Cinematographic evaluation of the Leica Summilux-C lenses

Byr Alfonso Parra AEC

Along this article we are going to study the new Leica lenses for film making from the view that a photographer is most interested in: color, aberrations and their uses within everyday shooting. The lenses have a new aspheric design. Aspheric glasses have a variable curvature radius opposite to the constant curvature of the spherical. For this reason aberrations reduce, especially spherical and geometric ones; in addition, we can use larger apertures with less aberration owing to the fact that we use less elements (glasses) in order to get the mentioned apertures. As we are going to see below, the new design allows slighter lenses with an astonishing sharpness all over the image surface and hardly any chromatic deviations.

The initial set of lenses is made up of 16mm, 18mm, 21mm, 25mm, 35mm, 40mm, 50mm, 65mm, 75mm and 100 mm, all of them with T1.4-22 aperture, and 95mm diameter. The diaphragm has also a "closed" mode that totally prevents light from entering to the sensor. The minimum focusing distance is between 0.31m with 16mm, and los 0.90m with 100mm. All the lenses have the same length: 142mm from the mount.

Shooting test was made with the REDOneMX camera, 4KHD format, 42 redcode, moreover we used also other Alexa camera. Nevertheless, all of the results we show in the present article come from the REDOneMX, unless we tell otherwise.

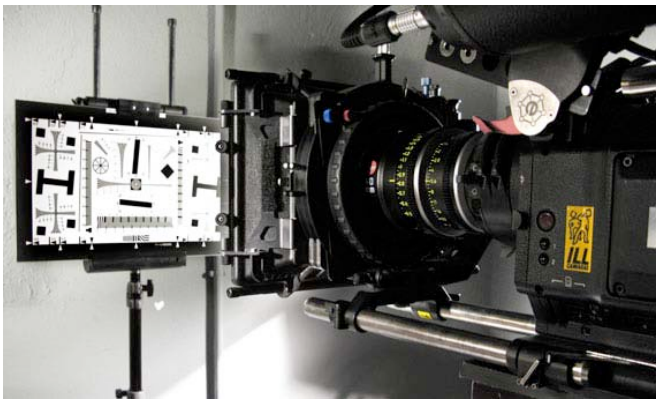
Alfonso Parra AEC, during outdoor location shooting, it´s very cold as usual..

As usual, we have contrasted outcomes with other brands optics in order to understand better where the lenses can be located within the market offer. However, we did not intend to state quality criteria, because every manufacturer settles different balance among all of the parameters involving the optics quality; so, they apply different criteria in their construction.

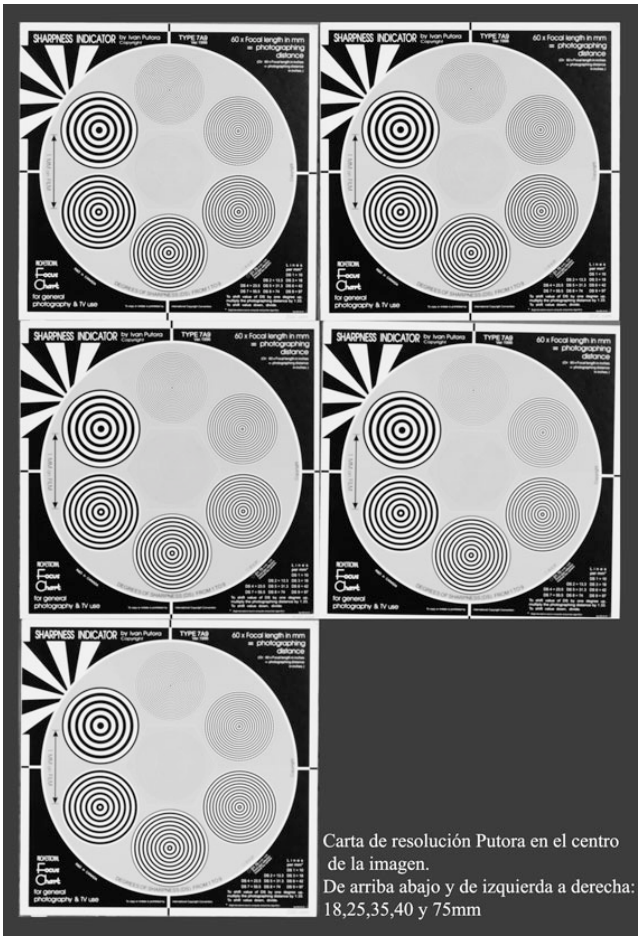
I would like to point out again that "*it is not an optician's study, but a photographer´s one, with resources that are not as precise as used in a scientific tests. However; they are enough to choose what kind of lens I need regarding the image I want to create*".

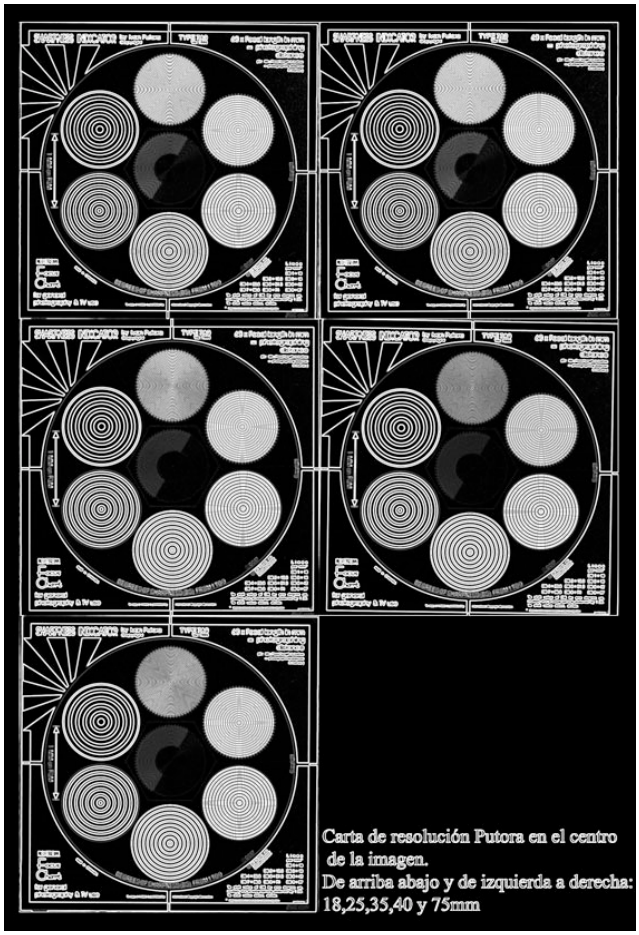
RESOLUTION/SHARPNESS. ★★★★☆

As we did in other articles, we point out again that lenses resolution is related to the camera resolution, the REDOneMX; that is why it is the camera resolution that forces the limit of the lenses. Therefore, we have answered already the following question: how the lenses behave under the maximum frequency of the camera, and how this resolution is regarding other lenses that we can acquire in the market. We have worked with the next resolution charts: Putora, Esser, and ISO12232; moreover we have checked frames from outdoor location shooting.



