusting the magnifying glass or the object viewed \( G02B 25/004 takes precedence \)](#) }
- G02B 25/007 .. { [comprising other optical elements than lenses \( G02B 25/004 , G02B 25/005 take precedence \)](#) }
- G02B 25/008 .. { [comprising two or more lenses \( G02B 25/004 to G02B 25/007 take precedence \)](#) }
- G02B 25/02 . with means for illuminating object viewed

- G02B 25/04 . affording a wide-angle view, e.g. through a spy-hole
- G02B 26/00** **Optical devices or arrangements using movable or deformable optical elements for controlling the intensity, colour, phase, polarisation or direction of light, e.g. switching, gating, modulating ( specially adapted to measuring characteristics of light G01J ; using devices or arrangements the optical operation of which is modified by changing the optical properties of the medium of the devices or the arrangements G02F 1/00 ; control of light in general G05D 25/00 ; control of light sources H01S 3/10 , H05B 37/00 to H05B 43/00 ; mechanically operable parts of lighting devices for the control of light F21V )**
- G02B 26/001 . { based on interference in an adjustable optical cavity ( interference filters [G02B 5/28](#) ; devices or arrangements using multiple reflections in spectrometry or monochromators [G01J 3/26](#) ) }
- G02B 26/002 . { the movement or the deformation controlling the frequency of light, e.g. by Doppler effect }
- G02B 26/004 . { based on a displacement or a deformation of a fluid }
- G02B 26/005 .. { based on electrowetting }
- G02B 26/007 . { the movable or deformable optical element controlling the colour, i.e. a spectral characteristic, of the light }
- G02B 26/008 .. { in the form of devices for effecting sequential colour changes, e.g. colour wheels }
- G02B 26/02 . for controlling the intensity of light ( ( [G02B 26/004](#) takes precedence ) )
- G02B 26/023 .. { comprising movable attenuating elements, e.g. neutral density filters }
- G02B 26/026 .. { based on the rotation of particles under the influence of an external field, e.g. gyricons, twisting ball displays ( based on orientable dipolar particles [G02F 1/172](#) ; based on electrophoresis [G02F 1/167](#) ) }
- G02B 26/04 .. by periodically varying the intensity of light, e.g. using choppers ( shutters, diaphragms for cameras [G03B 9/00](#) ; devices for eliminating or reducing the effect of flicker in projection systems [G03B 21/40](#) )
- G02B 26/06 . for controlling the phase of light ( [G02B 26/08](#) takes precedence { , measuring optical phase difference [G01J 9/00](#) } )
- G02B 26/08 . for controlling the direction of light ( in light guides [G02B 6/35](#) )
- G02B 26/0808 .. { by means of one or more diffracting elements }
- G02B 26/0816 .. { by means of one or more reflecting elements }
- G02B 26/0825 ... { the reflecting element being a flexible sheet or membrane, e.g. for varying the focus ( flexible mirrors for cosmetic use [A45D 42/24](#) ) }
- G02B 26/0833 ... { the reflecting element being a micromechanical device, e.g. a MEMS mirror, DMD ( [G02B 26/0825](#) takes precedence; micromechanical devices in general [B81B](#) ) }
- G02B 26/0841 .... { the reflecting element being moved or deformed by electrostatic means }
- G02B 26/085 .... { the reflecting means being moved or deformed by electromagnetic means }
- G02B 26/0858 .... { the reflecting means being moved or deformed by piezoelectric means }
- G02B 26/0866 .... { the reflecting means being moved or deformed by thermal means }
- G02B 26/0875 .. { by means of one or more refracting elements }



- G02B 26/0883 . . . { the refracting element being a prism }
- G02B 26/0891 . . . . { forming an optical wedge }
- G02B 26/10 . . Scanning systems ( for special applications, see the relevant places, e.g. [G03B 27/32](#), { [G03F 7/20](#) } , [G03G 15/04](#) , [G09G 3/00](#) , [H04N](#) )
- G02B 26/101 . . . { with both horizontal and vertical deflecting means, e.g. raster or XY scanners ( colour television using laser beams scanning a display screen [H04N 9/3129](#) ) }
- G02B 26/103 . . . { having movable or deformable optical fibres, light guides or waveguides as scanning elements ( light guides per se [G02B 6/00](#) ) }
- G02B 26/105 . . . { with one or more pivoting mirrors or galvano-mirrors ( [G02B 26/101](#) takes precedence ) }
- G02B 26/106 . . . { having diffraction gratings as scanning elements, e.g. holographic scanners ( holographic optical elements [G02B 5/32](#) , holography [G03H](#) ) }
- G02B 26/108 . . . { having one or more prisms as scanning elements }
- G02B 26/12 . . . using multifaceted mirrors
- G02B 26/121 . . . . { Mechanical drive devices for polygonal mirrors }
- G02B 26/122 . . . . . { Control of the scanning speed of the polygonal mirror }
- G02B 26/123 . . . . { Multibeam scanners, e.g. using multiple light sources or beam splitters }
- G02B 26/124 . . . . { Details of the optical system between the light source and the polygonal mirror ( [G02B 26/123](#) , [G02B 26/127](#) take precedence ) }
- G02B 26/125 . . . . { Details of the optical system between the polygonal mirror and the image plane ( [G02B 26/12 D](#), [G02B 26/127](#) take precedence; F-Theta lenses [G02B 13/00 A](#) ) }
- G02B 26/126 . . . . . { including curved mirrors }
- G02B 26/127 . . . . { Adaptive control of the scanning light beam, e.g. using the feedback from one or more detectors ( [G02B 27/0031](#) takes precedence ) }
- G02B 26/128 . . . . . { Focus control }
- G02B 26/129 . . . . { Systems in which the scanning light beam is repeatedly reflected from the polygonal mirror }
  
