Biconcave Lenses | PCL-B-N/PCQL-B-N

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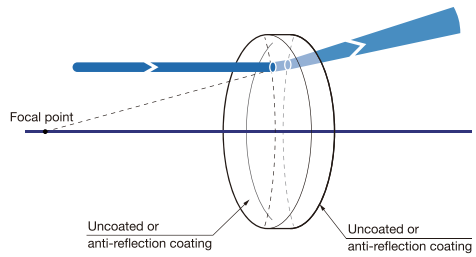
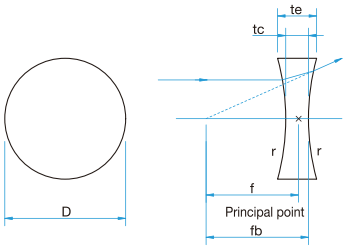
With its two concaves surface, the biconcave lens refracts light efficiently in a small space and spread widely the light.
Possible to use it for enlarging the illumination area.

- There are two types available; BK7 for from visible range to infrared wavelength range, high-strength synthetic fused silica which has high laser damage threshold used in less than 350nm ultraviolet light.
- Made of BK7 lenses are also available with three types of anti-reflection coating in the infrared wavelength, near-infrared wavelength and visible wavelength.
- From among the wide variations that have been subdivided in outside diameter and focal length, you can make selection according to your specifications.

Schematic



Outline Drawing (in mm)



●Tolerance
Diameter $D^{0}_{-0.1}$
Thickness tc±0.15
Focal length ±7%

Specifications

Material	SLB: BK7 SLSQ: Synthetic fused silica
Design wavelength	546.1nm
Refractive index	BK7: n_e=1.519 Synthetic fused silica: n_e=1.460
Coating	Uncoated: the end of the part number 'N' Anti-reflection coating: the end of the part number 'NM', 'NIR1', 'NIR2'
Laser Damage Threshold	Anti-reflection coating: 4J/cm² Laser pulse with 10ns, repetition frequency 20Hz
Clear aperture	90% of actual aperture: Uncoated 85% of actual aperture: with coating
Surface Quality (Scratch–Dig)	20–10

Guide

- It is available other than the products which listed in the catalog such as focal length and outer diameter size.
- Production is also available with a specific wavelength of anti-reflective coating on the lens of no coated.

Attention

- In the single concave lens will not be able to converge the light and can not be projected image. Make sure to use it in combination with a convex lens.
- The biconvex spherical lens has a chromatic aberration, and the focal length will vary depending on the wavelength. Please check the "wavelength characteristic of the focal length data" on the Web for the focal lengths of each wavelength. WEB Reference Catalog Code W3060
- When using a high power pulsed laser, the spark may occur at the focal point on the optical path connecting the light reflected by the concave surface. Please use the plano-concave lens when used with a pulsed laser.
- Losses due to reflection of the front and rear surfaces of the lens, the transmittance of no coated is about 90%.
- The outer periphery of the ridge, concave side is chamfered. There is a possibility that it is smaller than the edge thickness for this design.

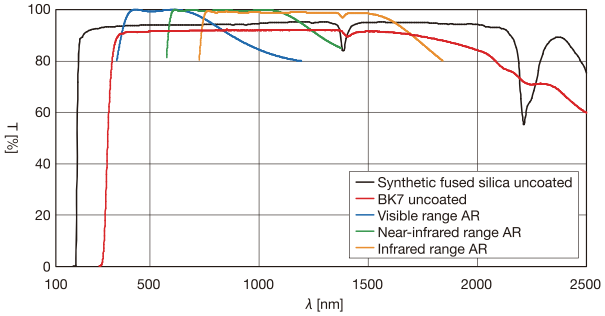
How to specify the anti-reflection coating

In case of specifying a anti-reflection coating 633nm – 1064nm to near infrared lens of PCL-50.8B-200N.
⇒ PCL-50.8B-200N**IR1**

Type of AR Coat	Part Number	Wavelength Range [nm]	Transmittance [%]
Visible range	PCL-50.8B-200NM	400 – 700	> Average 99
Near-infrared	PCL-50.8B-200NIR1	633 – 1064	> Average 98.5
Infrared	PCL-50.8B-200NIR2	750 – 1550	> Average 98.5

! Part of the above is an example of if you want to coat anti-reflective coating on the lens of the PCL-50.8B-200N.
! Anti-reflection coating can be available to the lens of all of PCL.

