Magnetic Pull Test

Why test Magnetic Strength?
A magnetic pull test is a reliable method of determining the magnetic strength of a magnet. A magnetic pull test can be used in comparing two magnetic devices that look very similar on the outside. When testing magnet(s) for changes in performance, consistency must be maintained through thorough documentation. On some equipment, it is necessary to use a polarity indicator to determine the location and the midpoint of the internal magnetic poles so that the exact test location can be documented and replicated. Magnetic strength testing can be performed on magnets with round or flat surfaces and either permanent or electromagnetic circuits.

Principle
Pull strength is determined by using a calibrated scale and a ferrous test piece. A metal plate is used for plate magnets and conveying rail, and a metal sphere is used for magnetic tubes. The ferrous object is attached to the snap swivel hook on the scale and drawn away 90 degrees from the magnet until it is released. The pull strength or pounds of pull is read off the scale using the red breakaway readout indicator. It is important that each pull test be conducted with consistency to ensure that an accurate reading is achieved.

Test Surface Preparation
Clean the magnet surface of all tramp metal by using a rag to wipe the metal fines to a non-magnetic area or to one end of the magnet. The surface area to be used for the pull test must be free of any fine metal particles. Fine particles, whether ferrous or non-ferrous, will cause an air gap between the pull test piece and the magnet. Air gaps will reduce the value of the pull test. If suspended, move the magnet to a position of accessibility so that the test sphere or plate can be pulled away from the magnet at a 90° (degree) angle.

Test Kit Equipment

<table>
<thead>
<tr>
<th>Contents</th>
<th>Where to use it.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pc. Chatillon, Model IN-25MRPSVR</td>
<td>0-25 lbs. pull scale (Small Ball on Rare Earth)</td>
</tr>
<tr>
<td>1 Set of four Spacers (1/8” thick, 1” wide, 2” long stainless steel bar stock pieces) with thru holes on a key-chain.</td>
<td>Use for testing air gap in 1/8” increments on magnetic tubes, plates and rail.</td>
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<tr>
<td>1 pc. Ball on ring, 1” diameter</td>
<td>On surface of: Ceramic, tubes, pipe, plates and bullet magnets.</td>
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<tr>
<td>1 pc. Ball on ring, 1/2” diameter</td>
<td>On surface of: Ceramic or Rare Earth (see above).</td>
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<tr>
<td>1 pc. Ball on ring, 1/4” diameter</td>
<td>On surface of Rare Earth round products (tubes, pulleys, etc.).</td>
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<tr>
<td>1 pc. Round Test Plate (16 ga. x 3” dia.)</td>
<td>Ceramic or electromagnetic flat surfaces with Airgap.</td>
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<tr>
<td>1 pc. Polarity Tester</td>
<td>Used to determine if magnets are properly aligned. Magnetic rail should be N to N and S to S. Magnetic tubes should alternate NSNS.</td>
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<tr>
<td>Green Light (South)</td>
<td>Used to show gap between magnets, either air or pole pieces.</td>
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<tr>
<td>Red Light (North)</td>
<td>Used to measure magnet thickness and application areas.</td>
</tr>
<tr>
<td>1 pc. Magna View (4” x 4” green sheet)</td>
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<tr>
<td>1 pc. General 6” rule</td>
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</tbody>
</table>
Testing Procedures

1. Record the tester’s name, date, time, and ambient temperature on the pull test data sheet provided.

2. Select and record the proper scale, test piece and air gap (if needed). **TEST BALLS** should be used whenever possible to measure the strength of the magnetic field on the magnetic surfaces. Test plates are better suited for measuring magnetic strength at greater distances (air gap) from the magnetic face. **TEST PLATES** should always be centered, bridging from North to South Pole.

3. Attach the test device to the scale. Calibrate the scale by holding the scale vertically, then pulling the test device to the 3 to 4 pound range and release. Then reset the maximum readout pointer (red slide piece) to ensure it is at the zero mark. Adjust the pointer to the zero mark using the knurled calibrated screw as required. This procedure “clears” the scales and should be done prior to each magnet pull test.

4. Carefully position the spacer (if required) and the test device in the designated position on the magnetic face. **USE CAUTION:** do not allow hands or fingers to be pinched or trapped by the test piece.

5. Pull the scale slowly and firmly in a direction perpendicular (90°) to the magnetic face until the test device breaks away from the magnetic field. **USE CAUTION:** keep the direction of the pull away from head, body or other persons.

6. Record the peak reading measured by the scale.

7. Perform four more additional tests (for a total of 5) in the same location on the magnet. Throw out the highest pull and the lowest pull. Find the average of the remaining (3) pulls and record it on the Pull Test Data Sheet. This value (average) is your baseline for pounds of pull for this magnet.

Magnet Testing

**HOW TO TEST A MAGNETIC TUBE**

**Direct Surface Test**

PULL SCALE

TEST BALL

TUBE MAGNET

MAGNETIC POLES

PULL TEST ON TUBE MAGNET WITH TEST BALL AND NO SPACER

**Test with Air Gap**

1/8" Spacers

**HOW TO TEST A FLAT SURFACED MAGNET:**

**Direct Surface Test**

PULL SLOWLY AND FIRMLY

TEST PLATE

SPACER

PLACE MAGNET

MAGNETIC POLES

PULL TEST ON PLATE MAGNET WITH TEST PLATE AND SPACER

Place test plate on centerline of magnetic poles.

**Test with Air Gap**

1/8" Spacers
### Pull Test Kit

**DATA SHEET**

**TOLL FREE: 888.582.0821**

**MAKE COPIES OF BLANK FORM FOR FUTURE USE.**

Instructions: Record five (5) pulls. Thrown out the highest and the lowest pulls. Find the average of the remaining three (3) pulls and enter it in the “AVERAGE” column.

<table>
<thead>
<tr>
<th>TEST</th>
<th>Product</th>
<th>Description</th>
<th>Or Part No.</th>
<th>Tested By</th>
<th>Test Scale Used</th>
<th>Date &amp; Time</th>
<th>Ambient Temp.</th>
<th>Test Piece</th>
<th>Or Plate</th>
<th>Size &amp; Thickness</th>
<th>Airgap</th>
<th>Pull Test Results</th>
<th>Type</th>
<th>Range 1</th>
<th>Range 2</th>
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<th>Average</th>
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**MAGNET LOCATION:**

**LINE NAME OR NUMBER:**

**FILE NAME OR NUMBER:**

**TEST OR PART NO.:**

**DESCRIPTION:**

**REMARKS / OBSERVATIONS:**

- **FAIL**
- **PASS**

**DATE:**

**TIME:**

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**GROUP  IMI**

**TRAMP METAL**

**PULL TEST KIT • DATA SHEET**

**TOLL FREE: 888.582.0821**

**Established 1967**

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