

# **Apo-Nikkor and Process-Nikkor large format lenses**

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### **1 Apo-Nikkors, according to Nikon**

Nikon made two families of Apo-Nikkor lenses, both intended to be used for, e.g., photoengraving. These are, respectively, dialyte types (“Symmetrical Type Apo-Nikkor”) and Tessar types (“Asymmetrical Type Apo-Nikkor”).

Nikon claims that all of them have low distortion (“almost zero” at 1:1) and are highly corrected for three colors, (“red, green, and blue”). “The highest sharpness will be attained when the aperture is stopped down by 2-3 stops from the maximum. When the aperture is reduced by 2 stops, a uniformly bright image area will be obtained without vignetting at the corners of the image field.” “Even when the aperture is stopped down, the image is maintained in the same position, so that focusing can be done at maximum brightness.”

I have an old Nikon catalog that says this about the two types:

#### **1.1 Symmetrical Type Apo-Nikkor**

Each Apo-Nikkor of symmetrical type, consisting of a symmetrically arranged optical system consisting of 4 groups and 4 elements of lenses, has the following features:

1. The lenses will give a wide effective picture angle (about 46°) for their long focal length. Therefore, the image area being assumed the same, a camera of shorter length can be used.
2. Since the lens system is symmetrical in respect to the iris diaphragm, the optical performance remains the same, regardless of the direction in which the lens is used. No need to reverse the lens for magnification. This greatly facilitates the use of the lenses mounted on a camera with automatic focusing device.
3. The lenses are also suitable for work, where no distortion is permissible at a reproduction ratio close to full size. On the other hand, since the lenses give an excellent image, for a wide picture angle at infinite distance as well as in enlarging work, they can also be utilized for a large size camera or on an enlarger.



Figure 1: Symmetrical Apo Nikkor lenses, dialyte type, focal lengths 305 and 420 mm



Figure 2: Symmetrical Apo Nikkor lens, dialyte type, focal length 480 mm



Figure 3: Symmetrical Apo Nikkor lens, dialyte type, focal length 610 mm



Figure 4: Four Symmetrical Apo Nikkor lenses, dialyte type

## 1.2 Asymmetrical Type Apo-Nikkor

The asymmetrical type Apo-Nikkor lenses are intended primarily for reproduction of Japanese and Chinese characters. They have a rather narrow picture angle in order to attain highest resolving power. They can also be used as reproduction lenses in electrostatic photography and microphotography, as enlarging lenses for color and monochromatic photography, and in connection with general purpose cameras like view-cameras and studio-cameras.

## 2 Process-Nikkors, according to Nikon

Nikon made four Process-Nikkor lenses, all four elements in four groups double Gauss types with minimum aperture of  $f/32$ . Very similar – identical, but for the name – lenses were sold as Nikkor-Q before the name Process-Nikkor was used. Nikon does *not* claim that these lenses are apochromatic and does *not* recommend that they be used outside their usable range of magnifications.

I have a Nikon catalog that says this about them:

The wide picture angle design of Process-Nikkor lenses makes for larger subject area coverage than obtained with conventional lenses at the same working distance. In addition, this distance can be reduced for the same subject area, meaning the camera equipment can be compact.

Although the maximum aperture ratio is 1:10, these lenses have large diameters and minimal vignetting...  $68^\circ$  subject area coverage at full aperture or  $74^\circ$  coverage when stopped down to  $f/22$ .

Process-Nikkor lenses assure remarkable flatness of the image over the entire image area. They provide quick and low-cost photoengraving for monochromatic reproduction.

The lens construction is 4 elements in 4 groups, and their configurations are symmetrical so they can be used for either enlargement or reduction without reversing.



Figure 5: Process-Nikkor or Nikkor-Q lenses, double-Gauss type, were supplied in a nice wooden box



Figure 6: Nikkor-Q lens, double-Gauss type, focal length 260 mm; note the protruding rear lens element of this particular design.



### **3 Wide-angle Apo-Nikkors, according to Nikon**

Steve Hamley very kindly shared a Nikon brochure on these lenses with me. The full text can be found at: <http://www.largeformatphotography.info/forum/showthread.php?t=86484>

Nikon made four Wide-angle Apo-Nikkors, all six elements in four groups plasmat types with minimum aperture of f/128. Nikon says explicitly that these lenses are apochromatic, "fully symmetrical," and that, although their published "usable magnification range" is 1:10 - 10:1, they "are equally suited for other precision optical tasks, such as: . . . use with view cameras or large format studio cameras."

f (mm)	max aperture	type	coverage	mount (mm)	weight (g)
150	f/9	tessar	45°	53x0.75	175
180	f/9	dialyte	46°	53x0.75	210
210	f/9	tessar	45°	53x0.75	185
240	f/9	dialyte	46°	53x0.75	220
300	f/9	tessar	41°	53x0.75	240
305	f/9	dialyte	46°	72x1	430
360	f/9	dialyte	46°	72x1	470
420	f/9	dialyte	46°	90x1	780
450	f/9	tessar	37°	72x1	550
455	f/9	dialyte	46°	90x1	810
480	f/9	dialyte	46°	90x1	860
600	f/9	tessar	37°	90x1	775
610	f/9	dialyte	46°	110x1	1450
750	f/9	tessar	37°	110x1	2015
760	f/11	dialyte	42°	110x1	1360
890	f/11	dialyte	42°	162x1.5	3600
900	f/9	tessar	37°	140x1.5	3570
1070	f/12.5				1600
1200	f/9	tessar	37°	213x1.5	8385
1210	f/12.5	dialyte	40°	162x1.5	3800
1780	f/14	dialyte	36°	213x1.5	6430
1800	f/14	tessar	35° 20'	213x1.5	8860

Table 1: Summary of Apo-Nikkors' characteristics

f (mm)	max aperture	type	coverage f/10, f/22	mount (mm)	weight (g)	Magnification (usable)
180	f/10	4/4 double Gauss	68°, 74°	62x1	350	1:4 - 4:1
210	f/10	4/4 double Gauss	68°, 74°	72x1	510	1:3 - 3:1
240	f/10	4/4 double Gauss	68°, 74°	82x1	730	1:2 - 2:1
(*) 267	f/10	4/4 double Gauss	68°, 74°	90x1	1070	1:2 - 2:1

(\*) note: engraved 260 mm

Table 2: Summary of Process-Nikkors' characteristics

f (mm)	max aperture	type	coverage	mount	weight (g)	Magnification
150	f/8	6/4 plasmat	60°	53x0.75	240	1:10 - 10:1
210	f/9	6/4 plasmat	57°	72x1	455	1:10 - 10:1
300	f/9	6/4 plasmat	54°	90x1	840	1:10 - 10:1
360	f/9	6/4 plasmat	54°	90x1	970	1:10 - 10:1

Table 3: Summary of Wide-angle Apo-Nikkors' characteristics