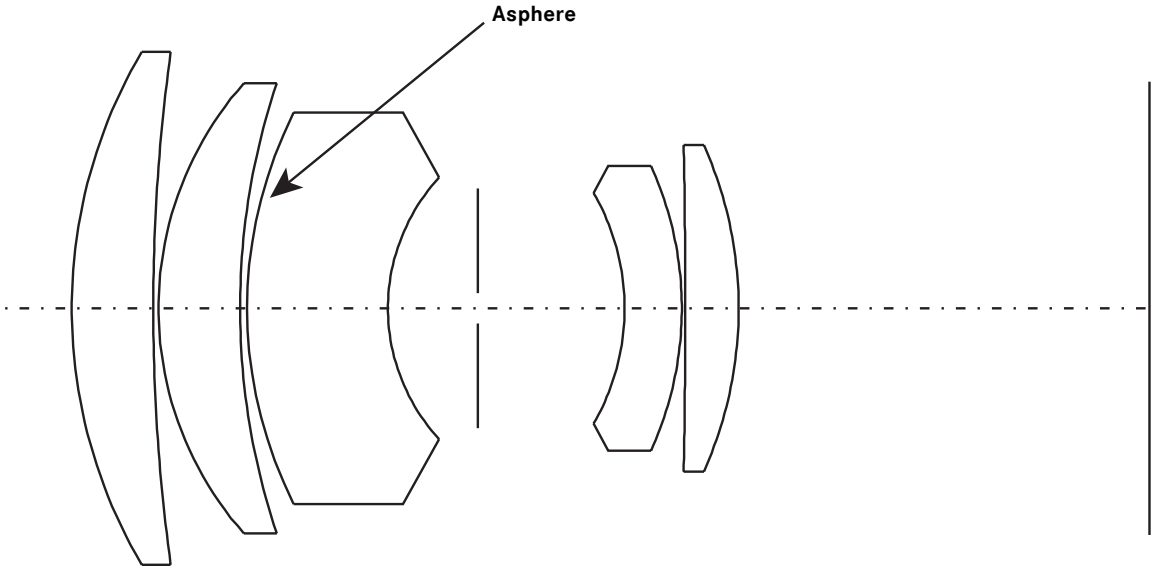
Apochromatic correction and the use of a lens element with an aspherical surface are combined in this compact telephoto lens for high-performance imaging. Two of the five lens elements are made of high-refraction optical glass. Two other lens elements have anomalous partial dispersion. As a result, brilliance and resolution are exemplary, even at full aperture. Peak performance is achieved at full aperture. Vignetting is already minimal with the lens wide open. As a result of the large aperture of f/2 and impressive contrast rendition, it produces a particularly bright viewfinder image that permits very accurate and positive focusing, even in poor light. The nearest focusing distance is 0.7 m (27.5 in), so that subjects as small as 14 x 21 cm (5.5 x 8.25 in) can be explored. Combining this lens with the LEICA APO-EXTENDER-R 2 x produces a high-performance tele combination of 180 mm f/4.

