

Spherical Lenses

Cylindrical Lenses

Lens Kits

Achromatic Doublets

Multi-Element

Micro Optics

Mirrors

Prisms

Substrates & Windows

Beamsplitters

Polarizers

Filter & Apertures

Chromatic aberration is simply the result of optical materials having different indices of refraction at different wavelengths - and as a result the focal length of a lens will be slightly different for different colors. A bandwidth of 100nm or less will rarely produce problems.

But when your operating range is much larger than this you really should use an achromat that has been designed for use in this region.

Our high quality achromats are designed for use throughout the visible spectrum.

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Cemented Achromatic Doublets

- Cemented construction
- Focal lengths from 20 to 1000mm
- Diameters from 10 to 50.8mm
- Broadband Anti-Reflection coated

These are cemented achromats with a very precise range of tolerances and specifications. They are extremely convenient general purpose lenses. Being cemented they do not need a lens cell and can be treated as an individual component.

These lenses can be used as collimators, focusing lenses or light collectors. Optimized for use at three wavelengths, 486.1, 546.1 and 656.3nm, these lenses perform well throughout the visible spectrum. They have a minimum of spherical and chromatic aberration and perform well for all paraxial imaging tasks. These achromats are coated with a broadband Anti-Reflection coating to reduce surface losses in the visible region. Optional Anti-Reflection coatings for other wavelength regions are also available.



