Performance Testing of Rare Earth Magnetic Tube Circuits

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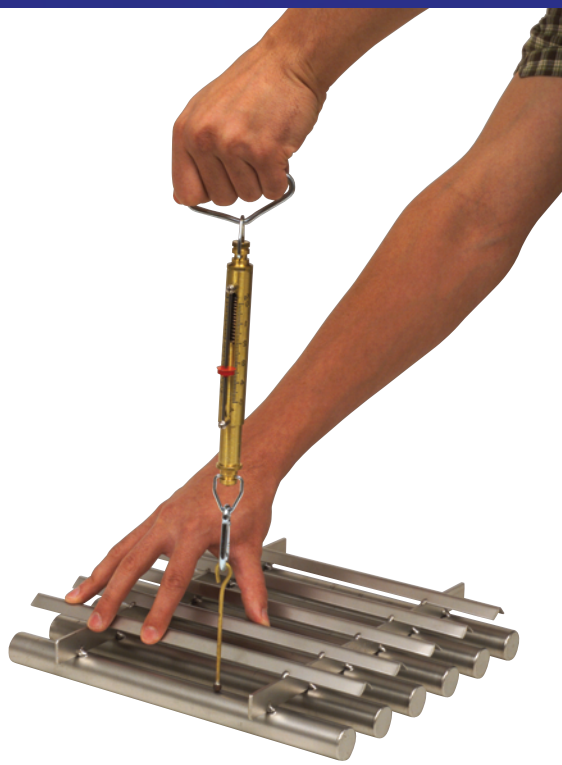
Testing Conducted March 2008

Test Results



Purpose

The research "Performance Testing of Rare Earth Magnetic Tube Circuits" commissioned by Eriez Magnetics and conducted by the Pennsylvania State University, Erie Campus in March of 2008. It is designed to determine which commercial tube magnets will provide the greatest opportunity to remove dangerous ferrous metal and weakly magnetic contaminants from process flows in industrial applications.

Methodology

To best measure overall performance, each magnet was Gauss tested and subjected to a Pull Test. The gauss readings were measured using an F.W. Bell Model 6010 Gauss meter with an axial probe. The Pull Test readings represent the force required to remove a 1/4-inch mild steel sphere from the tube surface. See page 4 for Terms and Definitions. All of the 10-inch tube magnets tested were purchased and received in October 2007.

Manufacturer	Std 1/4 in Steel Ball Pull Test	Gauss Test	Price*
Eriez RE6HP	105.8	11,827	$271.00
Bunting NHI	101.6	11,882	$403.00
McMaster Carr	94.7	11,599	$272.00
IMI	89.1	9,163	$284.00
Puratin	88.5	10,847	$241.00
MPI	78.4	10,378	$229.00
Cesco	70.5	9,150	$189.00
Ding's	61.4	8,363	$294.00
Bunting (NPB-Power Balanced)	51.5	6,262	$155.00

Note: Actual values may vary from tube to tube depending upon tube length and slight manufacturing variances.

*Data collected at the time of order.

Conclusion

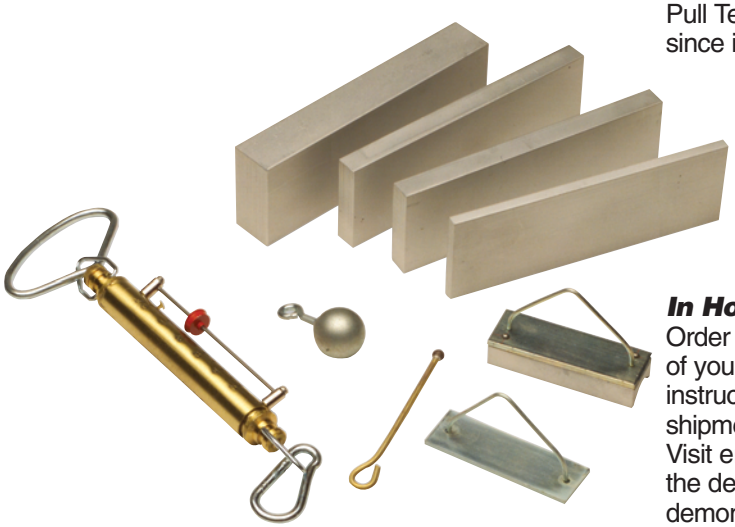
The ability to effectively remove ferrous metal and weakly magnetic contaminates from process flows depends on a number of factors… flow rates, particle size, magnetic equipment design (spacing and number of tubes) and others. In similar applications and equipment design, the single most important factor in removing these contaminants is the performance of the magnetic circuit.

These test results suggest Eriez' ***Xtreme™ Rare Earth*** magnetic circuits will provide the highest level of ferrous metal removal.