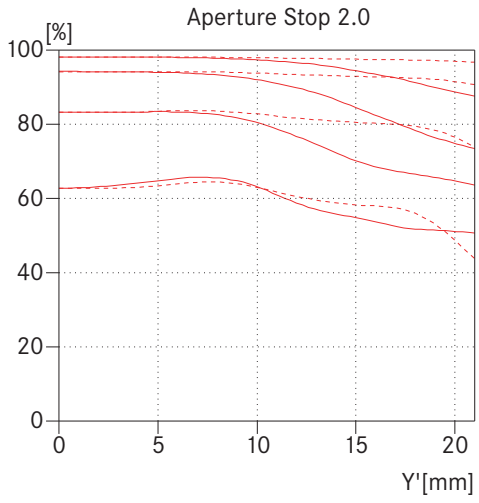
Lens shape

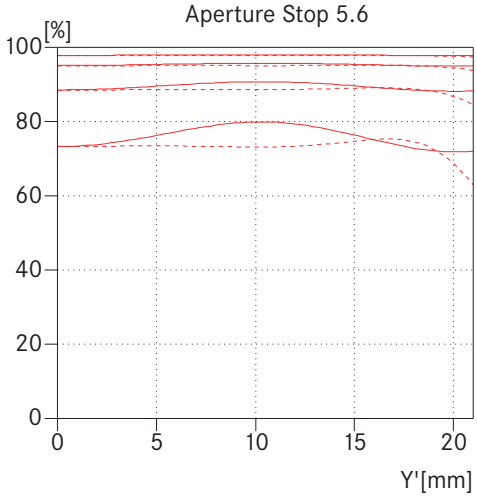


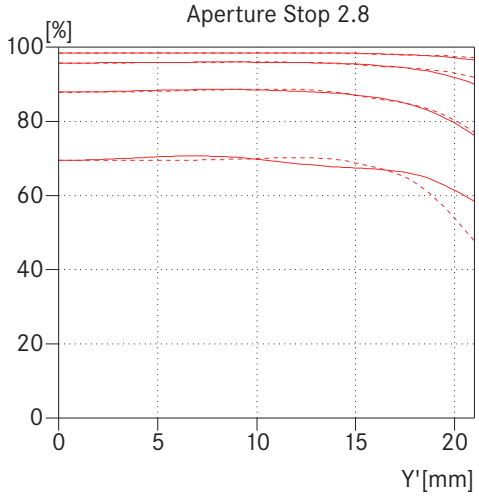
Engineering drawing

Technical Data	
Angle of view (diagonal, horizontal, vertical)	27°, 22°, 15°
Optical design	**Number of elements / groups:** 5 / 5 **Focal length:** 90.9 mm **Entrance pupil:** 58.6 mm (related to the first lens surface in light direction) **Focusing range:** 0.7 m to Infinity
Distance setting	**Scale:** Combined meter/feet-increments **Smallest object field:** 140 mm x 210 mm **Highest reproduction ratio:** 1:5.8
Diaphragm	**Setting / Type:** Preset diaphragm with clickstops (including half values), Fully automatic diaphragm **Smallest aperture:** f/16
Bayonet	LEICA R quick-change bayonet for LEICA R3 to LEICA R9 with mechanical, and, for LEICA R8/R9, additional electronic exposure control
Filter (type)	Internal thread for screw-in type filters E 60
Lens hood	Built-in, telescopic, lockable
Dimensions and weight	**Length:** 59 mm **Largest diameter:** 70 mm **Weight:** approx. 520 g

