

University of Oregon Cinema Studies Program



Canon 60D User Guide for Shooting DSLR Video

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Please note: this camera is not recommended for productions that require long shots, such as documentary where you have long interviews. This camera is ideal for narrative productions where shots are much shorter. Filming for long durations on the 60D will cause the camera to overheat and you may lose footage or have to let the camera cool.

What's in the Kit?



1 Canon 60D Camera Body

1 Canon EF 50MM
f/1.4 Prime Lens



1 LP-E6 Battery



Stereo AV Cable



1 Camera Bag

1 Lens Blower



58mm Variable
ND Filter



1 Focus Shifter



Assembly

1. Remove the body cap from the camera and the rear lens cap. Align the EF lens mount index (the red dot) on both the camera body and lens and turn clockwise until the lens locks on.

***Do not touch the back glass of lens OR mirror/sensor of camera!!!



2. Slide card slot cover towards rear of camera and it will spring open. Gently push in SD card until you feel the spring lock mechanism click in. (To remove card push it in to unlock the mechanism). Close slot cover.



3. Push lever and open battery compartment. Gently slide battery in and close door.



We recommend SanDisk, Lexar or Transcend brand of SD cards. The 60d requires that you use a Class 6 or higher for video. A 16GB-32GB, Class 10 SanDisk is the optimal card. A 16GB card will hold 44 minutes of 1080p HD video.

Layout

Shutter button



Lens release

Mirror

Shoe mount for mic,
monitor, light, etc.

On/Off Switch

Live View and movie
mode record/stop <CAMERA>



Focus assist/zoom

MENU **MENU**

Quick menu <Q>

Quick control dial
(scrolls within menus
or sets f-stop) <DIAL>

Multi-controller
(scrolls menus and
w/in menus; scroll
ISO) <MULTI-CONTROLLER>

Set or "ok" button

<SET>

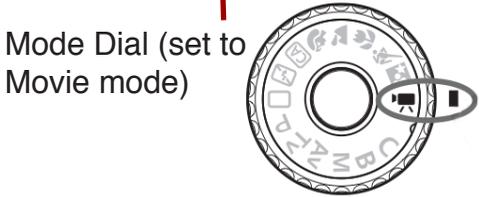
Flip screen LCD

LCD info display

<INFO.>

File playback

Layout



Quick Use Guide

1. Set the lens to MF (manual focus) on the lens body.

2. Turn ON, and set Mode Dial to movie



3. Swing out LCD screen. Put camera into Live View Mode.



4. Format your SD card.

MENU [

FORMAT>OK

***Hint: use the main dial to scroll across menus; use the quick control dial to scroll through options within a given menu.



Main Dial



Quick Dial

5. Media settings. Set your resolution and frame rate. You will want to shoot full HD 1080p (1920x1080) and choose either 24fps (for cinematic look) or 30fps (for video look). You can shoot 60fps

MENU [

Movie rec. size> 1920x1080 24fps> Set < >

6. Adjust the focus on the focus ring of the lens so that your subject is in focus. Press the Live View button to begin and stop recording. “●”

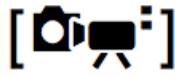
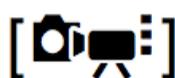
7. To review your footage press the playback button and press SET to select file to play back. < >

Movie Menus

There are many menus on this camera. It's important to understand how to navigate them and what lies within each.

Select MENU, use Main Dial to scroll through and Quick Control dial to move within menus. To select a menu press the SET button. To go back to the previous menu, press the MENU button again. To exit the menus, press the MENU button and it will take you back to Live View mode.

MENU

Menu	Options
	<ul style="list-style-type: none"> -<i>Movie Exposure</i>: Set to MANUAL -<i>ISO Speed Increment</i>: Set this to 1/3-stops
	<ul style="list-style-type: none"> -<i>Movie rec size</i>: Set 1920x1080 30fps or 1920x1080 24fps. You can also shoot 60fps but at a lower resolution. We suggest using 1920x1080 24fps for narrative production. -<i>Sound rec.</i>: Set to MANUAL. While you shouldn't record your primary source of audio on this camera, you can at least set levels for production level audio for syncing. -<i>Grid display</i>: This will bring up a grid on the LCD screen that can be helpful for framing.
	<ul style="list-style-type: none"> -<i>Picture Style</i>: Set to User Def. 1-3. You can customize 3 pictures styles. You SHOULD have at least one where you have turned OFF the sharpness and contrast, as well as dial down your saturation a few notches to shoot a "flat" image (more on that later). -<i>White Balance</i>: Here you will find numerous white balance presets, as well as the custom white balance option. -<i>Custom White Balance</i>: this is where you select the image to base custom white balance off of.

Media Storage & MGMT

Any new SD card must be formatted. To do this:

MENU [] **FORMAT > OK**

To retrieve your footage after a shoot please follow these steps:

1. Remove your SD card from camera. Set the little switch on the card to LOCK (this could prevent loss of footage during transfer if you have a corrupted disk).

2. Place SD card into SD slot on computer or use a card reader. A drive will pop up on your desktop titled EOS_DIGITAL



3. You will find your video files by clicking on the following folder path: EOS_DIGITAL > DCIM > 100CANON

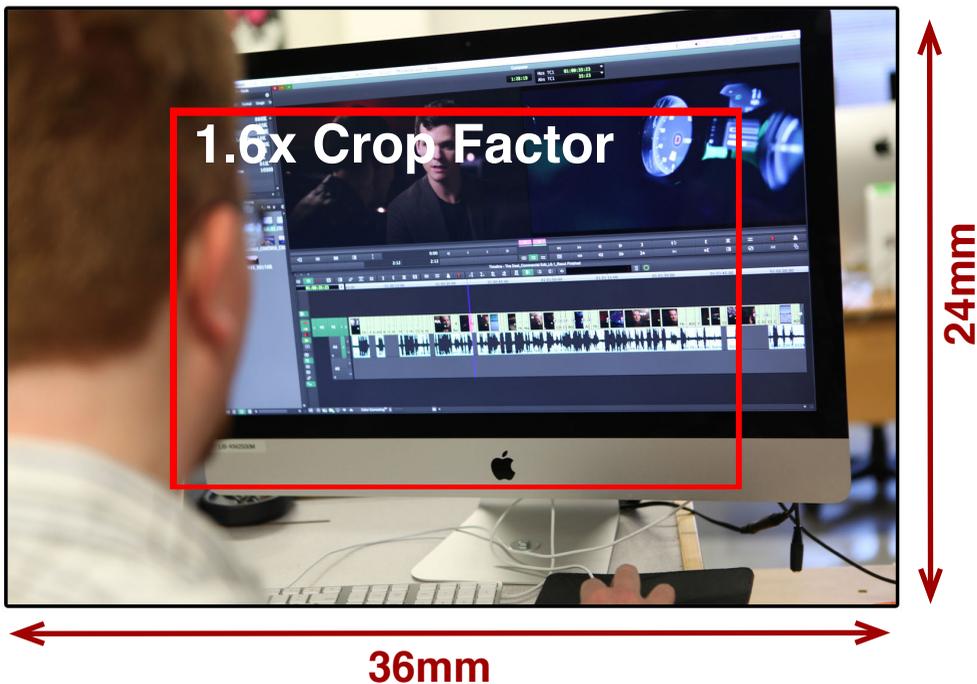
4. We recommend that you transfer the whole DCIM folder and do not rename the video files in the 100CANON folder. Often, there is important data in the folder/file structure that editing software rely on to log, transfer/transcode. On your EXTERNAL hard drive, make a project folder, within that make a folder for footage, then make a folder to put the DCIM folder into. For example:

External Drive > Music Video > Footage > Day 1 Shoot > DCIM

***The 60D shoots in the high quality codec, h.264, and uses the .MOV format/wrapper. Depending on your editing software, you may have to transcode this footage before editing.