Specifications & Tolerances

Focal length: $\pm 1\%$ @ 546.1nm

Thickness: $\pm 0.2\text{mm}$

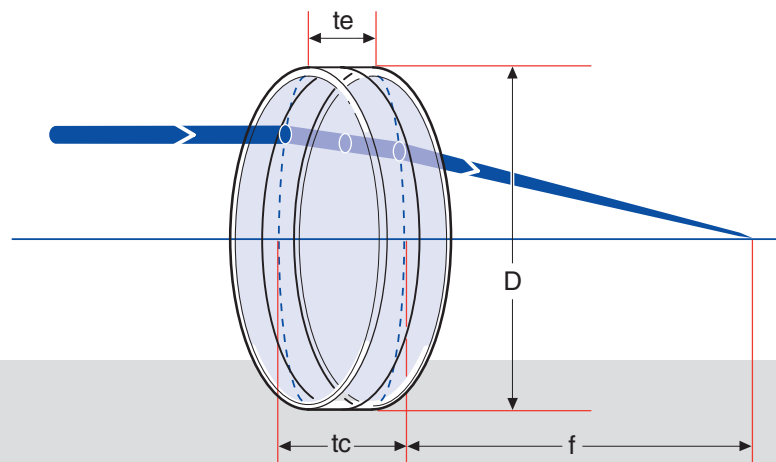
Temperature range: -40°C to 90°C

Material: Grade A optical crown and flint glasses

Diameter: $+0, -0.1\text{mm}$

Surface quality: 40-20

Coating: Broadband Anti-Reflection
425-675nm, or specify from pages
18 and 19



ACHROMATIC DOUBLET

Achromatic Doublets

D (mm)	f (mm)	tc (mm)	te (mm)	r1 (mm)	r2 (mm)	ff (mm)	fb (mm)	Centration (arcmin)	Price	PART NUMBER
10.0	20.0	6.7	5.1	12.1	-26.0	18.8	16.6	≤ 1		026-0160
10.0	25.0	6.1	4.9	15.6	-31.1	23.8	22.1	≤ 1		026-0170
10.0	30.1	5.7	4.7	18.5	-39.0	29.0	27.4	≤ 1		026-0180
10.0	40.0	5.3	4.6	24.6	-52.9	39.0	37.5	≤ 1		026-0190
10.0	50.0	5.0	4.4	28.1	-83.4	49.4	47.5	≤ 1		026-0220
10.0	60.1	4.9	4.4	33.8	-98.9	59.4	57.6	≤ 1		026-0230
10.0	69.9	4.7	4.3	37.4	-135.0	69.4	67.3	≤ 1		026-0235
10.0	80.1	4.6	4.2	44.5	-138.0	79.6	77.8	≤ 1		026-0240
10.0	100.5	4.5	4.2	53.7	-195.4	100.0	98.1	≤ 1		026-0225
12.7	25.1	7.3	5.3	15.6	-32.2	23.7	21.5	≤ 1		026-0250
12.7	30.0	6.8	5.2	18.5	-39.4	28.8	26.7	≤ 1		026-0260
12.7	40.1	6.1	4.9	23.4	-60.3	39.2	36.9	≤ 1		026-0270
12.7	50.1	5.7	4.7	30.4	-69.3	49.1	47.3	≤ 1		026-0280
12.7	60.0	5.4	4.6	35.7	-86.6	59.1	57.3	≤ 1		026-0290
12.7	69.9	5.2	4.5	43.3	-93.6	69.0	67.5	≤ 1		026-0300
12.7	79.9	5.1	4.5	46.1	-124.6	79.2	77.4	≤ 1		026-0310
12.7	100.1	4.8	4.3	61.4	-136.7	99.2	97.9	≤ 1		026-0320
15.0	25.2	8.8	6.0	15.4	-33.8	23.7	20.7	≤ 1		026-0340
15.0	30.1	8.0	5.7	18.2	-41.4	28.8	26.0	≤ 1		026-0350
15.0	40.1	6.9	5.2	23.4	-60.3	39.2	36.5	≤ 1		026-0360
15.0	50.1	6.3	5.0	31.1	-66.2	49.0	47.1	≤ 1		026-0370