Resolution tests in INFOTV



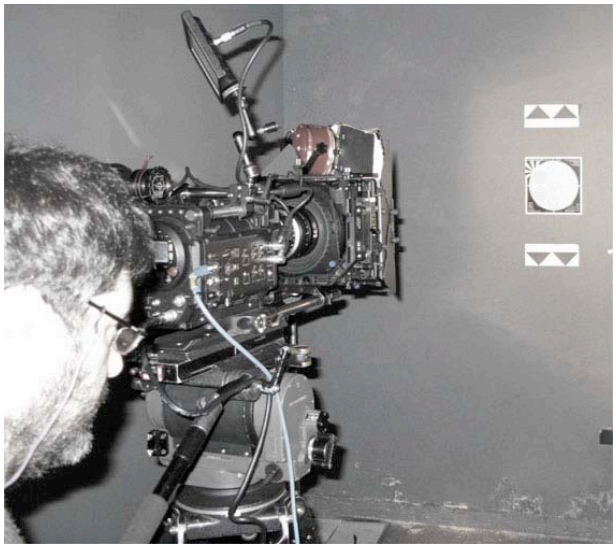


Putora resolution chart on the center of image. From top to bottom, from left to right: 18 mm, 25 mm, 35 mm, 40 mm, and 75 mm

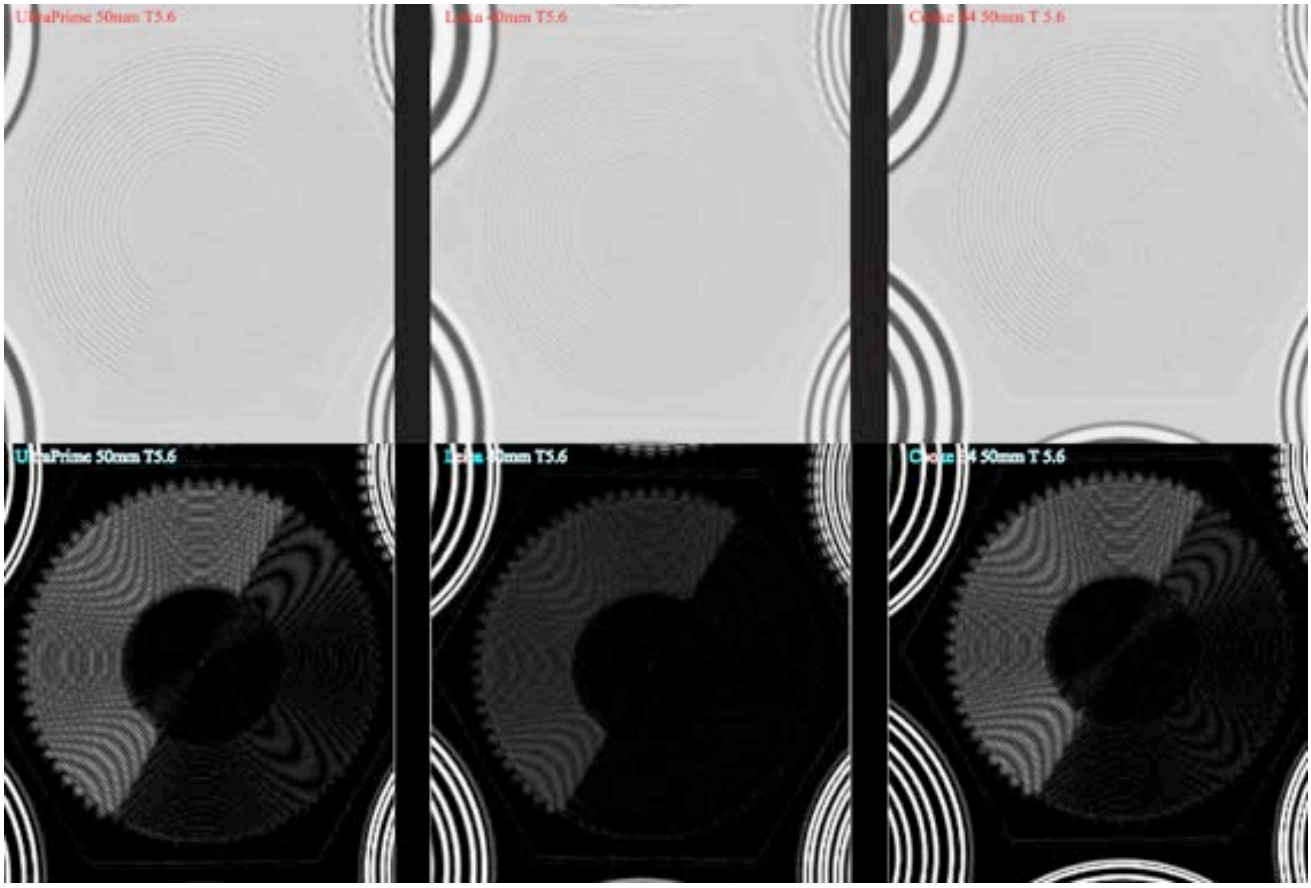
Above, we show the Putora chart photographed in the center of the image, and with the application of the edge detector. As all high quality lenses, they distinguish until 55.5 l/m on the center of the chart. In relation to this resolution, we can see that 35mm and 40 mm show less sharpness than the rest of lenses. For example, if we analyze the ISO chart through Imatest, we can see that resolutions on the center are 1163 Lw/Ph with 25mm or 1092 Lw/Ph with 75mm, whereas they are 967 Lw/Ph and 917 Lw/Ph with 35mm and 40mm respectively. Of course, when we have photographed the charts with different lenses, maintaining the same size, with equivalent distances, and the same lighting. When we have opened the Raw through REDCineX, we have used the same parameters with every lens. We cannot know if the design and manufacturing of these two lenses caused the different sharpness, or this effect occurs just with the set of lenses that BandPro has kindly lent to *ILL Cameras* for the present study.

We have also checked resolution on sides, and this is where we have found one of the best features of the lenses: the corner and side resolution hardly decreases regarding the center; within the lenses range. For example, if we measure through Imatest; the value of 25 mm is 1163 Lw/Ph in the center, whereas they are 1139 Lw/Ph and 1149 Lw/Ph on the right and left sides respectively. Therefore images give a great feeling of sharpness, although, as we are going to see later, this sharpness is larger with lenses provided by other manufacturers.

