ERIEZ MAGNETICS RESEARCH & DEVELOPMENT
TEST SUMMARY

April 25, 2012

METAL DETECTION: E-Z TEC

Sample No: None
MDR Number: 12-147
Technician: JDD

Department: Metal Detection
Eriez Contact: John Collins
Eriez Rep:

Contact Info:
Phone:

Company Information: Confidential

Material Characteristics:

Characteristic	Applicable Information
Type of Material:	**HDPE with 20% PolyMag Gray HSCP Pellets 135827**
Size:	≈ 0.125" x 0.125" x 0.06" ≈ 0.25" x 0.25" x 0.06"
Process Temperature:	Ambient
Wet/Dry:	Dry samples
Comments:	

Comments:

1. Twenty pieces of each size sample were provided.
2. These samples would be more difficult to detect in a dry non-conductive product; products with a phase out point around zero degrees. Larger Pieces could be detected where the magnitude of the contaminant is much larger than that of the good product. For the DSP metal detector this would be length detection.
3. Refer to **Table 1** below for the voltage magnitude of each sample and its equivalent mild steel test sphere sizes for each sample size of (PolyMag additive) when setup for a wet or conductive product with a phase out point around ninety degrees.
4. Liquid line systems typically are setup to detect between 0.5mm and 2.5mm mild steel test spheres depending on the pipe size and product signal.
5. Packaged products typically are setup to detect between 1.5mm and 4.0mm mild steel test spheres depending on the aperture size and the product signal.

Table 1:

	0.125" x 0.125" x 0.06"		0.25" x 0.25" x 0.06"	
Sample	µV Signal	≈ Fe Equivalent	µV Signal	≈ Fe Equivalent
1	47.2	1.2mm	120.9	1.7mm
2	32.7	1.0mm	127.0	1.7mm
3	40.3	1.1mm	148.5	1.8mm
4	38.9	1.1mm	115.1	1.7mm
5	36.2	1.0mm	141.0	1.8mm
6	35.8	1.0mm	122.6	1.7mm
7	37.0	1.0mm	127.3	1.7mm
8	26.2	1.0mm	111.0	1.6mm
9	37.5	1.1mm	129.0	1.7mm
10	36.0	1.0mm	105.0	1.6mm
11	27.2	1.0mm	109.9	1.6mm
12	48.9	1.2mm	119.9	1.7mm
13	38.6	1.1mm	130.7	1.8mm
14	32.6	1.0mm	128.7	1.7mm
15	53.1	1.2mm	125.6	1.7mm
16	27.5	1.0mm	114.0	1.7mm
17	35.7	1.0mm	138.4	1.8mm
18	42.9	1.2mm	120.3	1.7mm
19	48.6	1.2mm	119.4	1.7mm
20	38.3	1.1mm	122.0	1.7mm

Qualifiers:

1. These results are based on the information and sample(s) provided. If either should change, these results may be affected.
2. These results are expected in typical installations. Some installations may influence these results. All installation guidelines must be followed.
3. A power line conditioner for the metal detector should be considered if used on other existing equipment (i.e., computers, weigh scales, etc.) at the installation site.
4. All non-hazardous samples will be disposed within 60 days from the completion of the product tests, unless alternative instructions are given.

LOCATION: **2200 ASBURY ROAD ♦ ERIE, PENNSYLVANIA 16506 ♦ U. S. A.**
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PHONE: **814/ 835-6000** ♦ FAX: **814/ 838-4960**

Metal Detectable Plastic Application Considerations

Major restaurant chains are insisting that their food processing suppliers utilize plastic and rubber parts which are metal detectable. This has become part of many food processor's HACCP (Hazard Analysis Critical Control Point) program. The FDA considers hard objects, greater than .275" (7 mm) in length to present a choking hazard. As a result, food processors are using their existing metal detector inspection systems and metal detectable plastics to prevent plastic contaminated foods from reaching consumers.

Metal Detectors are highly sensitive instruments that create an electromagnetic field. When metal passes through this field, "detection" occurs and the offending product is isolated and rejected. The sensitivity of a Metal Detector is set up and verified by using a mild steel, brass or 300 series stainless steel sphere of different diameters. For instance a high sensitivity liquid line metal detector may be set up to detect a 1 mm mild steel sphere and larger.

Two methods of detection are used to identify metal contaminates: *length* detection and *phase angle* detection.

The amount of metal additive included in a plastic part and the size of the plastic piece determines how "detectable" the piece is based upon the *length* of the signal. Here are some typical plastic piece sizes, metal loadings and the size of the metal detection signal as compared to a mild steel sphere in wet food products.

