Chelsea Filter

It is important to recognize what a Chelsea Filter IS and more importantly, what it ISN'T.

Chelsea Filters are simply dichromatic filters developed in 1934, not originally intended to be used for gemological purposes.

The filter is only able to transmit light in 2 regions of the spectrum: deep red (690nm) and near yellow-green (570nm).

Therefore, an object can only appear red or green or a brownish tone, resulting from a combination of red and green, when viewed through the filter.

It was discovered (in 1934) that one could gemologically separate some natural emeralds from imitations and other green gems by observing them through the filter.

That is because many Colombian and Siberian emeralds absorbed most of the yellow-green portion of the spectrum, but NOT the red portion of the spectrum. Therefore, when viewed through an apparatus only allowing transmission of red or yellow-green, they appear red.

This characteristic is NOT true with all emeralds. Typically African emeralds and Indian emeralds absorb portions of the spectrum around 690nm, so they will NOT appear red when viewed through a Chelsea.When one viewed green glass, green sapphire, many green tourmalines, etc through the filter, they did not appear red as these stones were absorbing red color around 690nm.

BUT there are varieties of green flourite, green zircon and demantoid garnets which also absorb the yellow-green portion of the spectrum while transmitting red.

Subjective determinations were assigned to the Chelsea. "Colombian Emeralds appear more red".

OK....as a gemologist, I could easily and POSITIVELY separate all the gems listed above using a refractometer, polariscope and some magnification.

With the development of synthetic emeralds in the mid to late 20th century, it was observed that ALL synthetics appeared red when viewed through a Chelsea, as they were colored solely by chromium, thus absorbing in the yellow-green and transmitting the red.

It had been subjectively asserted, again, that these synthetics appeared "more red." Seriously?

Well, more filters were developed to separate natural and synthetic emeralds. Would I bet my professional reputation on the basis of subjective observations made with these filter reactions?

Not likely.

In addition, it is reported that some blue materials colored by cobalt appear red when viewed through a Chelsea. That is because cobalt can cause the absorption of the green portion of the spectrum, while allowing transmission of the red. This was considered useful in helping to separate synthetic cobalt colored blue spinel, blue cobalt glass, or doublets which may be confused with sapphire in the mid 20th century. But bear in mind, a sapphire containing chromium as a chromophore can also appear red, as can some natural blue spinel.Again, standard gemological testing equipment would be far more reliable.

Chelsea Filters were also used to help separate aquamarine and natural zircon from synthetic flame-fusion spinel (used extensively in "birthstone" jewelry}, as both of the former absorb the red portion of the spectrum and the synthetic spinel did not.

Again, is there anyone here who would need a filter to make that separation?

Over the years folks have tried to ascribe the Chelsea with vast diagnostic attributes it simply does not have.I think it is time to recognize that although a Chelsea may have been marginally (and I emphasize MARGINALLY) useful to the jewelry industry in the mid-20th century, it really has little professional benefit at this point.

Possible exception. Filters are confirmative, not determinative.

What does this mean?

If one has a parcel of stones, let's say, represented as aquamarine, and some of the stones appear RED when viewed with a chelsea, we have confirmed, they are not aquamarine.

BUT, we have neither determined what they are nor the identity of the rest of the stones in the parcel. They may be aqua.....they may not

Chelsea Filter Reaction

compiled by Cheryl Castner

The Chelsea Filter is a tool that helps confirm what something is NOT. It can not identify what something is. Use it with reservations, as all reactions should be confirmed with other more reliable gem identification instruments.

Stone	Reaction
Green Stones	
Alexandrite Red	
Aventurine Quartz	Reddish
Chrome Chalcedony	Red
Chrysoprase	Green
Demantoid Garnet	Reddish
Emerald (some Emeralds from South Africa and India may not show a Red hue, but remain Greenish)	Pink to Red
Enstatite	Green
Fluorite	Reddish
Glass (Paste)	Green
Hiddenite	Slight Pink
Jadeite	Green
Peridot	Green (Aqua Blue)
Sapphire	Green
Soude Emerald (the old type Soude emerald may show red)	Green
Stained Bowenite	Red
Stained Chalcedony	Red
Stained Jadeite	Red
Synthetic corundum (alexandrite effect) Red	Red
Synthetic emerald Strong	Red
Synthetic Sapphire	Red
Synthetic Spinel (some old types may show green)	Red
Tourmaline (Certain anomalous green tourmalines have been found to show Red – which would indicate chrome tourmaline)	Green
Tsavorite Ganet	Red
Uvarovite Garnet	Pink
Zircon	Reddish
Aquamarine	Distinctly Green
Red Stones	
Garnets, dark red, no fluorescence	Red
Garnet topped doublet , no fluorescence	Dark Red
Glass, paste, no fluorescence	Reddish
Ruby, natural and synthetic, strong fluorescence The natural and synthetic sapphire are indistinguishable under the color filter)	Red
Spinel, fluorescent	Red
Spinel, synthetic, fluorescent (pink synthetic spinel does not show a red color through the filter)	Red

Blue Stones	
Aquamarine Distinctive	Green
Garnet topped doublet	Greenish-blue
Glass, paste,	dark blue Red
Glass, paste, light	blue Greenish
Lapis lazuli	Weak brownish red
Sapphire, blackish (The Blue sapphire which shows a Purple color under artificial light, usually shows Red under the filter)	Green
Sodalite	Slightly brownish
Spinel	
Spinel, colored by cobalt	Red
Swiss lapis, greenish-blue	Greenish blue
Synthetic sapphire (The natural and synthetic sapphire are indistinguishable under the color filter)	Dark Greenish Blue
Synthetic Spinel,dark blue	Red
Synthetic Spinel, light blue	Orange
Synthetic Spinel, zircon color	Orange to Red
Synthetic Spinel, lapis lazuli color	Bright Red
Zircon	Greenish
Purple Stones	
Amethyst	Reddish
Violet Sapphire	Bright Red