

## EXTREME WIDE-ANGLE PHOTOGRAPHY

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Photography reveals realities that could only be imagined otherwise. A discreet example is extreme wide-angle photography, which provides a far wider view than unassisted eyesight, but usually appears as if a normal or moderately wide image. As such, extreme wide-angle photography is typically taken for granted, compared to more rarefied optics that liberate seeing such as telephoto or macro-photography. Yet extreme wide-angle photography is available for everyday picture-taking, expands visual horizons and can even warp space.



Construction site. A roughly 100° view, twice normal vision.

Super-wide lenses provide a dynamic perspective of the world around us, well beyond the scale of eyesight. Normal vision comfortably takes in a 45-50° angle of view, corresponding to the standard 50mm lens in 35mm film photography. The extreme-wide perspective begins with a 90° field of view, which emerges through lenses of 21mm and shorter focal length in 35mm film photography, and 15mm or shorter focal length in most digital cameras.

## Seeing Broad Perspectives Easily

Atria ceilings of modest, medium-rise corporate office buildings illustrate how wide-angle photography can assist seeing. If you stand at the center of such an atrium, and look up to view an entire glass-paned dome of a 12-15 storey



Atrium dome w/Zeiss Biogon lens

building as in the image above, you will be able to take in most of the structure but only by shifting your eyeballs from side to side. Your eyes will unexpectedly tire in a few seconds. With much attention diverted to make sense of the constantly changing view, you will not be able to visualize or appreciate the distinctive pattern of supports that is clearly distilled through ultra-wide photography.

With an extreme-wide lens, a simple photograph “shooting straight up” at the ceiling puts the whole view into easy perspective. A unique pattern emerges, not beautiful or dazzling, but interesting and admirable for its ingenuity.

The maxim that experts make it look easy (and normal) often applies to extreme-wide photography. Viewers typically do not realize when they are seeing an image taken with an ultra-wide lens, even if they are somewhat familiar with the subject. Classic wide-angle views of great cathedral interiors, courtyards, restaurant and new-house interiors are cases in point. Examples of extreme-wide photography in this article are noted in the context of architecture, my main photographic interest, but a similar broadening of perspective can benefit landscape and nature portfolios, and add sparkle to wedding photography too.

## The Fisheye Lens

The widest optic is the fisheye lens, designed to capture half of the total field of view surrounding the photographer; that is, a  $180^\circ$  diagonal view. In the case of at least one major lens manufacturer, fisheye optics were initially produced to aid in police work, to enable the recording of an entire crime scene in a single photograph. Only after some years were the lenses made available to the public.

The fisheye photograph below, of a circular atrium, indicates how an ultra-wide  $180^\circ$  view may appear normal while greatly enhancing vision. The unaided eye, looking up from the point where the picture was taken, would see only the central third of the area captured in the photograph, and be immediately overwhelmed.



Atrium w/Zeiss Distagon lens: a  $180^\circ$  field of view.

The spherical architecture illustrates the one condition when fisheye photography appears undistorted: objects positioned in successively widening concentric circles around a central point. Unfortunately, fisheye lenses substantially distort the perspective of most photographic situations, though it is sometimes possible to design such a composition with good effect. A rough analogy is the difficulty in drawing all the contours of a globe on a two-dimensional map. In practice, fisheye lenses are seldom used, due to having to contend with the distortion, the difficulty in using filters, the impossibility of using flash, and the high cost. The fragility of the lenses may further discourage casual use. In fact, most extreme-wide shooting is done with rectilinear optics (non-fisheye, essentially non-distorting lenses).

## The Widest Rectilinear Lenses

An ultra-wide 12mm f/5.6 lens introduced by Voightlander for its viewfinder cameras is the widest true-rectilinear (essentially non-distorting) lens in 35mm film photography. This jewel provides a 121° diagonal angle of view (112° long by 90° wide). Depth of field is astounding, with the possibility to focus one foot to infinity. In fact, an effort is required to put anything out of focus. The lenses can be used on Leica rangefinder cameras as well as Voightlander models. For 35mm SLR film and digital cameras, rectilinear lenses of 14mm or 15mm focal length are obtainable from major manufacturers including Canon, Leica and Nikon. For digital cameras alone, ultra-wide rectilinear lenses of 12-14mm are available (with roughly equivalent effect of 18mm focal length in a 35mm film camera).

In medium and large formats, the wide-field record similarly tops out at just over 120° diagonal angle of view. The lenses offer limited shift capability for architectural shooting when it is desired to aim the camera up and avoid converging lines.