Typical Transmittance Data T: Transmission



BK7 ϕ10 – ϕ50.8

Uncoated	How to specify the anti-reflection coating			Diameter D [mm]	Focal length f [mm]	Thickness of the edge te [mm]	Thickness of the center tc [mm]	Back focal length fb [mm]	Radius of curvature r [mm]	(Optical) eccentricity [′]
Part Number	Visibe 400 – 700nm	Near-infrared 633 – 1064nm	Infrared 750 – 1550nm							
PCL-10B-10N	M	IR1	IR2	ϕ10	–9.7	4.6	2.0	–10.3	10.38	<1
PCL-10B-15N	M	IR1	IR2	ϕ10	–14.7	3.6	2.0	–15.3	15.57	<1
PCL-10B-20N	M	IR1	IR2	ϕ10	–19.7	3.2	2.0	–20.3	20.76	<1
PCL-10B-25N	M	IR1	IR2	ϕ10	–24.7	3.0	2.0	–25.3	25.95	<1
PCL-10B-30N	M	IR1	IR2	ϕ10	–29.7	2.8	2.0	–30.3	31.14	<1
PCL-10B-40N	M	IR1	IR2	ϕ10	–39.7	2.6	2.0	–40.3	41.52	<1
PCL-10B-50N	M	IR1	IR2	ϕ10	–49.7	2.5	2.0	–50.3	51.90	<1
PCL-15B-15N	M	IR1	IR2	ϕ15	–14.7	5.9	2.0	–15.3	15.57	<1
PCL-15B-20N	M	IR1	IR2	ϕ15	–19.7	4.8	2.0	–20.3	20.76	<1
PCL-15B-25N	M	IR1	IR2	ϕ15	–24.7	4.2	2.0	–25.3	25.95	<1
PCL-15B-30N	M	IR1	IR2	ϕ15	–29.7	3.8	2.0	–30.3	31.14	<1
PCL-15B-40N	M	IR1	IR2	ϕ15	–39.7	3.4	2.0	–40.3	41.52	<1
PCL-15B-50N	M	IR1	IR2	ϕ15	–49.7	3.1	2.0	–50.3	51.90	<1
PCL-20B-20N	M	IR1	IR2	ϕ20	–19.7	7.1	2.0	–20.3	20.76	<1
PCL-20B-25N	M	IR1	IR2	ϕ20	–24.7	6.0	2.0	–25.3	25.95	<1
PCL-20B-30N	M	IR1	IR2	ϕ20	–29.7	5.3	2.0	–30.3	31.14	<1
PCL-20B-40N	M	IR1	IR2	ϕ20	–39.7	4.4	2.0	–40.3	41.52	<1
PCL-20B-50N	M	IR1	IR2	ϕ20	–49.7	3.9	2.0	–50.3	51.90	<1
PCL-25B-25N	M	IR1	IR2	ϕ25	–24.7	8.4	2.0	–25.3	25.95	<1
PCL-25B-30N	M	IR1	IR2	ϕ25	–29.7	7.2	2.0	–30.3	31.14	<1
PCL-25B-35N	M	IR1	IR2	ϕ25	–34.7	6.4	2.0	–35.3	36.33	<1
PCL-25B-40N	M	IR1	IR2	ϕ25	–39.7	5.9	2.0	–40.3	41.52	<1
PCL-25B-50N	M	IR1	IR2	ϕ25	–49.7	5.1	2.0	–50.3	51.90	<1
PCL-25B-60N	M	IR1	IR2	ϕ25	–59.7	4.5	2.0	–60.3	62.28	<1
PCL-25B-70N	M	IR1	IR2	ϕ25	–69.7	4.2	2.0	–70.3	72.66	<1
PCL-25B-80N	M	IR1	IR2	ϕ25	–79.7	4.0	2.0	–80.3	83.04	<1
PCL-25B-90N	M	IR1	IR2	ϕ25	–89.7	3.7	2.0	–90.3	93.42	<1
PCL-25B-100N	M	IR1	IR2	ϕ25	–99.7	3.5	2.0	–100.3	103.80	<1
PCL-25.4B-25N	M	IR1	IR2	ϕ25.4	–24.7	8.6	2.0	–25.4	25.95	<1
PCL-25.4B-30N	M	IR1	IR2	ϕ25.4	–29.7	7.4	2.0	–30.4	31.14	<1
PCL-25.4B-40N	M	IR1	IR2	ϕ25.4	–39.7	6.0	2.0	–40.4	41.52	<1
PCL-25.4B-50N	M	IR1	IR2	ϕ25.4	–49.7	5.2	2.0	–50.4	51.90	<1
PCL-25.4B-60N	M	IR1	IR2	ϕ25.4	–59.7	4.6	2.0	–60.4	62.28	<1
