

Wet Drum Magnetic Separators



Technical Details

The Wet Drum Magnetic Separator recovers magnetite and ferro-silicon in dense media plants for the scrap recycling and coal processing industries and is also used in iron ore beneficiation. Magnetite recovery commonly occurs in coal washing plants with ferro-silicon recovery an important stage in the heavy-media separation of secondary metals in scrap metal fragmentation plants.

The Wet Drum Magnetic Separator is a key part of a dense media plant, located after the density separation process to recover the heavy media (magnetite or ferrosilicon) for recycling and reuse. High percentage recoveries are vitally important due to the high cost of the media. Multiple stages of Wet Drum Magnetic Separation feature in coal washing plants and secondary metal heavy-media operations.

The Wet Drum Magnetic Separator features a strong, stationary permanent magnetic element mounted inside a revolving non-magnetic shell. The adjustable multi-pole ceramic ferrite magnetic element produces a high-flux, radial magnetic field (along the circumference of the shell), which maximises recovery to + 99.9%



Magnet System

This is the most critical part of any wet drum design; the permanent magnet unit involves the use of strontium or barium ferrite non-deteriorating ceramic magnets enclosed in stainless steel cases.

The wet drum separators have a multi-pole high flux gradient and Gauss value, ensuring maximum adhesion of magnetics to drum cover whilst tumbling the magnetics and releasing entrapped non-magnetics as the product passes over alternate (N/S) stationary poles within the drum. This ensures a clean magnetic product and minimum entrainment of non-magnetic and colloidal material.

The magnet system within the drum is adjustable radially to ensure the optimum setting for magnetics recovery and solids density and by shims allowing minimum clearance between drum cover and magnet, bringing the magnet poles as close as possible to the media slurry, ensuring maximum magnetic field strength in the separating zone of the unit.

Drum construction

The main cover is in stainless steel, as is the replaceable wearing cover - the drum can be rubber covered if required. Stainless steel end flanges have inner and outer seals ensuring the cover and flange joints are watertight.

Sealed-for-life proprietary flange bearings have grease nipples fitted and are protected from the slurry running down the flange by a simple radial cover.

An adjustment mechanism on the shaft allows the magnet system to be readily moved to the optimum setting before being locked in position.

Tank & Launder

Manufactured in stainless steel, the two-compartment header box ensures uniform feed to the drum.

The launder design depends on the type of process involved. A step feature ensures that the slurry impinges on the drum face directly, where the magnet is the strongest.

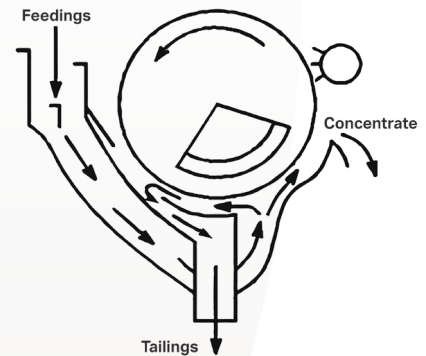
Drum Scraper, Spray Pipe and Spill Boxes

- Rubber scraper or an alternative of a spray pipe are fitted depending on application.
- Spill boxes for intermediate water supply are fitted when multi-drum installations are used.

Principle of Operation

A slurry containing the magnetic component is fed between the rotating magnet drum cover and casing.

The stationary magnet system, which has several radial poles, attracts the magnetic component to the drum face, and the rotating cover carries the magnetics from one magnetic pole to another at the same time, gyrating the magnetic particles and allowing entrapped non-magnetics to fall away back into the slurry mainstream, ensuring a clean magnetic product is discharged clear of the slurry tailings.



