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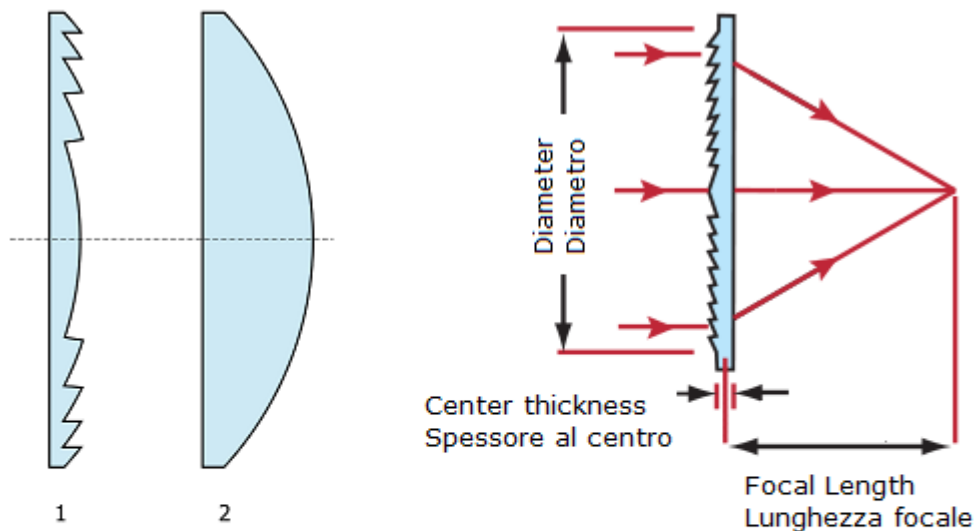


Fresnel\_Doc\_V01\_17\_En

## Fresnel lenses

Fresnel lenses consist of a series of concentric grooves etched onto one surface. Their thin, lightweight construction, available in small as well as large sizes, and excellent light gathering ability make them useful in a variety of applications. They are most often used in light gathering applications, such as condenser systems or emitter/detector setups.

The grooves in a Fresnel lens act as individual refracting surfaces, much like a group of tiny prisms. The grooved surfaces replace the continuous surface of a conventional lens into a set of surfaces with the same curvature.



1) Cross Section of a positive Fresnel lens  
1) Sezione trasversale di una lente di Fresnel positiva

2) Cross-section of a standard lens of equal diopter power  
2) Sezione trasversale di una lente standard di eguale potere diottrico



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They can also be used as magnifiers or projection lenses in illumination systems, and image formulation.

The Fresnel lens allows the construction of large-size and small optical focal length lenses without the bulk: the thickness and weight of the material needed to build them are lower than in a conventional spherical lens of equivalent dioptric power.

#### Groove Density

A lens's groove density is measured in grooves per millimeter. Higher groove density (more grooves per millimeter) results in better quality images with lower optical efficiency, while lower density lenses yield better efficiency and poorer images. Less-dense lenses are most suitable for light gathering applications, while high density ones are more suited for imaging and projection.

#### Fresnel Lenses datasheet

<b>IODA code</b>	<b>Back focal length</b>	<b>Lens base diameter</b>	<b>Weight</b>	<b>Center thickness</b>	<b>Edge thickness</b>	<b>Material</b>
FR_F15_D52_R	15mm	52mm	8 gr.	5mm	4,5mm	REVO-01
FR_F25_D54_R	25mm	54mm	12gr.	4,5mm	4mm	REVO-01
FR_F110_D96_R	110mm	96mm	22gr.	4mm	2,5mm	REVO-01
FR_F40_D114_R	40mm	114mm	82gr	11mm	3mm	REVO-01

These lenses are made of polyurethane optical, called REVO-01, which is a material developed by IODA in collaboration with Acomon (a Japanese multinational leader in ophthalmic monomers). This material allows the lens to last over time, being UV-resistant, and makes it suitable for both indoors and outdoors usages.

#### Historical Note

Augustin-Jean Fresnel — an early 19th century pioneer in the field of wave optics — is credited with the invention and application of grooved lenses. While working as a commissioner of lighthouses in France, Fresnel discovered that grooved lenses captured more oblique light than conventional ones, allowing lighthouse lights to operate more efficiently, use less material, and be visible over a greater distance.

Webpage: <http://ioda-it.com/product/fresnel-lenses/>