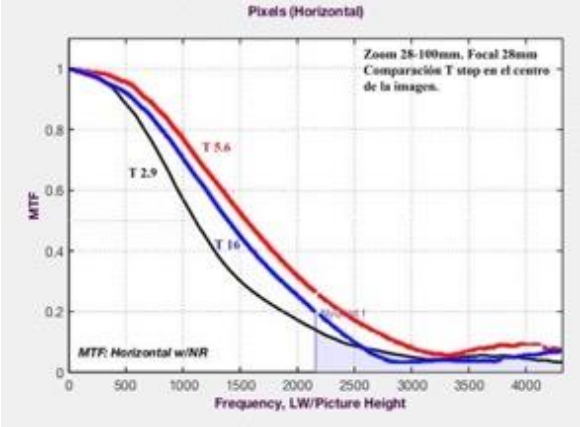
EVALUATION AND PHOTOGRAPHIC STUDY OF FUJINON'S PREMISTA 28-100MM AND 80-250MM ZOOMS FOR FF CINEMATOGRAPHY

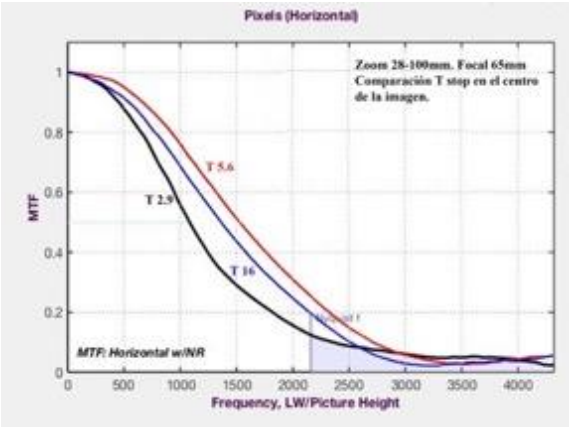
By Alfonso Parra ADFC

In this article we are going to study two of the Premista Full Frame zooms .We have focused on aspects such as bokeh, resolution, light uniformity or aberrations, among others. For the tests we used the Arri mini LF camera in LF16: 9 UHD format and Apple ProRes 4444. The analysis of the different tests has been carried out with programs such as Imatest, ImageJ or color inspector. We have used different light sources adjusted by the Sekonic C700 spectrometer and the Sekonic L-558 / cine photometer. Similarly, detailed observation of the material has been carried out in the color room using Davinci resolve and Scrtach on some occasions.
In addition to the more theoretical study we have photographed natural exteriors shot in Bogotá and some of the sequences of the film "Un rabón con corazón" produced by DGP and directed by Juan Carlos Vásquez in Girardot (Colombia) Frames extracted from the originals are included in this article so they are mere references as they are compressed.

Resolution

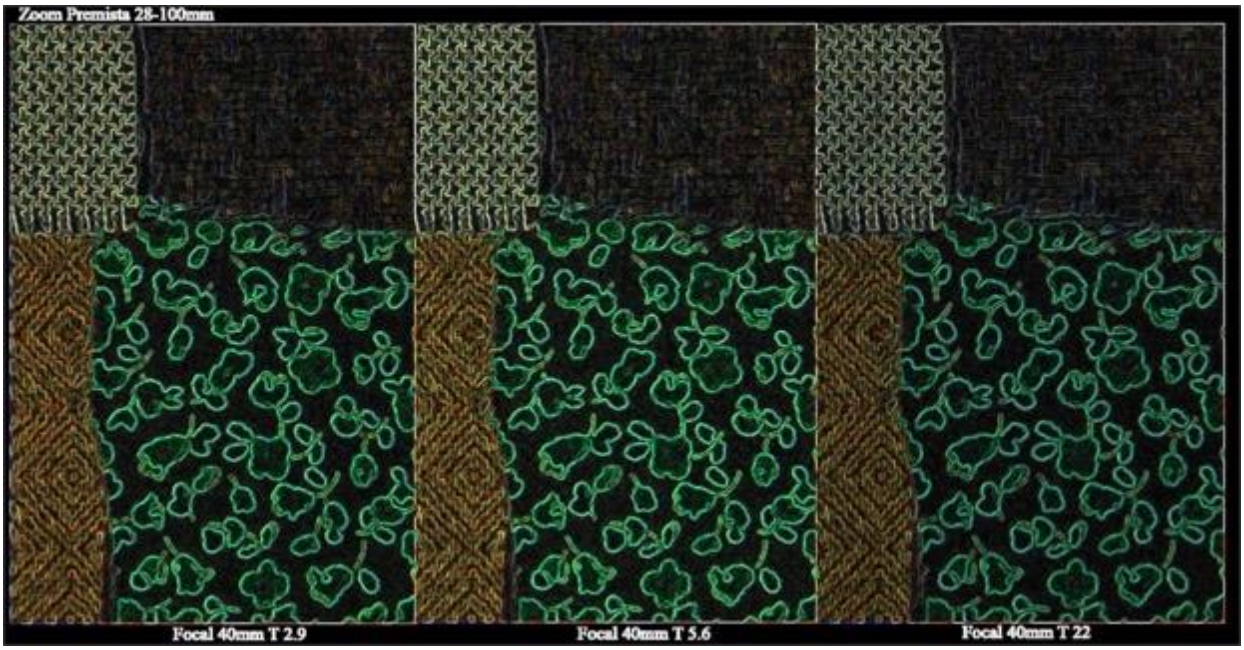
What we are interested in observing regarding the resolution provided by the lenses is how it manifests itself with different focal lengths within the zoom range, as well as with different diaphragms without forgetting the comparison between the center and the sides of the image, that is, not only the value of the resolution measured in TV lines but the consistency of resolution throughout the focal range, as well as between the two zooms that we have tested.
For the study of resolution we have photographed frequency charts, as well as textured charts and planes shot in natural outdoors. The resolution that we study here is the sum of the different factors that intervene in its result, such as the sensor or the compression process, among others. An alteration of any of them would modify the results obtained, although the relative values and the comparison between them are perfectly valid.
When it comes to zoom lenses, we have evaluated the different aspects of them at three different focal lengths, the most open, the most tele and an intermediate one. In order not to get too long with the MTF curves, we can say that both zooms show a high enough resolution to perfectly show all the detail and texture in Full Frame format. Let's first look at the 28-100mm zoom, for example, the resolution at different T values in two different focal lengths, 28mm and 65mm.





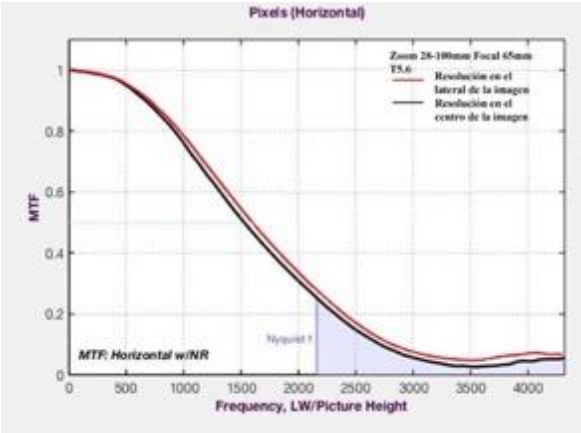
As expected, the highest resolution is obtained with the T 5.6, while it decreases with the more open T value and with the T16 value due to the diffraction effect.

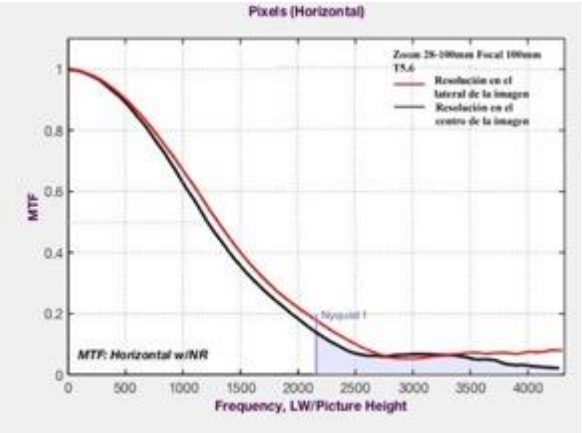
The example of this variation can be seen in the prêt-à-porter card, although this difference is not really significant if we observe a normal image and we can consider that we will not visually perceive a difference in resolution using any of the T values.



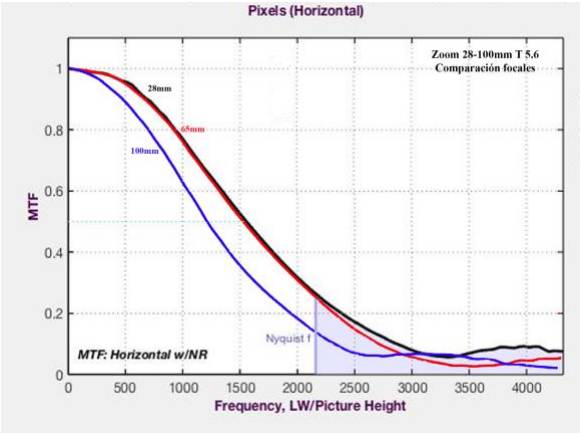
Felipe Cortés and Nasly Weller first camera assistant

On the other hand, it should be noted that the difference in resolution in the center with respect to the sides is practically insignificant. In the graphs, I compare the 65 mm focal length with the 100 mm lens, although it is also the same in the other focal length studied.