- G02B 27/00** **Other optical systems ; Other optical apparatus** ( means for bringing about special optical effects in shop-windows, show-cases [A47F](#) , e.g. [A47F 11/06](#) ; optical toys [A63H 33/22](#) ; designs or pictures characterised by special light effects [B44F 1/00](#) )
  
- G02B 27/0006 . { with means to keep optical surfaces clean, e.g. by preventing or removing dirt, stains, contamination, condensation ( cleaning in general [B08B](#) ) }
- G02B 27/0012 . { Optical design, e.g. procedures, algorithms, optimisation routines }
- G02B 27/0018 . { with means for preventing ghost images ( anti-reflection coatings [G02B 1/11](#) ) }
- G02B 27/0025 . { for optical correction, e.g. distortion, aberration }
- G02B 27/0031 . . { for scanning purposes }
- G02B 27/0037 . . { with diffracting elements ( [G02B 27/0056](#) takes precedence; holographic optical elements [G02B 5/32](#) ; zone systems [G02B 5/1876](#) ) }
- G02B 27/0043 . . . { in projection exposure systems, e.g. microlithographic systems }
- G02B 27/005 . . { for correction of secondary color or higher-order chromatic aberrations }
- G02B 27/0056 . . . { by using a diffractive optical element }
- G02B 27/0062 . . . { by controlling the dispersion of a lens material, e.g. adapting the relative partial

- dispersion }
- G02B 27/0068 . . { having means for controlling the degree of correction, e.g. using phase modulators, movable elements ( controlling the phase of light using moving or deformable elements [G02B 26/06](#) ) }
- G02B 27/0075 . { with means for altering, e.g. increasing, the depth of field or depth of focus } { WARNING Not complete, see also [G02B 27/00](#) }
- G02B 27/0081 . { with means for altering, e.g. enlarging, the entrance or exit pupil }
- G02B 27/0087 . { Phased arrays }
- G02B 27/0093 . { with means for monitoring data relating to the user, e.g. head-tracking, eye-tracking }
- G02B 27/01 . Head-up displays

**NOTE**

Details of head-up displays covered by [G02B 27/01](#) but not provided for in this group are also to be classified under [G02B 27/01](#) and subgroups

- G02B 27/0101 . . { characterised by optical features ( [G02B 27/0172](#) takes precedence ) }
- G02B 27/0103 . . . { comprising holographic elements }
- G02B 27/0149 . . { characterised by mechanical features ( [G02B 27/0176](#) takes precedence ) }
- G02B 27/017 . . { Head mounted }
- G02B 27/0172 . . . { characterised by optical features }
- G02B 27/0176 . . . { characterised by mechanical features }
- G02B 27/0179 . . { Display position adjusting means not related to the information to be displayed }
- G02B 27/0189 . . { Sight systems }
- G02B 27/02 . Viewing or reading apparatus ( stereoscopic systems per se [G02B 27/22](#) ; of the projection type [G03B](#) ; slide-changing apparatus [G03B](#) )
- G02B 27/021 . . { Reading apparatus }
- G02B 27/022 . . { Viewing apparatus ( [G02B 27/04](#) , [G02B 27/06](#) , [G02B 27/08](#) take precedence ) }
- G02B 27/023 . . . { for viewing X-ray images using image converters, e.g. radiosopes ( X-ray screens [G21K 4/00](#) ; X-ray image conversion tubes [H01J 31/50](#) ; circuit arrangements for X-ray apparatus incorporating image intensifiers [H05G 1/64](#) ) }
- G02B 27/024 . . . { comprising a light source, e.g. for viewing photographic slides, X-ray transparencies ( [G02B 27/023](#) , and photographic, cine and overhead projectors [G03B 21](#) and subgroups ) }
- G02B 27/025 . . . . { and magnifying means }
- G02B 27/026 . . . . { and a display device, e.g. CRT, LCD, for adding markings or signs or to enhance the contrast of the viewed object }
- G02B 27/027 . . . { comprising magnifying means ( [G02B 27/023](#) , [G02B 27/025](#) , [G02B 27/04](#) , [G02B 27/06](#) and [G02B 27/08](#) take precedence ) }
- G02B 27/028 . . { characterised by the supporting structure }
- G02B 27/04 . . having collapsible parts
- G02B 27/06 . . with moving picture effect

