

## Technical Specifications

Revised December 2018



**Product Name:**

BST XDETECT®

**Format:**

Granular Compound / Moulded Products

**Colour Availability:**

Blue, Green, Red, Pink, White, Black, Yellow, Orange

**Product Description:**

BST XDETECT is a polypropylene based thermoplastic co-polymer compound suitable for injection moulding. The compound is electromagnetically detectable, x-ray visible and can also incorporate silver ion antimicrobial technology for specific applications. The native properties of polypropylene make the compound strong and resistant against many chemical solvents, acids and bases.

High performance mechanical properties, in combination with extensive food contact approvals make the plastic ideally suited for products used in food, pharmaceutical, and other hygiene critical production environments.

XDETECT has benefited from over 25 years of technological refinement, making it one of the most advanced detectable compounds available on the market, with our latest version available in 8 high visibility colours.

By using items manufactured from XDETECT you are displaying due diligence and actively minimising foreign body contamination risks when used in combination with a correctly calibrated x-ray inspection or metal detection / rejection system.

# BST XDETECT® POLYPROPYLENE

FOOD GRADE METAL DETECTABLE & X-RAY VISIBLE PLASTIC

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## XDETECT Advantages:

- ✓ Detectable by in-line metal detection systems
- ✓ Detectable by in-line x-ray inspection systems
- ✓ Can optionally incorporate silver ion antibacterial technology
- ✓ Strong, durable & highly shatter resistant
- ✓ Fully compliant with EU & FDA food contact legislation
- ✓ Available in 8 vibrant colours for visual detection and colour co-ordination

## Product Materials:

**XDETECT 2.0** - Polypropylene base resin combined with a proprietary blend of food safe electromagnetically detectable and x-ray visible additives.

**XDETECT 2.0 with antibacterial technology** - Polypropylene base resin combined with a proprietary blend of food safe electromagnetically detectable, x-ray visible and antibacterial additives.

## Physical Properties:

<u>Property</u>	<u>Value</u>	<u>Test Methods</u>
Specific gravity	1.10 g/cm <sup>3</sup>	ISO 11183
Water absorption (at saturation, 23°)	0.02 %	ISO 62
Humidity absorption (23°/50% r.h.)	0.01 %	ISO 62

## Mechanical Properties:

<u>Property</u>	<u>Value</u>	<u>Test Methods</u>
Tensile strength (Max)	20 MPa	ISO 527
Elongation at break	>60 %	ISO 527
Flexural strength	25 MPa	ISO 178
Flexural modulus	1.2 GPa	ISO 178
IZOD impact strength, notched	10 kJ/m <sup>2</sup>	ISO 180 / 1eA
IZOD impact strength, unnotched	35 kJ/m <sup>2</sup>	ISO 180 / 1eU

## Processing Conditions:

The following are our general guidelines for successful injection moulding of BST XDETECT compound:

Drying Conditions (Dehumidifying Dryer):	2-4 Hours @ 80°C
Maximum allowable moisture content:	0.05 %
Melt Temperature:	200 - 260°C
Mould Temperature:	40 - 80°C
Screw Speed:	0.1 - 0.25 m/s
Back Pressure:	0 - 1.0 MPa
Injection Pressure:	Keep to a minimum
Injection Speed:	Fast Ram Speed
Hold Pressure:	Keep to a minimum



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## Chemical Resistance:

As a polypropylene based compound, XDETECT offers very good chemical resistance to most solvents, acids and bases when compared to other plastics. The below table rates this resistance on the following numeric scale:

- |                  |                                  |
|------------------|----------------------------------|
| 1) Excellent     | (No Attack)                      |
| 2) Satisfactory  | (No significant attack)          |
| 3) Not advisable | (Light attack, limited use)      |
| 4) Unsuitable    | (Significant Attack)             |
| 5) Unsuitable    | (Possible cracking & dissolving) |

