A *short* GUIDE FOR

MAGNET SELECTION & VALIDATION

IN THE MILLING, POWDER & FOOD

PROCESSING INDUSTRIES

WITH REGARD TO

PULL TESTING vs GAUSS TESTING

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Presented by Active Magnetics Research Pty Ltd.

Consulting Reference - HACCP International and Food Safety Standard MAGSEP 1-2010

A *short* GUIDE FOR MAGNET SELECTION & VALIDATION WITH REGARD TO PULL TESTING vs GAUSS TESTING

How do I really know if my magnets are peak performers?

If the magnet in question is a final magnet I should first see if it conforms to HACCP International Food Safety Standard 0909MAGSEP 1-2010 - at least in terms of gauss and pole centres.

What are the measures of peak performance in order of importance?

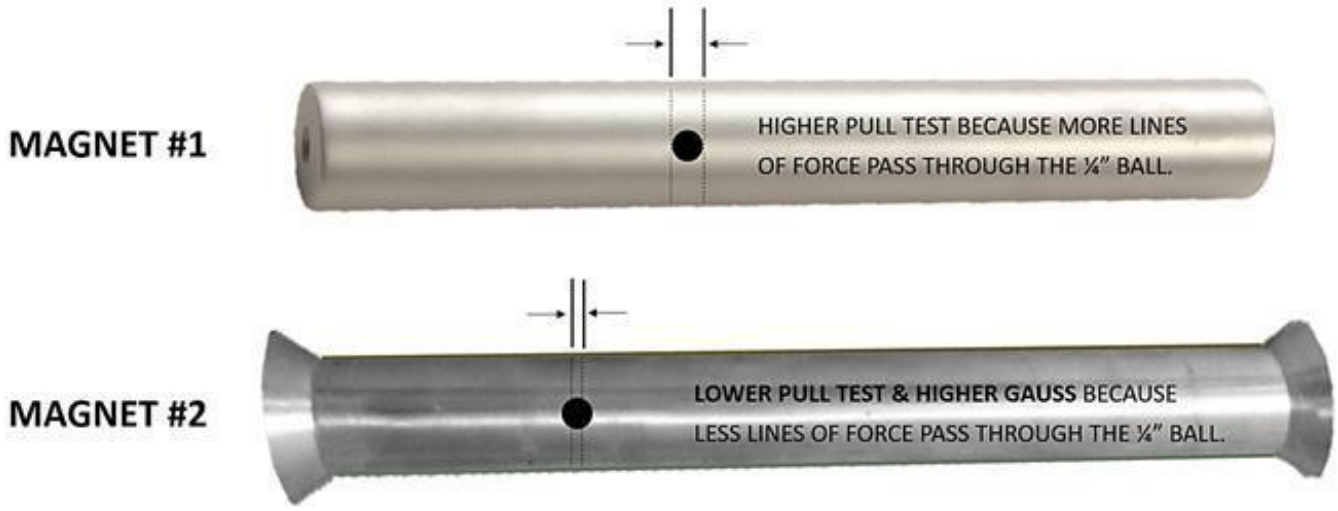
1) Most 10,000 gauss collection poles (22mm centres or less) in a given bar length
2) Longest linear length of collection poles per given bar length
3) Location to avoid downstream re-contamination (nearest to out loading or packing)
4) Sizing to magnetically cover the product stream without blocking
5) Best magnet strength retention measures as confirmed by certified magnet validations to detect decline from original strength
6) The magnet shape will efficiently retain magnetics extracted.
7) Easiest magnet to regularly clean of collected fragments to maintain separating efficiency of a clean magnet.

Consider installing additional 10,000 gauss magnets of final magnet standard at earliest intake positions to confirm ingredients are free of magnetics.
Best practice will also likely include magnets to remove bulk of magnetics such as SS & ferrous tramp, rust and magnetic stone to avoid machinery damage and grinding of larger magnetics to fine weakly magnetic particles which are harder to separate.