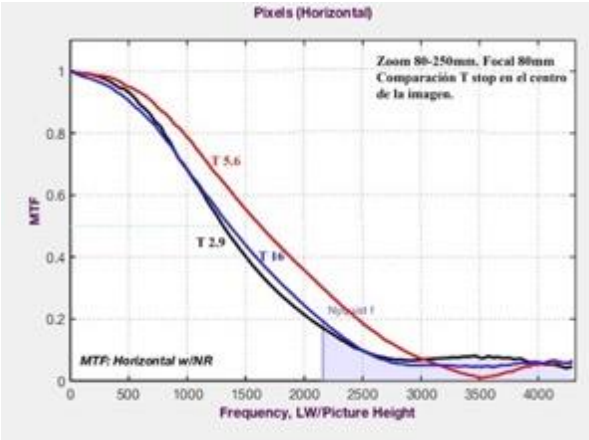


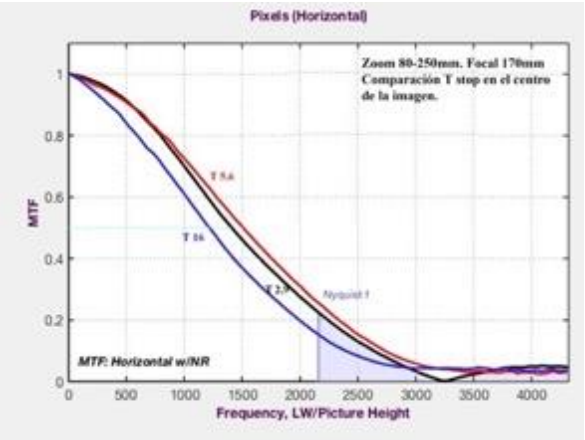
Regarding the three focal points related to each other, we have observed a lower resolution with the 100 mm focal length compared to the other two, as can be seen in the fabric chart. This lower resolution occurs at all diaphragms. This lower resolution has to do in part with the lower luminous uniformity that this focal point shows, as we will see later in that section.



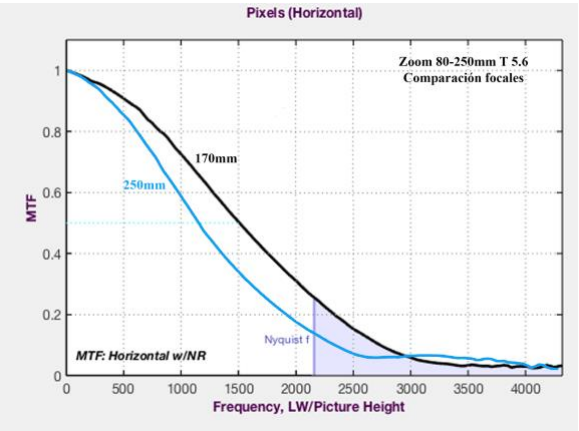
Just to give some reference values, the average value at 50% at T5.6 of the three focal points is 1433 Lw / Ph

We can conclude that despite the differences in resolution observed with the cards both in the most open and in the most closed T and the difference with the 100mm focal length, these differences are not visually relevant when working in the real world beyond of the cards. As for the 80-250 zoom, we can observe similar characteristics.

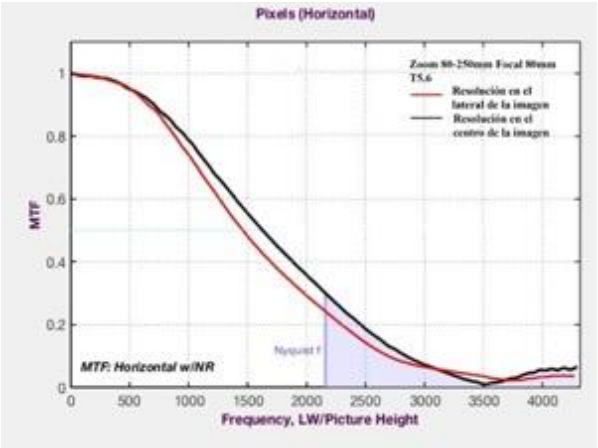


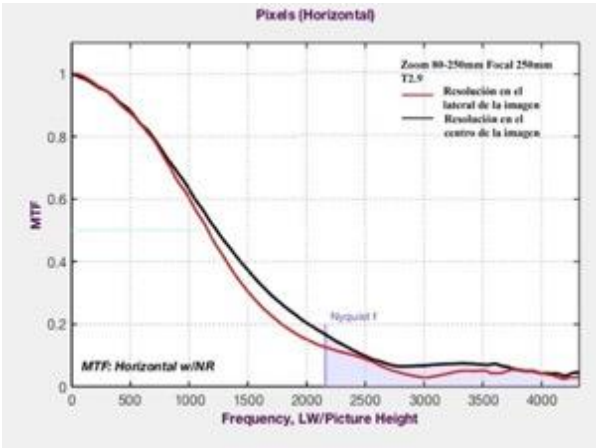


A greater effect of diffraction is observed than in the 28-100 mm zoom, but the behavior is similar, lower resolution with the T more open and with the more closed. In the fabric chart you can see that slight difference. Likewise, the resolution decreases as we increase the focal length as we can see in the graph on the right where we compare the 170 mm focal length with the 250mm at T 5.6 in the center of the image.



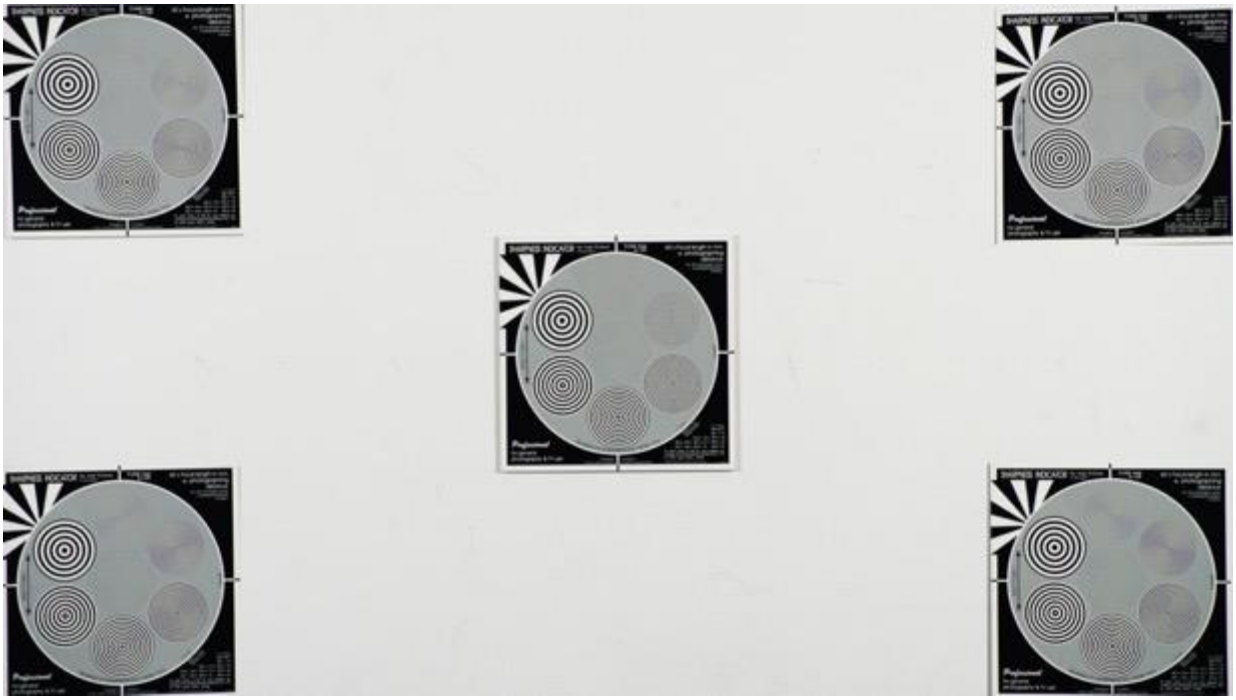
In relation to the resolution between the sides and the center, the behavior is very similar to the other zoom.