15.0	59.9	5.9	4.8	36.3	-83.4	58.9	57.0	≤ 1		026-0375
15.0	70.2	5.7	4.8	41.4	-103.8	69.4	67.4	≤ 1		026-0380
15.0	79.9	5.5	4.7	46.1	-124.6	79.2	77.1	≤ 1		026-0390
15.0	100.0	5.2	4.5	56.0	-167.7	99.3	97.3	≤ 1		026-0440
20.0	30.6	10.9	6.8	18.7	-41.4	28.8	24.9	≤ 1		026-0450
20.0	40.1	9.2	6.2	24.1	-57.2	38.8	35.3	≤ 1		026-0460
20.0	50.2	8.1	5.7	30.2	-71.4	49.0	46.0	≤ 1		026-0470
20.0	60.2	7.4	5.4	37.4	-80.0	58.9	56.6	≤ 1		026-0480
20.0	70.1	6.9	5.2	42.4	-98.9	69.1	66.7	≤ 1		026-0485
20.0	79.9	6.6	5.1	48.0	-114.2	78.9	76.6	≤ 1		026-0490
20.0	99.5	6.1	4.9	58.5	-150.0	98.7	96.4	≤ 1		026-0550
20.0	120.3	5.7	4.7	68.3	-195.4	119.5	117.3	≤ 1		026-0560
20.0	149.8	5.4	4.6	84.3	-250.0	149.2	147.0	≤ 1		026-0570
20.0	170.0	5.3	4.6	93.6	-302.7	169.4	167.2	≤ 1		026-0575
20.0	200.1	5.1	4.5	109.0	-368.0	199.5	197.3	≤ 1		026-0580
20.0	220.0	5.0	4.5	107.7	-666.0	219.8	216.9	≤ 3		026-0582
20.0	250.0	4.9	4.4	122.3	-758.6	249.8	247.0	≤ 3		026-0584
20.0	300.0	4.7	4.3	146.6	-913.9	299.8	297.1	≤ 3		026-0586
25.0	40.9	12.5	7.7	24.5	-58.8	39.0	34.2	≤ 1		026-0590
25.0	50.1	10.9	7.1	32.5	-61.4	48.0	44.9	≤ 1		026-0660
25.0	60.1	9.8	6.7	36.8	-82.6	58.5	55.2	≤ 1		026-0670
25.0	69.9	9.0	6.3	41.4	-104.0	68.7	65.3	≤ 1		026-0675
25.0	80.0	8.5	6.2	49.1	-110.0	78.7	75.9	≤ 1		026-0680
25.0	100.2	7.7	5.9	61.4	-138.0	98.9	96.5	≤ 1		026-0690
25.0	119.8	7.2	5.6	70.2	-181.7	118.8	116.2	≤ 1		026-0770
25.0	149.6	6.7	5.5	86.6	-233.6	148.6	146.2	≤ 1		026-0780
25.0	170.4	6.4	5.3	98.0	-270.0	169.5	167.1	≤ 1		026-0790
25.0	200.1	6.1	5.2	111.1	-350.0	199.4	197.0	≤ 1		026-0880
25.0	220.0	6.0	5.2	121.9	-400.0	221.3	218.9	≤ 1		026-0885
25.0	250.0	5.8	5.1	136.7	-460.0	250.1	247.7	≤ 1		026-0890