Crop Sensor

Focal length is based on the 35mm film standard (full frame for DSLR is 36mm x 24mm). The crop frame sensor crops out the edges of the frame. The 60D has CMOS APS-C sensor, which has a 1.6 crop factor. In the image below, the red box is the crop of the sensor in comparison to what you would see with a full frame sensor.



The crop factor gives you greater depth of field (DOF) that will make pulling focus easier and your lens won't be as sensitive as it would with a shallow DOF.

The downside is that you will have less dynamic range (light and color information), a greater DOF (this may be a disadvantage depending on your aesthetic), and won't be able to shoot as well in low light settings.

Lensing

All 60D kits come stock with a 50mm f/1.4 lens, although depending on the course, you may also have access to a Canon 85mm f/1.8, or Rockinon 16mm, 24mm, 35mm, and 85 T/1.5 CINE lenses.

All these lens are “prime” lenses, meaning that the focal length is fixed, which means you cannot zoom in/out. Focal length is the distance over which light rays are brought into focus from lens to sensor.

In narrative production “zooms” are only used in the rare instance of a contrazoom (the “vertigo” effect made popular by Hitchcock). Zooming simply magnifies an entire image, whereas a dolly move changes the perspective or depth between foreground and background, exaggerating space.

Therefore, with a prime lens you have to get used to re-positioning the camera. In narrative production a dolly in or out is how the camera moves closer or farther from a subject. Prime lenses will require manual focus only.

The crop sensor will have several effects on a lens. It will impact your focal length and angular wideness of your lens. So, multiply your focal length by 1.6: the 50mm becomes 80mm, the 85mm becomes 136mm, and the 24mm becomes 38mm, etc..

A long focal length lens collapses foreground/background while a short focal length exaggerates perspective (a great distance appears between foreground and background).

Lenses

Lens choices are important choices to make. This will affect what's in frame, the perspective, the color information, and your DOF (while f-stop settings impact DOF, this factor is MOST affected by your lens choices).

Canon 50mm f/1.4: All kits comes with this lens. This lens give you a perspective closest to your eyes and is great in low light conditions at f/1.4. This is a mid-range focal length, and a work-horse (this was Hitchcock's favorite focal length).



Canon 85mm f/1.8: With the crop factor, this lens becomes 136mm, so it's near telephoto, thus a shallow DOF and compression of background/foreground. This focal length is often used for portraiture and product photography.



Rokinon 24mm T/1.5: This is a wide angle lens. This is a manual lens; no autofocus or auto exposure. **Also, you HAVE to change your T-number on the lens and cannot do it from the camera.** The aperture ring is clickless, so you can perform iris pulls. At 24mm (38mm), you will have a great DOF and exaggeration between foreground and background.



Use this lens for landscapes and building shots.

Exposure: ISO

There are three primary factors in setting proper exposure on the 60D, and any DSLR: 1) ISO 2) Shutter speed and 3) Aperture/f-number. Obviously your lens choice and lighting decisions will affect exposure, so set lights and lens first.

ISO: Set this first! This controls the camera's sensitivity to light. The higher the ISO the brighter the image will appear. However, the higher you set this number the more "noise" or artifacting you will have. Try to set this as low as possible and adjust lighting to avoid artifacting. Never crank ISO above 1600 and try and stay under 800.

A general rule is that an ISO of 100 is half as sensitive to light as ISO 200. This is similar to "stopping down" your f-number a full stop.

Try and use "native" ISOs for best performance: **160, 320, 640, and 1250**. In general, for outside shooting set at 320 or below. (Native ISOs are multiples of 160, roughly.)

To set ISO. Press the ISO button on top of camera. It will bring up all the ISO numbers on the LCD screen. Use either the Quick Control or Main Dial to scroll ISO numbers. Once you've selected a number, the ISO is set.



Exposure: Shutter Speed

Shutter Speed: In DSLR photography, this is a very important way of manipulating exposure. However, for DSLR video you mainly have two options for shutter speed. You will set your shutter to **1/50** or **1/60** to maintain the proper film look and maintain the 180 degree shutter that is characteristic of the cinematic look.

Shutter speed is the length of time the sensor is exposed to light. With DSLR, the shutter number is how long the sensor will be turned on for for each frame

The rule is this: your shutter speed should be twice the speed of your fps. So, if you're shooting at 24fps, you set the shutter to 1/50; if you're shooting at 30fps, you set the shutter to 1/60. If you shoot at 60fps, 1/125 is the proper number.

However, because shutter speed also affects how motion is interpreted. If you want a jerky looking shot, similar to the opening scenes of *Saving Private Ryan*, try setting your shutter to 1/80, 1/100, or 1/125.

To set your shutter speed, simply turn the Main Dial on the top of the camera. You will see the shutter number change in the lower left hand of the LCD screen. <  >

***For chase and fight scenes, try shooting at a higher shutter than normal to intensify the action.

Exposure: F-Number

F-Number: The last factor in exposure is your f-number, also called a f-stop. This controls how much light is let in through the lens, and is also referred to as the “aperture” or “iris.”

Adjusting your f-stop will be the BEST way to control exposure. This allows “clean” light (not digitally enhanced light like the ISO) through the lens to the sensor. The smaller the f-number the larger the opening (iris); and the larger the f-number the smaller the iris. Moving to smaller f-number is “opening up”; a larger f-number is “stopping down” or “closing.”

The 60D can adjust in 1/3 stops. Moving a full stop will halve or double the light let in. Full stop f-numbers are: **f/1.4, 2, 2.8, 4, 5.6, 8, 11, 16, 22**

***Adjusting your f-number will also change your DOF. Thus the higher the number (smaller iris) and you’ll have a greater DOF; the lower the number (larger iris) and you’ll have a shallow DOF.

To adjust the f-number, use the Quick Control dial and you will see the number next the shutter number on the LCD change. (Note, on the Rokinon you must adjust the f-number on the lens itself).

- For documentary/news, set from f/4-f/8 for great DOF.
- For narrative, try f/1.4-f/4 for a shallow DOF.
- Depending on lens, even at f/2.8 it’s hard to keep subject in focus.

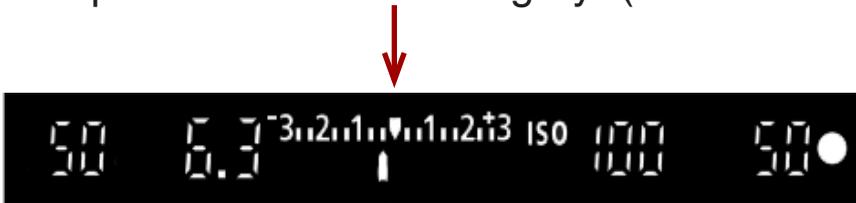


Exposure Cont'd

To measure exposure, typically you're use a light meter to get a reading. However, with the 60D you can use the built-in exposure meter to get a reading. To activate the exposure meter, half-press the shutter button; the meter mark will start to move up and down the scale.



Each number represents a stop change in the light (half/double the light), and each pip between the numbers represents 1/3 stop. The central mark is the “correct” exposure, as determined by the light meter on camera. The correct exposure is called “18% grey” (half black/white).