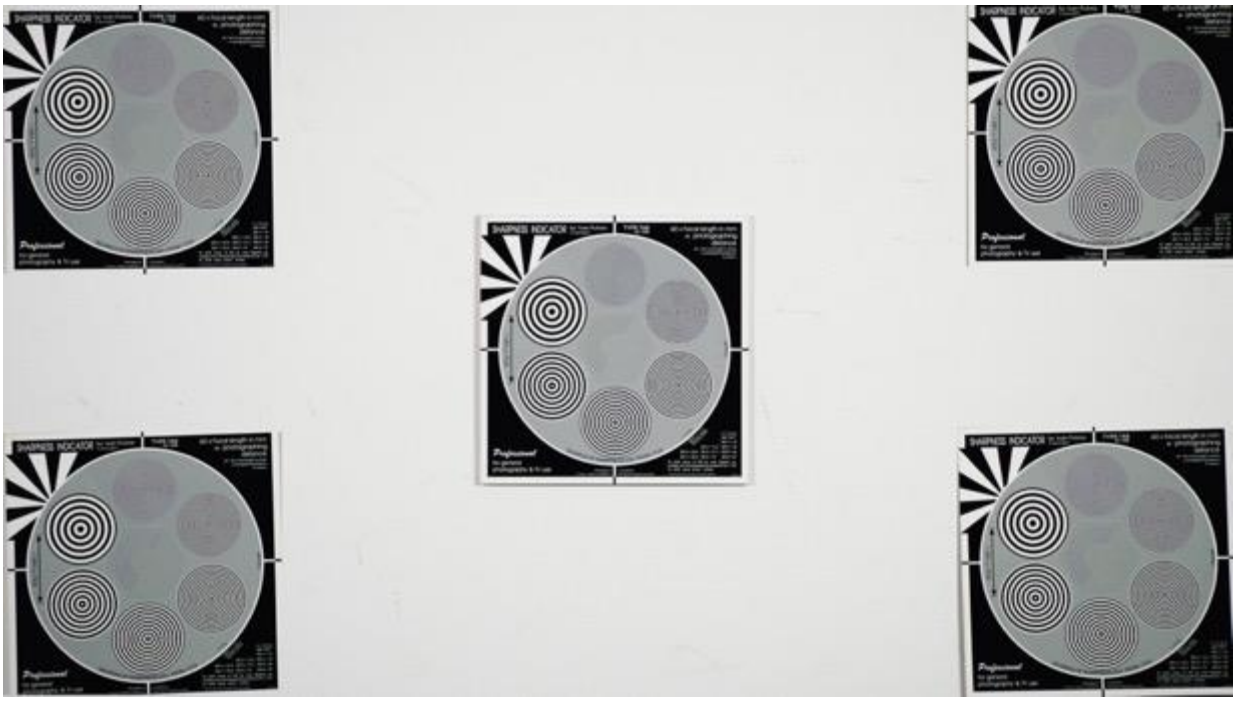


The average value of the three focal lengths with T 5.6 at 50% in the MTF curve is 1431 Lw / Ph, which is practically the same as we have with the other zoom, so we can conclude that it is possible to change from one lens to another without any difference as to sharpness or texture. By means of the Putora letter we have carried out a visual inspection of the resolution confirming the results obtained by means of the curves.

Alfonso Parra ADFC. DOP



Putora test chart. Zoom 28-100. Focal 100 mm T5.6



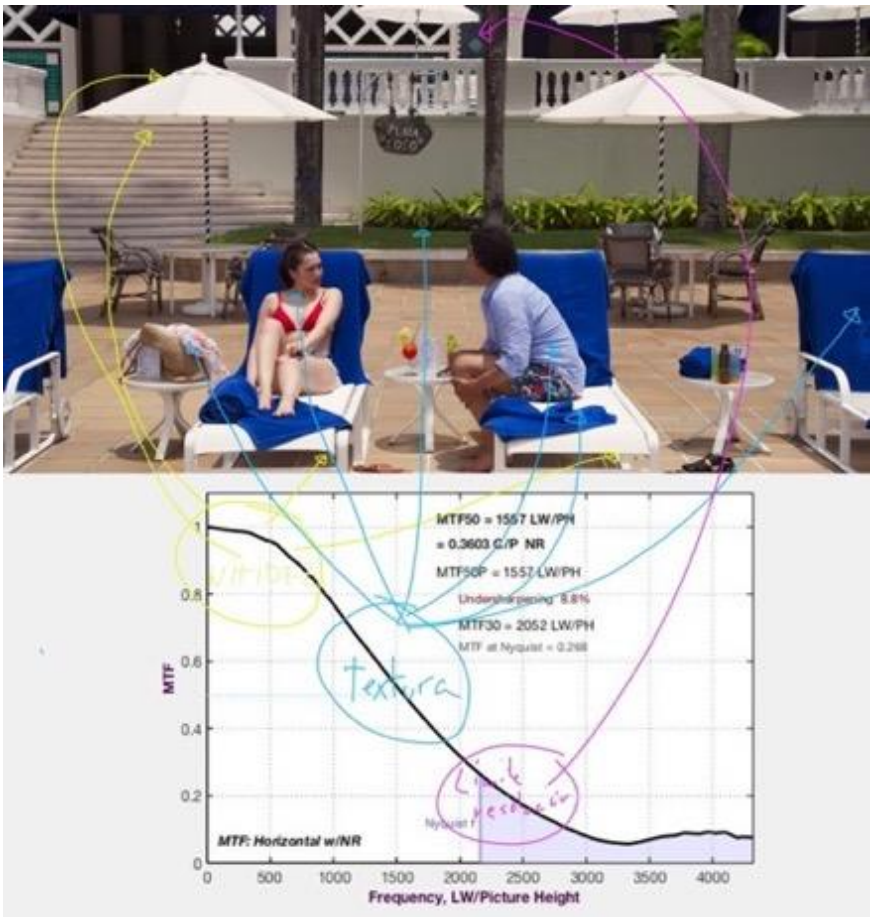
Putora test chart. Zoom 80-250. Focal 170 mm T2.9

Let's look at some examples of images beyond the cards.

Rodaje exterior/Día

Arri Alexa Mini LF, Zoom Premista 28-100 mm. Focal 75mm T 3.5 29.97 fps 180ª 5.600 k EI 800 . ProRes 4444 LogCWgam. ND 1.8

In this frame we can see the excellent resolution in both clothing and hair, as well as wall texture and skin tones.

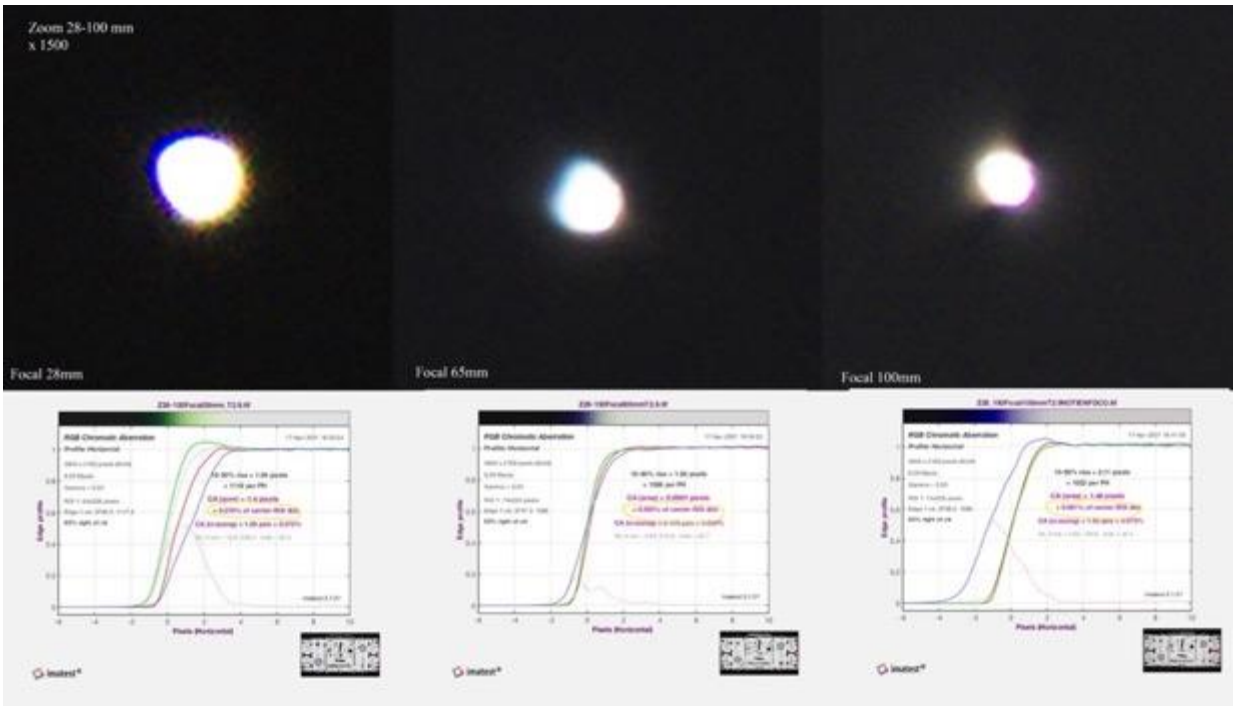


Frame of film "Un Rabón con corazón". Sony Venice 6054x3272 X-OCN XT 24p 180º EI500, 5.500ºK Zoom Premista 28-100 mm Focal 50 mm T 11, ND 0.6

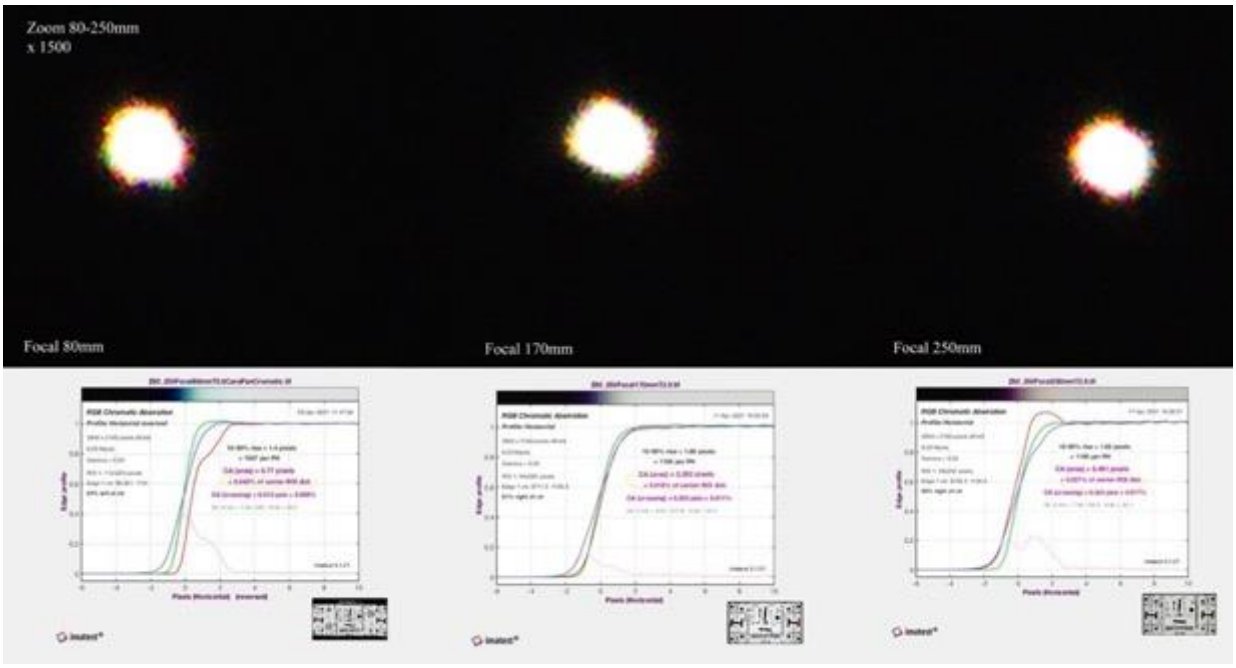
Frame from the film "Un Rabón con corazón" where excellent sharpness is combined with a lot of texture.