MTF graphs





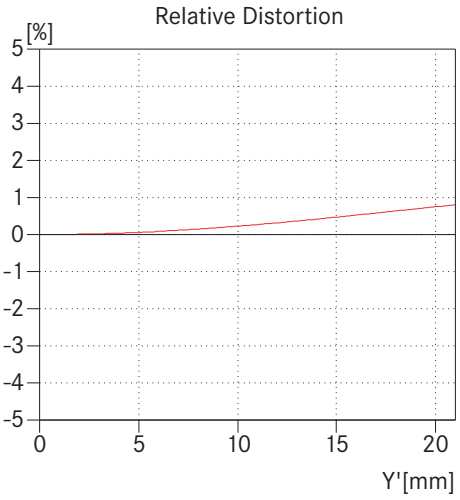


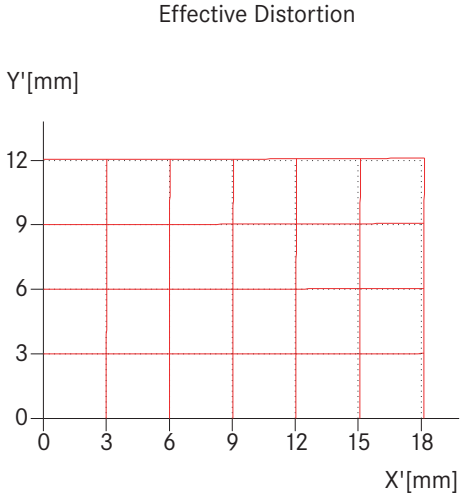
The MTF is indicated both at full aperture and at f/5.6 at long taking distances (infinity). Shown is the contrast in percentage for 5, 10, 20 and 40 lp/mm accross the height of the 35 mm film format, for tangential (dotted line) and sagittal (solid line) structures, in white light. The 5 and 10 lp/mm will give an indication regarding the contrast ratio for large object structures.The 20 and 40 lp/mm records the resolution of finer and finest object structures.

sagittal structures

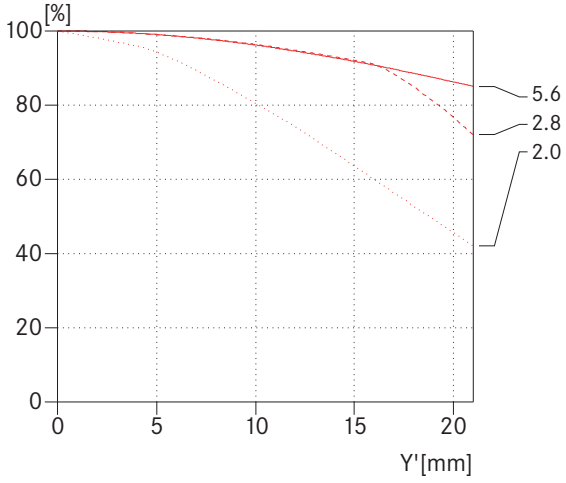
tangential structures

Distortion





Vignetting



Distortion is the deviation of the real image height (in the picture) from the ideal image height. The relative distortion is the percentage deviation. The ideal image height results from the object height and the magnification. The image height of 21.6mm is the radial distance between the edge and the middle of the image field for the format 24mm x 36mm. The graph of the effective distortion illustrates the appearance of straight horizontal and vertical lines in the picture.

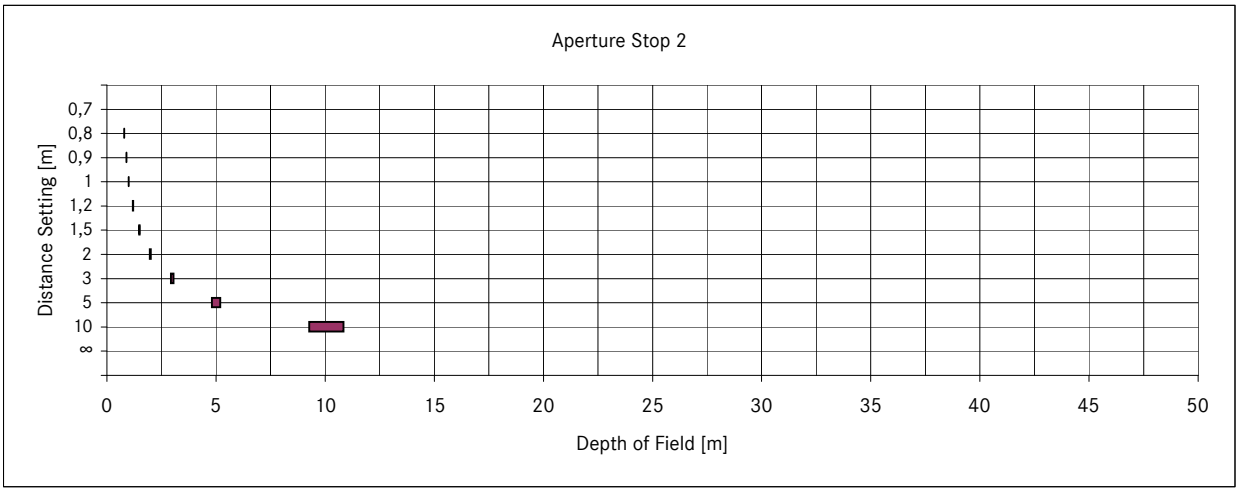
Vignetting is a continous decrease of the illumination to the edges of the image field. The graph shows the percentage lost of illumination over the image height. 100% means no vignetting.