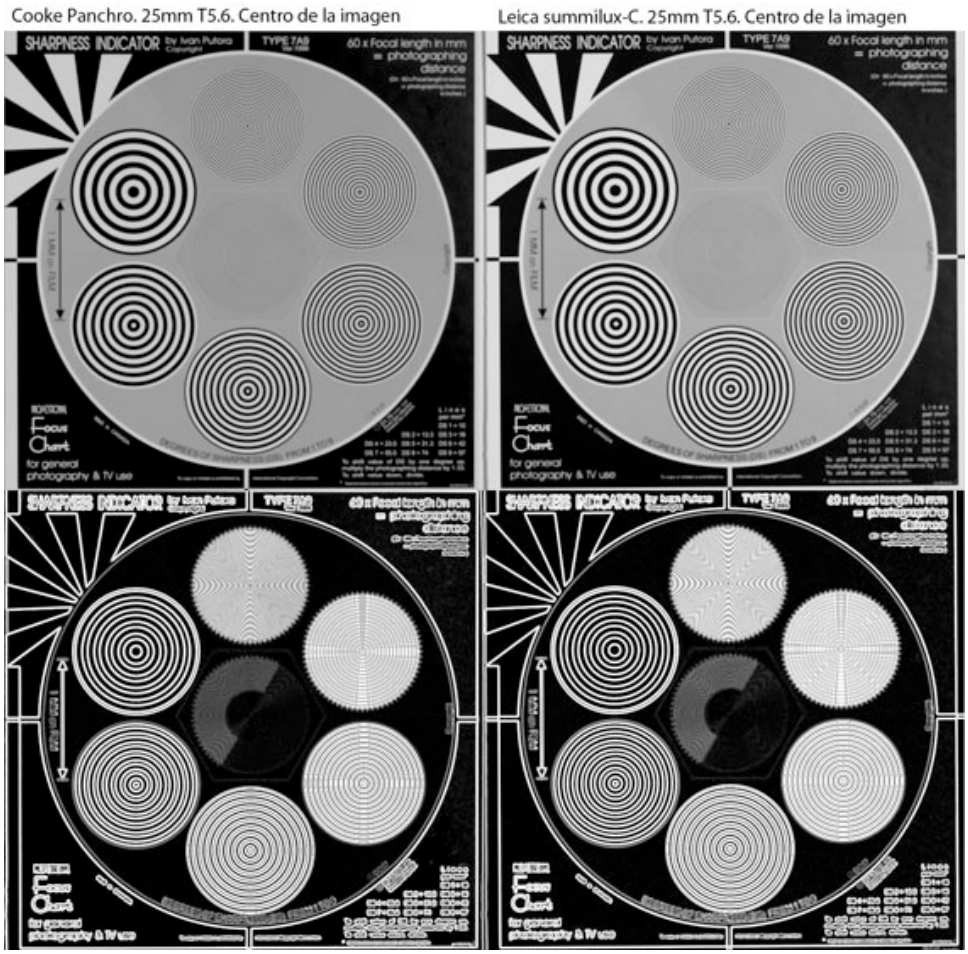
We are going to compare the lenses with other ones, just to locate them among the possibilities that the market offers for Directors of Photography. And, as we have already stated in the introduction, we do this with no competitive interest.



Shooting the Putora test chart in INFOTV.



Above, we show the central part of the Putora chart in the center of the image. We can see how Leica lenses show less sharpness than Cooke S4 and Zeiss Ultraprime. Below, we can see how Leica´s show slightly sharper than Cooke Panchro (in the center of the image).



Cooke Panchro; 25mm; T5.6; center of the image. *Leica Summilux-C; 25mm; T5.6; center of the image*

Therefore; we can classify the Leica lenses within the group of soft lenses, with a high degree of power in showing the finest details all over image surface, on both sides and corners.

With regard to the diffraction, we cannot see until T22, and even at this point just slightly.

Putora test chart in the center of the image through edge detector

I believe that these lenses, which belong to the high quality group, can only be depicted through comparison and similarity just like wine; therefore, regarding lenses resolution I would say they show soft, and at the same time tremendously crystalline and clear, with certain creamy feeling. With no doubt, they remind me of the lenses I used to photograph with during lot of time with my R4: a 35 mm which I liked so much that I have not used another lens over a long period of time. As an example about this Leica-feature, I show the frame from the Cuenca Mountain Range (Spain).

I have applied the edge detector to the red outlined areas in order to see better the excellent resolution of the sides of the image. We can check with frames like this what an excellent sharpness and detail these lenses provide, with a very natural feeling, not at all artificial, making more human the fearsome sharpness that digital cameras offer sometimes.

Preparing a shot in Cuenca (Spain) with 100 mm and REDOneMX

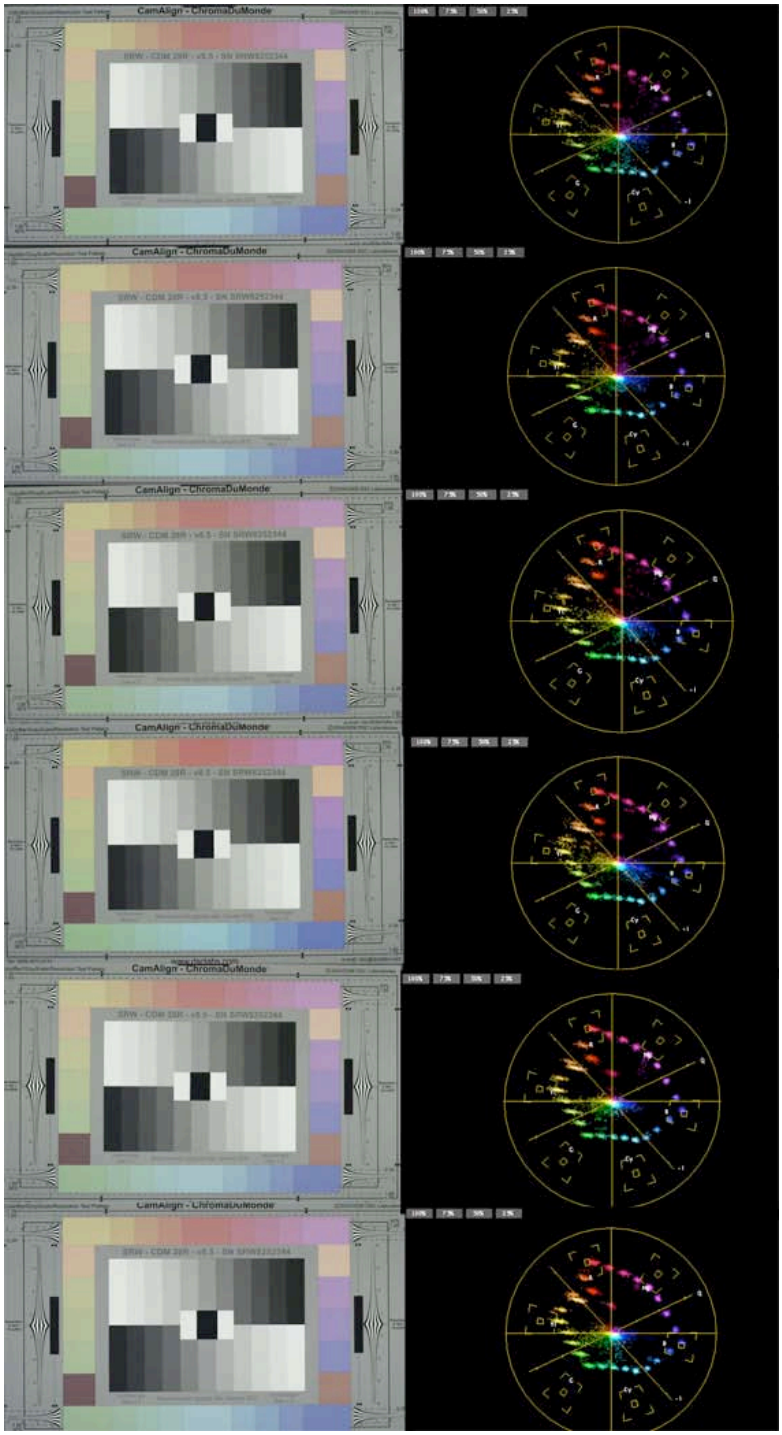
Leica Summilux-C 18mm. T 6.3 Filter ND 0.9. MTD 640 ISO 5.600ºK..Obt180º.25fps.RedGamma2. Redcolor2. Cuenca Mountain Range (Spain). Without grading

One more example where we can see not only the excellent texture of our model's skin tone but also details of the cap, the hair and the scarf: soft, fine and elegant.

Leica Summilux-C 100mm. T 19. MTD 640 ISO 5.600ºK..Obt180º.25fps.RedGamma2. Redcolor2. Cuenca (Spain) Without grading.