Chromatic aberrations

One of the most characteristic aberrations that we observe in digital images is chromatic aberration, either axial or lateral, and which is characterized by a series of color bands that outline the lines of the image, being especially visible in the most contrasted edges. . The lateral aberration increases as we get closer to the edges of the image while the axial aberration is shown in the whole of the image, both in the center and on the sides. To assess this aberration, we have analyzed the ISO 12232 chart with Imatest, as well as the Via Stellae chart and the observation in the planes shot outdoor.
Next, the values obtained by Imatest of the lateral aberration and its visualization with the Via Stellae chart, where we have made a x2000 magnification increasing the contrast and saturation.



Zoom 28-100mm

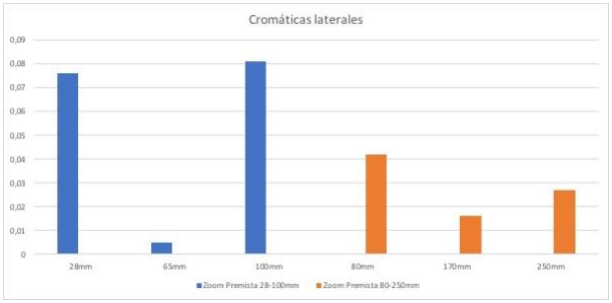


Zoom 80-250mm

These are the values obtained

Focal	Zoom Premista 28-100mm % of center-ROI dist.	Assessment	Focal	Zoom Premista 80-250mm % of center-ROI dist.	Assessment
28mm	0,076	Short. Difficult to observe unless closely searched.	80mm	0,042	Short. Difficult to observe unless closely searched.
65mm	0,005	Insignificant	170mm	0,016	Insignificant
100mm	0,081	Moderate Visible when the image is greatly enlarged.	250mm	0,027	Insignificant

As we can see, the visibility of the aberrations is different depending on the focal length used in each zoom, but in any case their presence is really low. The 28-100mm zoom is where they become most visible, especially with the 28mm and 100mm focal lengths. In the 80-250mm zoom they are practically unnoticeable. Let's see an example.



Arri Alexa Mini LF, Zoom Premista 28-100 mm. Focal 28mm T 11, 29.97 fps 180ª 5.600 k EI 800 . ProRes 4444 LogCWgam ND 1.2

Arri Alexa Mini LF, Zoom Premista 80-250 mm. Focal 88 mm T 9.5 29.97 fps 180ª 5.600 k EI 800 . ProRes 4444 LogCWgam ND 1.2

Geometric aberrations.

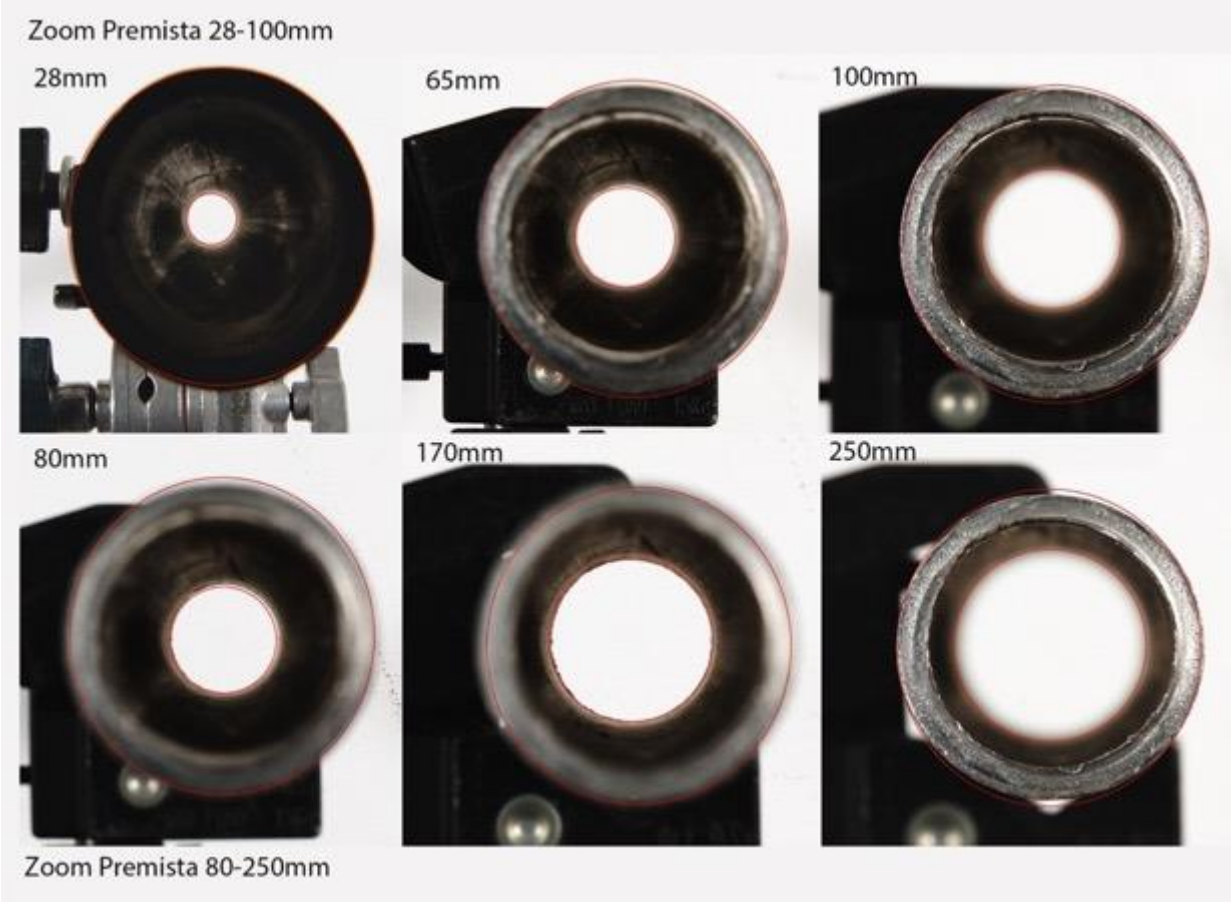
The barrel or pincushion geometric distortion is produced by a different magnification in the field covered by the lens. To assess this distortion we have used a grid analyzing it with the Imatest program. The values we have obtained are not relevant, with the 28-100 mm zoom having a barrel distortion with the 28mm focal length of -3.31%, while with the 100 mm focal length of the same zoom there is a slight pincushion distortion, insignificant.

Entre ríos. Bogotá, Colombia. Arri Alexa Mini LF, Zoom Premista 28-100 mm. Focal 28mm T 9.5, 29.97 fps 180ª 5.600 k EI 800 ProRes 4444 LogCWgam ND 1.2

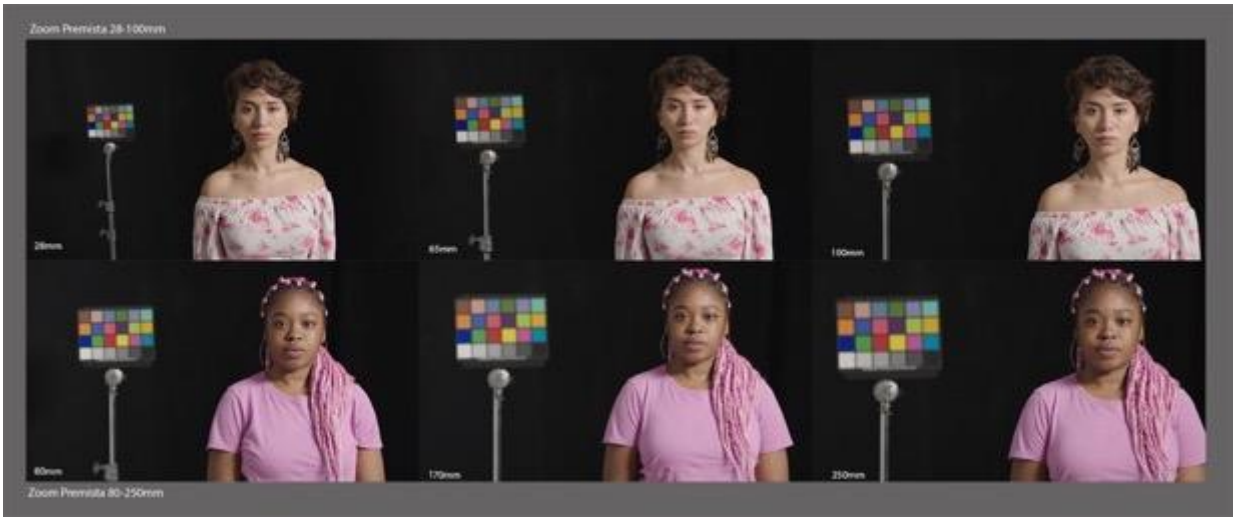
Regarding the 80-250mm zoom, the pincushion distortion is irrelevant.