The meter measures reflected light, which is the light that reflects off of objects rather than the light that illuminates objects (incident). The meter only measures light as black/white and is essentially colorblind.

When you change ISO, f-number or shutter, you will need to compensate by stopping down or opening up one of those 3 factors, known as “exposure compensation,” to get 18% grey.

If you cannot get “correct” exposure according to the meter, underexpose it a 1/3 stop. You can always bump up exposure in post, but you cannot fix overexposed images in the same manner.

Using Histograms

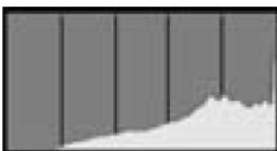
One thing to make clear is that you shouldn't use the LCD screen to judge the exposure of an image until you've worked on your skills and can do it. There are external factors, such as glare, that will cause the images you record to be improperly exposed. One tool to objectively measure exposure is the meter, another tool is the histogram, which measures luminance.

To access the histogram, press the INFO button on the back of the camera until the histogram shows in the upper right hand of LCD screen.



<INFO.>

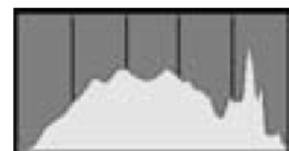
What you see horizontally on the histogram on the far left are the black pixels (darkest) and on the far right are the white pixels (lightness), and also shadows and highlights. The vertical scale measures amount of pixels. A properly exposed image will appear more even both horizontally and vertically. Big spikes in the far left or right means you're losing details or it's too contrasty. Try to get even distribution of pixels near middle, although you may have higher values at either end. You will work with a histogram in post as well.



Bright image



Dark image



Normal brightness

To get the best read take a still image of your scene. Hit the playback button. Hit INFO twice to bring up luminance histogram and a third time to bring up the color value histogram (RGB).

Controlling Exposure Outside

You may find out that your image is overexposed when shooting outside, even if you dial your ISO down to 160 (or, 100). For still photography this is not a problem as you can adjust your shutter speed, but for video you must shoot at 1/50, 1/60, or 1/125. You can try to close down your iris as well, but then that will also change your DOF.

In order to properly expose your image, you have two options.

1). **ND Filter:** This filter attenuates or lessens the light that hits the sensor. Each 60D kit has a 58mm variable ND filter that will ONLY work w/ the 50mm and 85mm lens (not the Rokinons). These are variable ND filters, and allow you to cut the light by 2 to 8 full stops.

Gently thread the ND filter onto end of the lens



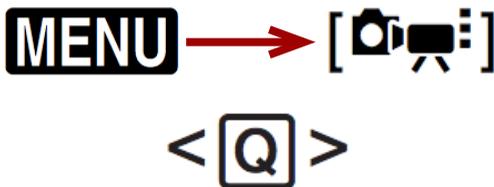
2). **Diffusion Screen:** The 7 in 1 large reflectors also act as diffusion screens, similar to a diffusion umbrella. To use one you will likely need two c-stands and then sand-bags for the c-stands.

White Balance

Remember, exposure is color blind. But all light has color. Our eyes by nature balance color, but cameras base all color information off of the color white so that what we see in the scene (color-wise) is what we get on the camera. Color information is usually balanced in RGB (red, green and blue). You set white balance AFTER you have lit your scene and set exposure.

The color of light is referred to as temperature, measured in kelvin or K. Generally speaking daylight is 5200K (emitting a blue light), shade is 7000K (bluer), cloud cover emits 6000K (still blue), fluorescent light is 4000K (green), and tungsten lights like our light kits or candle light give off 3200K.

The 60D actually has powerful presets for white balancing. To bring up the white balance options select MENU and use Movie Menu 3 or use the QUICK MENU button.



AWB: This will automatically set white balance

Daylight: 5200K

Shade: 7000K

Cloudy: 6000K

Tungsten: 3200K

White Fluorescent light: 4000K

K: when set to K you can use the Main Dial to set the K value

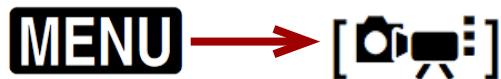
Custom White Balance

Despite the 60D white balance presets, you should get in the habit of custom white balancing. You NEED to do this every time you change the lights significantly.

One of the main reasons why you should custom white balance is because you may have different light sources casting different color temperatures on your scene. For instance, say you're using window light (5200k, blue) as a key light and then you use a tungsten lights (3200k, orange) to fill in the detail. Thus, you'll have both blue and orange light on your subject and it won't look right in the camera. (Note, you can "correct" light using correction gels to change orange light to blue light).

Once you have set the camera and lights, have your subject hold a white card or white piece of paper. If you have to, move the camera in until the LCD is filled with white. Then, take a picture (take this pic in AWB).

Then MENU>Movie Menu 3>Custom White Balance



Then, make sure you select the white image you just took and press SET and then OK in the following menu. Then, go into the white balance options and select the custom white balance icon, which will then set the white balance based upon that image.



Remember, do this every time you change the light and have different color temperatures.

Picture Profiles

The 60D has numerous picture profiles that it shoots with. Don't use any of the preset ones! The 60D has three customizable picture profiles where you can adjust sharpness, contrast, saturation, and color tone. You want to shoot a flat or neutral image so that you can process the image in post. To access, adjust and select picture profile.



Scroll to User Def. 1 using Main Dial. Use multi-controller and go to the scales below. Use Main Dial to turn sharpness off, turn the contrast off, and dial down saturation one-three pips.

- Sharpness
(line/edge contrast)
- Contrast (difference
between light/dark)
- Saturation (color sep-
aration)



Flat images will maintain line detail and prevent loss of detail in shadows. You add sharpness using aperture and focus (sharpness in the camera is “fake” sharpness). Flat images are softer and you avoid aliasing. You add contrast and saturation in post to achieve your “look.”



Contrast/sharp Image



Flat Image

Focus

Now that we have our exposure correct, white balance set, and a flat image, the last element before we record is to focus our image. Make sure the lens is set to MF.

Move the white box on LCD screen using the Multi-Controller to area you want to achieve focus on. Then press the focus assist button once to magnify x5, twice to magnify x10, and a third time to go back to Live View.



Once you have magnified your image. Turn the focus ring until you have critical focus on your subject. Then, press the focus assist to return to Live View.

You are now ready to record!!! To begin recording press the Live View/Record button; to stop recording press the button again. “●”

To play back footage hit the playback button on back of the camera. While in playback mode, use Quick Control dial to select files, and the focus assist buttons to see more or less file thumbnails.

***To pull focus you will want to use a follow focus/focus shifter. If you use tape, it MUST be lens tape and not any other tape. Grease pencils allow you to mark a lens, or use rubber bands with pen. Confirm with your instructor how to mark for focus pulls without damaging lens.

Audio

Any audio that you record using the camera's on-board mic, or any input into the 1/8" mic jack on camera, should be for sync purposes ONLY. You should NEVER record your audio intended for use in the final product on the camera, but you NEED to still record audio as a scratch track for syncing it in post. These mics pick up all of the noise from the camera mechanism and all handling of the camera/lens.

You should record audio you intend to use on the final product to a ZOOM H4N or other digital recorder. All DSLRs have unbalanced audio inputs, which are not suitable for professional audio. Also, the 60D does not have a headphone jack, so you have no way of monitoring your audio. While interfaces are available w/ XLR inputs and channel gain, they still push the signal through the camera's unbalanced 1/8" input and audio card.