## Acids

Product	Rating (20°C)	Rating (60°C)
Benzoic Acid	Excellent	Satisfactory
Boric Acid	Excellent	Excellent
Hydrobromic Acid 25%	Satisfactory	Satisfactory
Citric Acid	Excellent	Excellent
Hydrocyanic Acid	Satisfactory	Satisfactory
Hydrofluoric Acid	Satisfactory	Satisfactory
Phosphoric Acid 25%	Excellent	Excellent
Phosphoric Acid 85%	Excellent	Excellent
Phthalic Acid	Excellent	Excellent
Tannic Acid	Excellent	Excellent
Chromic Acid	Excellent	Satisfactory
Maleic Acid	Excellent	Excellent
Oleic Acid	Satisfactory	Not Advisable
Oxalic	Excellent	Excellent
Nitric Acid 5%	Satisfactory	Not Advisable
Nitric Acid 65%	Unsuitable	Unsuitable
Chlorhydric Acid 10%	Excellent	Excellent
Chlorhydric Acid 37%	Satisfactory	Not Advisable
Butyric Acid	Excellent	Excellent
Sulphuric Acid 10%	Excellent	Excellent
Sulphuric Acid 78%	Satisfactory	Unsuitable (4)
Sulphuric Acid 93%	Not Advisable	Unsuitable (4)
Tartaric Acid	Excellent	Excellent
Acetic Acid 10%	Excellent	Excellent
Acetic Acid 50%	Excellent	Excellent
Acetic Acid 75%	Excellent	Excellent
Acetic Acid 100%	Satisfactory	Not Advisable
Perchloric Acid	Excellent	Satisfactory



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## Bases

<u>Product</u>	<u>Rating (20°C)</u>	<u>Rating (60°C)</u>
Aqua Ammonia	Excellent	Excellent
Calcium Hydroxide	Excellent	Excellent
Potassium Hydroxide	Excellent	Excellent
Caustic Soda	Excellent	Excellent
Acidic Salt	Excellent	Excellent
Basic Salt	Excellent	Excellent
Neutral Salt	Excellent	Excellent
Potassium Bicarbonate	Excellent	Satisfactory
Potassium Permanganate	Excellent	Satisfactory
Sodium Cyanide	Excellent	Excellent
Natriumferricyanid	Excellent	Satisfactory
Sodium Hypochlorite	Satisfactory	Not Advisable

## Solvents

<u>Product</u>	<u>Rating (20°C)</u>	<u>Rating (60°C)</u>
Acetone	Satisfactory	Satisfactory
Aniline	Excellent	Excellent
Benzol	Not Advisable	Unsuitable (4)
Petrol	Unsuitable (4)	Unsuitable (4)
Butyl Alcohol	Excellent	Excellent
Ethyl Acetate	Satisfactory	Unsuitable (4)
Ethyl Alcohol	Excellent	Excellent
Ethyl Dichloride	Not Advisable	Unsuitable (4)
Ethyl Ether	Unsuitable (4)	Unsuitable (4)
Phenol	Satisfactory	Satisfactory
Formalin 37%	Excellent	Excellent
Heptanes	Not Advisable	Unsuitable (4)
Chlorobenzene	Not Advisable	Unsuitable (4)
Chloroform	Unsuitable (4)	Unsuitable (4)
Carbon Disulphide	Unsuitable (4)	Unsuitable (4)
Carbon Tetrachloride	Unsuitable (4)	Unsuitable (4)
Methyl Alcohol	Excellent	Excellent
Methylene Dichloride	Unsuitable (4)	Unsuitable (4)
Methyl Ethyle Ketone	Not Advisable	Unsuitable (4)



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Nitrobenzene	Not Advisable	Unsuitable (4)
Toluene	Not Advisable	Unsuitable (4)
Trichlore	Not Advisable	Unsuitable (4)
Trichlorethylene	Unsuitable (4)	Unsuitable (4)