- G02B 27/08      ..      Kaleidoscopes
- G02B 27/09      .      Beam shaping, e.g. changing the cross-sectional area, not otherwise provided for { ( adapting the beam shape of a laser diode G02B19/B3D; adapting the beam shape of an LED G02B19/B3L ; coupling into light guides using intermediate optical elements [G02B 6/4204](#) ; beam shaping specially adapted for lasers [H01S 3/005](#) ) }
- G02B 27/0905    ..      { Dividing and/or superposing multiple light beams }
- G02B 27/0911    ..      { Anamorphic systems }
- G02B 27/0916    ..      { Adapting the beam shape of a semiconductor light source such as a laser diode or an LED, e.g. for efficiently coupling into optical fibers ( coupling into light guides using intermediate optical elements [G02B 6/4204](#) ; details of lighting devices in general [F21V](#) ; semiconductor devices with at least one potential-jump barrier or surface barrier specially adapted for light emission [H01L 33/00](#) ) }

### **WARNING**

This group and subgroups are no longer used for the classification of new documents as from May 1, 2012. The backlog is being continuously classified to [G02B 19/00](#) and subgroups

- G02B 27/0922    ...      { the semiconductor light source comprising an array of light emitters }
- G02B 27/0927    ..      { Systems for changing the beam intensity distribution, e.g. Gaussian to top-hat }
- G02B 27/0933    ..      { Systems for active beam shaping by rapid movement of an element }
- G02B 27/0938    ..      { Using specific optical elements }
- G02B 27/0944    ...      { Diffractive optical elements, e.g. gratings, holograms ( gratings per se [G02B 5/18](#) ; holograms used as optical elements per se [G02B 5/32](#) ) }
- G02B 27/095     ...      { Refractive optical elements }
- G02B 27/0955    ....      { Lenses ( lenses per se [G02B 3/00](#) ) }
- G02B 27/0961    .....      { Lens arrays ( lens arrays per se [G02B 3/00 A](#) ) }
- G02B 27/0966    .....      { Cylindrical lenses ( cylindrical lenses per se [G02B 3/06](#) ) }
- G02B 27/0972    ....      { Prisms ( prisms per se [G02B 5/04](#) ) }
- G02B 27/0977    ...      { Reflective elements }
- G02B 27/0983    ....      { being curved }
- G02B 27/0988    ...      { Diaphragms, spatial filters, masks for removing or filtering a part of the beam }
- G02B 27/0994    ...      { Fibers, light pipes ( optical fibers per se [G02B 6/02](#) ) }
- G02B 27/10      .      Beam splitting or combining systems ( polarising systems [G02B 27/28](#) ; mixing and splitting light signals using optical waveguides [G02B 6/28](#) ; { beam shaping, e.g. changing the cross-sectional area, by dividing or superposing multiple light beams [G02B 27/0905](#) } )
- G02B 27/1006    ..      { for splitting or combining different wavelengths ( [G02B 27/1086](#) , [G02B 27/141](#) take precedence ) }
- G02B 27/1013    ...      { for color or multispectral image sensors, e.g. splitting an image into monochromatic image components on respective sensors ( spectral imaging systems [G01J](#) ) }
- G02B 27/102     ...      { for generating a colour image from monochromatic image signal sources }
- G02B 27/1026    ....      { for use with reflective spatial light modulators }
- G02B 27/1033    .....      { having a single light modulator for all colour channels }
- G02B 27/104     ....      { for use with scanning systems ( scanning systems [G02B 26/10](#) ) }