Shooting tests of the lenses with the Arri Alexa camera

COLOR. ★★★★½



For all of the lenses, from top to bottom, from left to right: 18 mm, 25 mm, 35 mm, 40 mm, 75 mm, and 100 mm. T5.6 MTD800.3300ºK. Obt180º 25fps. RedGamma2. Redcolor2

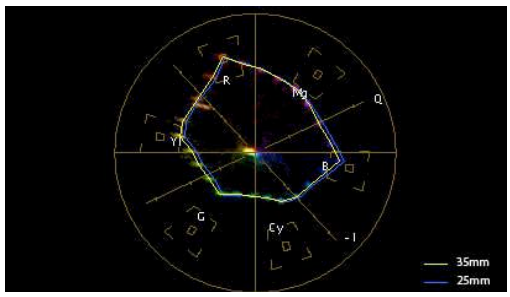
Leica Summilux-C 100mm. T 22. MTD 640ISO. 5.600ºK..Obt180º.25fps. RedGamma2. Redcolor2. Cuenca (Spain). Without grading

As on other occasions, we have studied color with the ChrormaDuMonde, and as well on Macbeth charts, in addition we have checked frames in outdoor locations. We have photographed the CDM chart with each one of the lenses, under the same circumstances, in other words, with the same lighting and the same parameters of "developing" when we open the RAW. Our lighting devices were adjusted to 3200ªK, and we have corrected at grading in order to keep the neutral middle gray and the standardized white and black levels. We have made the same correction all over the set.

We can see generally that lenses keep similar response regarding the color tones of the chart, although we have seen a tone slightly warmer with 35mm and 40mm regarding the rest of the lenses. 18mm, 25mm, 75mm and 100mm show generally the same tone.

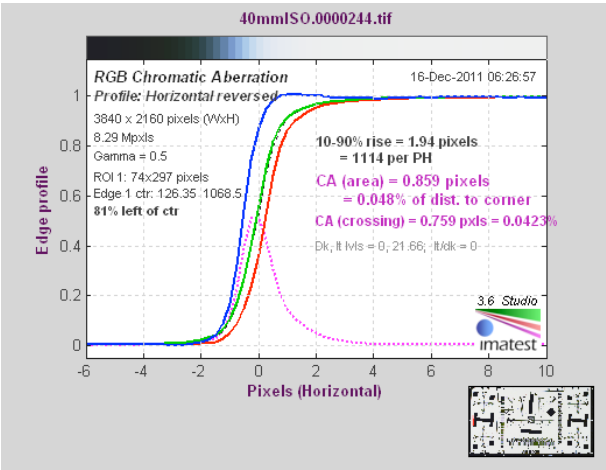
We can only see these small differences with the vectorscope and color charts. They are imperceptible on real "*images*". There is no need to make any kind of color correction if we change the lenses.

However, we show the values of the chart from 25mm and 35mm, superposed in the vectorscope.



Leica Summilux-C 100mm. T 5.0. MTD 640ISO. 5.600ºK..Obt180º.25fps. RedGamma2. Redcolor2. Cuenca (Spain). Without grading

CHROMATIC ABERRATIONS. ★★★★★



One of the most noticeable aberrations we can see in digital images is the chromatic aberration, either it is lateral or it is longitudinal. Its main feature is that the image is surrounded by a series of color lines, especially among the most contrasted edges. Lateral aberration increases as we approach to the edges of the image, meanwhile longitudinal one appears all over the image, in the center and on the sides.

We can state that these aberrations are practically corrected with these lenses; we can see them only a little bit more with 40mm.

On the right graph, we show the chromatic deviation of the ISO12232 chart on sides through Imatest. Value is determined by the CA area of the dotted magenta line and is indicated in pixels. For example, value is 0.859 with 40mm as opposed to 0.47 or 0.281 with 25mm and 75mm respectively. In order to make visible this aberration we have used our Stellae chart. We have enlarged one of the punch-holes of the sides, and then we have saturated “fiercely” to see much better the aberration. On the right side, we show the same point, but out of focus.

We should point out that these very small chromatic aberrations are identical with all of the lenses; as stated above, we can only see on our chart when we have forced the color. We show the next two frames as a proof of it. We cannot see any kind of aberration on the first frame, for example, over the mountain line in contrast with the sky, or the lines of the houses of Cuenca at the back.

Leica Summilux-C 35mm. T 25. MTD 640 ISO 5.600ºK..Obt180º.25fps. RedGamma2. Redcolor2. Cuenca (Spain). Without grading

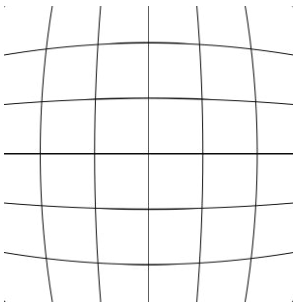
In the second frame, we have enlarged x1000 the area of the left side that contains the pine needlelike leaves. We cannot see chromatic aberrations, their correction is really excellent.

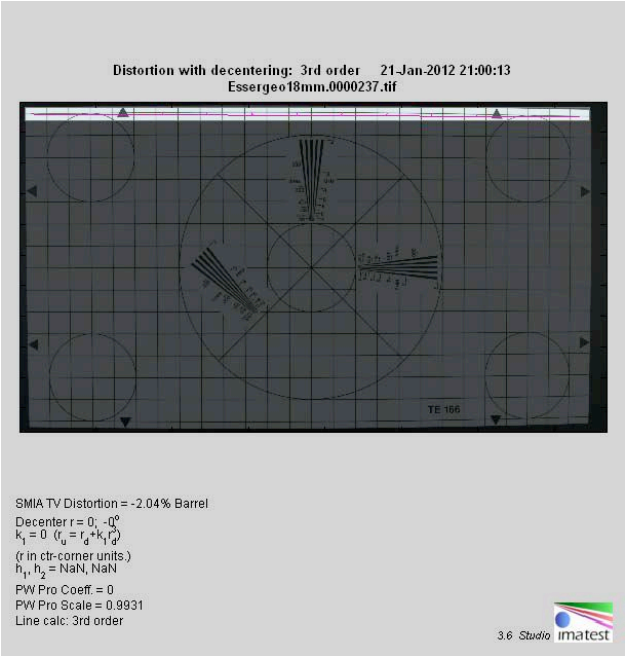
Leica Summilux-C 18mm. T 6.3 Filter ND 0.9. MTD 640 ISO. 5.600ºK..Obt180º.25fps.RedGamma2. Redcolor2. Cuenca Mountain Range (Spain). Without grading

DISTORTIONS. ★★★★½

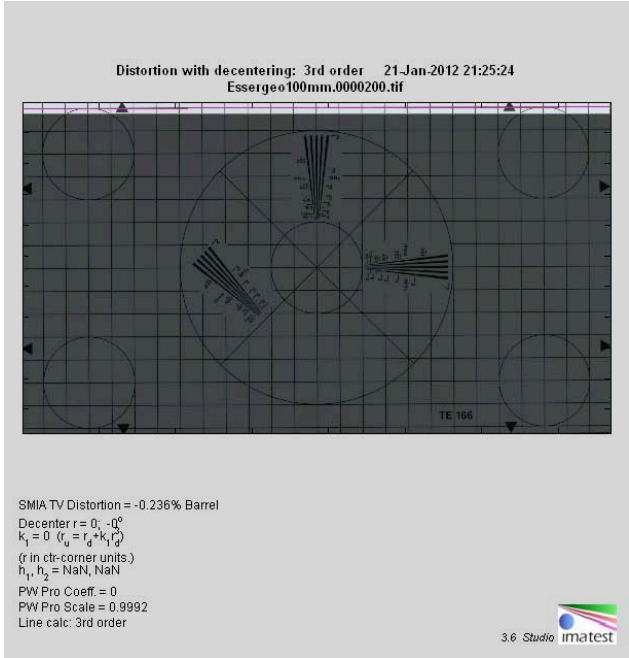
Geometric aberrations

The barrel geometric distortion is produced when the effect from a lens over its field has a different magnification. In order to evaluate this kind of distortion, we have used a grid through the Imatest program, an ESSER chart, and finally, outdoor frames. On the next image we show distortion measured through Imatest in SMIA* TV values. SMIA value is different from the traditional definition by television industry –SMIA distortion value is twice as much as the traditional one-.