Make sure that your camera is recording audio. Set up a mic to an external audio recorder. Use a clapper board or clap your hands in front of the camera before "Action" is called by the director. This clap is important for manually syncing audio to picture. If you cannot use a clap/clapper at beginning of a take, you will do this after the take for the same sync purpose.

As a general rule, set your audio levels on your external recorder to peak between -12dB to -6dB. Please see the user guide for the audio/boom kits for more information.

Transfer/Transcode/Backup

Transfer files from your SD card to a computer/external drive using the SD card slot on the computers or a card reader. Try to avoid using the camera for this.

Before transferring we recommend you turn the LOCK on on your SD card.

We recommend that you make a folder on your external drive of your original footage and that, if you can, back this footage up on another external drive or computer. When the drive icon pops up, you will find your files here: EOS_DIGITAL > DCIM > 100CANON

Try to avoid renaming or moving files. Many NLEs require specific folder structure for transfer/transcode, so after you move files to your external drive you will import from there (not the card). Here is a basic folder structure for transferring to your external drive: External Drive > Music Video > Footage > Day 1 Shoot > DCIM

The 60D shoots in the h.264 codec using the .MOV wrapper. When you import these files into an NLE it will transcode them to the proper codec for editing, usually creating new files.

Once you have backed up your files we recommend that you reformat your card instead of going through it on the camera or on the computer and erasing the files manually. Try and back up your original media in two locations.

Maintenance

Let's start the maintenance and care section with what NOT to do.

1. NEVER EVER touch the sensor inside the camera. In fact, if this is dirty, please notify an EM in Room 18. The camera has an auto-cleaner for the sensor, but sometimes this needs to be done manually (don't do this).
2. NEVER use anything other than a lens tissue or microfiber lens cleaning cloth. You will scratch the lens.
3. De-lens the camera only when you're a) done shooting or b) changing out the lens. You do not need to de-lens every time you put the camera in the bag.
4. NEVER EVER use canned air EVER on this camera or lens. Each kit has an air blower.

What you should do.

1. To clean dust or sand from lens or inside camera, hold the camera/lens pointing down. Blow the air up. This will loosen all dust and it will fall out. You can blow dust out of lens caps as well.
2. If you have a microfiber cloth or lens tissue and lens cleaner, you can remove dust or finger grease by using very little cleaner and ALWAYS rub in a circular fashion. A microfiber clothe can remove grease from LCD as well.
3. Always make sure you have lens caps on the lenses.
4. Contact cinemastudiessuper@gmail.com for more help with this.

60D DOF Charts

14mm

Canon 60D, 60Da, 50D, 40D Focal Length: 14 mm

Distance (feet)	f/1.4		f/2		f/2.8		f/4		f/5.6		f/8		f/11		f/16		f/22		f/32	
	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far
1	0' 11.5"	1' 0.5"	0' 11.4"	1' 0.7"	0' 11.1"	1' 1"	0' 10.8"	1' 1.5"	0' 10.3"	1' 2.3"	0' 9.8"	1' 3.5"	0' 9.1"	1' 5.6"	0' 8.3"	1' 9.9"	0' 7.3"	2' 9.1"	0' 6.3"	10' 3"
2	1' 10.2"	2' 2.1"	1' 9.5"	2' 3.1"	1' 8.6"	2' 4.7"	1' 7.5"	2' 7.2"	1' 6.1"	2' 11.6"	1' 4.4"	3' 8.6"	1' 2.5"	5' 9.2"	1' 0.5"	26' 3"	0' 10.4"	∞	0' 8.4"	∞
3	2' 8"	3' 5.1"	2' 6.6"	3' 7.6"	2' 4.9"	3' 11.8"	2' 2.7"	4' 7.3"	2' 0.1"	5' 11.1"	1' 9.2"	9' 11.3"	1' 6.1"	240'	1' 3"	∞	0' 10.1"	∞	0' 9.5"	∞
4	3' 5.2"	4' 9.5"	3' 2.9"	5' 2.6"	3' 0.1"	5' 11.7"	2' 8.7"	7' 6.1"	2' 4.9"	11' 10"	2' 0.8"	61'	1' 8.7"	∞	1' 4.7"	∞	1' 1.2"	∞	0' 10.1"	∞
5	4' 1.7"	6' 3.7"	3' 10.4"	7' 0.8"	3' 6.4"	8' 6.4"	3' 1.8"	12' 1"	2' 8.8"	29' 1"	2' 3.6"	∞	1' 10.6"	∞	1' 6"	∞	1' 1.9"	∞	0' 10.6"	∞
6	4' 9.7"	7' 11.8"	4' 5.3"	9' 3.1"	4' 0.1"	11' 11"	3' 6.3"	20' 3"	3' 0.1"	1245'	2' 5.9"	∞	2' 0.1"	∞	1' 6.9"	∞	1' 2.5"	∞	0' 10.9"	∞
7	5' 5.1"	9' 10.4"	4' 11.5"	11' 11"	4' 5.1"	16' 9"	3' 10.1"	39' 4"	3' 2.8"	∞	2' 7.8"	∞	2' 1.3"	∞	1' 7.6"	∞	1' 2.9"	∞	0' 11.1"	∞
8	6' 0.1"	12' 0"	5' 5.3"	15' 1"	4' 9.7"	23' 10"	4' 1.5"	133'	3' 5.2"	∞	2' 9.3"	∞	2' 2.2"	∞	1' 8.2"	∞	1' 3.2"	∞	0' 11.3"	∞
9	6' 6.6"	14' 5"	5' 10.6"	19' 1"	5' 1.8"	35' 9"	4' 4.5"	∞	3' 7.3"	∞	2' 10.7"	∞	2' 3"	∞	1' 8.6"	∞	1' 3.5"	∞	0' 11.4"	∞
10	7' 0.7"	17' 2"	6' 3.6"	24' 3"	5' 5.5"	59'	4' 7.1"	∞	3' 9"	∞	2' 11.8"	∞	2' 3.7"	∞	1' 9"	∞	1' 3.7"	∞	0' 11.5"	∞
12	8' 0"	24' 0"	7' 0.4"	40' 11"	6' 0"	12217'	4' 11.7"	∞	4' 0"	∞	3' 1.6"	∞	2' 4.8"	∞	1' 9.6"	∞	1' 4"	∞	0' 11.7"	∞
14	8' 10.1"	33' 7"	7' 8.1"	80'	6' 5.6"	∞	5' 3.4"	∞	4' 2.4"	∞	3' 3.1"	∞	2' 5.7"	∞	1' 10.1"	∞	1' 4.3"	∞	0' 11.8"	∞
16	9' 7.2"	48' 0"	8' 2.8"	280'	6' 10.3"	∞	5' 6.5"	∞	4' 4.4"	∞	3' 4.2"	∞	2' 6.3"	∞	1' 10.5"	∞	1' 4.5"	∞	0' 11.9"	∞
18	10' 3"	72'	8' 8.8"	∞	7' 2.4"	∞	5' 9.2"	∞	4' 6"	∞	3' 5.2"	∞	2' 6.8"	∞	1' 10.8"	∞	1' 4.6"	∞	1' 0"	∞
20	10' 11"	120'	9' 2.1"	∞	7' 6"	∞	5' 11.5"	∞	4' 7.4"	∞	3' 6"	∞	2' 7.3"	∞	1' 11"	∞	1' 4.7"	∞	1' 0.1"	∞
30	13' 4"	∞	10' 10"	∞	8' 6.8"	∞	6' 7.3"	∞	4' 11.9"	∞	3' 8.6"	∞	2' 8.7"	∞	1' 11.7"	∞	1' 5.1"	∞	1' 0.3"	∞
40	15' 0"	∞	11' 11"	∞	9' 2.6"	∞	6' 11.9"	∞	5' 2.5"	∞	3' 10"	∞	2' 9.4"	∞	2' 0.1"	∞	1' 5.3"	∞	1' 0.4"	∞
50	16' 2"	∞	12' 8"	∞	9' 7.9"	∞	7' 2.9"	∞	5' 4.2"	∞	3' 10.8"	∞	2' 9.9"	∞	2' 0.4"	∞	1' 5.4"	∞	1' 0.4"	∞
75	18' 2"	∞	13' 10"	∞	10' 4"	∞	7' 7.3"	∞	5' 6.5"	∞	4' 0.1"	∞	2' 10.5"	∞	2' 0.7"	∞	1' 5.6"	∞	1' 0.5"	∞
100	19' 4"	∞	14' 6"	∞	10' 8"	∞	7' 9.7"	∞	5' 7.8"	∞	4' 0.7"	∞	2' 10.9"	∞	2' 0.9"	∞	1' 5.7"	∞	1' 0.6"	∞
∞	24' 0"	∞	17' 0"	∞	12' 0"	∞	8' 6.1"	∞	6' 0.3"	∞	4' 3.3"	∞	3' 0.4"	∞	2' 1.9"	∞	1' 6.5"	∞	1' 1.2"	∞
Hyperfocal Distance	24' 0"		17' 0"		12' 0"		8' 6.1"		6' 0.3"		4' 3.3"		3' 0.4"		2' 1.9"		1' 6.5"		1' 1.2"	