Plastic Piece Size	Net Metal Loading	Mild Steel Sphere Equivalent
.12" x .12" x .12"	7%	1.0 mm
.12" x .12" x .12"	14%	1.2 mm
.12" x .25" x .25"	7%	1.8 mm
.12" x .25" x .25"	14%	2.0 mm
.25" x .25" x .25"	7%	3.2 mm
.25" x .5" x .5"	8%	4.2 mm
.25" x 2" x 2"	8%	>9.0 mm

Another consideration is "Product Effect". It is much easier to detect Metal Detectable plastic in wet or conductive food products. Detection in dry foods like flour is more difficult because the *phase angle* of the dry food and the metal detectable plastic is nearly the same. Oils, margarine, dry spices and frozen foods also have phase angles similar to metal detectable plastics. To detect metal detectable plastics in these food products the plastic piece must have a longer signal than the food product so a larger piece of plastic with a higher metal loading is required.

Here are some questions you should learn about the application.

- What is the food product? Is it wet or dry? Is it frozen when it is inspected by a metal detector?
- Does the product contain iron which produces a long signal i.e. enriched flour or beef?
- What sensitivity are their metal detectors set up for? What sphere size and material do they detect?
- How much product is in the Metal Detector aperture at one time? For instance a 50 lb bag of enriched flour produces a long signal so the plastic part needs more metal additive and a larger size.

The concentration or "let down ratio", of the FDA compliant metal detectable additives included in plastic or rubber moldings, can be changed to suit the demands of the food processor's application and metal detector sensitivity.

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PolyMag® Gray HSCP Data Sheet

This masterbatch additive imparts Magnetic Susceptibility, Metal Detectability and X-Ray contrast into a broad range of polymers.

1. **Eriez Item Number: 135827**
2. **Stainless Steel Content: 70% +/- 3%**
3. **Carrier: Ethylene Ethyl Acrylate**
4. **Pellet Style: Gala**
5. **Bulk Density: 75 +/- 8 Lbs/Ft^3 (untapped)**
6. **Ash Content: 70% +/- 3**
7. **Moisture Content: 0.1% Maximum, drying not recommended.**
8. **Color: Gray**
9. **FDA Compliant for food contact articles per CTS 75807**
10. **Packaging: 20 lbs per carton or 250 lbs per drum**

Revision Date: 12/16/11

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT & COMPANY IDENTIFICATION

PRODUCT NAME: PolyMag Gray HSCP & HSCPF Pellet

PRODUCT PART NUMBER: 135827, 139110

COMPANY IDENTIFICATION (USA):

Eriez Magnetics
2200 Asbury Road
Erie, PA 16514-0608

COMPANY IDENTIFICATION (EUROPE):

Eriez Magnetics Europe Ltd.
Bedwas House Industrial Estate
Bedwas, Caerphilly CF83 8YG UK

Information Phone in USA: 814-835-6000
Information Phone in Europe: 44-29-208-68501
Emergency Phone in USA: 814-835-6000
Emergency Phone in Europe: 44-29-208-68501

SECTION 2 – COMPOSITION & INGREDIENT INFORMATION

MATERIAL	CAS #	Percent	OSHA PEL mg/m^3	ACGIH TLV mg/m^3
Stainless Steel	12597-68-1	~ 70	0 (dust)	5.0 (fume)
Ethylene Ethyl Acrylate	9010-86-0	~ 30	NE	NE

SECTION 3 - HEALTH HAZARD IDENTIFICATION

PRIMARY ROUTE (S) OF ENTRY: INHALATION [X] SKIN [X] INGESTION [X]

EFFECTS OF OVEREXPOSURE:

INHALATION: Thermal decomposition products may produce nasal irritation and irritation to the upper respiratory tract. High concentrations may produce fluid in the lungs.

EYE CONTACT: Fumes and gases released during heating and decomposition of product may produce irritation and tearing. Contact could produce some mechanical irritation.

SKIN CONTACT: Chronic exposure to dust may produce primary irritation or allergic reaction and dermatitis.

SECTION 4 – FIRST AID MEASURES

INHALATION OF GASES, FUMES OR VAPORS: Remove to fresh air at once. Get medical attention if irritation develops, or if breathing becomes difficult.

SKIN CONTACT: Wash with soap and water. Wash all work clothes before wearing again. If any redness, swelling, itching or pain of the skin starts, seek medical attention.

EYE CONTACT (DUST): Immediately flush with large amounts of water for at least 15 minutes, holding eyelids open to rinse completely. Get medical help as a precaution.

