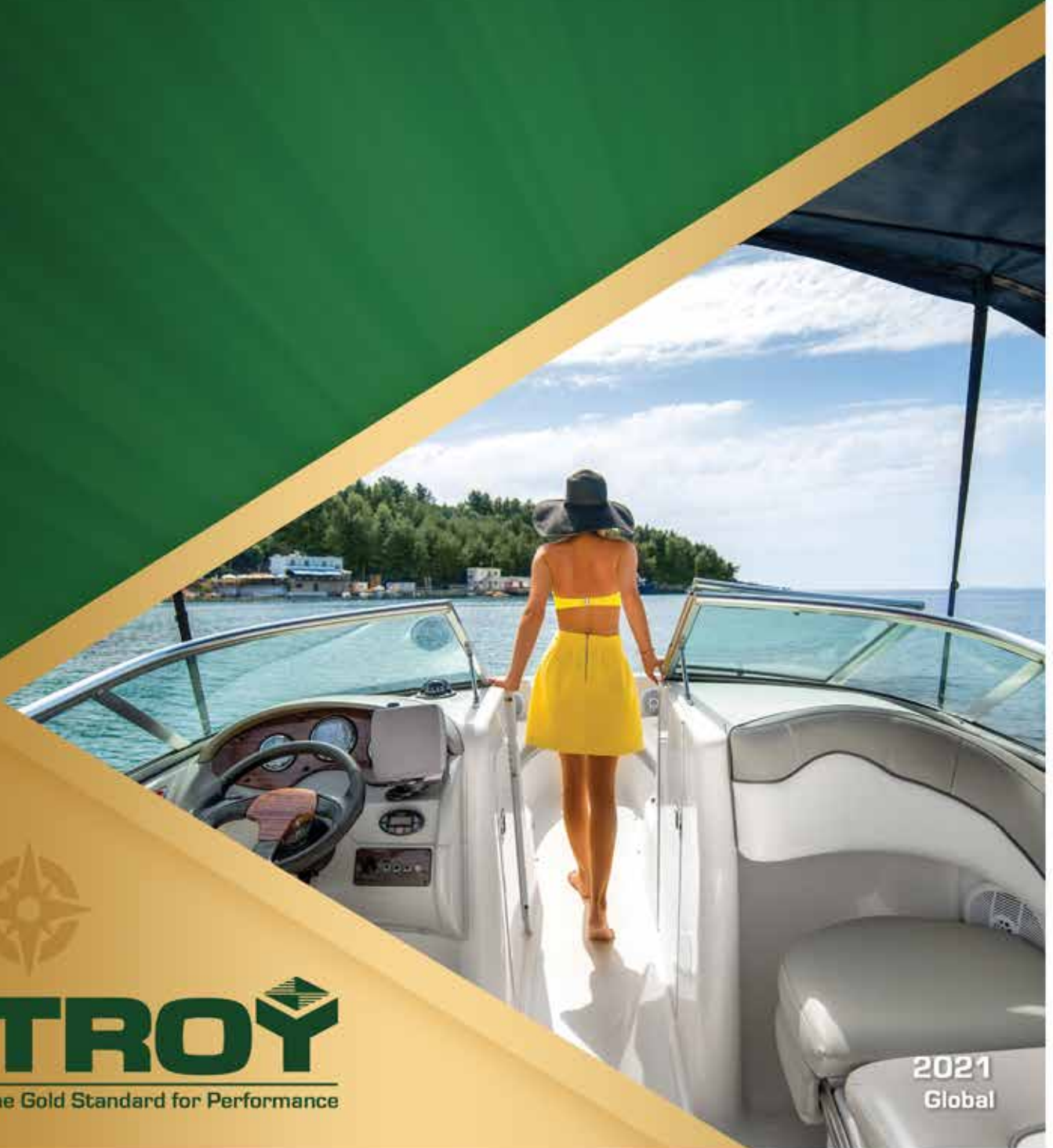


Antimicrobials for Plastics

A FULL PORTFOLIO OF ADVANCED SOLUTIONS



TROY

The Gold Standard for Performance

2021
Global

Troy Micropel® & Plastiguard® Product Line Selection Guide



Troy and Plastics Introduction

Troy Antimicrobials for Plastics

Troy manufactures antimicrobials engineered for the protection of PVC and other plastics from microbial growth, including bacteria, fungi, mold, and mildew. Troy offers advanced Micropel® and Plastiguard® antimicrobials based on a variety of leading active chemistries, ensuring formulating flexibility, regulatory compliance, and excellent performance at low cost-in-use. Micropel® and Plastiguard® antimicrobials are designed for use in flexible PVC, polyurethane, and silicone-based polymers for a wide range of end-use applications.