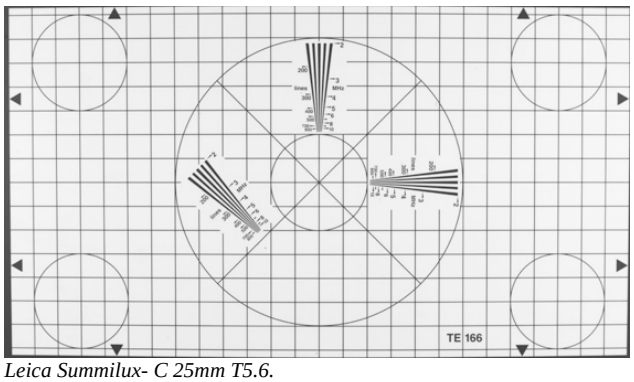
Leica Summilux- C 18mm T5.6..



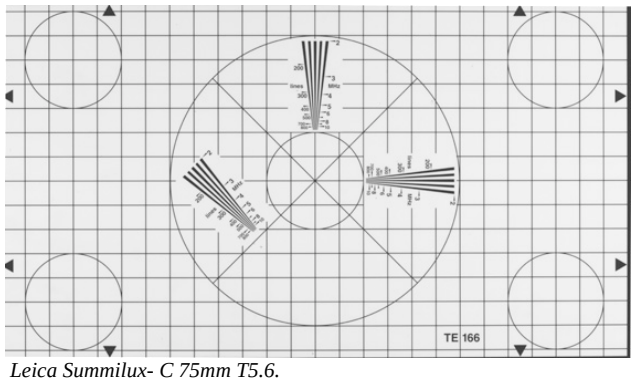
Leica Summilux- C 100mm T5.6..

As we can see on the right table, the wide-angle lenses show greater aberration, with the "anomaly" of 35mm, that shows greater distortion than 25mm. These values are really low in any case, and they indicate an excellent response of the lenses regarding the geometric building of the image. We can see the minimum distortion of 18mm in both a general view of the Madrid Mountain Range (Spain) and the model who is in the view-point.

Lens	SMIA TV Distortion % (Barrel)
18mm	-2.04
25mm	-1.29
35mm	-1.56
40mm	-1.20
75mm	-0.38
100mm	-0.23



Leica Summilux- C 25mm T5.6.

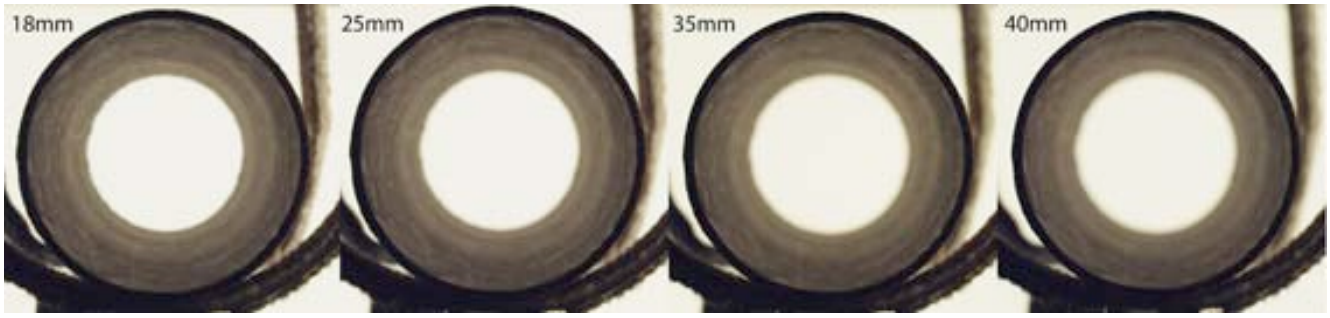


Leica Summilux- C 75mm T5.6.

Leica Summilux-C 18mm. T 5.6. MTD 640 ISO. 5.600ºK..Obt180º.25fps. Filters ND 1.2+Hot Mirror. RedGamma2. Redcolor2. Boca del asno(Spain)

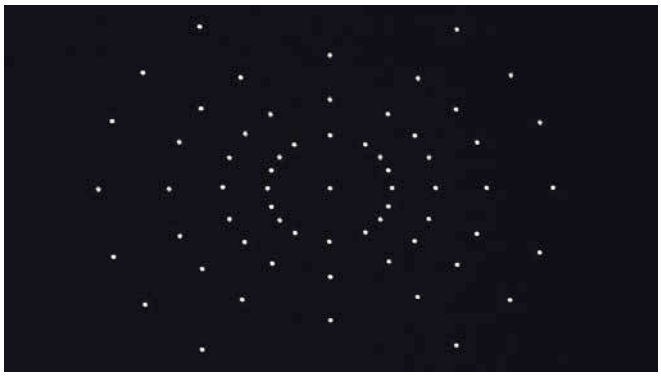
Leica Summilux-C 18mm. T 8. Filter ND 0.9. MTD 640 ISO 5.600ºK..Obt180º.25fps.. RedGamma2. Redcolor2. View-point. Cuenca city (Spain) at back