SECTION 5 - FIRE FIGHTING MEASURES

COMBUSTION TEMPERATURE.....: NE
FLASH POINT.....: NA
AUTOIGNITION TEMPERATURE.....: NE
FLAMMABLE LIMITS.....: LEL - NE, UEL - NE
EXTINGUISHING MEDIA.....: Foam, CO_2, Dry Chemical, Water Fog

SPECIAL FIRE FIGHTING PROCEDURES: Wear full fire protective clothing. Use self-contained breathing apparatus. Evacuate personnel from area. Remove containers from fire if possible.

UNUSUAL FIRE & EXPLOSION HAZARDS: Avoid dust formation and control ignition sources. Product may burn or smolder if ignited. May produce toxic thermal decomposition products including carbon monoxide, carbon dioxide, nitrogen oxides, metal oxides and other hazardous compounds.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

SPILL OR LEAK CLEANUP PROCEEDURES: Contain spillage. Sweep or scoop spilled material and discard in a proper waste container. This material can form slippery surfaces on floors. Dispose of in accordance with federal, state and local regulations.

SECTION 7 - HANDLING AND STORAGE

DO NOT DRY THIS PRODUCT: It is not necessary

HANDLING AND STORING PRECAUTIONS: Use normal safe handling and good housekeeping practices when processing, storing or transporting this type of product. Keep containers closed.

SECTION 8 – EXPOSURE CONTROLS AND PERSONAL PROTECTION EQUIPMENT

VENTILATION: Where feasible, enclose processes to prevent dust dispersion into the work area. Provide local exhaust when possible, and general ventilation as necessary, to keep airborne concentrations below exposure limits and as low as possible.

HAND PROTECTION: Use impervious gloves such as neoprene, nitrile or rubber for hand protection.

EYE PROTECTION: Wear safety glasses with side shields and/or goggles as necessary to prevent dust from entering eyes.

OTHER PROTECTION: Use adequate work clothing and shoes to minimize the physical hazards associated with handling this material. Wash hands thoroughly after handling this material and before eating, drinking or smoking. Eye wash stations should be available to flush eyes if necessary.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT .....: NA
MELTING POINT.....: 207°F / 97°C
SOFTENING POINT.....: 190°F / 88°C
BULK DENSITY.....: ~75 lbs/ft^3 (1.2 g/cc) +/- 8 lbs/ft^3
PERCENT VOLATILITY BY VOLUME (%).....: NA
EVAPORATION RATE (Butyl Acetate = 1).....: NA
SOLUBILITY IN WATER.....: NA
APPEARANCE AND ODOR .....: Gray pellet with no distinctive odor
MOLECULAR FORMULA .....: NE

SECTION 10 – STABILITY & REACTIVITY

STABILITY: UNSTABLE [ ] STABLE [X]

INCOMPATIBILITY (MATERIALS TO AVOID): None expected. Possible incompatibility with strong oxidizing agents, strong acids, and strong bases.

HAZARDOUS DECOMPOSITION PRODUCTS: NE

HAZARDOUS POLYMERIZATION: MAY OCCUR ( ) WILL NOT OCCUR (X)

CONDITIONS TO AVOID: Avoid creating dusty conditions and exposure to open flames.

SECTION 11 – TOXICOLOGICAL INFORMATION

KNOWN HAZARDS UNDER 29 CFR 1910.1200:
Excessive dust/fume levels produce non-specific irritation of the eyes and respiratory system.

TOXICITY DATA: NE

LISTED AS A CARCINOGEN OR A POTENTIAL CARCINOGEN:

NTP Yes ( ) / No (X)
IARC Yes ( ) / No (X)
OSHA Yes ( ) / No (X)

SECTION 12 – ECOLOGICAL INFORMATION

ECO-TOXICITY: Non-toxic material has no known harmful effect on the environment.

SECTION 13 – DISPOSAL INFORMATION

WASTE DISPOSAL METHOD: Recycle or dispose of material according to local, state and federal requirements.

SECTION 14 – TRANSPORTATION INFORMATION

AIR, LAND & SHIP TRANSPORT: Product is not hazardous and dangerous goods identification is not necessary.

SECTION 15 – REGULATIONS

HIMS Rating: Health – 1, Fire – 1, Reactivity - 0

SECTION 16 – FURTHER INFORMATION

MSDS DATE: February 11, 2014
REVISION #: 6
SUPERSEDES DATE: 8/13/12
REASON FOR REVISION: Update section 14

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USER RESPONSIBILITY: A bulletin such as this cannot be expected to cover all possible individual situations. As the user has the responsibility to provide a safe workplace, all aspects of an individual operation should be examined to determine if, or where, precautions – in addition to those described herein – are required. Any health hazard and safety information herein should be passed on to your customers or employees, as the case may be.

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