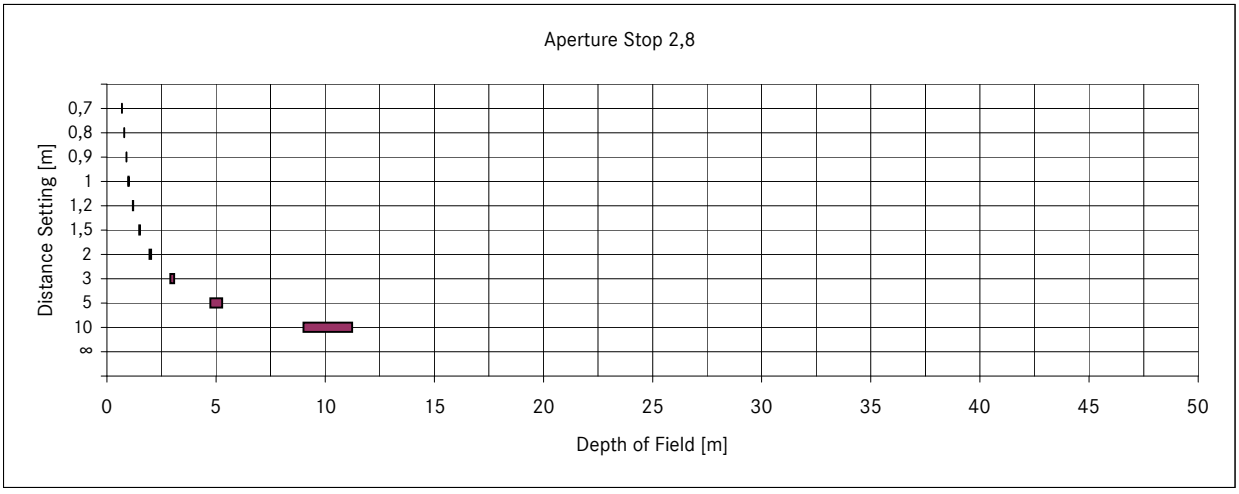
sagittal structures

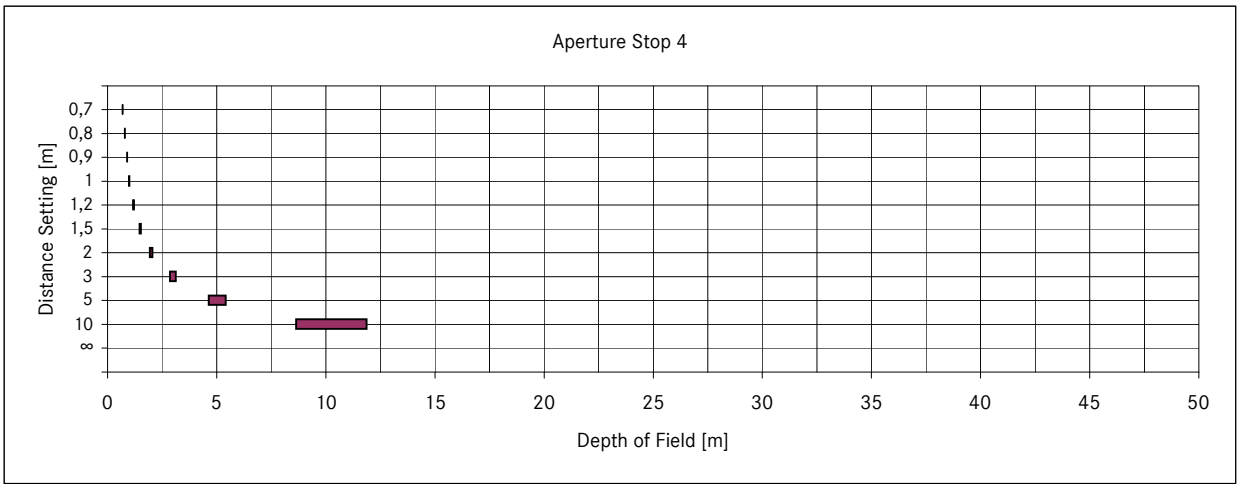
tangential structures

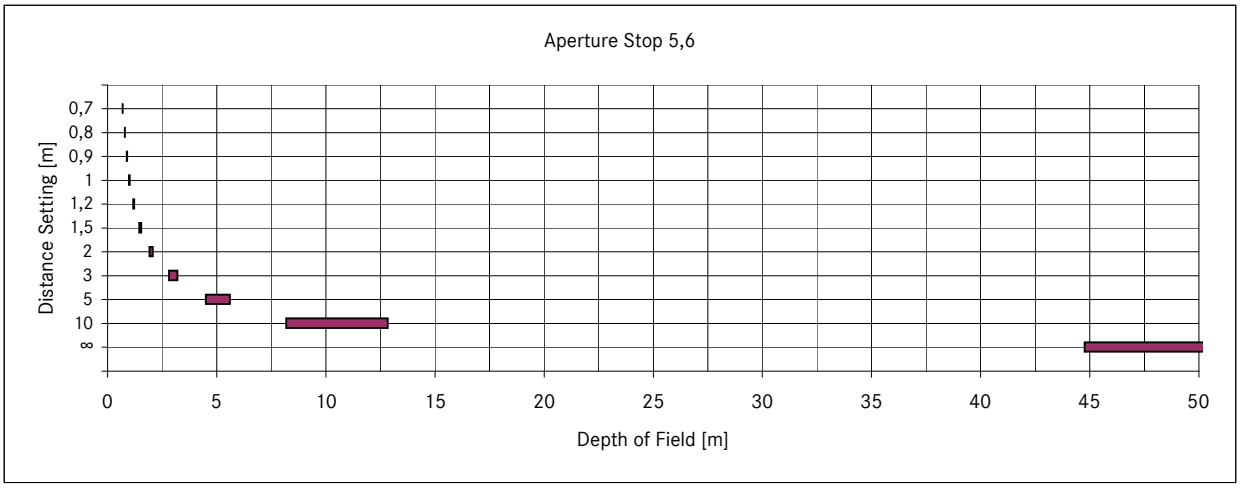
Depth of field table

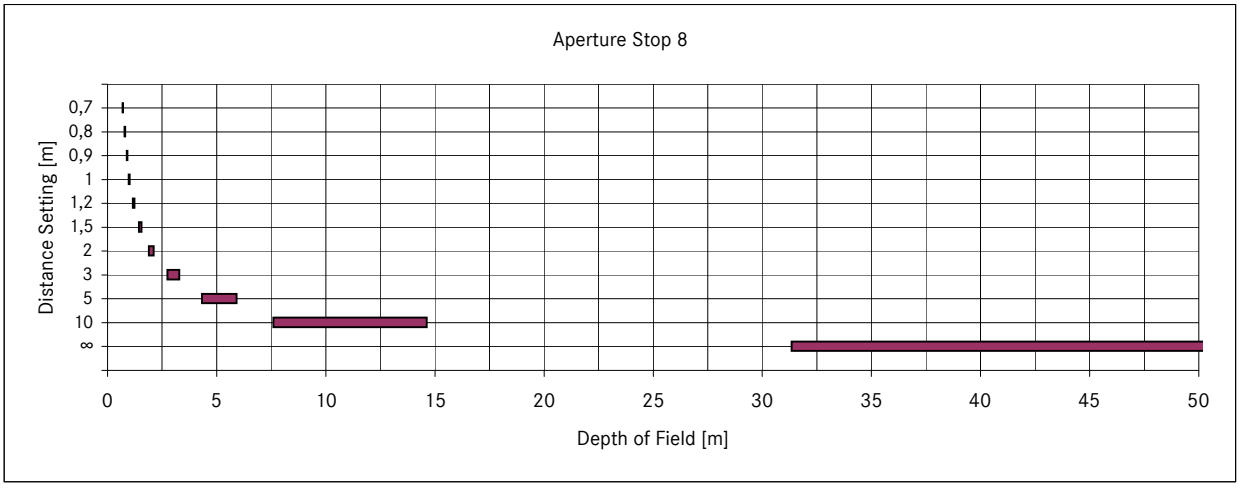
Distance Setting [m]	Aperture Stop 2	2,8	4	5,6	8	11	16	Magnification
0,7	0,697 - 0,703	0,695 - 0,705	0,694 - 0,707	0,691 - 0,709	0,687 - 0,713	0,683 - 0,719	0,675 - 0,727	1/5,82
0,8	0,796 - 0,804	0,794 - 0,806	0,791 - 0,809	0,788 - 0,813	0,783 - 0,818	0,777 - 0,825	0,766 - 0,837	1/6,94