Perspective distortion and others. ★★★★☆

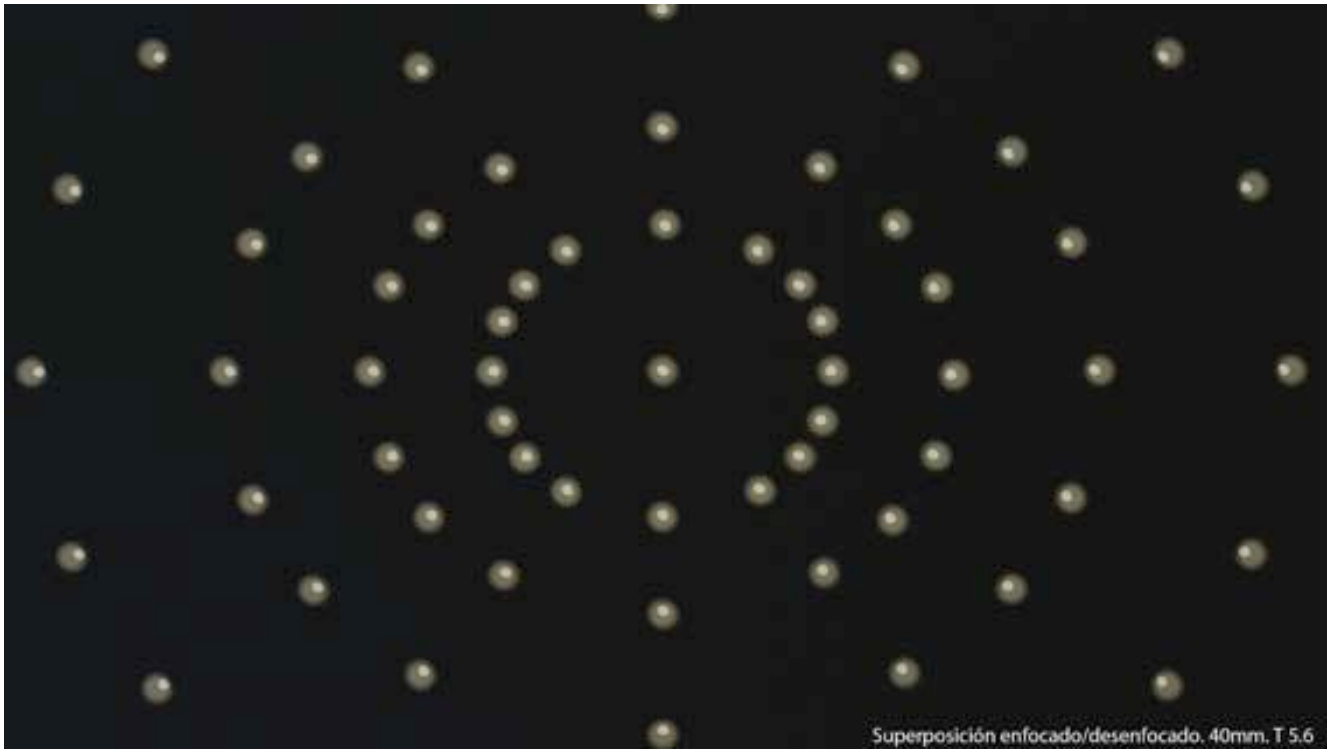


Above, we show the perspective distortion with the comparison of four lenses. We have photographed a cardboard cylinder in such a way that its axis matches up with the optical one. If we compare the distance between entrance and exit circumferences of the cylinder, we can see that distortion is practically the same with all of the lenses; as we can expect, it is a bit larger with 18mm, but the different is not really significant.

We have used again our *Via Stellae* chart in order to look for other kind of aberrations. We have not seen anything significant regarding coma, astigmatism or field curvature effects. However, we have made another test: we have shot the chart, focused and out of focus; we have superimposed one image on the other one with the next result: we can see how both focused and out of focus punch-holes are exactly in a line on the center, nevertheless, on the sides, out of focus punch-holes are slightly moved regarding the focused ones.

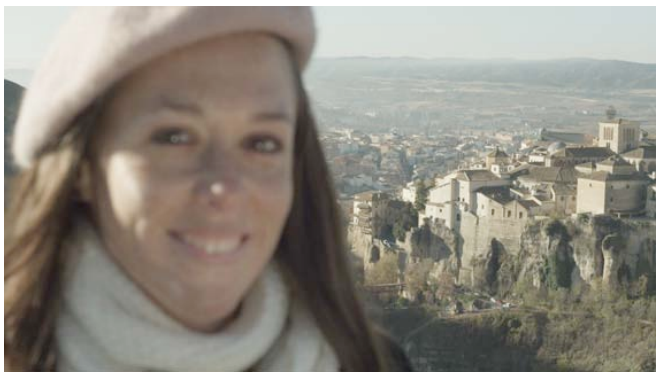


Via Stellae chart



Superimposing, focused/out of focus; 40 mm; T 5.6

Owing to this feature, out of focus is not completely uniform over all of the image surface, so, size of the apparent image of out of focus parts change. On the left image, we show the mentioned effect on the lighted white chart at back; its surface changes if the focus is in close-up (front mount rods and green outlined box), but it keeps average values at back (second rods and red outlined box). We have also checked the effect in outdoor locations, as we can see on the Elisa´s shots, our model, with Cuenca city (Spain) at back.



Even if it is difficult to see the effect with the lenses, except if we are shooting in motion; we show how out of focus cathedral rose window is smaller than in focused image (right side of the frame); the same effect happens with the house window.

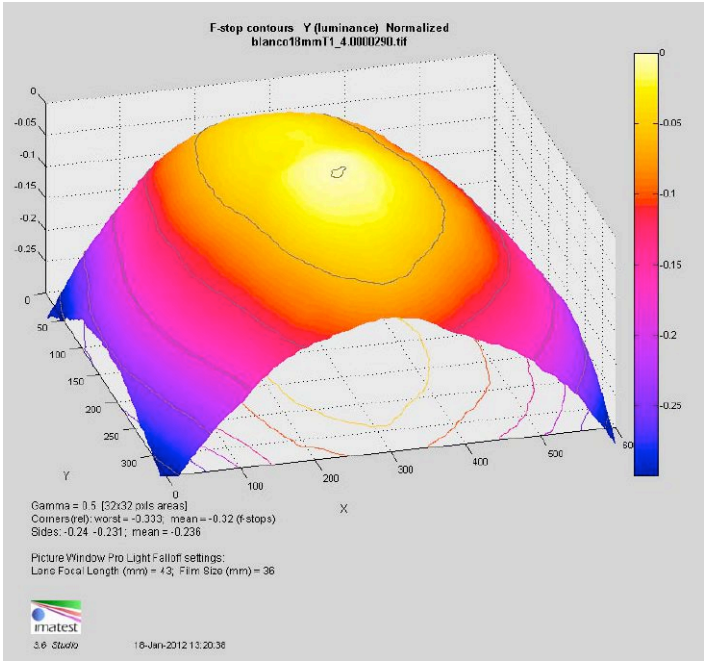
As we have checked, the effect makes that out of focus images are different from images provided by other lenses. Leica´s out of focus images seem “fluffed up”, outlines increase as the muffin dough in a hot oven.

LIGHT UNIFORMITY. ★★★★★

We have checked the good light uniformity of every lens through this test section. The light uniformity evaluates if brightness of the whole image frame is uniform, or if there are deviations on sides and corners (vignetting).

We have used the LV5 light sphere; it grants a homogeneous illuminated surface.

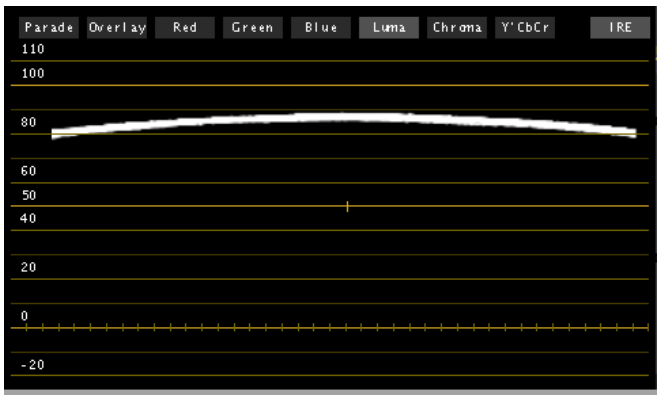
We have analyzed every shot from every lens through Imatest. On the right graph, we can see brightness value standardized at 1 (yellow tone) in the center, and how this value gets smaller as we move closer to the corners and sides (violet and blue). This program gives brightness differences in f-stops values.