### Warp Space: Beyond the 90° Field of View

Photographic lenses capture light from three dimensions, of course, to project a flat, two-dimensional image. The resulting picture normally conveys an accurate three-dimensional perspective to the eye. However in extreme-wide photography, an intriguing effect occurs in the peripheral area of the film where the angle of view exceeds 90°. At that point, the horizontal or vertical dimension, having been fully covered in the photograph, may run into the third dimension of depth. In the resulting image, that part of the perimeter showing depth will take on the appearance of the horizontal or vertical, as if two dimensions have melded into a single plane.



Union Station w/Rodenstock Apo-Grandagon lens

For example, the above photograph of the great hall of the Washington DC rail station incorporates statuary to the extreme left and right of the photograph. The image was taken with an extreme-wide medium-format lens with a  $100^\circ+$  horizontal angle of view. The statues appear as if on the horizontal plane, albeit slightly indented, together with the hall and arches comprising most of the picture. In reality, the statues are not on the horizontal plane, but are perpendicular to the hall and arches. In effect, two corners of the building appear to have nearly merged with the horizontal.

In landscape photography, an impact of shooting clouds just beyond the  $90^\circ$  field of view can be the appearance that the clouds are arranged in a progression or array, when to the eye the order is haphazard.

### Progress in Extreme-Wide Photography

Until about a decade ago, extreme-wide lenses with focal lengths less than 20-21mm were seldom used with single-lens reflex (SLR) cameras because the lens would have had to be located too close to the film to allow sufficient space for the instant-return mirror. For this reason, the widest lenses were more commonly used in rangefinder or view-camera models. However the introduction of smaller lenses of aspherical design has made it possible for major manufacturers to introduce extreme-wide lenses of 14-15mm focal length for 35mm SLR film and digital cameras. The Leica 15mm Super-Elmarit-R aspherical lens, at a cost upwards of \$7000, is uniquely superior with a virtual absence of peripheral distortion, and exceptional contrast and glare control, for an optic of its focal length.

## Complications of Extreme-Wide Photography

By virtue of their design, the majority of extreme-wide lenses capture excess light at the center of the lens. As a result, a graduated center filter has to be placed over the lens (or is built into the optic) to nullify the excess light. Although the center filter will normally not decrease resolution or contrast, it requires an additional 1.5 – 2 f-stops, and complicates use of additional filters.

Extreme-wide lenses should be used with a spirit level and tripod whenever feasible, since even a couple degrees of tilt will noticeably detract from the impression of a super-wide photograph that features definitive vertical or horizontal lines.

In wide-angle photography, caution must be exercised with regard to a tendency to increase the size of figures in the foreground in relation to the background.

### The Zeiss Biogon Lens

Finally, most extreme-wide lenses are more distorting than telephoto and normal lenses, although the effect is often not noticed unless expressly pointed out. Yet one distinctive lens design, epitomized by the Zeiss Biogon, is unique among very wide lenses for having virtually no distortion and not requiring a center filter (the premium Leica 15mm lens also shares these characteristics). Unfortunately the Biogon design has a drawback with respect to some architectural and landscape applications: capacity for lens shift with a view camera or other perspective-control mechanism is negligible due to a minimal image circle inherent in its design. However if lens shift is not necessary, the Biogon is unsurpassed in resolution and absence of distortion in wide-angle photography.

The Zeiss Biogon is manufactured for 35mm film and digital photography, expressly for M-mount rangefinder cameras (the dimensions of the Biogon do not allow its use in SLR cameras). The Biogon is available in 21mm, 25mm, 28mm and 35mm focal lengths for Leica, Voigtlander and Zeiss Ikon M-mount cameras. The optics are compact and weigh in a range of just 190-300g.

As to medium format, a Biogon design is available from Mamiya, which produces two such lenses for its 7II camera in 6x7 medium format. The Biogon lens had been available with the Hasselblad 903/905 SWC cameras; sadly, production of this model was discontinued in 2006, but instruments may be purchased on the used market. In its place, the Swiss camera manufacturer Alpa has introduced two lenses somewhat characteristic of the Biogon, the Apo-Helvetar and Apo-Switar, for its wide-angle medium-format cameras.

Bearing in mind and applying its technical peculiarities to advantage, extreme-wide photography can manage extreme perspectives and produce awesome views, from faithful rendition to the impressionistic.

In sum, if you have a calling for the great spaces of photography, in monumental cities or the wilds of nature or the smallest confines of your home, then extreme-wide photography can help to capture and expand upon the full perspective.

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