Advanced Micropel® and Plastiguard® Antimicrobials Bring Performance & Value

Troy Corporation is committed to its continuing support of OBPA-based biocides for plastics applications in the United States and Canada. OBPA use continues to grow in North America, and remains the preferred active in PVC due to its superior efficacy and low cost-to-treat. As the only supplier to support OBPA's US EPA registration, Troy continues to see strong and steady demand for OBPA from flexible PVC manufacturers. Troy offers customers a full line of Micropel® antimicrobials for plastics based on proven OBPA technology.

Troy offers biocides for a number of Product Types as classified by the European Biocidal Products Regulations (BPR). For Product Type 9* applications, Troy offers the Plastiguard® series of antimicrobials based on Folpet chemistry, which has an optimistic regulatory future in the European market. With unique features such as long-term weatherability characteristics and efficacy against mold, mildew, and bacteria, Folpet-based Plastiguard® is at the forefront of antimicrobial protection for flexible PVC.

Troy is committed to developing unique solutions for the PVC market and meeting global requirements for compliance and sustainability.

In This Brochure...

You will find the complete global portfolio of Troy antimicrobials for plastics and engineered coated textiles. Included are both the Micropel® and Plastiguard® product lines. Product Selector tables in this brochure are presented by active chemistry, as follows:

- OBPA
- Folpet
- Isothiazolinone
- IPBC

Please note that biocide usage is regulated by local governmental agencies. Ask your Troy representative about products available in your local market.

Following the Product Selector tables, you will find a brief discussion on the numerous value-added services Troy offers its customers.

For more information, please visit www.troycorp.com, or contact your Troy representative.



** EU BPR Product Type 9 refers to the category of biocides for plastics, polymers, rubber, and textile applications.*

OBPA-Based Protection

Product Name	Chemical Active	Performance	Typical Use Range (% w/w)	Physical Form	Key Benefits
Micropel® 5DIDP	OBPA	Broad-Spectrum	0.6-1	Liquid	Optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 5DINP	OBPA	Broad-Spectrum	0.6-1	Liquid	Optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 5DOTP-IDA	OBPA	Broad-Spectrum	0.6-1	Liquid	Non-ortho phthalate, optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 5DOTP-BZA	OBPA	Broad-Spectrum	0.6-1	Liquid	Non-ortho phthalate, optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 5ESO	OBPA	Broad-Spectrum	0.6-1	Liquid	Phthalate-free, optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 5PPG	OBPA	Broad-Spectrum	0.6-1	Liquid	Phthalate-free, optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 5PVC	OBPA	Broad-Spectrum	0.6-1	Pellet	Phthalate-free, optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 5PVC-PF	OBPA	Broad-Spectrum	0.6-1	Pellet	Phthalate-free, optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 5 911P	OBPA	Broad-Spectrum	0.6-1	Liquid	Optimal weatherability, ideal for cold climates, suitable for clear applications, zones of inhibition in tests
Micropel® 2DIDP	OBPA	Broad-Spectrum	1.5-2.5	Liquid	Optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 2DOTP-IDA	OBPA	Broad-Spectrum	1.5-2.5	Liquid	Non-ortho phthalate, optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests
Micropel® 2ESO	OBPA	Broad-Spectrum	1.5-2.5	Liquid	Phthalate-free, optimal weatherability, withstand marine conditions, suitable for clear applications, zones of inhibition in tests

Please note that biocide usage is regulated by local governmental agencies. Ask your Troy representative about products available in your local market.

OBPA is the most cost-effective, efficacious antimicrobial active available, outperforming all current alternatives for the flexible PVC market. Additionally, OBPA is the only active molecule capable of adequately protecting flexible PVC from fungal attack and effectively preventing pink staining caused by the *Streptovorticillium reticulum* bacteria. OBPA has a long history of effective and economical protection of flexible PVC. Its use in the North American market continues to grow.

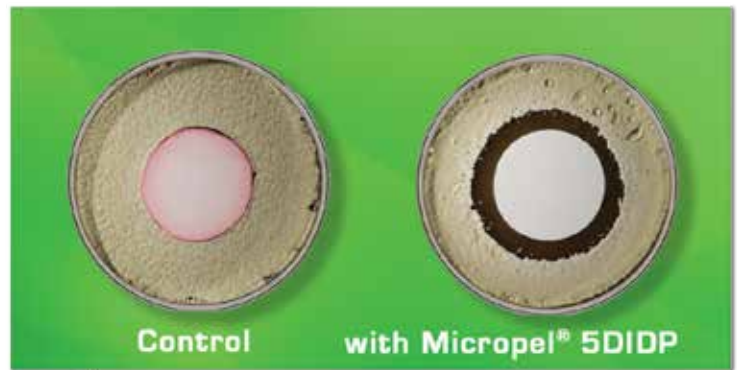
Benefits of OBPA

- Thermal and UV stable
- Wide spectrum performance against bacteria and fungi
- Effective against *Streptovorticillium reticulum*
- Effective range between 150-500 ppm
- Offers the lowest cost-to-treat