Entre ríos. Bogotá, Colombia. Arri Alexa Mini LF, Zoom Premista 80-250 mm. Focal 170 mm T 13.4, 29.97 fps 180ª 5.600 k EI 800 . ProRes 4444 LogCWgam ND 1.2

Perspective distortion and the configuration of space

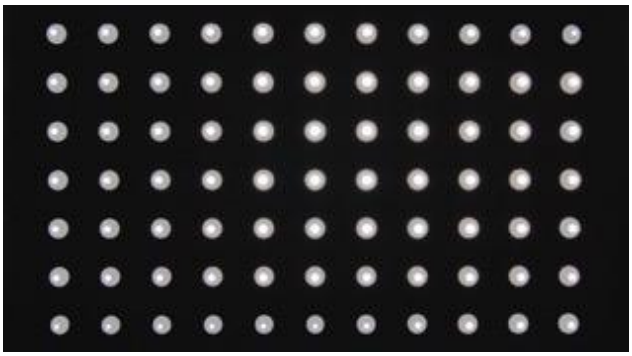


In the image above we show the perspective distortion compared between the two zooms and their different focal lengths. For this we have photographed a cylinder perpendicular to the sensor in such a way that the optical axis coincides with the axis of the cylinder. If we compare the distance between the cylinder inlet and the outlet, we will appreciate how each lens builds the spatial relationship, thus, for example, with 28 mm the objects in seconds will appear more distant, smaller, leaking in greater perspective than those photographed with the 100 mm.

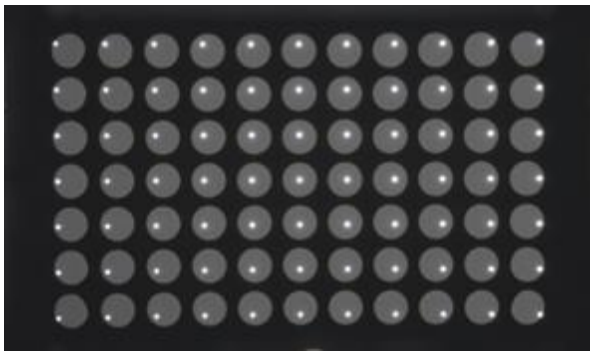


In this comparison we see the relative size of the letter in relation to the size of the face of the models, we can also observe on their faces the effect of using the different focal lengths. It seems important to us to understand how the zooms in their different focal points "compress" the spaces in what has to do with the apparent distances and the size of the objects in the different terms of the image, since the narration that we create with depends on this.

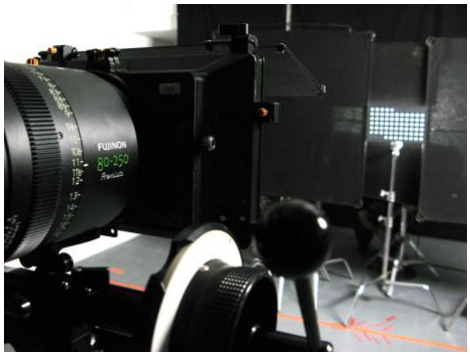
As we can see, there is a considerable difference between the different focal points when it comes to managing space, differences inherent to zooms, so you have to be attentive to these changes when creating spaces.
Another aspect that we study is the “respiration” of the lenses, that is, if the size of the frame varies when the focus changes from one point to another. For this we have used the Vía Stellae card again, superimposing a focused card to another unfocused one, in such a way that the small white point is the one with focus and the wider circle is the unfocused one. When the small circle has the same center as the wide one, then we can say that the lens does not breathe. The more displacement of said center there is between the two circles, the greater the variation of the frame when moving the focus.



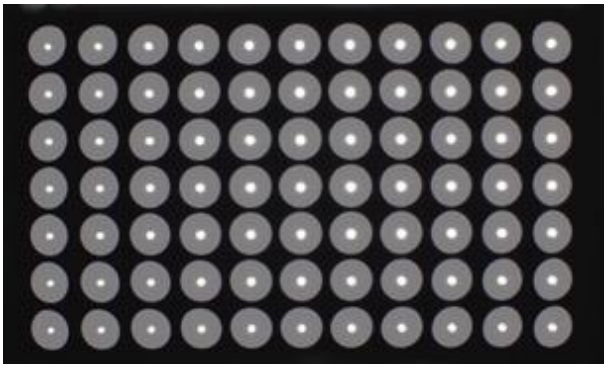
Vía Stellae Zoom 28-100m. Focal28mmT2.9



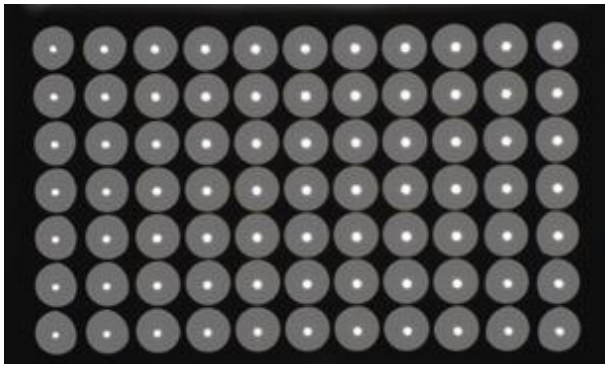
Vía Stellae Zoom 28-100mm. Focal 65mm T2.9



In the 28-100 mm zoom, a very slight breath is observed, hardly relevant, while in the 80-250 mm there is no sign of it.



Vía Stellae Zoom 80-250mm. Focal 80mm T2.9

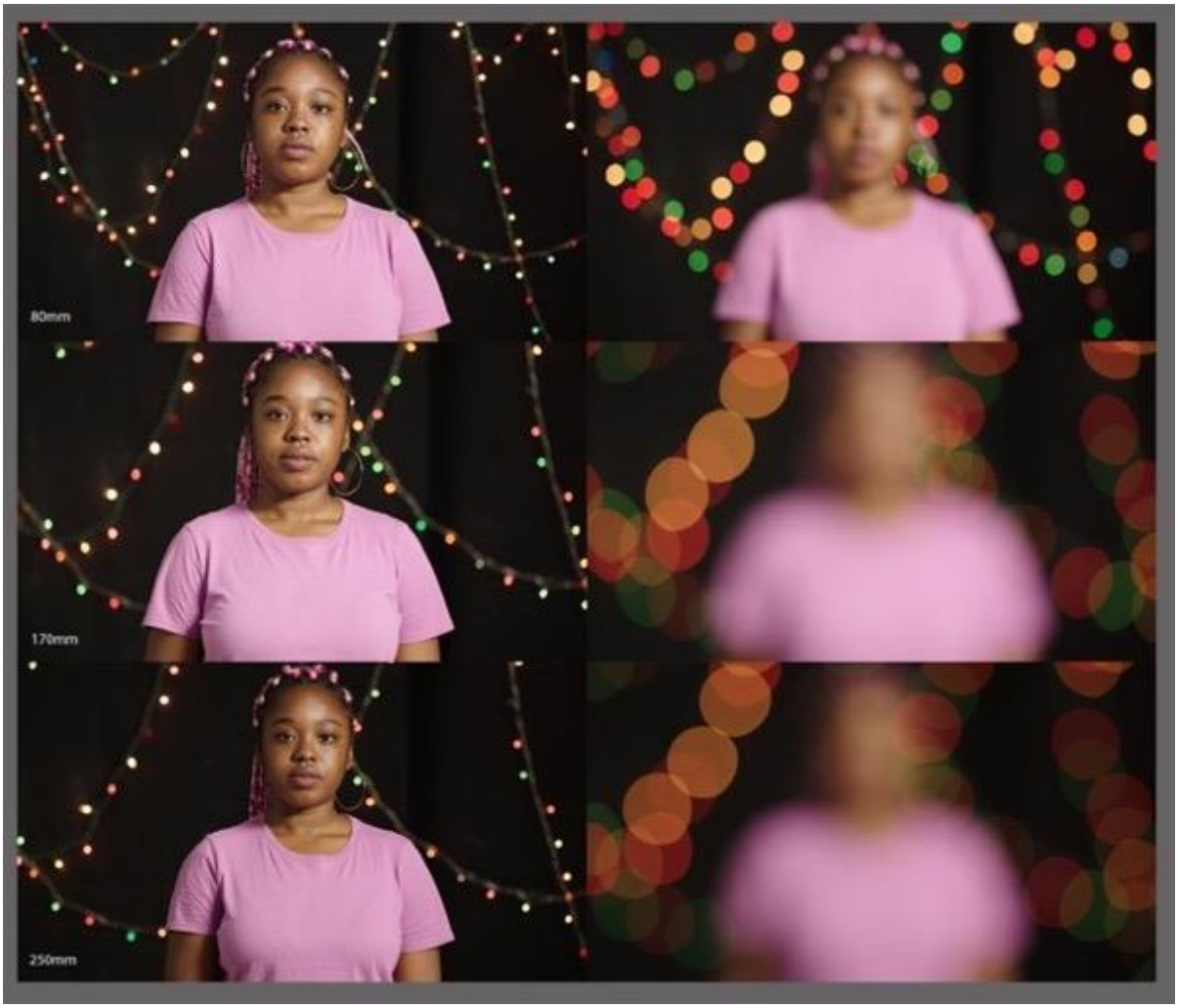


Vía Stellae Zoom 80-250mm. Focal 250mm T2.9

Bokeh

Here we show the Bokeh, as the Japanese term that designates the appearance of the blur is known, how it is, what sensations it gives, if softer, harder, and with this we also check how the terms change when they are out of focus, how they are blurred and how outlines that become out of focus are expanded.