PCL-25.4B-70N	M	IR1	IR2	ϕ25.4	–69.7	4.2	2.0	–70.4	72.66	<1
PCL-25.4B-80N	M	IR1	IR2	ϕ25.4	–79.7	4.0	2.0	–80.4	83.04	<1
PCL-25.4B-90N	M	IR1	IR2	ϕ25.4	–89.7	3.7	2.0	–90.4	93.42	<1
PCL-25.4B-100N	M	IR1	IR2	ϕ25.4	–99.7	3.6	2.0	–100.4	103.80	<1
PCL-25.4B-150N	M	IR1	IR2	ϕ25.4	–149.7	3.0	2.0	–150.4	155.70	<1
PCL-25.4B-200N	M	IR1	IR2	ϕ25.4	–199.7	2.8	2.0	–200.4	207.60	<1
PCL-30B-30N	M	IR1	IR2	ϕ30	–29.7	9.7	2.0	–30.3	31.14	<1
PCL-30B-35N	M	IR1	IR2	ϕ30	–34.7	8.5	2.0	–35.3	36.33	<1
PCL-30B-40N	M	IR1	IR2	ϕ30	–39.7	7.6	2.0	–40.3	41.52	<1
PCL-30B-50N	M	IR1	IR2	ϕ30	–49.7	6.4	2.0	–50.3	51.90	<1
PCL-30B-60N	M	IR1	IR2	ϕ30	–59.7	5.7	2.0	–60.3	62.28	<1
PCL-30B-70N	M	IR1	IR2	ϕ30	–69.7	5.1	2.0	–70.3	72.66	<1
PCL-30B-80N	M	IR1	IR2	ϕ30	–79.7	4.7	2.0	–80.3	83.04	<1
PCL-30B-90N	M	IR1	IR2	ϕ30	–89.7	4.4	2.0	–90.3	93.42	<1
PCL-30B-100N	M	IR1	IR2	ϕ30	–99.7	4.2	2.0	–100.3	103.80	<1
PCL-40B-40N	M	IR1	IR2	ϕ40	–39.7	12.3	2.0	–40.3	41.52	<1
PCL-40B-50N	M	IR1	IR2	ϕ40	–49.7	10.0	2.0	–50.3	51.90	<1
PCL-40B-60N	M	IR1	IR2	ϕ40	–59.7	8.6	2.0	–60.3	62.28	<1
PCL-40B-70N	M	IR1	IR2	ϕ40	–69.7	7.6	2.0	–70.3	72.66	<1
PCL-40B-80N	M	IR1	IR2	ϕ40	–79.7	6.9	2.0	–80.3	83.04	<1
PCL-40B-90N	M	IR1	IR2	ϕ40	–89.7	6.3	2.0	–90.3	93.42	<1
PCL-40B-100N	M	IR1	IR2	ϕ40	–99.7	5.9	2.0	–100.3	103.80	<1
PCL-50B-50N	M	IR1	IR2	ϕ50	–49.5	15.8	3.0	–50.5	51.90	<1
PCL-50B-60N	M	IR1	IR2	ϕ50	–59.5	13.5	3.0	–60.5	62.28	<1
PCL-50B-70N	M	IR1	IR2	ϕ50	–69.5	11.9	3.0	–70.5	72.66	<1
PCL-50B-80N	M	IR1	IR2	ϕ50	–79.5	10.7	3.0	–80.5	83.04	<1
PCL-50B-90N	M	IR1	IR2	ϕ50	–89.5	9.8	3.0	–90.5	93.42	<1
PCL-50B-100N	M	IR1	IR2	ϕ50	–99.5	9.1	3.0	–100.5	103.80	<1
PCL-50.8B-50N	M	IR1	IR2	ϕ50.8	–49.5	16.3	3.0	–50.5	51.90	<1
PCL-50.8B-60N	M	IR1	IR2	ϕ50.8	–59.5	13.8	3.0	–60.5	62.28	<1
PCL-50.8B-70N	M	IR1	IR2	ϕ50.8	–69.5	12.2	3.0	–70.5	72.66	<1
PCL-50.8B-80N	M	IR1	IR2	ϕ50.8	–79.5	11.0	3.0	–80.5	83.04	<1
PCL-50.8B-90N	M	IR1	IR2	ϕ50.8	–89.5	10.0	3.0	–90.5	93.42	<1
PCL-50.8B-100N	M	IR1	IR2	ϕ50.8	–99.5	9.3	3.0	–100.5	103.80	<1
PCL-50.8B-150N	M	IR1	IR2	ϕ50.8	–149.5	7.2	3.0	–150.5	155.70	<1
PCL-50.8B-200N	M	IR1	IR2	ϕ50.8	–199.5	6.1	3.0	–200.5	207.60	<1
PCL-50.8B-250N	M	IR1	IR2	ϕ50.8	–249.5	5.5	3.0	–250.5	259.50	<1
PCL-50.8B-300N	M	IR1	IR2	ϕ50.8	–299.5	5.1	3.0	–300.5	311.40	<1

