

STEARNS "WPD" WET MAGNETIC DRUM SEPARATORS

APPLICATION

Wet drum separators are used in magnetic media recovery, purification of solids carried in liquid suspension and in iron ore concentration. Stearns has developed a specific line of separators for handling slurries developed in heavy media plants. These heavy media plants require:

1. Magnetic separators which recover magnetics contained in feed slurries as efficiently as possible, to reduce the per ton/media consumption of treated product to a minimum.
2. Recovery of magnetic solids in as clean a magnetic concentrate as possible, to keep the separating bath at a low viscosity, and to eliminate a misplaced product.
3. A high gravity magnetic discharge to eliminate, in many instances, the need for a densifier. A high gravity concentrate simplifies plant operation.
4. Trouble-free operation with minimum down time, minimum operator attention and minimum cost.



Available Features

- 30", 36" and 48" Diameters
- Drum Widths Up to 120"
- Con-Current or Counter-current Models
- Standard or High Gauss Magnet Assemblies
- Single or Double Drum Units
- Stainless Steel Wear Covers
- Direct Drive
- High Volume Models
- Self-Leveling Design

FACTORS INFLUENCING SEPARATOR SELECTIONS

Five basic factors influence proper selection of a magnetic separator in terms of drum diameter, magnetic width, and type of wet drum separator for use in a specific application. These are:

1. Volume of Slurry to be Handled
2. Percent of Solids in Rinse Slurry
3. Percent of Magnetics in Feed Solids of the Rinse Slurry
4. Required Magnetics Recovery Efficiency
5. Cleanliness Required in the Magnetic Concentrate Products



One of the features of Stearns magnetic separator is its ability to handle widely fluctuating fluids. Thus, applications can be found lying outside the service limits indicated. However, the limits outlined below are basic guide lines which assure efficient magnetic separator performance. These guide lines will indicate changes that can be made in existing plants to improve media recovery efficiency. Each factor must be considered jointly for each individual application.

FEED VOLUME*...Feed volume should not exceed 75 gpm/ft. of magnet width on a 30 in. diameter single drum separator. If feed volumes up to 90 gpm/ft. must be handled, a double-drum separator (rougher-scavenger model), in which the primary drum tailing and overflow product are sent to the secondary drum, should be applied. Efficient magnetic recovery cannot be expected at rates beyond 90 gpm/ft.

PERCENT SOLIDS IN FEED*...The ratio of magnetic solids to non-magnetic solids cannot be efficiently isolated from total percent solids in evaluating magnetic recovery. As a general rule, the limiting recommended feed solids in a media recovery circuit is 50%. Variations of the ratio of magnetics to non-magnetics solids within this solids range can produce many potential feed slurries. The recommended maximum percent of solids for a single drum separator is 15% for con-current separators, 20% solids maximum can be tolerated without losing magnetic efficiency. Beyond 20% solids double-drum separators (rougher-scavenger) are recommended. In cases where the feed slurry goes above 30% solids, which sometimes occurs when a cyclone is being used to thicken a dilute rinse slurry product, sufficient water should be added in the feed box of the primary separator to bring it down to the 30% solids figure.

% OF MAGNETICS IN FEED SOLIDS OF THE RINSE SLURRY*...The ratio to non-magnetic solids will influence the purity of the concentrated obtained. The non-magnetic content tends to deter magnetic cleaning when the non-magnetic to magnetic ratio exceeds 40% by weight. If the feed pulp is sufficiently diluted (below 20% solids), purity of the magnetic concentrate will not be seriously affected at the 40% figure. When the total solids figure exceeds 20%, and when the non-magnetic to magnetic solids ratio exceeds 40%, it is difficult to obtain a high purity concentrate. This lopsided condition usually occurs in plants using reclaimed water and is alleviated by pulp dilution; or by running the media through the magnetic separator while the plant is not running, thus further rejecting non-magnetics. A primary limitation in magnetic separator selection, influenced by percent magnetics in the solids, is the magnetic discharge loading on the magnetic separator. Single-drum 30 in. diameter con-current separators should be limited to 3 tph of magnetic discharge per ft. of magnet width. These magnetic discharge limits are suggested in line with good magnetic cleaning at good magnetic recovery efficiencies. Counter-current separators can retain magnetic recovery at a sacrifice in magnetic cleaning at a discharge rate 30% higher than the above figures. A double-drum magnetic separator will permit the magnetic discharge rate to increase to as much as 30% above the indicated single-drum rate. Optimum magnetic cleaning and recovery at this increased rate can be obtained with a double-drum separator with con-current primary drum and a counter-current secondary drum as indicated on Page 26 in Figure #4. The counter-current separator is selected when feed characteristics are variable as to tonnage of magnetic solids and feed volumes. Efficient washing of the drum must be provided at the magnetic discharge point to prevent carry over of the magnetics on the drum.

DOUBLE DRUM TYPE WPD SEPARATORS...Double Drum separators are available in two basic types, depending on tank configuration use: 1. Double con-current tank arrangement shown on Page 26 in Figure #3. 2. Con-current primary with counter-current secondary shown on Page 26 in Figure #4. Double drum separators will either: Give a higher magnetic recovery as compared to single drum units when operated at recommended 75 gpm/ft. 30" diameter or 95 gpm/ft. for 36" diameter volume; or will permit higher feed volumes while obtaining the same recovery as can be reached at lower rates on single drum separators.