## Gases

<u>Product</u>	<u>Rating (20°C)</u>	<u>Rating (60°C)</u>
Chlorine (damp)	Satisfactory	Unsuitable (4)
Chlorine (dry)	Satisfactory	Unsuitable (4)
Carbon Dioxide	Excellent	Excellent
Carbon Monoxide	Excellent	Excellent
Sulphur Dioxide (damp)	Satisfactory	Not Advisable
Sulphur Dioxide (dry)	Satisfactory	Not Advisable
Hydrogen Sulphide	Excellent	Excellent

## Antimicrobial Performance

BST XDETECT can optionally be moulded with SteriTouch® silver ion antibacterial additive. This technology offers continuous protection against cross infection, reducing the risk of spreading pathogenic germs such as MRSA, E.Coli and Salmonella. The antibacterial surface protection harnesses the natural sterilising properties of silver; when used, this protection is permanently embedded into the XDETECT product and will not wear off over time.

These antibacterial properties have been laboratory tested and proven to be effective against harmful bacteria and mould including but not limited to:

### Bacterium

*Bacillus Cereus*  
*Bacillus Subtilis*  
*Campylobacter*  
*Klebsiella Pneumonia*  
*Pseudomonas Aeruginosa*  
*Streptococcus Mutavs*  
*Streptococcus Pyogenes*  
*Vibri Parahaemolyticus*  
MRSA  
*E.Coli*  
Salmonella

### Fungus

*Aspergillus Niger*  
*Aureobasidium Pullulans*  
*Candida Albicans*  
*Cladosporium Cladosporioides*  
*Fusarium Solani*  
*Penicillium Funiculosum*

The antibacterial additive used in XDETECT complies with the relevant requirements of Regulation 1935/2004/EC (Framework Regulation), applicable to intermediate materials (e.g. plastic powders, plastic granules or plastic flakes) and also with the relevant requirements of Regulation 10/2011/EC (PIM), applicable to intermediate materials (e.g. plastic powders, plastic granules or plastic flakes).

The monomers and additives used to produce the antibacterial additive are listed in the Union List of Authorized Substances of Regulation 10/2011/EC. Dual use additives subject to restrictions in food as defined in Regulation 10/2011/EC are not intentionally used in the manufacture of or formulation of this product.



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## Antibacterial Laboratory Testing

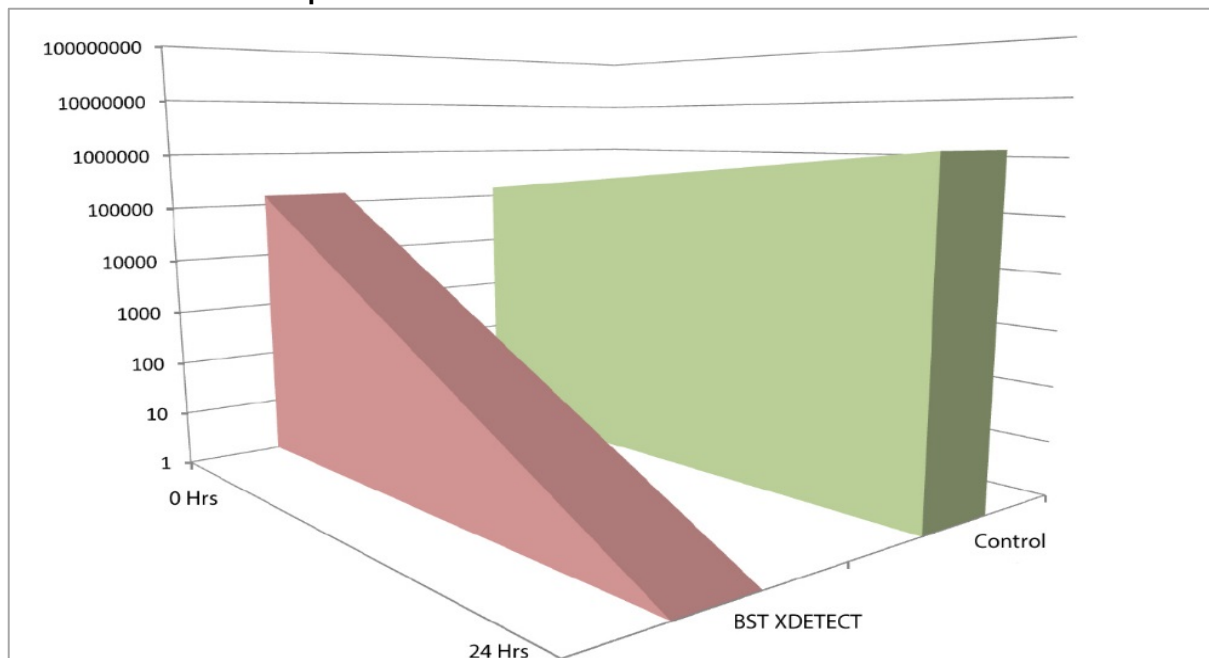
All testing is conducted by an independent laboratory using the JIS Z 2801:2000 test method. Where possible, all test materials are taken from samples of actual products. Samples typically measure 50mm x 50mm as specified by the JIS Z 2801:2000 method, although where this is impractical it is permissible to use smaller samples with the method being modified accordingly. Each test sample is inoculated with a suspension of the test organism (for example MRSA). The inoculum is held in contact with the test sample using a sterile polyethylene film. All test samples are inoculated in triplicate, with an additional three replicates of the control. The bacterial population on three control replicates is evaluated immediately following inoculation. This is assumed to be the initial population on all test samples. The remaining samples are incubated for the test period (typically 24 hours) at 35°C, at which time the bacterial population is evaluated.