Compatible Optic Mounts

FLH-10S,-15S,-20S,-25S,-25.4S,-30S,-40S,-50S,-50.8S/SLC-10,-15

Biconcave Lenses | PCL-B-N/PCQL-B-N

Synthetic fused silica ϕ10 – ϕ50.8

Part Number	Diameter D [mm]	Focal length f [mm]	Thickness of the edge te [mm]	Thickness of the center tc [mm]	Back focal length fb [mm]	Radius of curvature r [mm]	(Optical) eccentricity [′]
PCQL-10B-10N	ϕ10	−9.7	5.0	2.0	−10.3	9.20	<1
PCQL-10B-15N	ϕ10	−14.7	3.9	2.0	−15.3	13.80	<1
PCQL-10B-20N	ϕ10	−19.7	3.4	2.0	−20.3	18.40	<1
PCQL-10B-25N	ϕ10	−24.7	3.1	2.0	−25.3	23.00	<1
PCQL-10B-30N	ϕ10	−29.7	2.9	2.0	−30.3	27.60	<1
PCQL-10B-40N	ϕ10	−39.7	2.7	2.0	−40.3	36.80	<1
PCQL-10B-50N	ϕ10	−49.7	2.5	2.0	−50.3	46.00	<1
PCQL-15B-15N	ϕ15	−14.7	6.4	2.0	−15.3	13.80	<1
PCQL-15B-20N	ϕ15	−19.7	5.2	2.0	−20.3	18.40	<1
PCQL-15B-25N	ϕ15	−24.7	4.5	2.0	−25.3	23.00	<1
PCQL-15B-30N	ϕ15	−29.7	4.1	2.0	−30.3	27.60	<1
PCQL-15B-40N	ϕ15	−39.7	3.5	2.0	−40.3	36.80	<1
PCQL-15B-50N	ϕ15	−49.7	3.2	2.0	−50.3	46.00	<1
PCQL-20B-20N	ϕ20	−19.7	7.9	2.0	−20.3	18.40	<1
PCQL-20B-25N	ϕ20	−24.7	6.6	2.0	−25.3	23.00	<1
PCQL-20B-30N	ϕ20	−29.7	5.8	2.0	−30.3	27.60	<1
PCQL-20B-40N	ϕ20	−39.7	4.8	2.0	−40.3	36.80	<1
PCQL-20B-50N	ϕ20	−49.7	4.2	2.0	−50.3	46.00	<1
PCQL-25B-25N	ϕ25	−24.7	9.4	2.0	−25.3	23.00	<1
PCQL-25B-30N	ϕ25	−29.7	8.0	2.0	−30.3	27.60	<1
PCQL-25B-35N	ϕ25	−34.7	7.1	2.0	−35.3	32.20	<1
PCQL-25B-40N	ϕ25	−39.7	6.4	2.0	−40.3	36.80	<1
PCQL-25B-50N	ϕ25	−49.7	5.5	2.0	−50.3	46.00	<1
PCQL-25B-60N	ϕ25	−59.7	4.9	2.0	−60.3	55.20	<1
PCQL-25B-70N	ϕ25	−69.7	4.5	2.0	−70.3	64.40	<1
PCQL-25B-80N	ϕ25	−79.7	4.1	2.0	−80.3	73.60	<1
PCQL-25B-90N	ϕ25	−89.7	3.9	2.0	−90.3	82.80	<1
PCQL-25B-100N	ϕ25	−99.7	3.7	2.0	−100.3	92.00	<1
PCQL-25.4B-25N	ϕ25.4	−24.7	9.6	2.0	−25.4	23.00	<1
PCQL-25.4B-30N	ϕ25.4	−29.7	8.2	2.0	−30.4	27.60	<1
PCQL-25.4B-40N	ϕ25.4	−39.7	6.5	2.0	−40.4	36.80	<1
PCQL-25.4B-50N	ϕ25.4	−49.7	5.6	2.0	−50.4	46.00	<1
PCQL-25.4B-60N	ϕ25.4	−59.7	5.0	2.0	−60.4	55.20	<1
PCQL-25.4B-70N	ϕ25.4	−69.7	4.5	2.0	−70.4	64.40	<1