PVC Applications					Other Non-PVC Applications							Product Name
PVC Compounds	PVC Coated, Laminated & Expanded Fabric	PVC Co-Extruded Fibers	PVC Waterproof Membrane	Vinyl Floorcovering & Wallcovering	Silicone Sealants	PU-Based Sealants	Adhesives	PU Coated Fabrics	PU Foams	PU Roof Coatings	Rubber	
✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	Micropel® 5DIDP
✓	✓		✓	✓	✓	✓	✓	✓				Micropel® 5DINP
✓	✓			✓								Micropel® 5DOTP-IDA
✓	✓			✓								Micropel® 5DOTP-BZA
✓	✓	✓		✓								Micropel® 5ESO
	✓				✓	✓	✓	✓	✓	✓	✓	Micropel® 5PPG
✓		✓	✓									Micropel® 5PVC
✓		✓	✓									Micropel® 5PVC-PF
✓			✓									Micropel® 5 911P
✓	✓		✓	✓	✓	✓	✓	✓			✓	Micropel® 2DIDP
✓	✓			✓								Micropel® 2DOTP-IDA
✓	✓	✓		✓								Micropel® 2ESO

Micropel 5DIDP

- Excellent performance at low use levels
- Broad spectrum, long-term protection
- Effective against bacteria & fungi
- Prevents premature product failure due to microbial growth
- Resists pink staining in ASTM E1428



ASTM E1428

Folpet-Based Protection

Product Name	Chemical Active	Performance	Typical Use Range (% w/w)	Physical Form	Key Benefits
Plastiguard® F11	Folpet	Antifungal	0.3-1.5	Powder	Phthalate-free, good weatherability, low migrating properties, suitable for outdoors, non-volatile, EU and REACH compliant
Plastiguard® 642VP	Folpet IPBC	Antifungal	1-3	Pellet	Isothiazolinone-free, phthalate-free universal carrier, PVC-free, good weatherability, low migrating properties, suitable for outdoors, EU and REACH compliant
Plastiguard® 73L	Folpet IPBC	Antifungal	1.5-3	Dispersion	Isothiazolinone-free, good weatherability, low migrating properties, suitable for outdoors, EU and REACH compliant

Please note that biocide usage is regulated by local governmental agencies. Ask your Troy representative about products available in your local market.

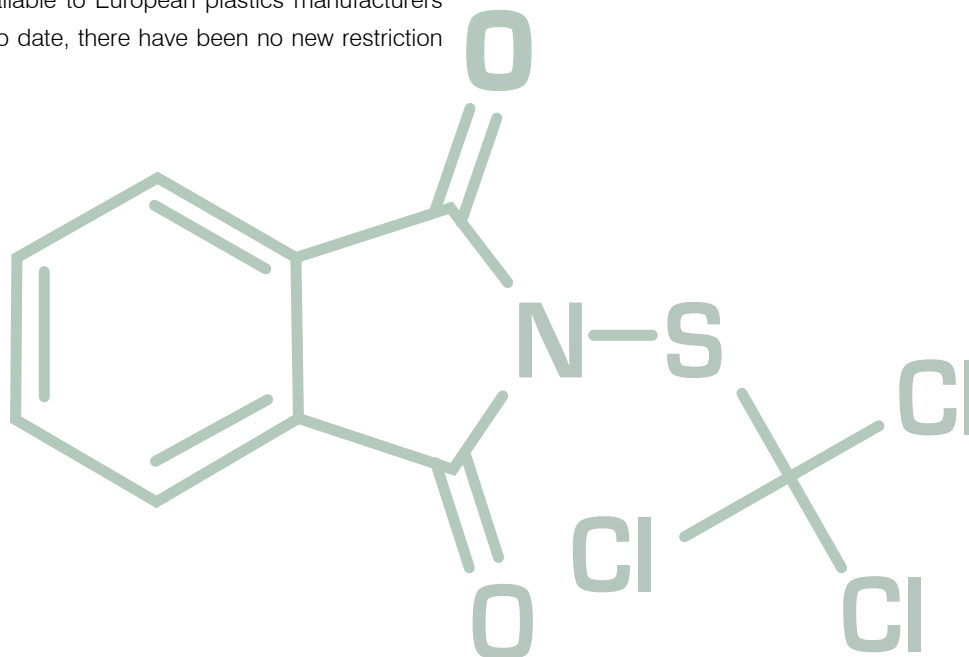
N-((Trichloromethyl)thio)phthalimide, also known as Folpet, was the first biocide active chemistry to be approved in the European Biocidal Product Regulation for Product Type 9 applications. Folpet technology offers an alternative to the OIT and DCOIT chemistries that are currently under regulatory pressure in Europe.

