

# PFL Garnet Sands



**General:** Garnet is a naturally occurring mineral (Almandine) with very uniform physical chemical and microstructural properties. There are no free elements, all oxides are combined chemically as an iron rich aluminosilicate.

<b>Characteristics:</b>	Grain Shape	Blocky, angular, irregular, conchoidal.
	Specific gravity	4.10
	Bulk Density	2.20 to 2.30 tonne/m <sup>3</sup> (finest to coarsest).
	Hardness	7.5 - 8 Moh.
	Acid Solubility	Insoluble.

<b>Typical Chemical Analysis:</b>	SiO <sub>2</sub>	37%	(No free silica)
	Al <sub>2</sub> O <sub>3</sub>	21%	
	FeO	29%	
	ZO <sub>2</sub>	1%	
	TiO <sub>2</sub>	<1%	
	MnO <sub>2</sub>	<1%	
	CaO	2%	
	MgO	6.0%	

**Grades Available:** The most common sizes used in Water Filtration are 0.3 / 0.6mm and 1.4 / 2.36mm. However, almost any size between 0.1 and 3.00mm can be made for customers specific requirements.

**Quality Control:** Garnets are available that are certified for use in potable water systems. These special garnets do not release any toxic substances into the water supply.

**Packaging:** 25kg or 1.0 tonne bulk bags available.

- Specific Grades of Garnet:**
- High Specific Gravity gives more control during critical backwash operations, less media is lost to the overflow tanks.
  - Angular, grains yield more pore space than rounded grains. This gives improves the ability to clean the water and lengthens filter runs.
  - Garnet is a naturally hard, durable mineral so its breakdown rate is very small.

**Discussion:** Mixed media filtration has become widely accepted as a standard in high rate, high performance filtration technology. Mixed media used a combination of three or more materials to approach the coarse to fine grain configuration of the ideal filter. Development of high rate filtration began to overcome the disadvantages of rapid sand filter beds. Rapid sand filters are plagued by fast headloss buildup and a tendency to blind. Hydraulic grading during backwash moves the finest sand grains to the top of the bed, thus creating the headloss and blinding problems.

The 3-component mixed media filter solved the problems of the coal-sand filter whilst retaining its improved headloss characteristics. The 3-component filter, through its unique inverse void gradation provided for higher filtration rates, longer filtration runs and consistently higher quality than has been possible previously. Materials of differing size and specific gravity are intermixed coarse to fine in the filter bed, providing superior performance whilst maintaining a stable configuration, even after long periods of use in backwash. Introduction of a very fine high density media restored the stability and efficiency lost in the coal-sand filter by increasing the total media surface area in the bed.

In the ideal filter, media grain size should decrease uniformly in the direction of flow. This configuration provides an infinite series of progressively finer "screens" which remove increasingly smaller particles and distribute the captured solids throughout the entire depth of the bed. Maintaining coarse grains above finer ones and achieving the important size, requires the use of materials of different sizes and specific gravities.

Mixed media filtration technology is applicable to both water and wastewater treatment. Custom designed filters with varying filter bed configurations can be designed to meet specific customer needs. For the majority of municipal and industrial water supply applications, a filter bed composed of 55% low density material, 30% medium density material and 15% high density material by volume is recommended.