PCQL-25.4B-80N	ϕ25.4	−79.7	4.2	2.0	−80.4	73.60	<1
PCQL-25.4B-90N	ϕ25.4	−89.7	4.0	2.0	−90.4	82.80	<1
PCQL-25.4B-100N	ϕ25.4	−99.7	3.8	2.0	−100.4	92.00	<1
PCQL-25.4B-150N	ϕ25.4	−149.7	3.2	2.0	−150.4	138.00	<1
PCQL-25.4B-200N	ϕ25.4	−199.7	2.9	2.0	−200.4	184.00	<1
PCQL-30B-30N	ϕ30	−29.7	10.9	2.0	−30.3	27.60	<1
PCQL-30B-35N	ϕ30	−34.7	9.4	2.0	−35.3	32.20	<1
PCQL-30B-40N	ϕ30	−39.7	8.4	2.0	−40.3	36.80	<1
PCQL-30B-50N	ϕ30	−49.7	7.0	2.0	−50.3	46.00	<1
PCQL-30B-60N	ϕ30	−59.7	6.2	2.0	−60.3	55.20	<1
PCQL-30B-70N	ϕ30	−69.7	5.5	2.0	−70.3	64.40	<1
PCQL-30B-80N	ϕ30	−79.7	5.1	2.0	−80.3	73.60	<1
PCQL-30B-90N	ϕ30	−89.7	4.7	2.0	−90.3	82.80	<1
PCQL-30B-100N	ϕ30	−99.7	4.5	2.0	−100.3	92.00	<1
PCQL-40B-40N	ϕ40	−39.7	13.8	2.0	−40.3	36.80	<1
PCQL-40B-50N	ϕ40	−49.7	11.2	2.0	−50.3	46.00	<1
PCQL-40B-60N	ϕ40	−59.7	9.5	2.0	−60.3	55.20	<1
PCQL-40B-70N	ϕ40	−69.7	8.4	2.0	−70.3	64.40	<1
PCQL-40B-80N	ϕ40	−79.7	7.5	2.0	−80.3	73.60	<1
PCQL-40B-90N	ϕ40	−89.7	6.9	2.0	−90.3	82.80	<1
PCQL-40B-100N	ϕ40	−99.7	6.4	2.0	−100.3	92.00	<1
PCQL-50B-50N	ϕ50	−49.5	17.8	3.0	−50.5	46.00	<1
PCQL-50B-60N	ϕ50	−59.5	15.0	3.0	−60.5	55.20	<1
PCQL-50B-70N	ϕ50	−69.5	13.1	3.0	−70.5	64.40	<1
PCQL-50B-80N	ϕ50	−79.5	11.8	3.0	−80.5	73.60	<1
PCQL-50B-90N	ϕ50	−89.5	10.7	3.0	−90.5	82.80	<1
PCQL-50B-100N	ϕ50	−99.5	9.9	3.0	−100.5	92.00	<1
PCQL-50.8B-50N	ϕ50.8	−49.5	18.3	3.0	−50.5	46.00	<1
PCQL-50.8B-60N	ϕ50.8	−59.5	15.4	3.0	−60.5	55.20	<1
PCQL-50.8B-70N	ϕ50.8	−69.5	13.4	3.0	−70.5	64.40	<1
PCQL-50.8B-80N	ϕ50.8	−79.5	12.0	3.0	−80.5	73.60	<1
PCQL-50.8B-90N	ϕ50.8	−89.5	11.0	3.0	−90.5	82.80	<1
PCQL-50.8B-100N	ϕ50.8	−99.5	10.2	3.0	−100.5	92.00	<1
PCQL-50.8B-150N	ϕ50.8	−149.5	7.7	3.0	−150.5	138.00	<1
PCQL-50.8B-200N	ϕ50.8	−199.5	6.5	3.0	−200.5	184.00	<1
PCQL-50.8B-250N	ϕ50.8	−249.5	5.8	3.0	−250.5	230.00	<1
PCQL-50.8B-300N	ϕ50.8	−299.5	5.3	3.0	−300.5	276.00	<1

Compatible Optic Mounts

FLH-10S,-15S,-20S,-25S,-25.4S,-30S,-40S,-50S,-50.8S/SLC-10,-15