Circle of confusion: 0.019 mm

24mm

Canon 60D, 60Da, 50D, 40D Focal Length: 24 mm

Distance (feet)	f/1.4		f/2		f/2.8		f/4		f/5.6		f/8		f/11		f/16		f/22		f/32	
	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far
1	0' 11.8"	1' 0.2"	0' 11.8"	1' 0.2"	0' 11.7"	1' 0.3"	0' 11.6"	1' 0.5"	0' 11.4"	1' 0.7"	0' 11.2"	1' 1"	0' 10.9"	1' 1.4"	0' 10.5"	1' 2.1"	0' 9.9"	1' 3.2"	0' 9.3"	1' 5.1"
2	1' 11.4"	2' 0.7"	1' 11.1"	2' 1"	1' 10.8"	2' 1.4"	1' 10.3"	2' 2"	1' 9.6"	2' 2.9"	1' 8.8"	2' 4.4"	1' 7.7"	2' 6.7"	1' 6.3"	2' 10.7"	1' 4.7"	3' 6.6"	1' 2.8"	5' 2.8"
3	2' 10.6"	3' 1.6"	2' 10"	3' 2.2"	2' 9.2"	3' 3.3"	2' 8.2"	3' 4.8"	2' 6.9"	3' 7.2"	2' 5.2"	3' 11.1"	2' 3"	4' 5.9"	2' 0.5"	5' 7.9"	1' 9.6"	8' 11.3"	1' 6.6"	49' 11"
4	3' 9.5"	4' 2.8"	3' 8.5"	4' 4.1"	3' 7.2"	4' 6"	3' 5.5"	4' 9"	3' 3.2"	5' 1.8"	3' 0.5"	5' 10.1"	2' 9.2"	7' 2.6"	2' 5.4"	10' 10"	2' 1.4"	37' 1"	1' 9.2"	∞
5	4' 8.1"	5' 4.5"	4' 6.6"	5' 6.6"	4' 4.8"	5' 9.8"	4' 2.1"	6' 2.8"	3' 10.9"	6' 11.3"	3' 7"	8' 3.3"	3' 2.5"	11' 4"	2' 9.5"	24' 0"	2' 4.3"	∞	1' 11.2"	∞
6	5' 6.4"	6' 6.6"	5' 4.3"	6' 9.7"	5' 1.6"	7' 2.6"	4' 10.2"	7' 10.5"	4' 5.9"	9' 0.6"	4' 0.8"	11' 6"	3' 7"	18' 5"	3' 0.9"	126'	2' 6.7"	∞	2' 0.8"	∞
7	6' 4.5"	7' 9.2"	6' 1.7"	8' 1.6"	5' 10.2"	8' 8.6"	5' 5.7"	9' 8.4"	5' 0.3"	11' 7"	4' 6"	15' 10"	3' 11"	32' 11"	3' 3.7"	∞	2' 8.6"	∞	2' 2"	∞
8	7' 2.3"	9' 0.2"	6' 10.8"	9' 6.2"	6' 6.4"	10' 4"	6' 0.8"	11' 9"	5' 6.2"	14' 7"	4' 10.6"	22' 1"	4' 2.5"	81'	3' 6.2"	∞	2' 10.3"	∞	2' 3.1"	∞
9	7' 11.8"	10' 4"	7' 7.6"	11' 0"	7' 2.1"	12' 1"	6' 7.5"	14' 0"	5' 11.6"	18' 3"	5' 2.9"	31' 10"	4' 5.6"	∞	3' 8.4"	∞	2' 11.6"	∞	2' 3.9"	∞
10	8' 9.2"	11' 8"	8' 4"	12' 6"	7' 9.6"	13' 11"	7' 1.8"	16' 8"	6' 4.7"	22' 11"	5' 6.7"	49' 6"	4' 8.4"	∞	3' 10.2"	∞	3' 0.8"	∞	2' 4.6"	∞
12	10' 3"	14' 5"	9' 8.2"	15' 9"	8' 11.5"	18' 2"	8' 1.3"	23' 1"	7' 1.8"	37' 3"	6' 1.5"	292'	5' 1.1"	∞	4' 1.4"	∞	3' 2.8"	∞	2' 5.8"	∞
14	11' 8"	17' 6"	10' 11"	19' 5"	10' 0"	23' 2"	8' 11.7"	31' 10"	7' 9.8"	67'	6' 7.3"	∞	5' 5"	∞	4' 3.9"	∞	3' 4.3"	∞	2' 6.7"	∞
16	13' 1"	20' 8"	12' 1"	23' 6"	11' 0"	29' 3"	9' 9.1"	44' 6"	8' 4.8"	169'	7' 0.2"	∞	5' 8.3"	∞	4' 5.9"	∞	3' 5.5"	∞	2' 7.4"	∞
18	14' 4"	24' 2"	13' 3"	28' 2"	11' 11"	36' 9"	10' 6"	64'	8' 11"	∞	7' 4.5"	∞	5' 11.1"	∞	4' 7.6"	∞	3' 6.5"	∞	2' 7.9"	∞
20	15' 7"	27' 11"	14' 3"	33' 4"	12' 9"	46' 2"	11' 1"	101'	9' 4.5"	∞	7' 8.2"	∞	6' 1.5"	∞	4' 9.1"	∞	3' 7.4"	∞	2' 8.4"	∞
30	21' 1"	52'	18' 9"	75'	16' 3"	201'	13' 7"	∞	11' 1"	∞	8' 9.7"	∞	6' 9.8"	∞	5' 1.9"	∞	3' 10.1"	∞	2' 9.9"	∞
40	25' 6"	93'	22' 2"	203'	18' 9"	∞	15' 4"	∞	12' 3"	∞	9' 6"	∞	7' 2.6"	∞	5' 4.7"	∞	3' 11.6"	∞	2' 10.7"	∞
50	29' 3"	172'	24' 11"	∞	20' 8"	∞	16' 8"	∞	13' 0"	∞	9' 11.6"	∞	7' 5.8"	∞	5' 6.4"	∞	4' 0.6"	∞	2' 11.2"	∞
75	36' 4"	∞	29' 11"	∞	24' 0"	∞	18' 8"	∞	14' 3"	∞	10' 8"	∞	7' 10.5"	∞	5' 9"	∞	4' 1.9"	∞	2' 11.8"	∞
100	41' 4"	∞	33' 3"	∞	26' 0"	∞	19' 11"	∞	15' 0"	∞	11' 1"	∞	8' 1"	∞	5' 10.3"	∞	4' 2.6"	∞	3' 0.2"	∞
∞	70'	∞	49' 10"	∞	35' 3"	∞	24' 11"	∞	17' 8"	∞	12' 6"	∞	8' 10.4"	∞	6' 3.5"	∞	4' 5.7"	∞	3' 2.2"	∞
Hyperfocal Distance	70'		49' 10"		35' 3"		24' 11"		17' 8"		12' 6"		8' 10.4"		6' 3.5"		4' 5.7"		3' 2.2"	