Sample Material	Bacterium	CFU at 0 Hours	CFU at 24 Hours	Comparison
Control	Salmonella. enteritidis	150000	140000	N/A
BST XDETECT	Salmonella. enteritidis	150000	<10	99.999% reduction

Sample Material	Bacterium	CFU at 0 Hours	CFU at 24 Hours	Comparison
Control	MRSA	100000	470000	N/A
BST XDETECT A	MRSA	100000	<10	99.998% reduction
BST XDETECT B	MRSA	110000	<10	99.998% reduction
BST XDETECT C	MRSA	110000	<10	99.998% reduction

Sample Material	Bacterium	CFU at 0 Hours	CFU at 24 Hours	Comparison
Control	E. Coli	140000	11000000	N/A
BST XDETECT A	E. Coli	140000	<10	99.999% reduction
BST XDETECT B	E. Coli	140000	<10	99.999% reduction
BST XDETECT C	E. Coli	140000	<10	99.999% reduction

## Salmonella Results Graph



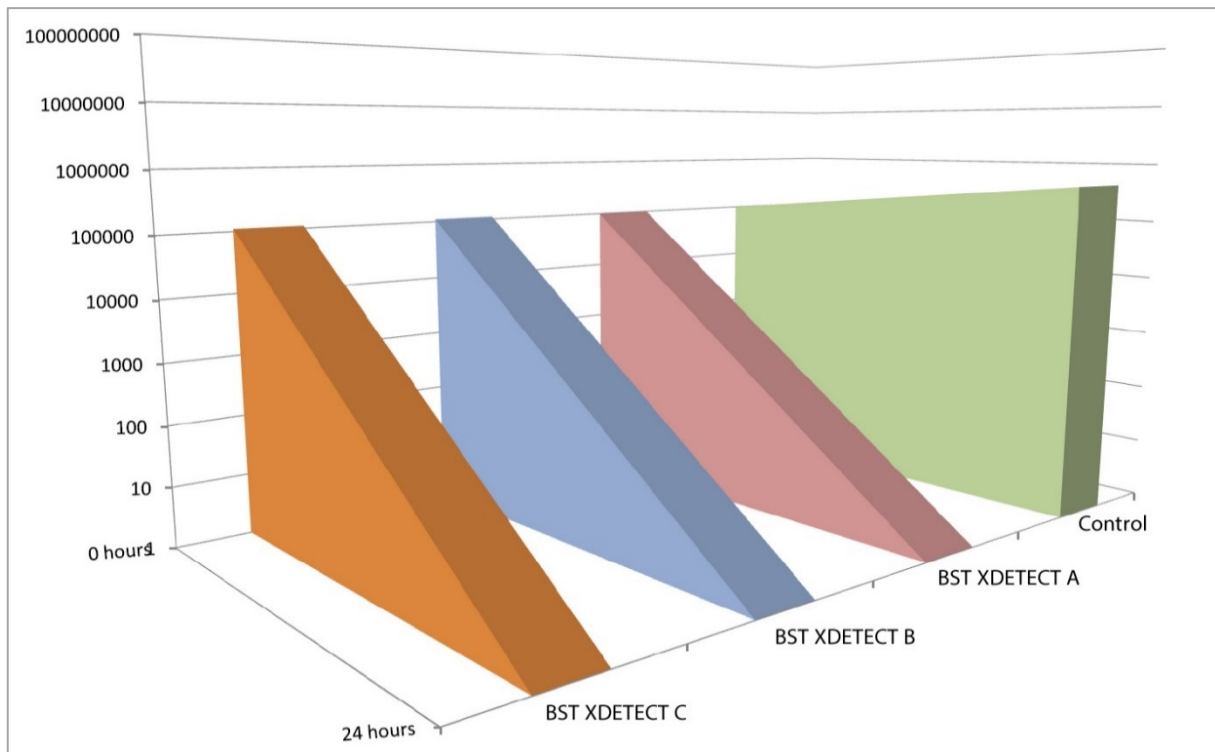


# BST XDETECT® POLYPROPYLENE

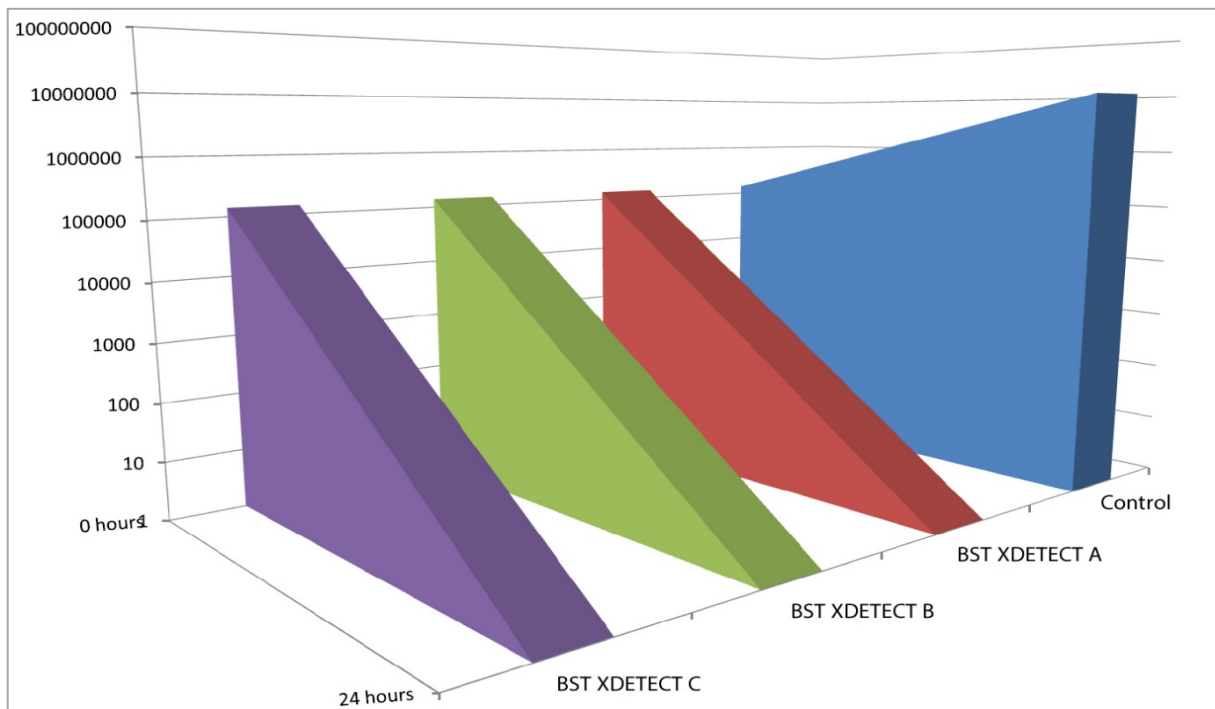
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**MRSA Results Graph**