Zoom 28-100mm T 2.9



Zoom 80-250mm T 2.9

The points of the lights out of focus do not show the geometric structure of the diaphragm, nor with higher T values, which indicates that the Bokeh will be soft, with delicate focus transitions. We have indeed verified this in this shot of the film Un Rabón con corazón.


Frame of film "Un Rabón con corazón". Sony Venice 6054x3272 X-OCN XT 24p 180º EI500, 5.500ºK Zoom Premista 28-100 mm Focal 100 mm T2.9 ND 1.8

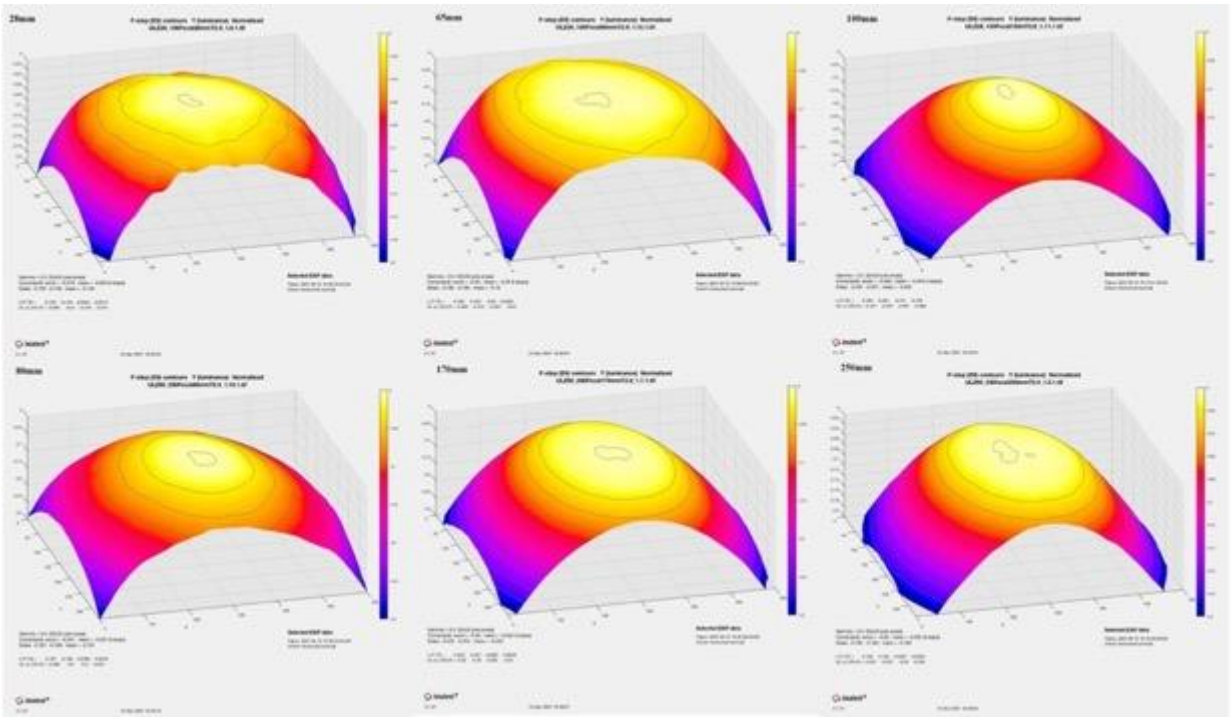
We can also check it in these two planes

The completely painterly tone of the backgrounds can be appreciated, as well as the soft and delicate blur of the colored braids.

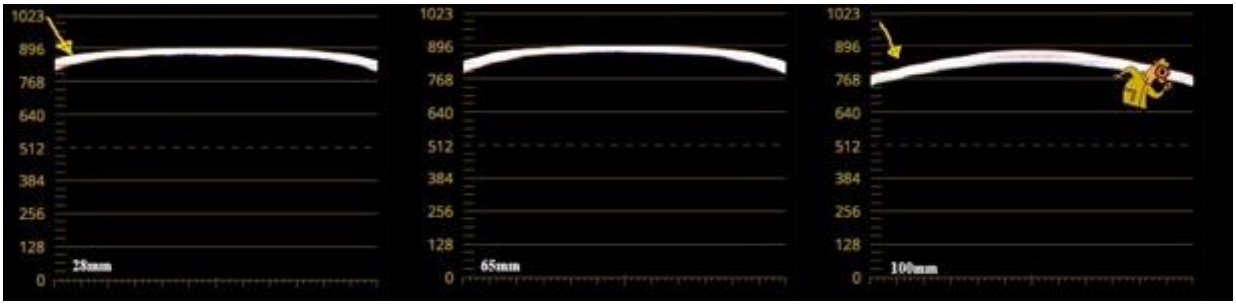
Luminous uniformity

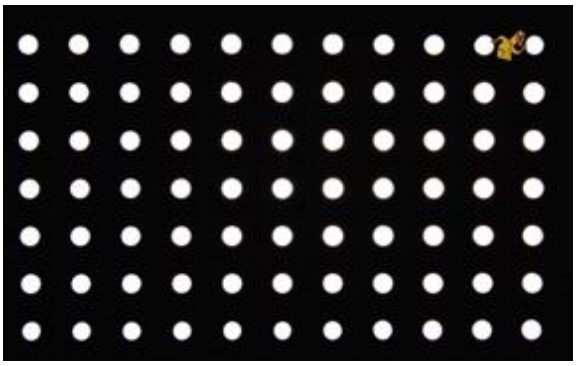
Luminous uniformity assesses whether the brightness of the entire image plane is uniform or whether there are differences in the sides and corners (vignette). To carry out this test we have photographed a homogeneously illuminated white surface that occupies the entire frame and then analyzed the images with Imatest.

Zoom Premista 28-100mm	Average in f stop of the corners with respect to the center. T 2.9	Average in f stop of the sides with respect to the center. T 2.9
28mm	0,265	0,139
65mm	0,32	0,19
100mm	0,456	0,346
Zoom Premista 80-250mm		
80mm	0,297	0,191
170mm	0,333	0,235
250mm	0,255	0,183

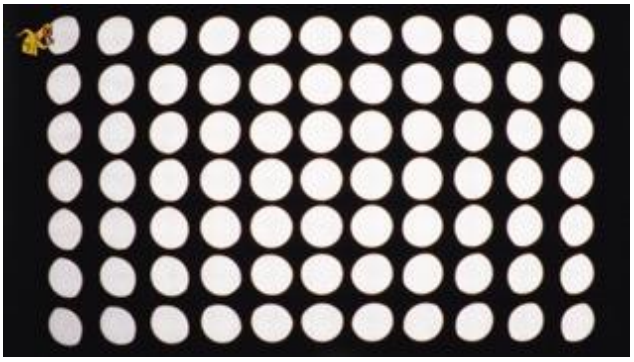


In most of the focal lengths we are practically below 1/3 of a stop of loss of luminosity except for the 100 mm focal length in the 28-100 mm zoom with almost half a stop of loss in the corners. Let's see, for example, that difference in the wave monitor.



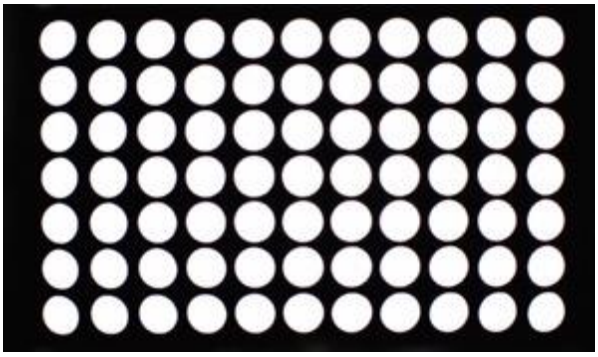


Zoom 28-100mm T 2.9 Focal 28mm

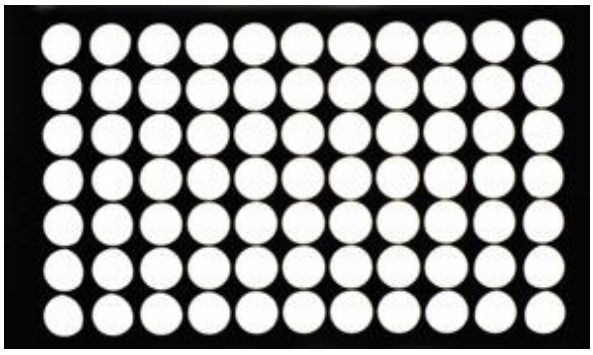


Zoom 28-100m T 2.9 Focal 100mm

On the chart you can see the difference between 28 mm and 100 mm and one of the possible causes of the loss of luminosity with the 100 mm focal length is shown, the physical vignette produced by the same structure where the crystals of the camera are supported. lens. The lower resolution in the 100 mm focal length that we saw in the first section is surely related to this loss of luminosity.