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Achromatic Doublets (continued)

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Achromatic Doublets

	D (mm)	f (mm)	tc (mm)	te (mm)	r1 (mm)	r2 (mm)	ff (mm)	fb (mm)	Centration (arcmin)	Price	PART NUMBER
Multi-Element	25.0	300.0	5.6	5.0	146.6	-913.9	299.8	296.6	≤ 3		026-0895
	25.4	40.9	12.5	7.6	24.5	-58.8	39.0	34.2	≤ 1		026-0985
Micro Optics	25.4	50.1	10.9	7.0	32.5	-61.4	50.5	44.9	≤ 1		026-0990
Mirrors	25.4	60.1	9.8	6.6	36.8	-82.6	60.8	55.2	≤ 1		026-1110
Prisms	25.4	69.9	9.0	6.2	41.4	-104.0	68.7	65.3	≤ 1		026-1115
Substrates & Windows	25.4	80.0	8.5	6.1	49.1	-110.0	80.3	75.9	≤ 1		026-1120
Beamsplitters	25.4	100.2	7.7	5.8	61.4	-138.0	100.2	96.5	≤ 1		026-1130
Polarizers	25.4	119.8	7.2	5.6	70.2	-181.7	118.8	116.2	≤ 1		026-1132
Filter & Apertures	25.4	149.6	6.7	5.4	86.6	-233.6	148.6	146.2	≤ 1		026-1134
	25.4	170.4	6.4	5.3	98.0	-270.0	169.5	167.1	≤ 1		026-1135
	25.4	200.1	6.1	5.1	111.1	-350.0	199.4	197.0	≤ 1		026-1136
	25.4	222.0	6.0	5.1	121.9	-400.0	221.3	218.9	≤ 1		026-1137
	25.4	250.8	5.8	5.0	136.7	-460.0	250.1	247.7	≤ 1		026-1138
	25.4	300.0	5.6	5.0	146.6	-913.9	299.8	296.6	≤ 3		026-1139
	30.0	50.3	14.1	8.6	32.5	-62.7	47.6	43.5	≤ 1		026-1140
	30.0	60.3	12.6	8.1	36.8	-84.3	58.4	53.9	≤ 1		026-1150
	30.0	70.8	11.5	7.7	43.3	-98.0	69.0	65.0	≤ 1		026-1155
	30.0	80.3	10.7	7.4	49.2	-111.1	78.5	75.0	≤ 1		026-1160
	30.0	100.7	9.5	6.8	60.3	-146.6	99.3	96.0	≤ 1		026-1170
	30.0	120.1	8.8	6.6	71.4	-176.8	118.8	115.7	≤ 1		026-1180
	30.0	150.0	8.1	6.3	88.9	-222.3	148.8	146.0	≤ 1		026-1190
	30.0	169.9	7.7	6.1	98.0	-270.0	168.8	166.0	≤ 1		026-1220
	30.0	200.2	7.3	6.0	111.1	-350.0	199.4	196.4	≤ 1		026-1230
	30.0	220.2	7.1	5.9	121.9	-390.5	219.4	216.5	≤ 1		026-1235
	30.0	249.7	6.9	5.8	138.0	-443.0	248.9	246.1	≤ 1		026-1240
	30.0	300.4	6.6	5.7	161.0	-588.8	299.7	296.9	≤ 1		026-1250
	30.0	350.0	6.4	5.6	171.0	-1067.0	349.7	346.2	≤ 3		026-1253
	30.0	400.0	6.2	5.5	195.4	-1220.0	399.7	396.3	≤ 3		026-1255
	30.0	450.0	6.1	5.5	219.8	-1375.0	449.8	446.5	≤ 3		026-1256
	30.0	500.0	6.0	5.5	244.1	-1530.0	499.8	496.5	≤ 3		026-1257
	40.0	60.2	19.3	11.0	37.4	-81.4	57.1	50.2	≤ 1		026-1260
	40.0	70.3	17.2	10.2	44.5	-91.8	67.4	61.7	≤ 1		026-1270
	40.0	80.2	15.8	9.7	48.0	-117.1	78.1	71.8	≤ 1		026-1280
	40.0	99.9	13.7	8.9	60.3	-143.0	97.9	92.8	≤ 1		026-1290
	40.0	120.0	12.3	8.3	72.6	-171.0	118.2	113.7	≤ 1		026-1330
	40.0	150.1	10.9	7.7	88.2	-228.4	148.7	144.5	≤ 1		026-1340
	40.0	169.7	10.3	7.5	101.2	-249.0	168.3	164.5	≤ 1		026-1350
	40.0	199.7	9.6	7.2	118.3	-296.7	198.3	194.8	≤ 1		026-1360
	40.0	220.7	9.2	7.0	128.2	-340.0	219.4	216.0	≤ 1		026-1365
	40.0	249.1	8.8	6.9	143.0	-400.0	248.0	244.6	≤ 1		026-1375
	40.0	300.5	8.3	6.7	167.7	515.9	299.5	296.1	≤ 1		026-1380
	40.0	349.9	7.9	6.5	195.4	-603.5	349.0	345.8	≤ 1		026-1382
	40.0	399.7	7.6	6.4	219.8	720.0	398.8	395.7	≤ 1		026-1384
	40.0	450.0	7.4	6.3	219.8	-1375.0	449.8	445.5	≤ 3		026-1386
	40.0	500.0	7.2	6.3	244.1	-1530.0	499.8	495.6	≤ 3		026-1390
	50.0	81.0	22.9	13.4	50.0	-111.1	77.4	69.1	≤ 1		026-1450
	50.0	100.5	19.9	12.3	59.9	-148.0	97.8	90.0	≤ 1		026-1460
	50.0	120.2	17.7	11.4	72.2	-173.9	117.8	111.0	≤ 1		026-1470
	50.0	150.7	15.5	10.5	90.0	-219.8	148.6	142.8	≤ 1		026-1480
	50.0	169.8	14.5	10.1	102.1	-245.0	167.7	162.5	≤ 1		026-1485