**E. Coli Results Graph**



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## Food Contact Status

Hereby we declare that the material XDETECT in various colours is manufactured in line with the relevant requirements of 2023/2006/EC on good manufacturing practice (GMP) for materials and articles intended to come into contact with food. The raw materials used in the manufacturing process of the above mentioned materials can be considered suitable for food contact applications in terms of compliance with European regulations. The raw materials used meet the relevant requirements of EU Framework Regulation 1935/2004 as amended up to 202/2014/EC on materials and articles intended to come into contact with food.

All monomers, starting substances and additives used to manufacture these grades are listed in Commission Regulation (EU) No. 10 (2011) on plastic materials and articles intended to come into contact with food. Colourants used are compliant with European Council Resolution AP(89) 1 on the use of colourants in plastic materials coming into contact with food and also with German BfR Recommendations (IX).

XDETECT (various colours) is compliant with Directive 1895/2005/EC on the restriction of use of certain epoxy derivatives (BADGE, BFDGE, NOGE), since the latter substances are not intentionally used in the manufacturing process of XDETECT.

The following overall migration results for XDETECT sample plaques were obtained using a UKAS accredited laboratory, with the full report available upon request.

## Migration Testing

**Overall migration according to EU Commission Regulation (EU) No. 10 (2011) on plastic materials and articles intended to come into contact with food:**

Method	Simulant A (10% v/v Ethanol) (2 Hours @ 70°C)	Simulant B (3% w/v Acetic Acid) (2 Hours @ 70°C)	Simulant C (Olive Oil) (2 Hours @ 70°C)
Replicate #1	0.5 mg/dm <sup>2</sup>	0.1 mg/dm <sup>2</sup>	2.6 mg/dm <sup>2</sup>
Replicate #2	0.7 mg/dm <sup>2</sup>	0.0 mg/dm <sup>2</sup>	2.9 mg/dm <sup>2</sup>
Replicate #3	0.8 mg/dm <sup>2</sup>	0.2 mg/dm <sup>2</sup>	3.3 mg/dm <sup>2</sup>
Replicate #4	-	-	2.7 mg/dm <sup>2</sup>
Mean Result	0.7 mg/dm <sup>2</sup>	0.1 mg/dm <sup>2</sup>	2.9 mg/dm <sup>2</sup>
EU Limit	10.0 mg/dm <sup>2</sup>	10.0 mg/dm <sup>2</sup>	10.0 mg/dm <sup>2</sup>
EU Compliance	COMPLIANT	COMPLIANT	COMPLIANT

**Specific Migrations according to EU Commission Regulation (EU) No. 10 (2011) on plastic materials and articles intended to come into contact with food:**

Substance	Test Simulant	Test Temperature	Time	EU Limit	Result	EU Compliance
Barium	3% Acetic Acid	40°C	1 Hour	1000 µg/kg	146 µg/kg	COMPLIANT
Bis(2-ethylhexyl)phthalate DEHP	Olive Oil	40°C	1 Hour	1500 µg/kg	-	COMPLIANT
Bis(n-butyl)phthalate DBP	Olive Oil	40°C	1 Hour	300 µg/kg	-	COMPLIANT

## Statement of EU Food Contact Compliance

BST Detectable Products hereby declare that articles manufactured from BST XDETECT are, according to EU regulations, authorised to come into direct contact with all types of foodstuffs at a maximum temperature of 40°C for a maximum time period of one hour.

## Statement of USA Food Contact Compliance

The polypropylene base resin used in XDETECT meets the FDA (Food and Drug Administration) requirements contained in the Code of Federal Regulations – latest revision (1/4-2011) - in 21 CFR 177.1520 (a) (3) (i), (b) and (c) (3.1a).