0,9	0,894 - 0,906	0,892 - 0,908	0,889 - 0,912	0,884 - 0,916	0,878 - 0,923	0,870 - 0,933	0,857 - 0,948	1/8,06
1	0,993 - 1,007	0,990 - 1,010	0,986 - 1,014	0,980 - 1,020	0,972 - 1,029	0,962 - 1,041	0,946 - 1,061	1/9,18
1,2	1,190 - 1,211	1,186 - 1,215	1,179 - 1,221	1,171 - 1,230	1,159 - 1,244	1,145 - 1,261	1,122 - 1,291	1/11,4
1,5	1,483 - 1,517	1,477 - 1,524	1,467 - 1,534	1,455 - 1,549	1,436 - 1,570	1,413 - 1,599	1,377 - 1,648	1/14,7
2	1,970 - 2,031	1,958 - 2,043	1,941 - 2,063	1,918 - 2,089	1,886 - 2,130	1,846 - 2,183	1,784 - 2,278	1/20,2
3	2,932 - 3,071	2,906 - 3,101	2,867 - 3,146	2,817 - 3,209	2,746 - 3,307	2,661 - 3,440	2,531 - 3,687	1/31,3
5	4,812 - 5,204	4,740 - 5,290	4,637 - 5,426	4,506 - 5,617	4,323 - 5,931	4,115 - 6,378	3,809 - 7,294	1/53,3
10	9,268 - 10,86	9,004 - 11,25	8,635 - 11,88	8,188 - 12,85	7,598 - 14,64	6,972 - 17,73	6,130 - 27,39	1/108
∞	125,3 - ∞	89,51 - ∞	62,65 - ∞	44,77 - ∞	31,35 - ∞	22,81 - ∞	15,70 - ∞	1/∞