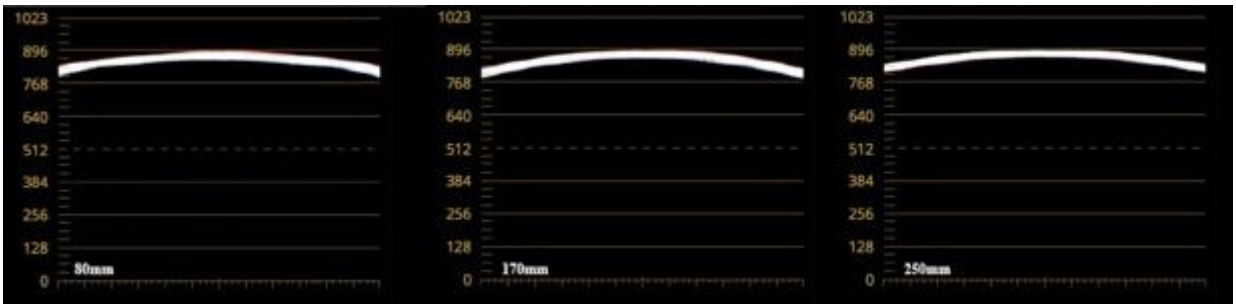


Zoom 80-250mm T 2.9 Focal 80mm



Zoom 80-250 T 2.9 Focal 250mm

In the 80-250mm zoom you don't see such a pronounced difference.



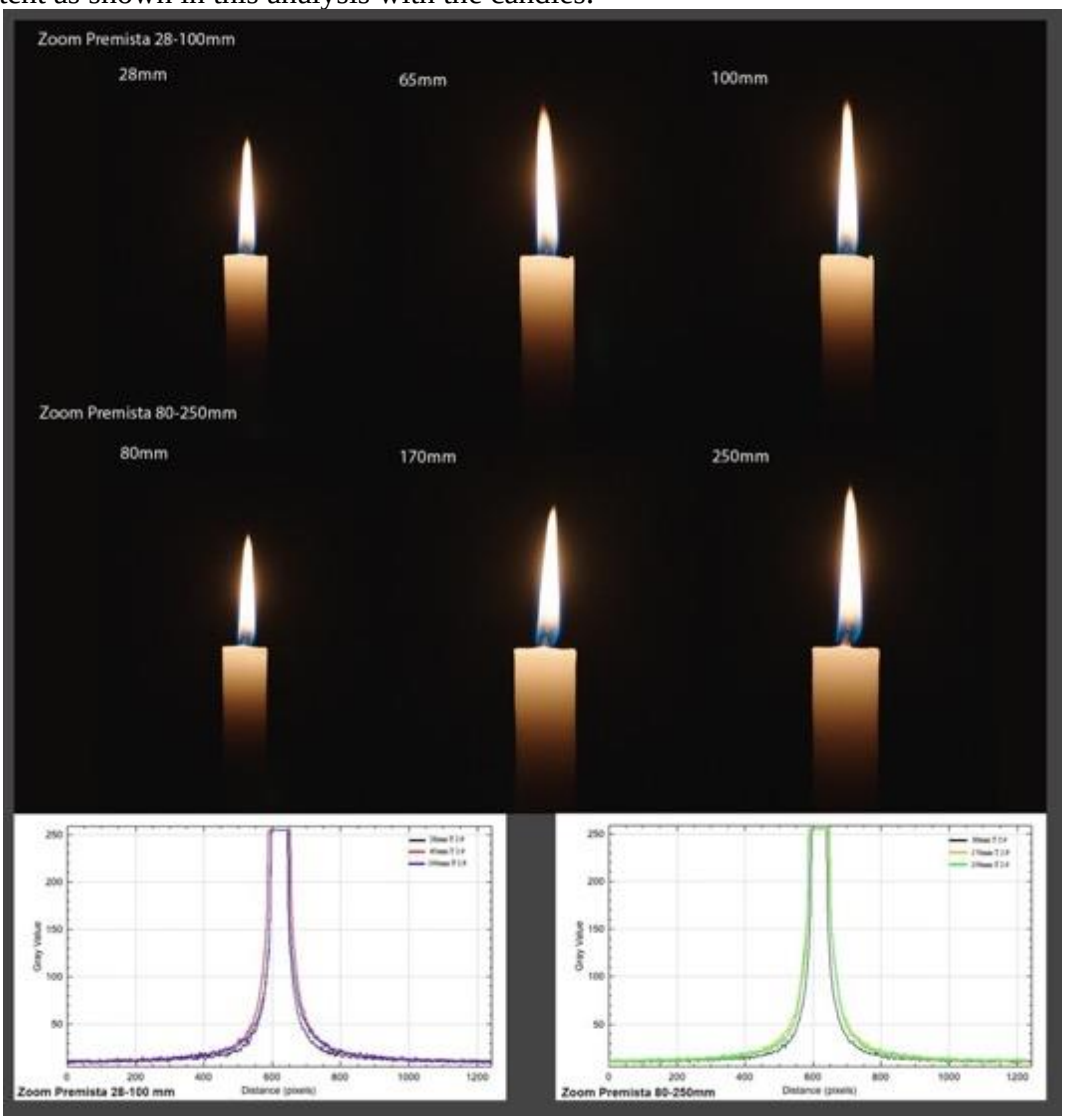
Veiling glare and flare

Veiling glare, as well as the flare, refers to how the reflections of the light beams between the crystals themselves and their supports within the structure of the lens contribute to modify the contrast, sharpness and resolution. For this test we have used a gray scale with a black hole constructed, and analyzed by Imatest. The measured veil is the ratio of the light reaching the sensor from the deepest black on the chart to the white that surrounds it.

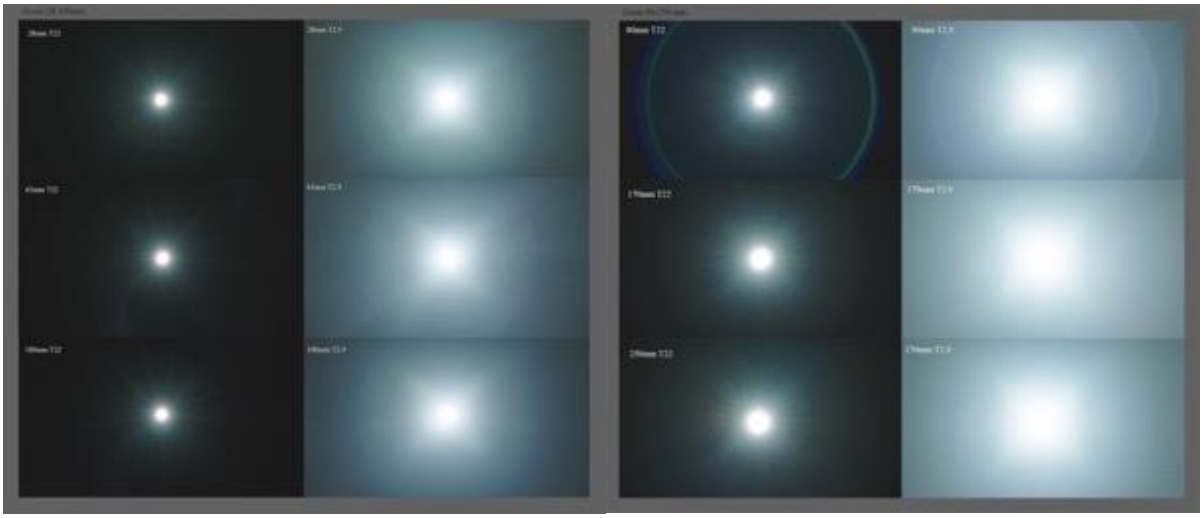
These are the values obtained:

Zoom Premista 28-100mm T 2.9	Veiling glare %	Zoom Premista 80-250 mm T 2.9	Veiling glare %
28mm	0,251	80mm	0,196
65mm	0,206	170mm	0,233
100mm	0,194	250mm	0,275
AVERAGE	**0,217**	AVERAGE	**0,234**

The values shown are really low, which indicate that we will have clean and deep blacks, in addition the average values of the two zooms are very similar, with the lens set being very consistent as shown in this analysis with the candles.



The curves show the superposition of the veil generated by the flame in each of the focal points, as can be seen they are very similar.
As for the flare, we start by showing it with a flashlight directly at the camera. With the diaphragm closed, the black is deep and quite sharp with the widest T value, large halos open flooding the entire frame.



