

Technical Data Sheet

Iron Reduction with Ferrous and Ferric Types Using Pyrolusite Media

For a 4.5" × 20" cartridge, there is no fixed gallon capacity. Pyrolusite acts mainly as a catalytic oxidation media rather than a conventional capacity-based adsorbent.

For an Atlas Filtri non-backwashing canister, a realistic service-life estimate is:

- Light iron/manganese loading (0.3–1 ppm Fe): 6–12 months
- Moderate loading (1–2 ppm Fe): 3–6 months
- Heavy iron or manganese (>2–3 ppm Fe): potentially only 1–3 months

A 4.5" × 20" refillable pyrolusite cartridge is recommended for applications with approximately:

- Iron: up to 2 ppm
- Manganese: up to 0.5 ppm
- Hydrogen sulfide: trace levels only (typically <0.5 ppm)

Beyond those levels, a backwashing Pyrolusite or other manganese dioxide media filter is generally the better long-term solution. This aligns with customer expectations for cartridge replacement intervals and avoids excessive pressure loss or frequent media changes.

The limiting factor will usually be pressure-drop buildup from trapped oxidized particles, not exhaustion of the Pyrolusite itself. In a properly designed backwashing tank, Pyrolusite can last many years because the media remains largely unchanged and accumulated solids are periodically removed.

Exact life depends primarily on the iron, manganese and H₂S concentrations, daily water consumption, pH, dissolved oxygen or oxidant feed, and flow rate. A Pyrolusite-filled cartridge should also be kept at a relatively low service flow because the media is extremely dense and normally designed for backwashing systems.

Oxidation using Pyrolusite is only the first step in removing iron. Once dissolved iron is oxidized, it becomes a solid particle that must be physically removed from the water using a sediment filter.

The process is as follows:

1. Dissolved ferrous iron (Fe²⁺) is clear and passes through most sediment filters
2. Pyrolusite catalyzes oxidation, converting ferrous iron to ferric iron (Fe³⁺)
3. Ferric iron precipitates into insoluble iron oxide ("rust") particles
4. Those particles must be filtered out mechanically

Assuming the Pyrolusite fully oxidizes the ferrous iron before the water reaches the filter, a 4.5" × 20" 5-micron melt-blown cartridge would typically last approximately:

Iron concentration	at 300 gallons/day	approximate life
0.5 ppm	Light loading	9–12 months
1.0 ppm	Light	4–6 months
2.0 ppm	Moderate	2–4 months
3.0 ppm	Moderate/heavy	6–12 weeks
5.0 ppm	Heavy	3–7 weeks

These are field estimates, not guaranteed capacities. Melt-blown cartridge manufacturers generally describe these filters as having high dirt-holding capacity but do not publish a standardized ferric-iron capacity. Replacement is normally based on differential pressure or iron breakthrough.

How the Estimate is Calculated

Oxidized iron does not remain as only the original weight of elemental iron. Once converted into hydrated ferric oxide or ferric hydroxide, approximately:

- 1 ppm of iron produces roughly 1.6–1.9 ppm of dry oxidized iron solids. The actual deposit can occupy substantially more filter volume because it is often hydrated, fluffy and gelatinous.
- 1.1 grams of elemental iron per day
- 1.8–2.2 grams of oxidized iron solids per day

A 4.5" × 20" depth cartridge may plug after capturing roughly 250–500 grams of this type of material, although the actual result varies significantly with particle characteristics and cartridge construction.

Check out all of Atlas Filtri's various solutions and kits to meet the application requirement for your filtration needs at atlasfiltri.com



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Atlas Filtri North America LLC
1068 North Farms Road, Building 3, Wallingford, CT 06492, USA
Office +1 (203) 284-0080 | email: atlasfiltrinorthamerica@atlasfiltri.com
A company of the Atlas Filtri Group, with headquarters and primary production in Italy, and an additional production site in the US.