It should be remembered that Intermediate or contributing magnets help to avoid overloading of final magnets particularly where the packing magnet is of small dimensions.

Higher pull test readings are easily engineered, but performance does not necessarily equate with highest pull test readings! Please refer diagram 'A' below.

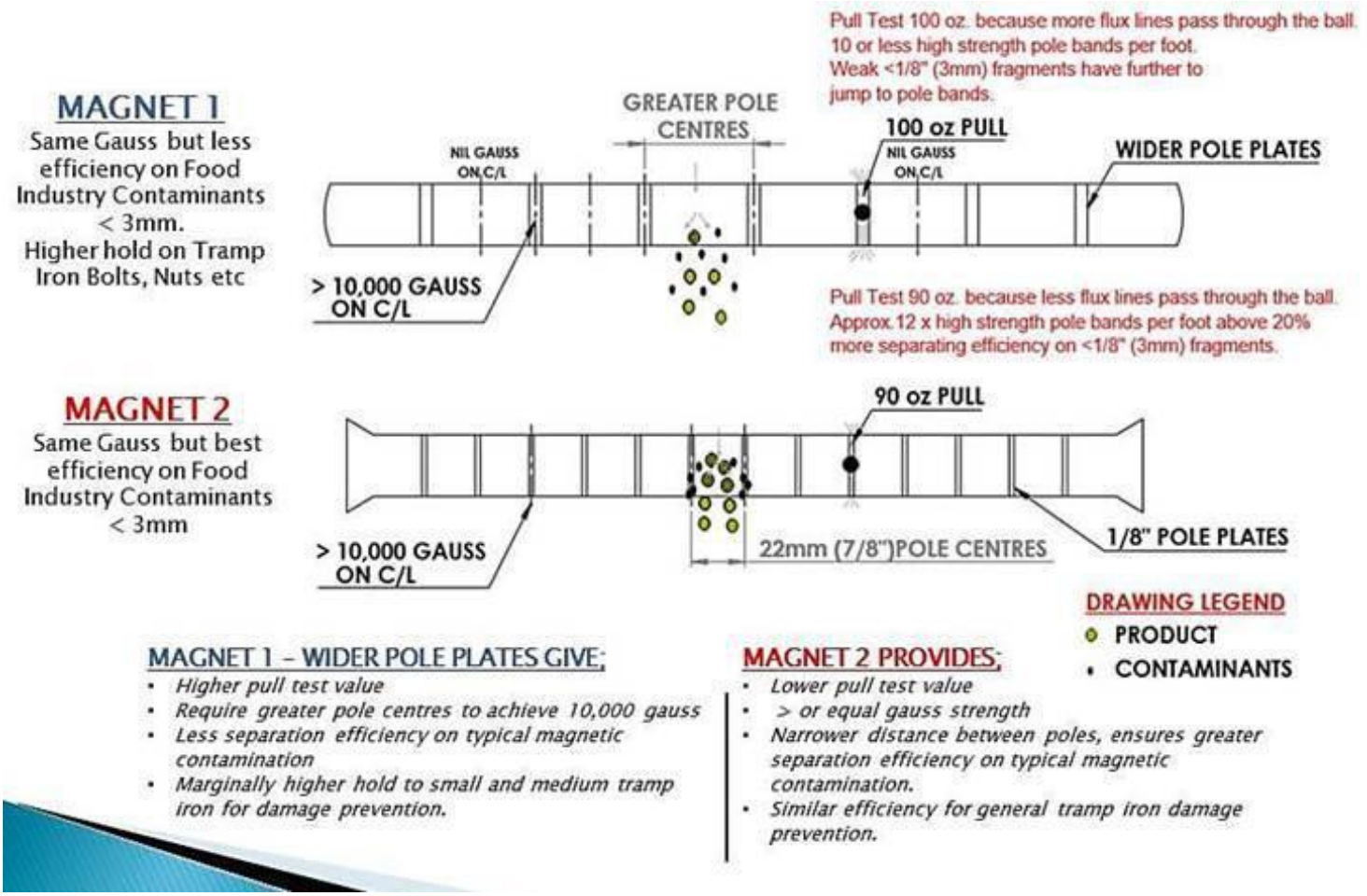
Diagram "A"