At the same time this base resin grade meets the FDA criteria in 21 CFR 177.1520 for food contact applications, excluding cooking, listed under conditions of use C through H in 21 CFR 176.170 (c), Table 2., and can be used in contact with all food types as listed in 21 CFR 176.170 (c), Table 1. Also the mineral additives and the pigments used are GRAS (Generally Recognized As Safe) or are FDA cleared under specific FDA citations.





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## Metal Detectability (FOR GUIDANCE ONLY)

BST XDETECT is an electromagnetically detectable and x-ray visible plastic compound. The metal detectability of this compound will vary based on, but not limited to the following factors:

- Detector Calibration Levels
- Food Product Type / Effect (E.g. Wet, Dry, Frozen, Liquid)
- Detector Aperture Dimensions
- Contaminant Orientation

For this reason BST recommend that all our products be thoroughly tested on your metal detection systems by a trained and certified professional. It may be the case that your equipment needs to be recalibrated in order to reliably detect this product. Such a professional should be available by contacting the manufacturer of your metal detection system. XDETECT samples gave following test piece equivalent readings when tested through the geometric centre of an Anritsu KD8124AW coaxial metal detection system with a 95 x 450 mm aperture:

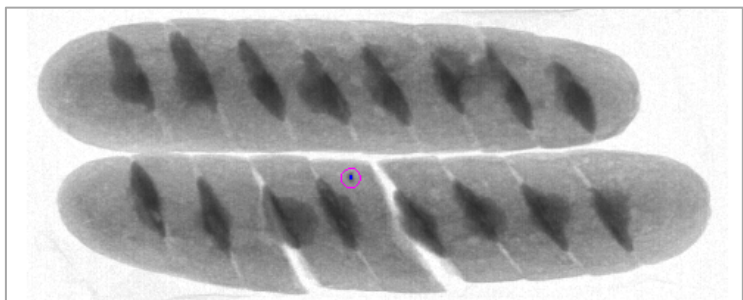
XDETECT Contaminant Size	Advised Minimum Ferrous Sensitivity for Detection
4.0 mm <sup>3</sup> Cube	2.0 mm FE
6.0 mm <sup>3</sup> Cube	2.5 mm FE
7.0 mm Ø Sphere	2.5 mm FE
8.0 mm <sup>3</sup> Cube	3.5 mm FE
11.0 mm Ø Sphere	4.0 mm FE

Although designed to be detected as a ferrous contaminant, XDETECT will also trigger smaller readings as a non-ferrous and stainless steel contaminant. Please note that the above information is for guidance only, and performance will vary.

## X-Ray Visibility (FOR GUIDANCE ONLY)

In contrast to metal detection, x-ray visibility is determined by material density. For this reason, XDETECT contains an additional, evenly dispersed, food safe, high density additive.

Based on our experience and testing, positive readings should be consistent for XDETECT fragments as small as 5mm<sup>3</sup>. X-ray detection performance will be reduced when small fragments are buried in deeper, denser products. **Detection will depend on product type and density.** This screenshot shows a 5mm<sup>3</sup> XDETECT fragment through a popular x-ray inspection system, inside a packaged garlic bread product.



We highly recommend that all our products be thoroughly tested on your x-ray inspection systems by a trained and certified professional. It may be the case that your equipment needs to be recalibrated in order to reliably detect this product. Such a professional should be available by contacting the manufacturer of your x-ray inspection system.

## DISCLAIMER

The information provided in this product specification sheet is based on our experience and knowledge to date and we believe it to be true and reliable. This information is intended as a guide for your use of our products, the use of which is entirely at your own discretion and risk. We, BS Teasdale & Son Ltd, cannot guarantee favourable results and assume no liability in connection with the use of our products. © 2014 BS Teasdale & Son Ltd. All Content, Data & Images are owned by BS Teasdale & Son Ltd and are protected by international copyright law.

