Lumita

Imaging & Color Science • Research & Product Development

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Lab Report

Projectors in Business & Education, a Lumita Labs Report

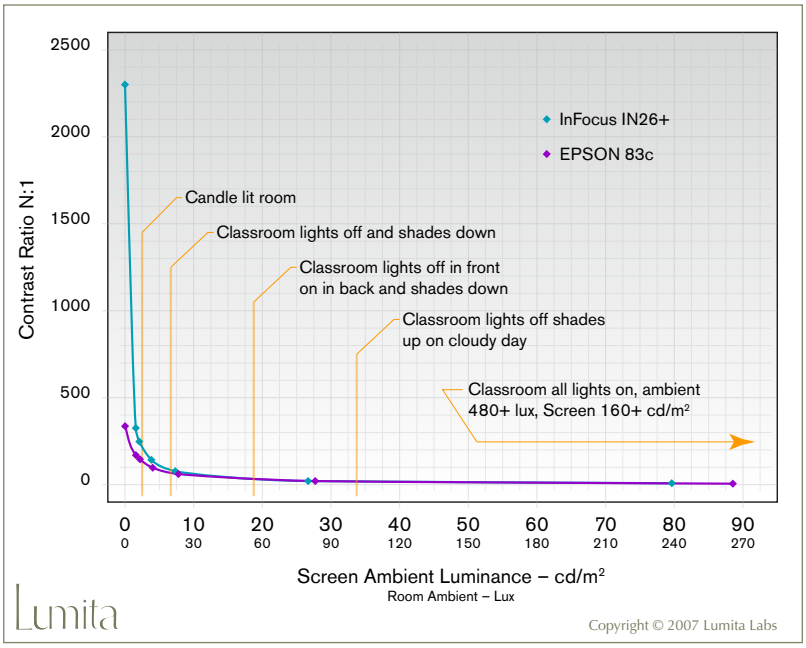
The Contrast Ratio of a Digital Projector in a Classroom or Business Environment is Irrelevant.

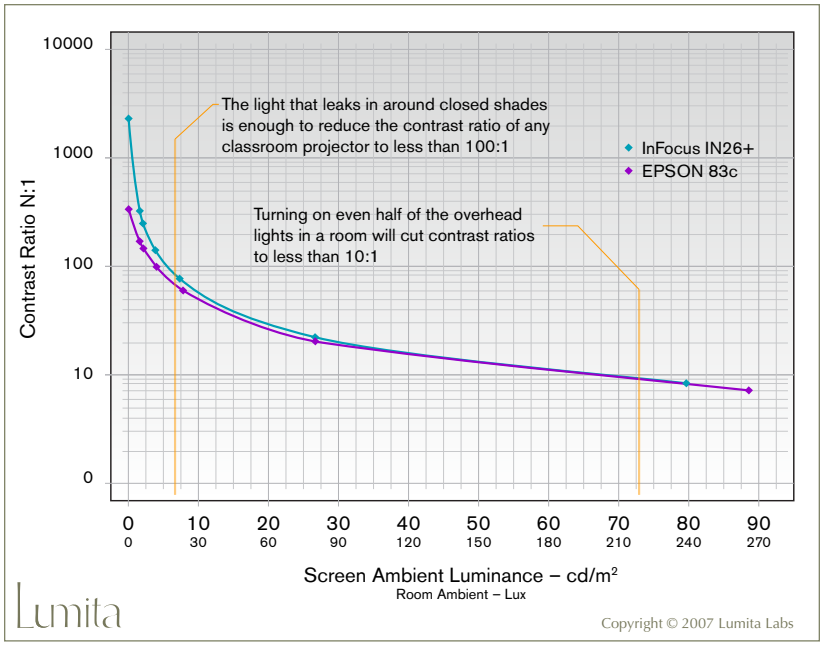
Many projector manufacturers tout the contrast ratio of their projectors and make all kinds of claims about how high contrast ratios are better. If you are building a home theater the contrast ratio of your projector is very important. A home theater is a black room with no light, in order to get rich blacks and images that pop you need a high contrast ratio.

The contrast ratio specification of a projector is measured in total darkness. It is measured with the light sensor directly in the beam. This creates a specification that will give you a good idea of how the projector will perform in a totally dark theater environment. The contrast ratio is simply the ratio of white to black.