- G02B 27/1046 . . . . { for use with transmissive spatial light modulators }
- G02B 27/1053 . . . . . { having a single light modulator for all colour channels }
- G02B 27/106 . . { for splitting or combining a plurality of identical beams or images, e.g. image replication }
- G02B 27/1066 . . { for enhancing image performance, like resolution, pixel numbers, dual magnifications or dynamic range, by tiling, slicing or overlapping fields of view }
- G02B 27/1073 . . { characterized by manufacturing or alignment methods }
- G02B 27/108 . . { for sampling a portion of a beam or combining a small beam in a larger one, e.g. wherein the area ratio or power ratio of the divided beams significantly differs from unity, without spectral selectivity }
- G02B 27/1086 . . { operating by diffraction only }
- G02B 27/1093 . . . { for use with monochromatic radiation only, e.g. devices for splitting a single laser source }
- G02B 27/12 . . operating by refraction only
- G02B 27/123 . . . { The splitting element being a lens or a system of lenses, including arrays and surfaces with refractive power }
- G02B 27/126 . . . { The splitting element being a prism or prismatic array, including systems based on total internal reflection }
- G02B 27/14 . . operating by reflection only
- G02B 27/141 . . . { using dichroic mirrors }
- G02B 27/142 . . . { Coating structures , e.g. thin films multilayers }
- G02B 27/143 . . . { using macroscopically faceted or segmented reflective surfaces }
- G02B 27/144 . . . { using partially transparent surfaces without spectral selectivity ( [G02B 27/147](#) takes precedence ) }
- G02B 27/145 . . . { having sequential partially reflecting surfaces }
- G02B 27/146 . . . . { with a tree or branched structure }
- G02B 27/147 . . . { using averaging effects by spatially variable reflectivity on a microscopic level, e.g. polka dots, chequered or discontinuous patterns, or rapidly moving surfaces ( [G02B 27/1086](#) takes precedence ) }
- G02B 27/148 . . . { including stacked surfaces having at least one double-pass partially reflecting surface }
- G02B 27/149 . . . { using crossed beamsplitting surfaces, e.g. cross-dichroic cubes or X-cubes }
- G02B 27/16 . . used as aids for focusing
- G02B 27/18 . for optical projection, e.g. combination of mirror and condenser and objective { not in use, see the relevant CPC classes according to projector type, e.g. photographic, cine and overhead projectors [G03B 27/21](#) and subgroups, photographic projection printing [G03B 27/32](#) , photolithographic projectors [G03F 7/20](#) , projection television [H04N 5/74](#) , colour projection television [H04N 9/31](#) }
- G02B 27/20 . . for imaging minute objects, e.g. light-pointer
- G02B 27/22 . for producing stereoscopic or other three dimensional effects ( { in microscopes [G02B 21/22](#) ; viewing apparatus [G02B 27/02](#) ; stereoscopic television [H04N 13/00](#) } )
- G02B 27/2207 . . { stereoscopic devices based on anaglyph techniques }
- G02B 27/2214 . . { involving lenticular arrays or parallax barriers }
- G02B 27/2221 . . { giving the psychological impression of depth to the observer of a single two dimensional image }
- G02B 27/2228 . . { Stereoscopes or similar systems based on providing first and second images }

situated at first and second locations, said images corresponding to parallaxically displaced views of the same object, and presenting the first and second images to an observer's left and right eyes respectively ( [G02B 27/2207](#) , [G02B 27/2264](#) , [G02B 27/26](#) take precedence ) }

- G02B 27/2235 . . . { including reflecting surfaces in the optical path between the images and the observer }
- G02B 27/2242 . . . { including refractive beam deviating means, e.g. wedges, prisms, in the optical path between the images and the observer }
- G02B 27/225 . . . { of the autostereoscopic type, i.e. left and right images projected to the left and right eyes of an observer who is not required to view the images through optical systems placed adjacent to the eyes ( autostereoscopic systems involving lenticular arrays or parallax barriers [G02B 27/2214](#) ) }
- G02B 27/2257 . . . { Collapsible stereoscopes }
- G02B 27/2264 . . { involving time multiplexing, e.g. using sequentially activated left and right shutters }
- G02B 27/2271 . . { the image being built up from image elements distributed over a three dimensional volume, e.g. by scanning the volume with modulated beams of radiation }
- G02B 27/2278 . . . { the volume being constructed from a stack or sequence of two dimensional planes, e.g. depth sampling systems }
- G02B 27/2285 . . . { the volume being generated by a moving, e.g. vibrating or rotating, two-dimensional surface }
- G02B 27/2292 . . . { involving projecting an aerial or floating image }
- G02B 27/24 . . involving reflecting prisms and mirrors only { ( not used, see [G02B 27/22](#) and subgroups ) }
- G02B 27/26 . . involving polarising means
- G02B 27/28 . for polarising ( used in stereoscopes [G02B 27/26](#) )
- G02B 27/281 . . { used for attenuating light intensity, e.g. comprising rotatable polarising elements }
- G02B 27/283 . . { used for beam splitting or combining }
- G02B 27/285 . . . { comprising arrays of elements, e.g. microprisms }
- G02B 27/286 . . { for controlling or changing the state of polarisation, e.g. transforming one polarisation state into another ( [G02B 5/3083](#) takes precedence; light guide coupling means utilising polarising elements [G02B 6/34](#) ) }
- G02B 27/288 . . { Filters employing polarising elements, e.g. Lyot or Solc filters ( [G02B 5/3016](#) takes precedence ) }
- G02B 27/30 . Collimators
- G02B 27/32 . Fiducial marks and measuring scales within the optical system
- G02B 27/34 . . illuminated
- G02B 27/36 . . adjustable
- G02B 27/40 . Optical focusing aids ( beam splitting or combining systems [G02B 27/10](#) )
- G02B 27/42 . Diffraction optics { , i.e. systems including a diffractive element being designed for providing a diffractive effect } ( [G02B 27/60](#) takes precedence )
- G02B 27/4205 . . { having a diffractive optical element [DOE] contributing to image formation, e.g. whereby modulation transfer function MTF or optical aberrations are relevant }