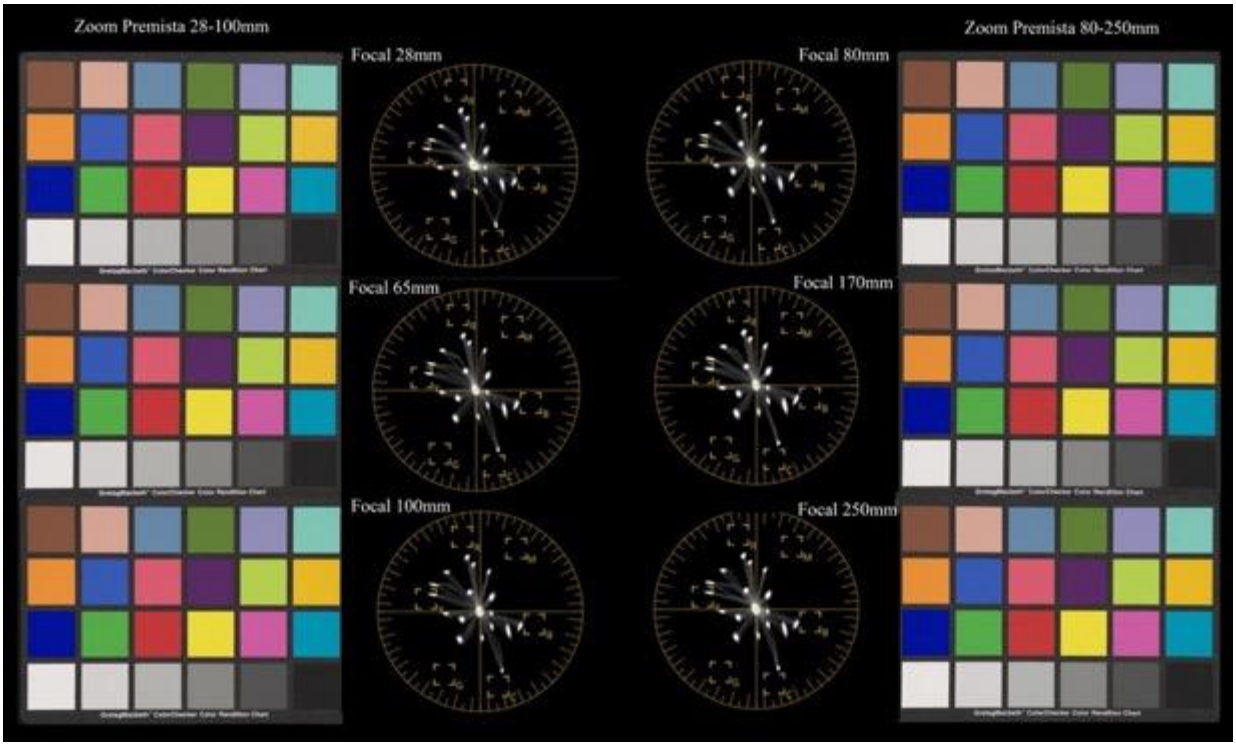
Zoom 28-100mm

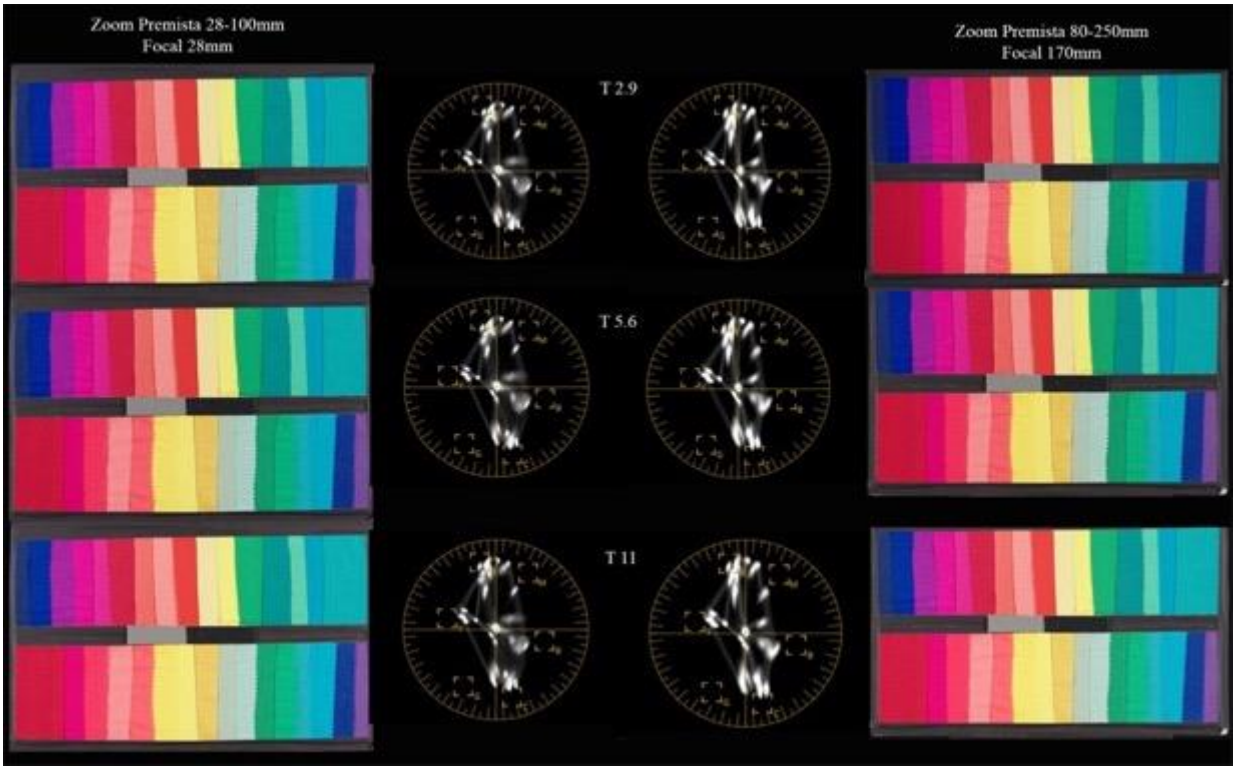
Zoom 80-250mm

Flares produce intense blue and cyan “pearls” with elliptical and circular halos. It seems to us that the zooms manage a balance between a very low veil, but with a dispersion of the high lights that make the contrast moderate, giving a natural image, not at all angry and not too "soft".

Color

We have studied the response to color on a Macbeth card and a textured Rainbow card, as well as observing the shots shot on the exteriors. We have photographed the Macbeth letter with each of the zooms in the three focal lengths considered. We have used Arri skypanel lights set to the corresponding color temperature. In addition to photographing the letter with different focal lengths, we have also done it with different T values. The two zooms match perfectly with no color deviations from one to the other as can be seen in the image below. In the vectorscope you can see the equality of the letters with both zooms.

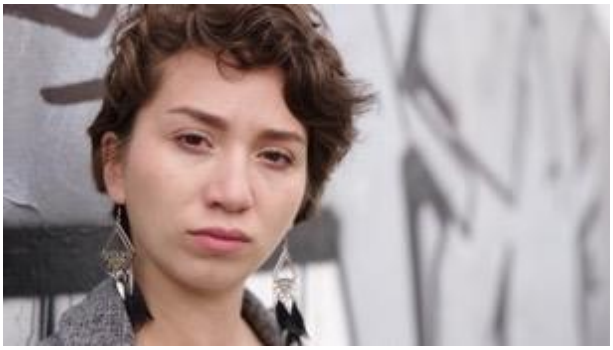




Adriana Bernal ADFC

The zooms are shown neutral without being "cold" or warm intonations at all.

Frame of film "Un Rabón con corazón". Sony Venice 6054x3272 X-OCN XT 24p 180º EI500, 5.500ºK. Zoom Premista 28-100 mm Focal 50 mm T 7.4.



Entre ríos. Bogotá. Colombia. Arri Alexa Mini LF, Zoom Premista 80-250 mm. Focal 80 mm T 3.5, 29.97 fps 180ª 5.600 k EI 800 ProRes 4444 LogCWgam ND 1.8

Conclusions

In the evaluation of the two zooms, it is necessary to consider not only the technical conditions that we have been analyzing, that is, those that determine the personality of the lens and that are established by the decisions that the manufacturer makes at the time of design, but also the experience of the Director of Photography and the taste that he develops based on his style when photographing. How could it be otherwise, the quality of the lenses has not surprised us, because for years we have been working with Fujinon lenses with excellent results. Both zooms have an optimal resolution in the FF format, which, however, does not result from a rabid sharpness, on the contrary, they are smooth without losing detail and texture, with a very appropriate micro contrast so that skin tones appear really beautiful. They are lenses with a very good luminosity for the focal range they handle and a very adequate behavior in light uniformity throughout the focal plane, with the slight deviation of the 100 mm focal length in the 28-100 mm zoom that makes it not adjust both to the rest of the focal points and that undoubtedly affects somewhat in the lower resolution of this focal point compared to the others. Geometric aberrations are not really an element to consider, because even with the 28mm, the most angular focal length, it is not excessive. Lateral chromatic aberrations, while observable if you look for them, do not significantly affect the quality of the image as a whole. We like the "pearls" generated by direct lights and the relationship between the veil and the flare seems very adequate to generate soft lenses, very kind to skin tones, but with deep blacks. We also highlight the Bokeh, which we have loved, soft, organic blurs that integrate the terms in focus and the blurred ones with friendly transitions.

Azalea deŌgata Kōrin.

Belflower deŌgata Kōrin.

It should also be noted the consistency of both zooms in all aspects that interest a cinematographer, being able to exchange both lenses or use their different focal lengths without noticeable differences in image quality. They are also zooms of a very acceptable weight, not at all insufferable and have in all respects, what is necessary for professional use.

As in the line of the other zooms of the brand with which we have worked, we associate them with the delicate works of the lacquer Ōgata Kōrin. As a director of photography, I place a primary value on the choice of the lens to build the image, shape and being of the cinematographic narration, for this reason I value the quality that these zooms offer us as a first-rate tool in Full Frame systems.

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Video https://vimeo.com/582737194

Frames from the film "Un rabón con corazón" are courtesy of Dago Producciones (DGP)

Have collaborated