Magnet Testing & Selection

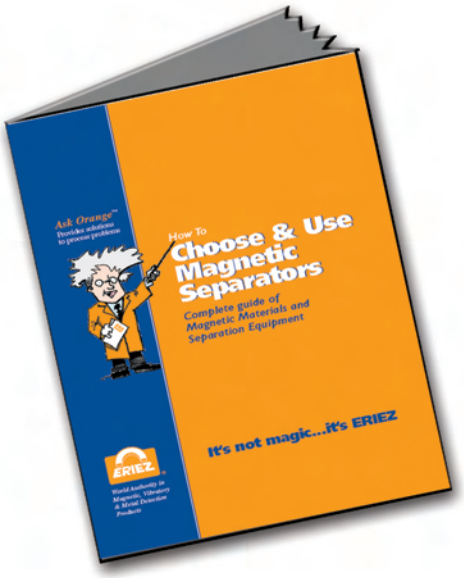
Year	1987	1992	1996	1999	2004
Pull Test Rating	24	50	70	80	95

*Pull Test value in ounces as measured with a 1/4-inch mild steel sphere



Check the Strength of YOUR own Magnets!
If your magnet is ten, five or even two years old, Eriez' new ***Xtreme*™ *Rare Earth*** magnets could be up to 3 times stronger than what you currently have installed! That makes a big difference in the magnet's ability to attract metal contaminates. The chart to the left shows Pull Test values of Eriez' rare earth magnetic circuits since introduced in 1987.

In House Pull Testing Kits
Order Eriez' Pull Test Kit and evaluate the strength of your current magnets. Test kits ship complete with instructions and are available from stock for immediate shipment through ***EriezXpress***™, part number 107121E. Visit eriez.com and click on the ***EriezXpress***™ icon to get the details. Or if you prefer, call Eriez and set up a live demonstration right in your plant.



The Ask Orange Series of How-to manuals provide solutions to process problems.

Free Booklet... How to Choose and Use Magnetic Separators
Complete guide of Magnetic Materials & Separation Equipment

Download your 16-page "How-to" manual and review magnetic materials, differences in dry, moist and liquid process applications and a complete overview of magnetic separation equipment. Get links to online calculators, diagrams and many free tools to simplify equipment selection.

Learn : The Power of Rare Earth Magnets
Proper Equipment Selection by Process
Time Saving Options and Helpful Hints

To receive Eriez brochures and other tools,
Go online to www.eriez.com
or call 888-300-ERIEZ (3743)

Terms & Definitions

Pull Test is a measure of force to remove a standardized piece of metal (1/4-inch mild steel sphere for tubes) from a magnet. This test is performed with a spring scale and is commonly used to evaluate magnet performance due to its ease of repeatability for testing and in house quality assurance verification. While Eriez uses gauss profiles and calculations in magnet design, all tube magnets are inspected to meet or exceed a specific pull test value prior to shipment. The Pull Test Values shown on page two are an average of the peak readings from around the tube circumference at multiple pole points along the tube length. Individual values may vary from tube to tube for any specific manufacturer due to slight manufacturing variances.

Gauss is a measure of "flux density" at some point on the tube magnet surface. A gauss meter and the appropriate probe measure flux per unit area through an element of area at right angles to the direction of flux. In other words, gauss is the number of flux lines in one square centimeter measured at a specific point on the tube surface. The Gauss values shown on page two are an average of the peak readings from around the tube circumference at multiple pole points along the tube length. Individual values may vary from tube to tube for any specific manufacturer due to slight manufacturing variances.

Pull Test and Gauss are two units of measure that evaluate magnet strength. Higher gauss does not necessary equate to higher pull test values as you can see in the Test Results and a specific gauss value does not calculate to a specific pull test value and vice versa. Eriez Rare Earth tube magnets are designed to maximize the pull test value on the tube surface and we would appreciate the opportunity to demonstrate our superior magnet performance with a FREE tube magnet demonstration at your facility.

Rare Earth Magnets

The term "Rare Earth" is a misnomer. It derives its name not because it is rare, nor because it is earth. It was named "Rare Earth" because part of its make-up is one of the Lanthanide elements of the Periodic Table between 57 and 71. There are 14 elements referred to as "The Rare Earth Elements." Samarium Cobalt was the first material used in the early 1980s followed by Neodymium Iron Boron. The early Neodymium Iron Boron circuits had an energy product of approximately 24 million gauss-oersteds (MGOe) and are now available in strengths over 40 MGOe.

Eriez' Rare Earth Material develops an extremely high surface force to enable the magnet circuit to remove very fine or weakly magnetic contamination such as rust scale or work-hardened stainless steel from a product flow.

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Manufacturing facilities in: Australia, Brazil, Canada, China, England, India, Japan, Mexico, South Africa, as well as the United States.