Circle of confusion: 0.019 mm

35mm

Canon 60D, 60Da, 50D, 40D Focal Length: 35 mm																				
Distance (feet)	f/1.4		f/2		f/2.8		f/4		f/5.6		f/8		f/11		f/16		f/22		f/32	
	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far
1	0' 11.9"	1' 0.1"	0' 11.9"	1' 0.1"	0' 11.9"	1' 0.1"	0' 11.8"	1' 0.2"	0' 11.7"	1' 0.3"	0' 11.6"	1' 0.4"	0' 11.5"	1' 0.6"	0' 11.2"	1' 0.9"	0' 11"	1' 1.3"	0' 10.6"	1' 1.9"
2	1' 11.7"	2' 0.3"	1' 11.6"	2' 0.4"	1' 11.4"	2' 0.6"	1' 11.2"	2' 0.9"	1' 10.8"	2' 1.3"	1' 10.4"	2' 1.8"	1' 9.8"	2' 2.7"	1' 9"	2' 4"	1' 8"	2' 6.1"	1' 6.7"	2' 9.6"
3	2' 11.3"	3' 0.7"	2' 11"	3' 1"	2' 10.7"	3' 1.4"	2' 10.1"	3' 2.1"	2' 9.4"	3' 3"	2' 8.5"	3' 4.4"	2' 7.2"	3' 6.6"	2' 5.6"	3' 10"	2' 3.5"	4' 4.1"	2' 1.1"	5' 3.9"
4	3' 10.8"	4' 1.3"	3' 10.3"	4' 1.8"	3' 9.6"	4' 2.6"	3' 8.7"	4' 3.8"	3' 7.5"	4' 5.6"	3' 5.9"	4' 8.3"	3' 3.7"	5' 0.6"	3' 1.1"	5' 8"	2' 9.9"	6' 10.1"	2' 6.2"	9' 8.4"
5	4' 10.1"	5' 2"	4' 9.4"	5' 2.9"	4' 8.3"	5' 4.2"	4' 6.9"	5' 6.1"	4' 5.1"	5' 9"	4' 2.6"	6' 1.6"	3' 11.6"	6' 9.2"	3' 7.8"	7' 11.2"	3' 3.4"	10' 6"	2' 10.5"	19' 2"
6	5' 9.3"	6' 2.9"	5' 8.2"	6' 4.2"	5' 6.7"	6' 6.1"	5' 4.8"	6' 9"	5' 2.2"	7' 1.4"	4' 10.9"	7' 8.6"	4' 6.8"	8' 9.1"	4' 1.8"	10' 10"	3' 8.2"	16' 2"	3' 2.1"	55'
7	6' 8.3"	7' 4.1"	6' 6.9"	7' 5.8"	6' 4.9"	7' 8.5"	6' 2.3"	8' 0.6"	5' 10.9"	8' 7"	5' 6.6"	9' 5.6"	5' 1.4"	11' 1"	4' 7.2"	14' 7"	4' 0.4"	26' 7"	3' 5.1"	∞
8	7' 7.2"	8' 5.3"	7' 5.3"	8' 7.7"	7' 2.8"	8' 11.3"	6' 11.5"	9' 4.8"	6' 7.3"	10' 2"	6' 1.9"	11' 5"	5' 7.5"	13' 10"	5' 0.1"	19' 10"	4' 4.1"	51'	3' 7.8"	∞
9	8' 5.9"	9' 6.8"	8' 3.6"	9' 9.9"	8' 0.5"	10' 3"	7' 8.5"	10' 10"	7' 3.3"	11' 10"	6' 8.8"	13' 7"	6' 1.2"	17' 2"	5' 4.6"	27' 5"	4' 7.4"	182'	3' 10.1"	∞
10	9' 4.6"	10' 9"	9' 1.7"	11' 0"	8' 10"	11' 6"	8' 5.1"	12' 4"	7' 10.9"	13' 7"	7' 3.3"	16' 0"	6' 6.5"	21' 3"	5' 8.7"	39' 8"	4' 10.3"	∞	4' 0.1"	∞
12	11' 1"	13' 0"	10' 10"	13' 6"	10' 4"	14' 3"	9' 9.6"	15' 6"	9' 1.3"	17' 7"	8' 3.3"	21' 10"	7' 4"	32' 11"	6' 3.8"	119'	5' 3.4"	∞	4' 3.5"	∞
14	12' 10"	15' 5"	12' 5"	16' 1"	11' 10"	17' 2"	11' 1"	19' 0"	10' 3"	22' 3"	9' 2.2"	29' 6"	8' 0.4"	54'	6' 9.9"	∞	5' 7.6"	∞	4' 6.2"	∞
16	14' 6"	17' 11"	13' 11"	18' 10"	13' 2"	20' 4"	12' 4"	22' 10"	11' 3"	27' 10"	9' 11.9"	40' 1"	8' 7.8"	106'	7' 3.2"	∞	5' 11.1"	∞	4' 8.4"	∞
18	16' 1"	20' 5"	15' 5"	21' 8"	14' 6"	23' 8"	13' 5"	27' 2"	12' 2"	34' 6"	10' 9"	56'	9' 2.4"	415'	7' 7.8"	∞	6' 2.1"	∞	4' 10.3"	∞
20	17' 8"	23' 1"	16' 10"	24' 8"	15' 10"	27' 3"	14' 6"	32' 1"	13' 1"	42' 9"	11' 5"	81'	9' 8.3"	∞	7' 11.8"	∞	6' 4.7"	∞	4' 11.9"	∞
30	25' 0"	37' 6"	23' 5"	41' 10"	21' 5"	50' 0"	19' 2"	69'	16' 8"	149'	14' 1"	∞	11' 7"	∞	9' 2.4"	∞	7' 1.8"	∞	5' 5.2"	∞
40	31' 7"	55'	29' 1"	64'	26' 1"	86'	22' 10"	163'	19' 4"	∞	15' 11"	∞	12' 9"	∞	9' 11.5"	∞	7' 7.1"	∞	5' 8.2"	∞
50	37' 6"	75'	34' 0"	95'	30' 0"	150'	25' 9"	882'	21' 5"	∞	17' 4"	∞	13' 8"	∞	10' 6"	∞	7' 10.7"	∞	5' 10.2"	∞
75	50' 0"	150'	43' 11"	257'	37' 6"	∞	31' 1"	∞	25' 0"	∞	19' 7"	∞	15' 0"	∞	11' 3"	∞	8' 3.9"	∞	6' 1"	∞
100	60'	301'	51'	1799'	42' 10"	∞	34' 7"	∞	27' 3"	∞	20' 11"	∞	15' 9"	∞	11' 8"	∞	8' 6.7"	∞	6' 2.5"	∞
∞	150'	∞	106'	∞	75'	∞	53'	∞	37' 6"	∞	26' 7"	∞	18' 10"	∞	13' 4"	∞	9' 5.6"	∞	6' 8.7"	∞
Hyperfocal Distance	150'		106'		75'		53'		37' 6"		26' 7"		18' 10"		13' 4"		9' 5.6"		6' 8.7"	