- G02B 27/4211 ... { correcting chromatic aberrations ( [G02B 27/0056](#) , [G02B 27/4222](#) , [G02B 27/4227](#) take precedence ) }
- G02B 27/4216 ... { correcting geometrical aberrations }
- G02B 27/4222 ... { in projection exposure systems, e.g. photolithographic systems }
- G02B 27/4227 ... { in image scanning systems }
- G02B 27/4233 .. { having a diffractive element [DOE] contributing to a non-imaging application ( diffusers having a diffractive element [G02B 5/0252](#) ; filters having a diffractive element [G02B 5/203](#) ; systems for controlling the direction of light having diffractive elements [G02B 26/0808](#) ; scanning systems having diffractive elements [G02B 26/106](#) ; beam shaping systems using diffractive optical elements [G02B 27/0944](#) ; beam splitting or combining systems operating by diffraction [G02B 27/1086](#) ) }
- G02B 27/4238 ... { in optical recording or readout devices ( optical pick-up devices such as for CD, DVD or BD reader or recorder using diffraction optics [G11B 7/1353](#) ) }
- G02B 27/4244 ... { in wavelength selecting devices ( spectrometry [G01J](#) ) }
- G02B 27/425 ... { in illumination systems ( mask illumination systems in photolithographic systems [G03F 7/70158](#) ) }
- G02B 27/4255 ... { for alignment or positioning purposes ( optical displacement encoding scales [G01D 5/347](#) ) }
- G02B 27/4261 .. { having a diffractive element with major polarization dependent properties }
- G02B 27/4266 .. { Diffraction theory; Mathematical models }
- G02B 27/4272 .. { having plural diffractive elements positioned sequentially along the optical path }

**WARNING**

Not complete, see also [G02B 5/18 E](#)

- G02B 27/4277 ... { being separated by an air space }
- G02B 27/4283 .. { having a diffractive element with major temperature dependent properties }
- G02B 27/4288 .. { having uniform diffraction efficiency over a large spectral bandwidth }
- G02B 27/4294 .. { in multispectral systems, e.g. UV and visible }
- G02B 27/44 .. Grating systems ; Zone plate systems ( [G02B 27/46](#) takes precedence; { beam splitting or combining systems operating by diffraction only [G02B 27/10D](#) } ; spectrometry [G01J](#) )

**WARNING**

This group is no longer used for the classification of new documents as from May 1, 2012. The backlog is being continuously classified to [G02B 27/42](#) and subgroups

- G02B 27/46 .. Systems using spatial filters ( character recognition [G06K 9/00](#) )

**NOTE**

In this group, the filter may be in any plane, e.g. the image or the Fourier transfer plane.

- G02B 27/48 . Laser speckle optics; { Speckle reduction arrangements } ( speckle suppression in holography [G03H 1/32](#) )
- G02B 27/50 . Optics for phase object visualisation



- G02B 27/52 . . Phase contrast optics ( in microscopes [G02B 21/14](#) )
- G02B 27/54 . . Schlieren-optical systems
- G02B 27/56 . Optics using evanescent waves, i.e. inhomogeneous waves
- G02B 27/58 . Optics for apodization or superresolution ; Optical synthetic aperture systems
- G02B 27/60 . Systems using moirè fringes ( means for converting the output of a sensing member using diffraction gratings [G01D 5/38](#) )
- G02B 27/62 . Optical apparatus specially adapted for adjusting optical elements during the assembly of optical systems ( adjusting means being part of the system to be assembled [G02B 7/00](#) )
- G02B 27/64 . Imaging systems using optical elements for stabilisation of the lateral and angular position of the image ( focusing systems [G02B 7/04](#) ) ]
- G02B 27/642 . . { Optical derotators, i.e. systems for compensating for image rotation, e.g. using rotating prisms, mirrors }
- G02B 27/644 . . { compensating for large deviations, e.g. maintaining a fixed line of sight while a vehicle on which the system is mounted changes course }
- G02B 27/646 . . { compensating for small deviations, e.g. due to vibration or shake ( movement of one or more optical elements for control of motion blur in cameras, projectors or printers [G03B 2205/0007](#) ; image stabilisation in cameras peculiar to the presence or use of an electronic image sensor [H04N 5/23248](#) ) }
- G02B 27/648 . . . { for automatically maintaining a reference alignment, e.g. in self-levelling surveying instruments ( surveying instruments per se [G01C](#) ) }