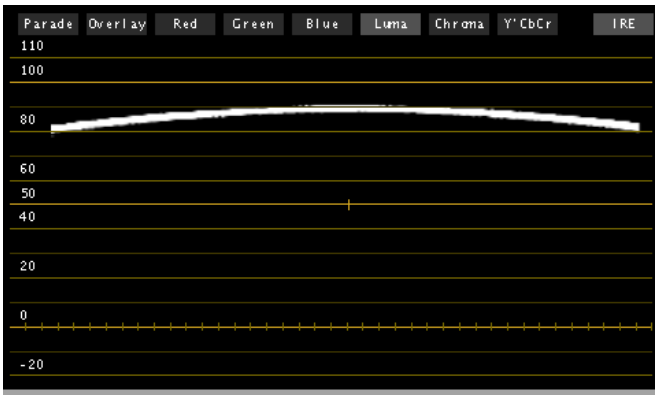
By way of example, we show results with 18mm at T1.4 due to brightness loss, on both sides and corners, is only noteworthy with this diaphragm. On the other hand, the set of lenses shows a difference of 0.3 stops regarding the center of the image, apart from 100mm of which deviation at T.14 is 0.2 stops. From T 2 diaphragm, difference drops to 0.1 f stop, and it is insignificant with T2.5 diaphragm. These small deviations are similar in all of the set of lenses. The clear consequence of these changes is that lenses do not show neither vignetting effect nor visible shady on the surface. On the next table, we show the values.

Lens	T 1.4 (F-stops)	T 2 (F-stops)	T 2 2/3 (F-stops)	T 2.8 (F-stops)
18mm	0.322	0.0836	0.0473	
25mm	0.334	0.106		
35mm	0.345	0.184	0.126	0.096
40mm	0.356	0.183	0.116	0.096
75mm	0.385	0.15	0.0675	
100mm	0.269	0.0533		

**Estas medidas corresponden a las esquinas. Los valores en los laterales son todavía más pequeños.*

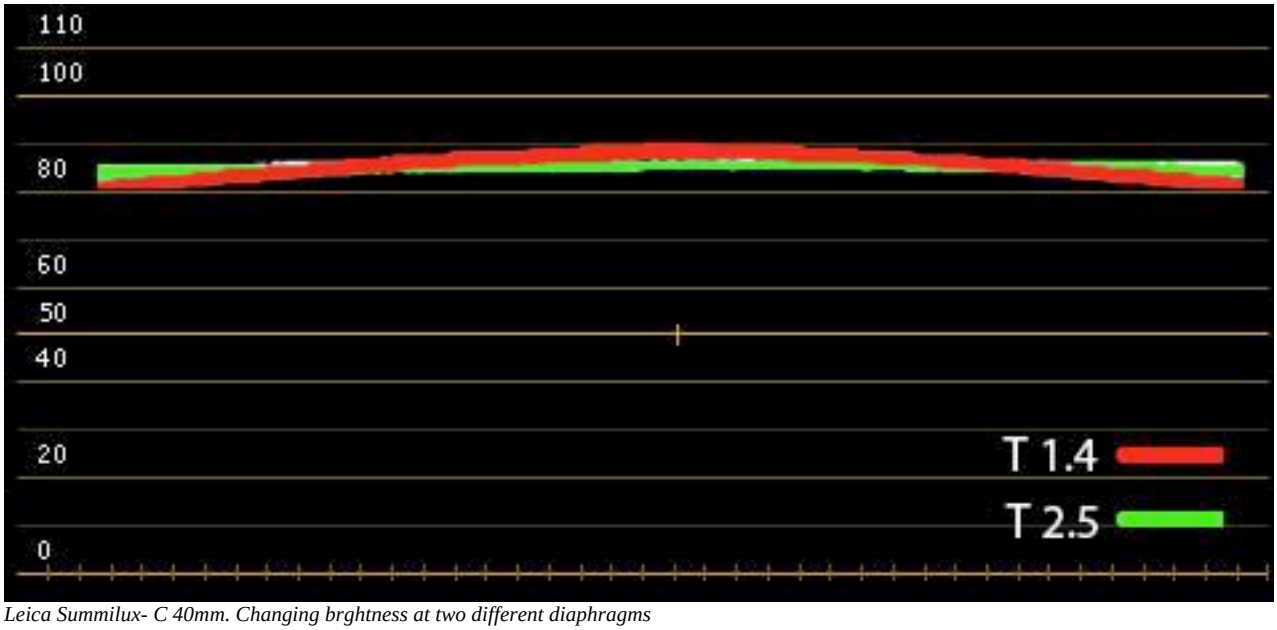


Leica Summilux- C 18mm T1.4



Leica Summilux- C 25mm T1.4

On the waveform monitor graph, we can see brightness loss on image sides with the maximum aperture, T1.4. We have checked through this system that every lens have practically the same loss with this diaphragm. Next, let us see two diaphragms in comparison with 40mm.



Leica Summilux- C 40mm. Changing brghtness at two different diaphragms

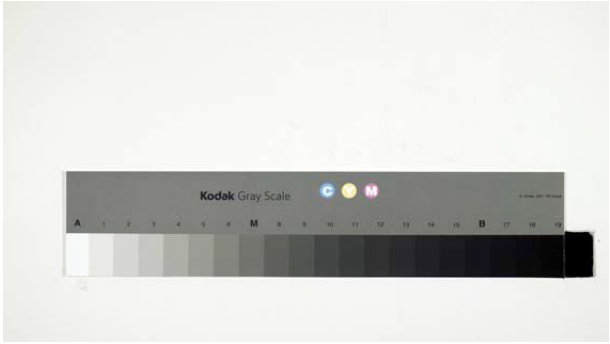
We have also checked response of the lenses photographing an ESSER's gray chart with every lens, and different diaphragms. We have not seen differences among them, neither at middle tones nor at high lights or shadow.

From all of this, it follows that the lenses not only show an excellent light uniformity all over the surface but in addition, their responses are alike. This fact gives to the whole set great consistency and solidity.

FLARE AND VEILING GLARE. ★★★½☆

We have evaluated the veil level (veiling glare) by means of using the absolute black from gray scale (Black Hole) through Imatest.

We can see that values are larger than others from lenses we have already analyzed. Even if it seems to us a bit high to these lenses, we think that soft and creamy look of images is partly owing to their veiling glare: a curious mixture of sharpness all over the image surface and a sweet and soft look. On the next table, we show the values.

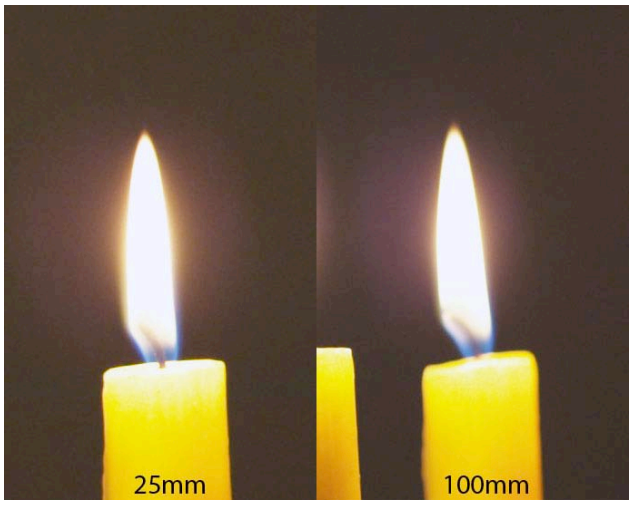


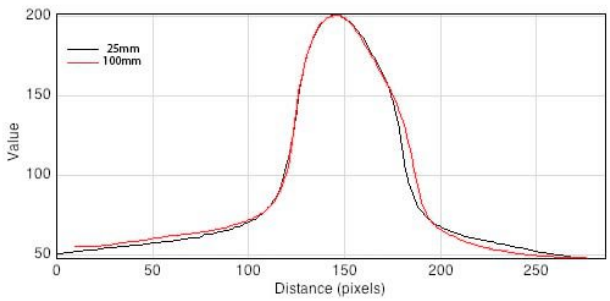
Lens	Veil level % (Veiling glare)
18mm	1.65
25mm	2.12
35mm	1.99
40mm	2.02
75mm	1.96
100mm	1.86