Circle of confusion: 0.019 mm

50mm

Canon 60D, 60Da, 50D, 40D Focal Length: 35 mm																				
Distance (feet)	f/1.4		f/2		f/2.8		f/4		f/5.6		f/8		f/11		f/16		f/22		f/32	
	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far
1	0' 11.9"	1' 0.1"	0' 11.9"	1' 0.1"	0' 11.9"	1' 0.1"	0' 11.8"	1' 0.2"	0' 11.7"	1' 0.3"	0' 11.6"	1' 0.4"	0' 11.5"	1' 0.6"	0' 11.2"	1' 0.9"	0' 11"	1' 1.3"	0' 10.6"	1' 1.9"
2	1' 11.7"	2' 0.3"	1' 11.6"	2' 0.4"	1' 11.4"	2' 0.6"	1' 11.2"	2' 0.9"	1' 10.8"	2' 1.3"	1' 10.4"	2' 1.8"	1' 9.8"	2' 2.7"	1' 9"	2' 4"	1' 8"	2' 6.1"	1' 6.7"	2' 9.6"
3	2' 11.3"	3' 0.7"	2' 11"	3' 1"	2' 10.7"	3' 1.4"	2' 10.1"	3' 2.1"	2' 9.4"	3' 3"	2' 8.5"	3' 4.4"	2' 7.2"	3' 6.6"	2' 5.6"	3' 10"	2' 3.5"	4' 4.1"	2' 1.1"	5' 3.9"
4	3' 10.8"	4' 1.3"	3' 10.3"	4' 1.8"	3' 9.6"	4' 2.6"	3' 8.7"	4' 3.8"	3' 7.5"	4' 5.6"	3' 5.9"	4' 8.3"	3' 3.7"	5' 0.6"	3' 1.1"	5' 8"	2' 9.9"	6' 10.1"	2' 6.2"	9' 8.4"
5	4' 10.1"	5' 2"	4' 9.4"	5' 2.9"	4' 8.3"	5' 4.2"	4' 6.9"	5' 6.1"	4' 5.1"	5' 9"	4' 2.6"	6' 1.6"	3' 11.6"	6' 9.2"	3' 7.8"	7' 11.2"	3' 3.4"	10' 6"	2' 10.5"	19' 2"
6	5' 9.3"	6' 2.9"	5' 8.2"	6' 4.2"	5' 6.7"	6' 6.1"	5' 4.8"	6' 9"	5' 2.2"	7' 1.4"	4' 10.9"	7' 8.6"	4' 6.8"	8' 9.1"	4' 1.8"	10' 10"	3' 8.2"	16' 2"	3' 2.1"	55'
7	6' 8.3"	7' 4.1"	6' 6.9"	7' 5.8"	6' 4.9"	7' 8.5"	6' 2.3"	8' 0.6"	5' 10.9"	8' 7"	5' 6.6"	9' 5.6"	5' 1.4"	11' 1"	4' 7.2"	14' 7"	4' 0.4"	26' 7"	3' 5.1"	∞
8	7' 7.2"	8' 5.3"	7' 5.3"	8' 7.7"	7' 2.8"	8' 11.3"	6' 11.5"	9' 4.8"	6' 7.3"	10' 2"	6' 1.9"	11' 5"	5' 7.5"	13' 10"	5' 0.1"	19' 10"	4' 4.1"	51'	3' 7.8"	∞
9	8' 5.9"	9' 6.8"	8' 3.6"	9' 9.9"	8' 0.5"	10' 3"	7' 8.5"	10' 10"	7' 3.3"	11' 10"	6' 8.8"	13' 7"	6' 1.2"	17' 2"	5' 4.6"	27' 5"	4' 7.4"	182'	3' 10.1"	∞
10	9' 4.6"	10' 9"	9' 1.7"	11' 0"	8' 10"	11' 6"	8' 5.1"	12' 4"	7' 10.9"	13' 7"	7' 3.3"	16' 0"	6' 6.5"	21' 3"	5' 8.7"	39' 8"	4' 10.3"	∞	4' 0.1"	∞
12	11' 1"	13' 0"	10' 10"	13' 6"	10' 4"	14' 3"	9' 9.6"	15' 6"	9' 1.3"	17' 7"	8' 3.3"	21' 10"	7' 4"	32' 11"	6' 3.8"	119'	5' 3.4"	∞	4' 3.5"	∞
14	12' 10"	15' 5"	12' 5"	16' 1"	11' 10"	17' 2"	11' 1"	19' 0"	10' 3"	22' 3"	9' 2.2"	29' 6"	8' 0.4"	54'	6' 9.9"	∞	5' 7.6"	∞	4' 6.2"	∞
16	14' 6"	17' 11"	13' 11"	18' 10"	13' 2"	20' 4"	12' 4"	22' 10"	11' 3"	27' 10"	9' 11.9"	40' 1"	8' 7.8"	106'	7' 3.2"	∞	5' 11.1"	∞	4' 8.4"	∞
18	16' 1"	20' 5"	15' 5"	21' 8"	14' 6"	23' 8"	13' 5"	27' 2"	12' 2"	34' 6"	10' 9"	56'	9' 2.4"	415'	7' 7.8"	∞	6' 2.1"	∞	4' 10.3"	∞
20	17' 8"	23' 1"	16' 10"	24' 8"	15' 10"	27' 3"	14' 6"	32' 1"	13' 1"	42' 9"	11' 5"	81'	9' 8.3"	∞	7' 11.8"	∞	6' 4.7"	∞	4' 11.9"	∞
30	25' 0"	37' 6"	23' 5"	41' 10"	21' 5"	50' 0"	19' 2"	69'	16' 8"	149'	14' 1"	∞	11' 7"	∞	9' 2.4"	∞	7' 1.8"	∞	5' 5.2"	∞
40	31' 7"	55'	29' 1"	64'	26' 1"	86'	22' 10"	163'	19' 4"	∞	15' 11"	∞	12' 9"	∞	9' 11.5"	∞	7' 7.1"	∞	5' 8.2"	∞
50	37' 6"	75'	34' 0"	95'	30' 0"	150'	25' 9"	882'	21' 5"	∞	17' 4"	∞	13' 8"	∞	10' 6"	∞	7' 10.7"	∞	5' 10.2"	∞
75	50' 0"	150'	43' 11"	257'	37' 6"	∞	31' 1"	∞	25' 0"	∞	19' 7"	∞	15' 0"	∞	11' 3"	∞	8' 3.9"	∞	6' 1"	∞
100	60'	301'	51'	1799'	42' 10"	∞	34' 7"	∞	27' 3"	∞	20' 11"	∞	15' 9"	∞	11' 8"	∞	8' 6.7"	∞	6' 2.5"	∞
∞	150'	∞	106'	∞	75'	∞	53'	∞	37' 6"	∞	26' 7"	∞	18' 10"	∞	13' 4"	∞	9' 5.6"	∞	6' 8.7"	∞
Hyperfocal Distance	150'		106'		75'		53'		37' 6"		26' 7"		18' 10"		13' 4"		9' 5.6"		6' 8.7"	