Classrooms and meeting rooms are brightly lit, often have windows and the walls are painted with white or light colors. Most rooms even with the lights off and the shades drawn have some ambient light leaking in. Digital projectors are often used with the window shades up or even some or all of the lights on. We don't stare directly at the beam of a projector we look at a screen. That screen is in the room and reflects the ambient light around us. In a real world environment the darkest black that we can see is the screen ambient with the projector turned off.

The contrast ratio that we actually experience is the black and white as they are reflected off the screen in the environment. It takes very little light to raise the black level we see on the screen. Two projectors of roughly equal brightness will have very little difference in the actual contrast if there is is any light in the room.



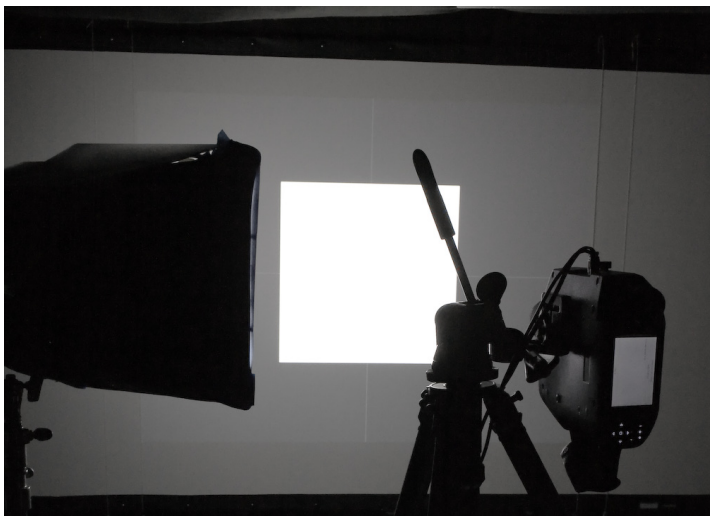


In order to demonstrate this we chose two projectors of equal brightness and very different contrast ratios. One with a 2000:1 contrast spec and another rated at 400:1. Both projectors produced about 2000 ANSI lumens of brightness in our laboratory set to their "Presentation" mode.

In the test we lit the screen to simulate the various ambient light levels found in a typical room. The international standard target for classroom illuminance is 480 Lux. The experiment demonstrates the massive impact of light at only half this level and below.

As you can see from the data, very small amounts of ambient light cause the high contrast ratio of the IN26+ to plummet. The amount of light that leaks in through closed window shades (the equivalent of a few candles in the room) causes the contrast ratio to drop below 100:1. In our graphs we are using a screen luminance number that is 1/3 the room ambient, In many cases (if the room is painted white) this would be even higher. Turn on some of the overhead lights, even in the back of the room and the contrast ratio goes down below 10:1.

You will notice that as soon as you add even a small amount of light to the room the difference between the two projectors becomes imperceptible. The human eye will not see a significant difference between 90:1 and 80:1 or 11:1 and 12:1.



In a business projector total light output is what matters, the ability of the projector to rise above the ambient.

A bright white is important, and so are bright colors. Both of the projectors tested produce about 2000 lumens (2052 for the IN26+ vs 1955 for the 83c) at white. However, the color luminance of these projectors is very different. The color luminance (the brightness of red, green and blue primaries) of the IN26+ is only 639 Lumens! Compared with 1827 lumens for the 83c. The IN26+ colors are less than half as bright.

For more information on color luminance and to see complete reports on both of these projectors and others go to www.lumita.com.

InFocus IN26+

Sample	Screen	Black	White	Ratio
1	0.07	0.25	578.00	2302 :1
2	1.61	1.78	580.67	327 :1
3	2.10	2.34	579.37	248 :1
4	3.86	4.12	583.77	142 :1
5	7.33	7.60	586.57	77 :1
6	26.65	26.98	606.63	22 :1
7	79.66	79.89	661.17	8 :1

EPSON 83c

Sample	Screen	Black	White	Ratio
1	0.07	1.66	557.70	336 :1
2	1.61	3.28	559.57	170 :1
3	2.18	3.84	559.97	146 :1
4	4.02	5.68	560.97	99 :1
5	7.79	9.49	565.37	60 :1
6	27.70	29.50	584.47	20 :1
7	88.56	90.26	647.60	7 :1