Nevertheless; the lenses have a good response regarding the flare, as we can see on the next images of Hoz del Júcar (Spain). The first image has a light reflected on the water, and sun goes straight into the optic on the second one

Leica Summilux-C 25mm. T11. MTD 800 ISO 5.600ºK..Obt180º.25fps

Leica Summilux-C 25mm. T22. MTD 800 ISO. 5.600ºK..Obt180º.25fps





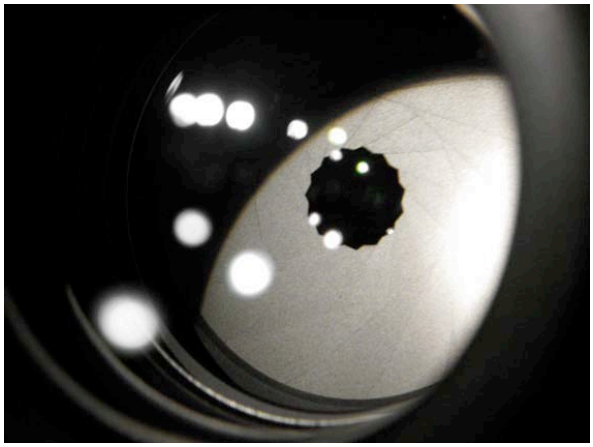
On the next image, we can see a mixture of veiling glare and flare. Results are practically identical with the two lenses in comparison. Below, the graph shows brightness level of the flame pixels, without considering the rest of the candle. The brightest part of the curve matches up with the flame itself. As we move away from the flame, we see black background more or less bright owing to the flare. Effect decreases es we get farther from the flame; it causes the bell-shaped curve. It should be pointed out how two such different lenses as 25mm and 100mm give practically identical flare. It happens with every lens of the set.

On the below image, we show our dolls with 40mm. We can see the pretty flare caused by the candles.

Leica Summilux-C 40mm. T 2.2. MTD 800 ISO. 3.300ºK..Obt180º.25fps. RedGamma2. Redcolor2

Leica Summilux-C 75mm. T 2.2. MTD 800 ISO 3.300ºK..Obt180º.25fps. RedGamma2. Redcolor2. Left image is focused whereas right one is strongly out of focus.

In order to see much better how flare is; we have compared images from Leica's lenses with images from Cooke Panchro's ones.



Panchro 75mm *Leica 75mm.*

We can see that Panchro's lenses show less halo around the flame than the Leica's.

On the two images below, we show one image well exposed, in other words, we have exposed to get the greatest detail from the model without clipping high lights at back; and the second one which is overexposed in order to see how the lens breaks lines: for example, if we look straight at the thin branches on the right, or at the line of the houses and at the metallic frame of the bridge, we can check that they keep certain sharpness, in other words, in the brightest areas, pollution or contrast loss are very controlled, generally, there is not too much flare, above all at shadow.

Leica Summilux-C 25mm. T 6.3. MTD 640 ISO 5.600ºK..Obt180º.25fps. Filtros ND 1.2. RedGamma2. Redcolor2

WEIGHT, VOLUME AND OTHER FEATURES. ★★★★½

On these aspects of the lenses; we have placed the evaluation in the hands of our first assistant, Saúl Oliveira.

Saúl Oiveira. First assistant camera

"Mechanical features of Summilux-C lenses were to be expected from a quality design aimed at the cinematographic work.

"First thing that we can see when opening the lenses case is their small size. With an average weight of 1.7 kg, they are significantly smaller than the Zeiss Master Prime's (a 2.5-kg average) and bit larger than the Ultra Prime's (1.1-kg average). These weight differences are important both if the camera configuration is by hand or Steadycam: it is important how many grams can be reduced in these cases, as well as in the transportation of the whole set: the differences can reach 7 kgs.

"Owing to the number of Leica Summilux-C lenses, there would be needed two suitcases for the transportation of the whole set. However, it is likely that we can work just with one case mostly.

"As a result of their size and exterior design, they are easy to use, and they give pleasant feeling of security to hold them (there is no need for big hands to hold them with just one hand): it is very important for first and second assistants when they have to move and mount them.

"When we take them to the camera we realize their PL mount of titanium, apart from helping to reduce the weight, they have an attractive design that matches with the general exterior finish.

"Since they are not very big, when they are at camera, it seems unlikely that they collide with other elements, as it happens, for example, with a Master Prime lens and the viewfinder of the Arriflex SR3 camera. Length of the whole set is the same, and the weight changes very little among them. Since the focus setting and

diaphragm rings have the same position, lenses change and camera leveling are easier, because we do not have to adjust again the focus control or the remote engine.

"The 95-mm same front diameter allows to use sunshades and 4x4 clip-on. As a result of that, we have significant advantages in effectiveness and reduction of accessories.

"I find easiness for optical handling because phosphorescent green marks help in their visibility. The focus marks are distributed logically along the range; moreover there is enough distance among them. This fact makes easier to find the mark and the subsequent focusing. For example, we are grateful for the 40-m marks, not because we can focus exactly in this distance, but to know how far from the optical infinite of the lens we are, so we can avoid this large empty length between the last mark (for example, 10 m) and the infinite one. We emphasize also that focus marks from 2 m until infinite are identical on all of the lenses, in other words, every lens has the same position on the focus ring.

"The diaphragm ring is the same in all of the lenses because we do not have to adjust at focal distance, in addition it closes totally, so it is easier to make black adjustments with digital cameras.

"Focus and diaphragm work fluidly, but not excessively free. This is important because the focus engine can move it easily, however a tap in the diaphragm does not change unintentionally the aperture.

"Their small size means also that there is a short distance among rings; it implies sometimes disadvantages when engines under certain circumstances, we have to couple great motors of diaphragm and focus.

"Lastly, we have to bear in mind that both weight and small size are well-finished among the lenses segment available currently. However, it is to be expected that the fact changes with the introduction of special lenses as 12 mm or 150 mm. With regard to this fact, we miss 65 mm, and 135 mm or 150 mm for the moment; however, the first two ones are announced for 2013."

From left to right, from top to bottom, 18mm,25mm,35mm,40mm,75 mm, and 100mm.

CONCLUSIONS

The Leica Summilux-C lenses join the lenses sets of high quality that we use in professional environment. They give their own look and texture, and they are able to distinguish the finest details, but with a "*soft*" contrast; in my opinion, very appropriate for making "*natural*" images with cameras especially sharp like the Epic. It should be pointed out that image sharpness is very similar on both center and sides, and corners, so, the impression of the images is very "*crystalline*" all over the shot surface. To the crystalline impression we should add the "*creamy*" look; this is helped by a slightly high level of veil, which softens colors, and shows tones a bit more "*pastel*" than provided by other optics. All of the lenses transmit color in the same way, they are "*neutral*", and perhaps "*slightly cold*". Aberrations are very minimized, both geometric and chromatic, above all the latter ones, which hardly can be seen beyond the charts. However, we should point out the change of the frame, may be a bit high, when we move the focus in a relatively long sections. We emphasize also the homogeneous behavior of the lenses regarding all of the studied aspects, as well as their speed (T 1.4) and high finish.

CREDITS

Cinematographer: Alfonso Parra AEC
First Assistants: Saúl Oliveira
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