Circle of confusion: 0.019 mm

85mm

Canon 60D, 60Da, 50D, 40D Focal Length: 85 mm

Distance (feet)	f/1.4		f/2		f/2.8		f/4		f/5.6		f/8		f/11		f/16		f/22		f/32	
	Near	Far	Near	Far	Near	Far														
1	1' 0"	1' 0"	1' 0"	1' 0"	1' 0"	1' 0"	1' 0"	1' 0"	1' 0"	1' 0"	0' 11.9"	1' 0.1"	0' 11.9"	1' 0.1"	0' 11.9"	1' 0.1"	0' 11.8"	1' 0.2"	0' 11.8"	1' 0.2"
2	2' 0"	2' 0"	1' 11.9"	2' 0.1"	1' 11.9"	2' 0.1"	1' 11.9"	2' 0.1"	1' 11.8"	2' 0.2"	1' 11.7"	2' 0.3"	1' 11.6"	2' 0.4"	1' 11.5"	2' 0.5"	1' 11.3"	2' 0.8"	1' 11"	2' 1.1"
3	2' 11.9"	3' 0.1"	2' 11.8"	3' 0.2"	2' 11.8"	3' 0.2"	2' 11.7"	3' 0.3"	2' 11.6"	3' 0.4"	2' 11.4"	3' 0.6"	2' 11.1"	3' 0.9"	2' 10.8"	3' 1.3"	2' 10.3"	3' 1.9"	2' 9.7"	3' 2.7"
4	3' 11.8"	4' 0.2"	3' 11.7"	4' 0.3"	3' 11.6"	4' 0.4"	3' 11.4"	4' 0.6"	3' 11.2"	4' 0.8"	3' 10.9"	4' 1.2"	3' 10.4"	4' 1.7"	3' 9.8"	4' 2.4"	3' 9"	4' 3.5"	3' 7.8"	4' 5.1"
5	4' 11.7"	5' 0.3"	4' 11.5"	5' 0.5"	4' 11.4"	5' 0.6"	4' 11.1"	5' 0.9"	4' 10.7"	5' 1.3"	4' 10.2"	5' 1.9"	4' 9.5"	5' 2.7"	4' 8.6"	5' 3.9"	4' 7.3"	5' 5.6"	4' 5.5"	5' 8.3"
6	5' 11.5"	6' 0.5"	5' 11.3"	6' 0.7"	5' 11.1"	6' 0.9"	5' 10.7"	6' 1.3"	5' 10.2"	6' 1.9"	5' 9.5"	6' 2.7"	5' 8.4"	6' 3.9"	5' 7.1"	6' 5.7"	5' 5.2"	6' 8.3"	5' 2.8"	7' 0.4"
7	6' 11.4"	7' 0.6"	6' 11.1"	7' 0.9"	6' 10.7"	7' 1.3"	6' 10.2"	7' 1.9"	6' 9.5"	7' 2.6"	6' 8.5"	7' 3.8"	6' 7.2"	7' 5.5"	6' 5.3"	7' 7.9"	6' 2.9"	7' 11.7"	5' 11.6"	8' 5.5"
8	7' 11.2"	8' 0.8"	7' 10.8"	8' 1.2"	7' 10.3"	8' 1.7"	7' 9.7"	8' 2.4"	7' 8.8"	8' 3.5"	7' 7.5"	8' 5"	7' 5.7"	8' 7.2"	7' 3.4"	8' 10.6"	7' 0.2"	9' 3.6"	6' 8.1"	9' 11.7"
9	8' 10.9"	9' 1.1"	8' 10.5"	9' 1.5"	8' 9.9"	9' 2.2"	8' 9.1"	9' 3.1"	8' 7.9"	9' 4.4"	8' 6.3"	9' 6.4"	8' 4.1"	9' 9.3"	8' 1.1"	10' 2"	7' 9.3"	10' 8"	7' 4.3"	11' 7"
10	9' 10.7"	10' 1"	9' 10.2"	10' 2"	9' 9.4"	10' 3"	9' 8.4"	10' 4"	9' 6.9"	10' 6"	9' 5"	10' 8"	9' 2.3"	11' 0"	8' 10.7"	11' 5"	8' 6"	12' 2"	8' 0.1"	13' 4"
12	11' 10"	12' 2"	11' 9"	12' 3"	11' 8"	12' 4"	11' 7"	12' 6"	11' 5"	12' 8"	11' 2"	13' 0"	10' 10"	13' 5"	10' 5"	14' 2"	9' 10.8"	15' 3"	9' 2.7"	17' 2"
14	13' 9"	14' 3"	13' 8"	14' 4"	13' 7"	14' 5"	13' 5"	14' 8"	13' 2"	14' 11"	12' 10"	15' 4"	12' 5"	16' 0"	11' 11"	17' 0"	11' 3"	18' 8"	10' 4"	21' 7"
16	15' 9"	16' 4"	15' 7"	16' 5"	15' 5"	16' 7"	15' 3"	16' 10"	14' 11"	17' 3"	14' 6"	17' 10"	14' 0"	18' 8"	13' 4"	20' 1"	12' 5"	22' 5"	11' 5"	26' 10"
18	17' 8"	18' 4"	17' 6"	18' 6"	17' 4"	18' 9"	17' 0"	19' 1"	16' 8"	19' 7"	16' 2"	20' 4"	15' 6"	21' 5"	14' 8"	23' 4"	13' 8"	26' 6"	12' 5"	33' 0"
20	19' 7"	20' 6"	19' 5"	20' 8"	19' 2"	20' 11"	18' 10"	21' 4"	18' 4"	22' 0"	17' 9"	22' 11"	17' 0"	24' 4"	16' 0"	26' 9"	14' 9"	31' 2"	13' 3"	40' 6"
30	29' 0"	31' 1"	28' 8"	31' 6"	28' 1"	32' 2"	27' 5"	33' 2"	26' 5"	34' 8"	25' 2"	37' 1"	23' 8"	41' 1"	21' 9"	48' 6"	19' 6"	65'	17' 0"	126'
40	38' 3"	41' 11"	37' 7"	42' 9"	36' 8"	44' 0"	35' 6"	45' 10"	33' 11"	48' 9"	31' 11"	54'	29' 5"	63'	26' 6"	82'	23' 3"	143'	19' 10"	∞
50	47' 4"	53'	46' 4"	54'	44' 11"	56'	43' 2"	59'	40' 10"	65'	37' 11"	73'	34' 6"	91'	30' 6"	138'	26' 4"	509'	22' 0"	∞
75	69'	82'	67'	85'	64'	90'	61'	99'	56'	113'	51'	144'	44' 9"	233'	38' 4"	1798'	31' 10"	∞	25' 9"	∞
100	90'	113'	86'	119'	82'	129'	76'	147'	69'	183'	61'	277'	53'	1045'	43' 11"	∞	35' 7"	∞	28' 1"	∞
∞	882'	∞	624'	∞	441'	∞	312'	∞	221'	∞	156'	∞	111'	∞	78'	∞	55'	∞	39' 3"	∞
Hyperfocal Distance	882'		624'		441'		312'		221'		156'		111'		78'		55'		39' 3"	

Circle of confusion: 0.019 mm