#### Guidance heading:

- G02B 2003/00** **Simple or compound lenses** ( artificial eyes [A61F 2/14](#) ; spectacle lenses or contact lenses for the eyes [G02C](#) ; watch or clock glasses [G04B 39/00](#) )
- G02B 2003/0093 . characterised by the shape
- G02B 2005/00** **Optical elements other than lenses** ( light guides [G02B 6/00](#) ; optical logic elements [G02F 3/00](#) )
- G02B 2005/18 . Diffraction gratings { ( holographic optical elements [G02B 5/32](#) , [G03H](#) ; integrally combined with optical fibres [G02B 6/02](#) G; for coupling light guides [G02B 6/34](#) ; integrally combined with optical integrated light guides [G02B 6/12](#) ; grating systems [G02B 27/44](#) ) }
- G02B 2005/1804 . . Transmission gratings
- G02B 2006/00** **Light guides**
- G02B 2006/0098 . for scanning
- G02B 2006/02 . Optical fibre with cladding { with or without a coating } ( mechanical structures for providing tensile strength and external protection [G02B 6/44](#) )

- G02B 2006/02057 .. { comprising gratings }
- G02B 2006/02076 ... { Refractive index modulation gratings, e.g. Bragg gratings }
- G02B 2006/0208 ..... { characterised by their structure, wavelength response ( [G02B 6/02114](#) , [G02B 6/02171](#) , [G02B 6/02195](#) take precedence; multiple layer cores or claddings [G02B 6/036](#) , protective coverings [G02B 6/4429](#) ) }
- G02B 2006/02085 ..... { characterised by the grating profile, e.g. chirped, apodised, tilted, helical }
- [G02B 2006/0209](#) ..... Helical, chiral gratings
- G02B 2006/02123 .... { characterised by the method of manufacture of the grating ( photolithography [G03F 7/0005](#) ) }
- [G02B 2006/02157](#) ..... Grating written during drawing of the fibre
- [G02B 2006/02161](#) ..... Grating written by radiation passing through the protective fibre coating
- [G02B 2006/02166](#) ..... Methods of designing the gratings, i.e. calculating the structure, e.g. algorithms, numerical methods
- G02B 2006/032 .. with non solid core or cladding { [G02B 6/02295](#) takes precedence }
- [G02B 2006/0325](#) ... Fluid core or cladding
- G02B 2006/10 . of the optical waveguide type ( [G02B 6/02](#) , [G02B 6/24](#) take precedence; devices or arrangements for the control of light by electric, magnetic, electro-magnetic or acoustic means [G02F 1/00](#) ; transferring the modulation of modulated light [G02F 2/00](#) ; optical logic elements [G02F 3/00](#) ; optical analogue/digital converters [G02F 7/00](#) ; stores using opto-electronic devices [G11C 11/42](#) , { using electro-optical elements [G11C 13/047](#) } ; electric waveguides [H01P](#) ; transmission of information by optical means [H04B 10/00](#) ; multiplex systems [H04J 14/00](#) )
- G02B 2006/12 .. of the integrated circuit kind ( production or processing of single crystals [C30B](#) ; electric integrated circuits [H01L 27/00](#) { coupling fibres and integrated optical circuits [G02B 6/30](#) } )
- [G02B 2006/12035](#) . Materials
- [G02B 2006/12038](#) .. Glass ( [SiO2](#) based materials )
- [G02B 2006/1204](#) .. Lithium niobate (LiNbO<sub>3</sub>)
- [G02B 2006/12042](#) .. Potassium niobate (KNbO<sub>3</sub>)
- [G02B 2006/12045](#) .. Lithium tantalate (LiTaO<sub>3</sub>)
- [G02B 2006/12047](#) .. Barium titanate (BaTiO<sub>3</sub>)
- [G02B 2006/1205](#) .. Arsenic sulfide (As<sub>2</sub>S<sub>3</sub>)
- [G02B 2006/12052](#) .. Arsenic selenide (As<sub>2</sub>Se<sub>3</sub>)
- [G02B 2006/12054](#) .. Tantalum pentoxide (Ta<sub>2</sub>O<sub>5</sub>)
- [G02B 2006/12057](#) .. Niobium pentoxide (Nb<sub>2</sub>O<sub>5</sub>)
- [G02B 2006/12059](#) .. Titanium niobate (TiNbO<sub>3</sub>)
- [G02B 2006/12061](#) .. Silicon
- [G02B 2006/12064](#) .. Zinc sulfide (ZnS)
- [G02B 2006/12066](#) .. Calcite (CaCO<sub>3</sub>)
- [G02B 2006/12069](#) .. Organic material
- [G02B 2006/12071](#) ... PMMA
- [G02B 2006/12073](#) ... Epoxy
- [G02B 2006/12076](#) ... Polyamide
- [G02B 2006/12078](#) .. Gallium arsenide or alloys ( [GaAs](#), [GaAlAs](#), [GaAsP](#), [GaInAs](#) )