Explanation:

By widening the inner high permeability mild steel pole plate between 2 magnets in repulsion, we can easily elevate the pull test but this reduces the gauss flux density. The catch is that pole centres are then widened in order to achieve specified gauss. This results in the higher pull test tube being less efficient as depicted in more detail in Diagram 'B' on the following page.

Diagram "B"



The magnet with the highest pull test will hold ¼" and larger ferrous pieces to the magnet bar with marginally more force and may be selected for the highest performance where the magnet is not a "final magnet" or where the prime importance is to extract small to medium tramp iron for prevention of equipment damage.

Gauss tests instead of, or as well as, pull tests are related to potential performance of magnet installations. The gauss test is more quantitative, gauss /tesla being an S.I. unit.
Pull test in ounces can vary to show elevated readings if the width of pole plates is varied.

How do I know that original peak performing magnets have not lost effective strength since new?

It can be demonstrated that since introduction of the new calibrated digital pull testers such as available from Eriez, AMR other manufacturers, calibrated digital instruments (either pull testers or gauss meters) are both an accurate means of measuring and trending DECLINE in magnetic strength from new magnet ratings comparing the same magnet/s over time.

It is recommended in the 0909MAGSEP 1-2010 Standard that final magnets be tested at least once yearly using recently calibrated Gauss meter. The results of these tests can trend magnet strength decline and help to pinpoint early demagnetisation due to unforeseen factors.

Appended test results for Gauss and pull test confirm that pull in oz. is not an S.I. value, meaning there is not an equivalent ratio between gauss flux density and ounce pull over a variety of magnets. Martin Stone of HACCP International explains this is the reason pull test is not allowed in the Standard as basis for endorsed magnet validations.

Conclusion:

Food Safety Standard 0909MAGSEP 1-2010 for final magnets in a food related process correctly specifies final magnets should be a minimum of 10,000 gauss at 22 mm pole centres.

The most efficient magnet grate tube or bar for separating fine and weakly magnetic contamination is not the magnet showing highest pull test value. The most efficient magnet will have the highest gauss at shortest distance between pole band centres. The MAGSEP Standard currently excludes pull test instruments. However, HACCP INTERNATIONAL have confirmed that magnet validations using calibrated pull test instruments may be acceptable provided the first validation includes calibrated gauss values as per the Standard.

AMR Magnet Validation Reports can include both gauss and pull test values. AMR Magnet Validation Reports are certified by HACCP International and are available globally. Contact your nearest AMR representative or enquire via

E: info@amrconsulting.co or visit www.amrconsulting.co

For Magnet validations conforming to HACCP International Food Safety Standard 0909MAGSEP 1-2010, **look for the HACCP Certification Logo** as shown below.

Some other copyright titles available to AMR/Representatives and Food/Milling Industry Partners (conditions may apply).

- *The Full Guide for Magnet Selection & Validation with regard to Pull Testing vs. Gauss Testing, including test tables.*
- *Types and sources of magnetic contamination*
- *Instructions for pull testing*
- *Instructions for Gauss testing*
- *Types and sources of magnetic contamination*
- *Metal detectors in focus*
- *Causes of rare earth magnet strength loss*
- *Order form for MAGSEP Voluntary standard for final magnets in a food industry operating under a HACCP risk reduction program. This standard is available by order form from AMR or direct from HACCP International.*

CONSULTING REFERENCE:

HACCP International

North Sydney, Australia

www.haccp-international.com

USA REPRESENTATIVE FOR AMR:

D.L. Newslow & Associates

Florida, USA

www.newslow.com