* NOTE: Add 20% to the above volume on magnetic discharge rate for 36" diameter models.

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CON-CURRENT SINGLE DRUM TYPE WPD

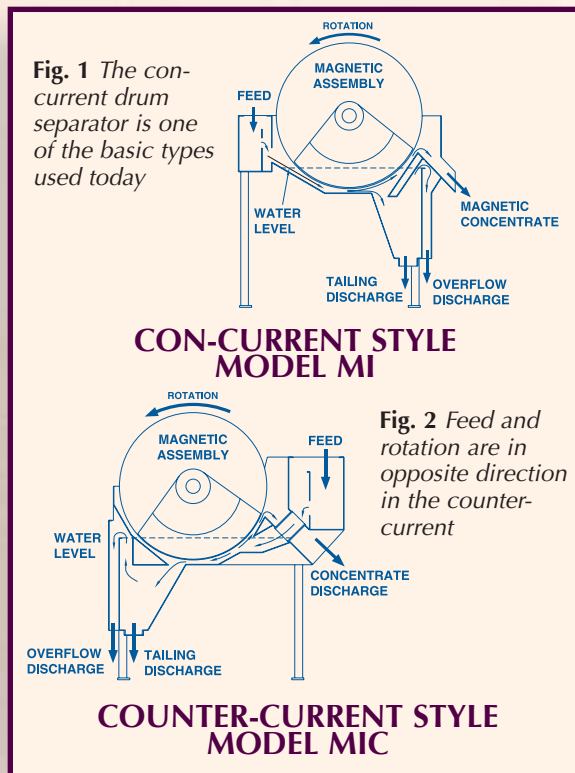
The con-current tank arrangement is shown in **Figure 1**. This separator is probably the most commonly used type in heavy media today. It gives:

1. Minimum wear on the cylinder, since it introduces the feed slurry in the same direction as the drum is traveling.
2. Maximum cleaning of magnetic solids since all recovered magnetics must traverse the full magnet arc and be subjected to numerous changes in magnet polarity.
3. Material passing wash spray is automatically returned to feed point, possibly of magnetic loss reduced.
4. Highest magnetic solids discharge since it produces best squeezing action at magnetic discharge point and can be operated with a minimum wash spray or with a drum wiper, if necessary.

COUNTER-CURRENT SINGLE DRUM TYPE WPD

The counter-current tank arrangement is shown in **Figure 2**. The counter-current separator's advantages include:

1. Maximum Magnetic Recovery, since the magnetics are recovered and transported a short distance into the magnetic discharge chute. Magnetics missed in the initial pick-up are scavenged out by the remaining poles of the magnet assembly. However, the short recovery zone does reduce the cleanliness of the magnetic concentrate.
2. Heavy Magnetic Loads can be handled without serious reduction of high magnetic recovery, due to the short transportation and scavenging features.
3. Less susceptibility to loss of magnetic efficiency at high feed volumes. Feeds as high as 80 gpm/ft. can be handled efficiently on this counter-current separator.
4. Magnetic discharge on feed side of separator. This sometimes makes plant layout easier.



OPTIONAL CONFIGURATIONS OF STEARNS WET MAGNETIC SEPARATORS

Fig. 3 Principles of operation of the double drum con-current wet type separator for magnetic media

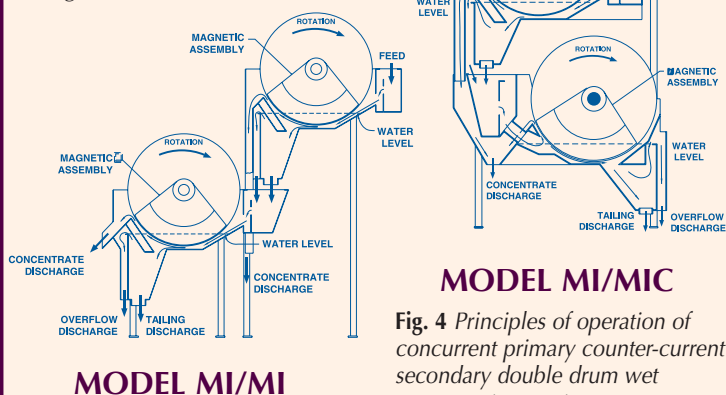


Fig. 4 Principles of operation of concurrent primary counter-current secondary double drum wet permanent separator

STEARNS HIGH VOLUME WET PERMANENT MAGNETIC DRUM SEPARATOR

Stearns' "HV"- High Volume, Wet Permanent Magnetic Separator is designed to handle the demands of increased production rates without adding additional drums to your circuit. The drum utilizes a wider arc magnet to increase retention time for maximum magnetic recovery. The interpole magnet arrangement allows for numerous polarity changes to improve the cleaning of recovered magnetics.

This high volume separator provides you with these features:

- Increased Capacity
- Maximum Magnetic Recovery
- Heavy-Duty Stainless Steel Construction on tank and feed box
- Low Maintenance