G02B 2006/1208	..	Rare earths
G02B 2006/12083	.	Constructional arrangements
G02B 2006/12085	..	Integrated
G02B 2006/12088	..	Monomode
G02B 2006/1209	..	Multimode
G02B 2006/12092	..	Stepped
G02B 2006/12095	..	Graded
G02B 2006/12097	..	Ridge, rib or the like
G02B 2006/121	..	Channel ; buried or the like
G02B 2006/12102	..	Lens
G02B 2006/12104	..	Mirror ; Reflectors or the like
G02B 2006/12107	..	Grating
G02B 2006/12109	..	Filter
G02B 2006/12111	..	Fibre
G02B 2006/12114	..	Prism
G02B 2006/12116	..	Polariser ; Birefringent
G02B 2006/12119	..	Bend
G02B 2006/12121	..	Laser
G02B 2006/12123	..	Diode
G02B 2006/12126	..	Light absorber
G02B 2006/12128	..	Multiple Quantum Well (MQW)
G02B 2006/1213	..	comprising photonic band-gap structures or photonic lattices
G02B 2006/12133	.	Functions
G02B 2006/12135	..	Temperature control
G02B 2006/12138	..	Sensor
G02B 2006/1214	..	Soliton
G02B 2006/12142	..	Modulator
G02B 2006/12145	..	Switch
G02B 2006/12147	..	Coupler
G02B 2006/1215	..	Splitter
G02B 2006/12152	..	Mode converter
G02B 2006/12154	..	Power divider
G02B 2006/12157	..	Isolator
G02B 2006/12159	..	Interferometer
G02B 2006/12161	..	Distributed feedback (DFB)
G02B 2006/12164	..	Multiplexing ; Demultiplexing
G02B 2006/12166	.	Manufacturing methods
G02B 2006/12169	..	Annealing
G02B 2006/12171	...	using a laser beam
G02B 2006/12173	..	Masking

- G02B 2006/12176 .. Etching
- G02B 2006/12178 .. Epitaxial growth
- G02B 2006/1218 .. Diffusion
- G02B 2006/12183 .. Ion-exchange
- G02B 2006/12185 ... field-assisted ion-exchange
- G02B 2006/12188 .. Ion implantation
- G02B 2006/1219 .. Polymerisation
- G02B 2006/12192 .. Splicing
- G02B 2006/12195 .. Tapering
- G02B 2006/12197 .. Grinding ; Polishing
  
- G02B 2006/24 . Coupling light guides ( for electric waveguides [H01P 1/00](#) )
- G02B 2006/26 .. Optical coupling means ( [G02B 6/36](#) , [G02B 6/42](#) take precedence )
- G02B 2006/28 ... having data bus means, i.e. plural waveguides interconnected and providing an inherently bidirectional system by mixing and splitting signals
- G02B 2006/2804 .... { forming multipart couplers without wavelength selective elements, e.g. "T" couplers, star couplers }
- G02B 2006/2821 ..... { using lateral coupling between contiguous fibres to split or combine optical signals }
- G02B 2006/2835 ..... { formed or shaped by thermal treatment, e.g. couplers }
- [G02B 2006/2839](#) ..... fabricated from double or twin core fibres
- [G02B 2006/2865](#) ..... couplers of the [3x3](#) type
- G02B 2006/42 .. Coupling light guides with opto-electronic elements

**NOTE**

In this group, the following expression is used with the meaning indicated:

- "opto-electronic elements" includes light emitting elements, e.g. lasers or LED's, as well as light receiving elements, e.g. photodiodes or phototransistors

- G02B 2006/4296 ... { coupling with sources of high radiant energy, e.g. high power lasers, high temperature light sources }
- [G02B 2006/4297](#) .... having protection means, e.g. protecting humans against accidental exposure to harmful laser radiation

**G02B 2027/00** **Other optical systems ; Other optical apparatus** ( means for bringing about special optical effects in shop-windows, show-cases [A47F](#) , e.g. [A47F 11/06](#) ; optical toys [A63H 33/22](#) ; designs or pictures characterised by special light effects [B44F 1/00](#) )