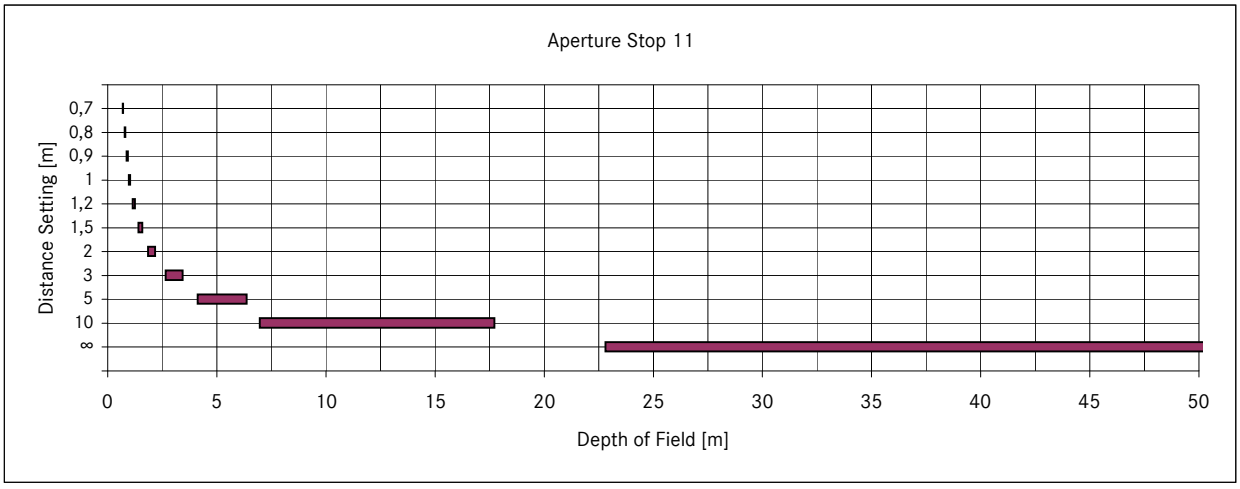


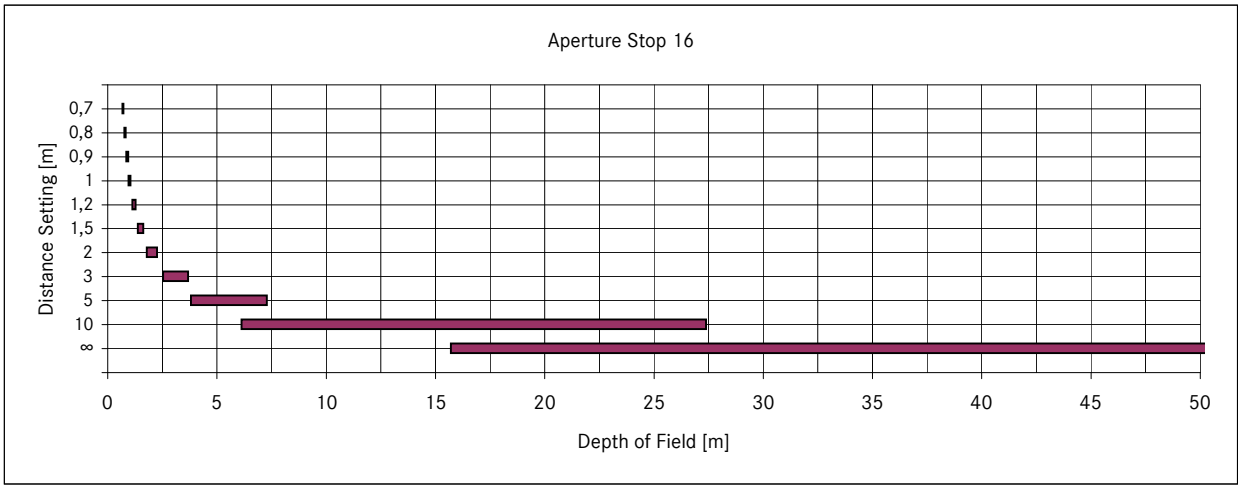



Aperture Stop 4
Distance Setting [m]
0,7
0,8
0,9
1
1,2
1,5
2
3
5
10
∞
0
5
10
15
20
25
30
35
40
45
50
Depth of Field [m]


Aperture Stop 5,6
Distance Setting [m]
0,7
0,8
0,9
1
1,2
1,5
2
3
5
10
∞
0
5
10
15
20
25
30
35
40
45
50
Depth of Field [m]


Aperture Stop 8
Distance Setting [m]
0,7
0,8
0,9
1
1,2
1,5
2
3
5
10
∞
0
5
10
15
20
25
30
35
40
45
50
Depth of Field [m]


Aperture Stop 11
Distance Setting [m]
0,7
0,8
0,9
1
1,2
1,5
2
3
5
10
∞
0
5
10
15
20
25
30
35
40
45
50
Depth of Field [m]


Aperture Stop 16
Distance Setting [m]
0,7
0,8
0,9
1
1,2
1,5
2
3
5
10
∞
0
5
10
15
20
25
30
35
40
45
50
Depth of Field [m]