Tank Design

There are three basic tank designs:

Concurrent

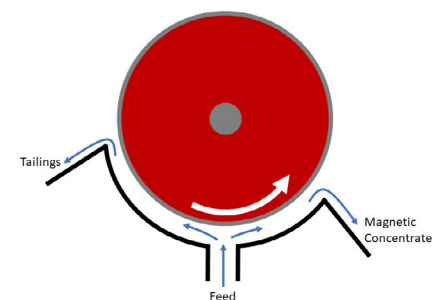
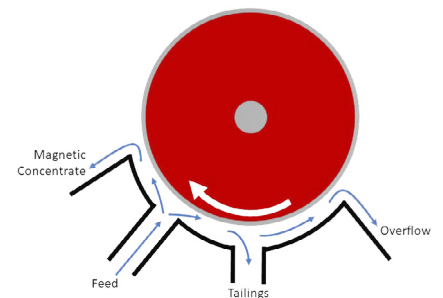
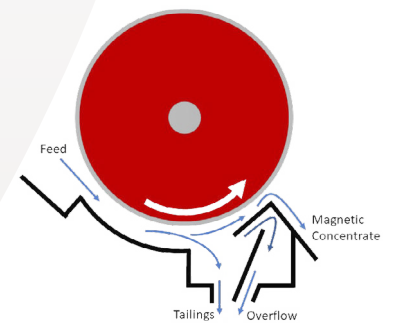
Concurrent tanks suit applications requiring high recoveries of medium with a high concentrate specific gravity. Also, the 'Concurrent' design enables the handling of slurries with particles up to 6mm in size. To maximise the recovery of magnetite or ferrosilicon, two Wet Drums work in series with the tailings from stage 1 feeding into the second Wet Drum.

Counter Flow

The Counter Flow design primarily caters for processes with surges in throughput. The tank configuration minimises magnetic material losses in slurries with a high magnetics content, especially when a clean concentrate is not of prime importance. Although the ideal material specification for this design is <math><0.5\text{mm}</math> (-30 mesh) with a solids content of 30-40% by weight, the Counter Flow configuration handles materials with particles up to 4mm.

Counter Current (Steffenson)

The Counter Current (Steffenson) tank produces a high-grade magnetic concentrate, with lost fine magnetics passing into the tailings which are then re-processed to maximise magnetics recovery.



Applications

Wet Drum Magnetic Separators can be used for increased efficiency in the following:

- Heavy media plants for recovery of magnetite or ferrosilicon.
- Iron Ore concentration
- Extracting ferromagnetic material from various slurries.
- Water Treatment Plants (Sirofloc Process)

Heavy Media Plants

Bunting Wet Drum Separators can process both dilute feeds direct from screens and concentrated feeds in coal plants. Our drums can deal efficiently with the variations in the amount of magnetite that occur due to high or low tonnage of coal in a constant volumetric throughput of slurry.

Magnetic recovery will be influenced by the percentage of solids and particle size distribution of the feed and the percentage of non-magnetics present relative to magnetics. Maintaining the slurry level whilst operating the separator is also critical, along with limiting surging. Excellent recovery figures of +99% can be achieved under the correct operating conditions.

Concentrate Specific Gravity

The separator can achieve concentrate-specific gravities for Magnetite 2.1 to 2.2 and ferrosilicon 2.9 to 3.0, but these can be affected by the amount of magnetics present, the position of the magnet element within the drum (which is adjustable) or the level of the slurry passing through the separator (which is most important).

Magnetic Concentrate Cleanliness

The percentage of magnetics in the feed can influence the cleanliness of the final concentrate as well as the presence of fine clays and colloidal matter (in waste water applications).

Iron Ore Concentration

Special tank designs are available for cobbing, roughing, and finishing operations in single and multiple stages.

Maintenance

As always, our equipment is designed with the purchaser in mind, being cost-effective initially and having minimum maintenance requirements so that downtime is always kept to a minimum.

We advise that certain items that are subject to wear, such as bearings and expendable covers, are kept in stock.

Planning

Designers are free to consult our engineering department whilst "planning in" plants, but in any case, they should bear in mind certain points, e.g., headroom for lifting the drum out of the casing and accessibility of the motor and at the opposite end of the shaft for magnet adjustment.

Multi-stage units may be necessary, and these are included in our range.

For more information on our full range of products please contact us on the contact details below.

BUNTING - REDDITCH
BURNT MEADOW ROAD, NORTH MOONS MOAT,
REDDITCH, WORCESTERSHIRE, B98 9PA
E-MAIL: SALES.REDDITCH@BUNTINGMAGNETICS.COM
TEL: +44 (0)1527 65858