- G02B 2027/01 . Head-up displays

**NOTE**

Details of head-up displays covered by [G02B 27/01](#) but not provided for in this group are also to be classified under [G02B 27/01](#) and subgroups

- G02B 2027/0101 .. { characterised by optical features ( [G02B 27/0172](#) takes precedence ) }

G02B 2027/0103	...	{ comprising holographic elements }
G02B 2027/0105	....	Holograms with particular structures
G02B 2027/0107	.....	with optical power
G02B 2027/0109	....	comprising details concerning the making of holograms
G02B 2027/011	...	comprising device for correcting geometrical aberrations, distortion
G02B 2027/0112	...	comprising device for generating colour display
G02B 2027/0114	....	comprising dichroic elements
G02B 2027/0116	....	comprising devices for correcting chromatic aberration
G02B 2027/0118	...	comprising devices for improving the contrast of the display / brilliance control visibility
G02B 2027/012	....	comprising devices for attenuating parasitic image effects
G02B 2027/0121	.....	Parasitic image effect attenuation by suitable positioning of the parasitic images
G02B 2027/0123	...	comprising devices increasing the field of view
G02B 2027/0125	....	Field-of-view increase by wavefront division
G02B 2027/0127	...	comprising devices increasing the depth of field
G02B 2027/0129	...	comprising devices for correcting parallax
G02B 2027/013	...	comprising a combiner of particular shape, e.g. curvature
G02B 2027/0132	...	comprising binocular systems
G02B 2027/0134	....	of stereoscopic type
G02B 2027/0136	....	with a single image source for both eyes
G02B 2027/0138	...	comprising image capture systems e.g. camera
G02B 2027/014	...	comprising information/image processing systems
G02B 2027/0141	...	characterised by the informative content of the display
G02B 2027/0143	...	the two eyes not being equipped with identical nor symmetrical optical devices
G02B 2027/0145	...	creating an intermediate image
G02B 2027/0147	...	comprising a device modifying the resolution of the displayed image
G02B 2027/0149	..	{ characterised by mechanical features ( <a href="#">G02B 27/0176</a> takes precedence ) }
G02B 2027/015	...	involving arrangement aiming to get less bulky devices
G02B 2027/0152	...	involving arrangement aiming to get lighter or better balanced devices
G02B 2027/0154	...	with movable elements
G02B 2027/0156	....	with optionally usable elements
G02B 2027/0158	....	with adjustable nose pad
G02B 2027/0159	....	with mechanical means other than scanning means for positioning the whole image
G02B 2027/0161	...	characterised by the relative positioning of the constitutive elements
G02B 2027/0163	....	Electric or electronic control thereof
G02B 2027/0165	...	associated with a head-down display
G02B 2027/0167	...	Emergency system, e.g. to prevent injuries
G02B 2027/0169	...	Supporting or connecting means other than the external walls
G02B 2027/017	..	{ Head mounted }
G02B 2027/0172	...	{ characterised by optical features }
G02B 2027/0174	....	holographic

G02B 2027/0178	...	Eyeglass type, eyeglass details <a href="#">G02C</a>
G02B 2027/0179	..	{ Display position adjusting means not related to the information to be displayed }
G02B 2027/0181	...	Adaptation to the pilot/driver
G02B 2027/0183	...	Adaptation to parameters characterising the motion of the vehicle
G02B 2027/0185	...	Displaying image at variable distance
G02B 2027/0187	...	slaved to motion of at least a part of the body of the user, e.g. head,eye
G02B 2027/0189	..	{ Sight systems }
G02B 2027/019	...	comprising reticules formed by a mask
G02B 2027/0192	..	Supplementary details
G02B 2027/0194	...	with combiner of laminated type, for optical or mechanical aspects
G02B 2027/0196	...	having transparent supporting structure for display mounting, e.g. to a window or a windshield
G02B 2027/0198	...	System for aligning or maintaining alignment of an image in a predetermined direction

#### Guidance heading:

**G02B 2207/00**      **Coding scheme for general features or characteristics of optical elements and systems of subclass [G02B](#) , but not including elements and systems which would be classified in [G02B 6/00](#) and subgroups**

G02B 2207/101	.	Nano-optics
G02B 2207/107	.	Porous materials e.g. for reducing the refractive index
G02B 2207/109	.	Sols, gels, sol-gel materials
G02B 2207/113	.	Fluorescence
G02B 2207/114	.	Two photon or multiphoton effect
G02B 2207/115	.	Electrowetting
G02B 2207/117	.	Adjustment of the optical path length
G02B 2207/121	.	Antistatic or EM shielding layer
G02B 2207/123	.	Optical louvre elements, e.g. for directional light blocking
G02B 2207/125	.	Wavefront coding
G02B 2207/129	.	Coded aperture imaging