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Achromatic Doublets (continued)

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50.0	200.1	13.3	9.6	117.6	-304.6	198.3	193.3	≤ 1		026-1490
50.0	220.7	12.7	9.3	134.0	-310.4	218.7	214.5	≤ 1		026-1495
50.0	249.4	12.1	9.1	148.0	-371.4	247.7	243.4	≤ 1		026-1550
50.0	299.5	11.2	8.7	171.0	-484.6	298.0	293.7	≤ 1		026-1560
50.0	350.2	10.7	8.6	195.4	-603.5	348.9	344.5	≤ 1		026-1563
50.0	400.0	10.2	8.3	222.3	-700.0	398.8	394.7	≤ 1		026-1566
50.0	451.5	9.9	8.3	245.0	-849.8	450.5	446.2	≤ 1		026-1568
50.0	500.3	9.6	8.1	273.4	-920.0	499.3	495.2	≤ 1		026-1570
50.0	599.9	9.2	8.0	292.9	-1835.0	599.6	594.4	≤ 3		026-1575
50.0	700.0	8.9	7.8	341.8	-2140.0	699.7	694.6	≤ 3		026-1580
50.0	800.0	8.6	7.7	390.5	-2450.0	799.7	794.9	≤ 3		026-1585
50.0	1000.0	8.3	7.6	488.2	-3060.0	999.6	995.0	≤ 3		026-1590
50.8	100.5	19.9	12.1	59.9	-148.0	103.5	90.0	≤ 1		026-1660
50.8	120.2	17.7	11.2	72.2	-173.9	117.8	111.0	≤ 1		026-1665
50.8	150.7	15.5	10.4	90.0	-219.8	152.2	142.8	≤ 1		026-1670
50.8	200.1	13.3	9.5	117.6	-304.6	201.1	193.3	≤ 1		026-1680
50.8	249.4	12.1	9.0	148.0	-371.4	249.9	243.4	≤ 1		026-1690
50.8	299.5	11.2	8.6	171.0	-484.6	298.0	293.7	≤ 1		026-1700
50.8	400.0	10.2	8.3	222.3	-700.0	398.8	394.7	≤ 1		026-1710
50.8	500.3	9.6	8.1	273.4	-920.0	499.3	495.2	≤ 1		026-1720
50.8	700.0	8.9	7.8	341.8	-2140.0	699.7	694.6	≤ 3		026-1730
50.8	1000.0	8.3	7.5	488.2	-3060.0	999.6	995.1	≤ 3		026-1740

Other sizes and focal lengths are available. Please call.



Keeping your optics clean will both improve optical performance and increase the optic's lifetime.

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The Laser Achromats mentioned on page 94 will also serve as very high quality imaging lenses for general applications.

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High Power Air-Spaced Laser Achromats

- Air-spaced design
- High damage Anti-Reflection coating
- Mounted in metal barrels for ease of use and pre-alignment
- Standard focal lengths from 40 to 200mm

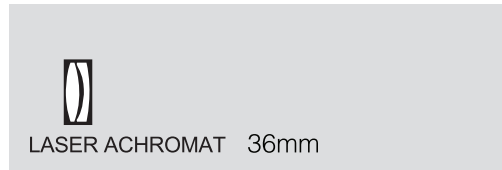
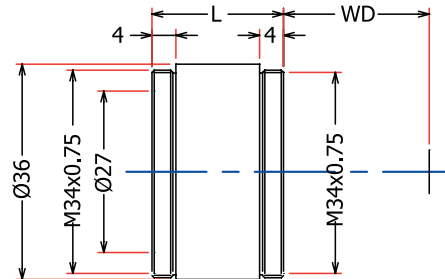


These laser achromats are ideal for use with any laser operating in the visible spectrum. They will also serve as excellent general purpose imaging lenses for white light applications. These lenses are optimized for three wavelengths, 486.1, 587.6 and 656.3nm. A crown and a flint glass element are housed in a metal cell and separated by a spacer. The air gap acts as a third lens element and provides a greater degree of correction than found in a cemented lens. In this way it is possible to balance the aberrations over a fairly wide range of wavelengths so that the lenses perform well as broadband imaging devices. Not only are chromatic effects minimized but other paraxial aberrations can also be significantly reduced. As a result, these lenses provide excellent performance for focusing, imaging and light collection. Both elements are coated with a broadband multilayer Anti-Reflection coating which will withstand high power laser use.

Specifications & Tolerances

Focal length: $\pm 2\%$ @ 532.1nm Material: BK7 and SF2
 Coating: Broadband Anti-Reflection 400-700nm
 Laser damage threshold: 7J/cm² @ 10ns pulse $\lambda=532$ nm

Detailed dimensions and optical parameters will be provided on request.



High Power Air-Spaced Laser Achromats

Focal Length @532nm	Working, Distance, WD (mm)	Cell Length, L (mm)	Lens Composition	Price	PART NUMBER
40.2	30.1	22.0	Triplet		026-5430
49.5	39.0	22.0	Triplet		026-5440
58.9	49.0	22.0	Triplet		026-5442
80.1	71.6	13.0	Doublet		026-5445
99.8	91.7	13.0	Doublet		026-5450
150.0	141.9	12.0	Doublet		026-5455
199.8	192.7	12.0	Doublet		026-5460

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