The EU BPR is limiting biocide usage across the majority of Product Types, particularly PT6 (wet-state) and PT7 (dry-film), in which dossiers have been submitted to propose lower sensitization limits for both DCOIT and OIT. Consequently, a smaller selection of biocides will be available to European plastics manufacturers for PT9 applications. To date, there have been no new restriction proposals for Folpet.

Not only does Folpet offer a long-term regulatory solution for Product Type 9 applications, but also the chemistry provides long-lasting weatherability for flexible PVC materials.

Benefits of Folpet

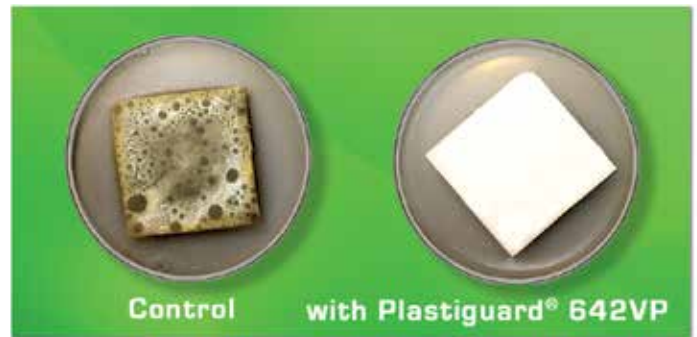
- UV resistant and non-volatile
- Outstanding weatherability offering long-term protection
- Excellent antifungal & antimicrobial performance



PVC Applications					Other Non-PVC Applications		Product Name
PVC Compounds	PVC Coated, Laminated & Expanded Fabric	PVC Co-Extruded Fibers	PVC Waterproof Membrane	Vinyl Floorcovering & Wallcovering	TPE Based Compounds	Rubber	
✓	✓	✓	✓		✓	✓	Plastiguard® F11
✓		✓	✓		✓		Plastiguard® 642VP
✓	✓		✓	✓			Plastiguard® 73L

Plastiguard 642VP

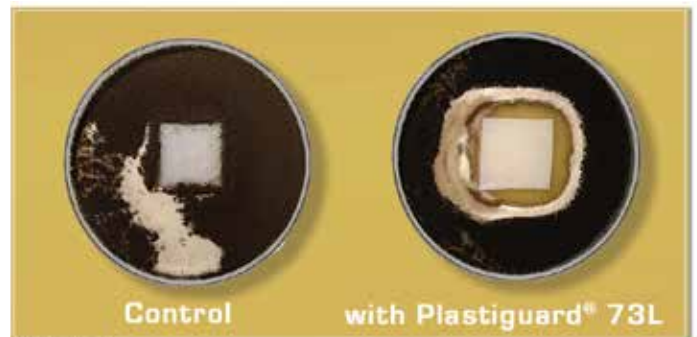
- Broad-spectrum coverage against a wide range of fungal organisms
- Avoids liquid spill concerns
- Pelletized in a universal carrier
- Dust-free handling



ASTM G21

Plastiguard 73L

- Broad-spectrum coverage against a wide range of fungal organisms
- Plasticized in a non-volatile carrier
- Fine grind dispersion for extended stability
- Minimal UV impact



ISO 846 B

Isothiazolinone-Based Protection

Product Name	Chemical Active	Performance	Typical Use Range (% w/w)	Physical Form	Key Benefits
Micropel® DC10DOTP	DCOIT	Antifungal	0.8-2	Liquid	Clear solution, non-ortho phthalate, good weatherability, EU and REACH compliant
Micropel® DC4DIDP	DCOIT	Antifungal	2-5	Liquid	Clear solution, good weatherability, EU and REACH compliant
Micropel® IT20DINCH	OIT	Antifungal	0.4-1	Liquid	Clear solution, phthalate-free, low treatment levels, EU and REACH compliant
Micropel® IT20ESO	OIT	Antifungal	0.4-1	Liquid	Clear solution, phthalate-free, low treatment levels, EU and REACH compliant
Micropel® IT9DOTP	OIT	Antifungal	0.9-2.2	Liquid	Clear solution, non-ortho phthalate, suitable for clear applications, EU and REACH compliant
Micropel® IT8DOTP	OIT	Antifungal	1-2.5	Liquid	Clear solution, non-ortho phthalate, suitable for clear applications, EU and REACH compliant
Micropel® IT4DIDP	OIT	Antifungal	2-5	Liquid	Clear solution, suitable for clear applications, EU and REACH compliant
Micropel® IT4DOTP	OIT	Antifungal	2-5	Liquid	Clear solution, non-ortho phthalate, suitable for clear applications, EU and REACH compliant
Micropel® IT4ESO	OIT	Antifungal	2-5	Liquid	Clear solution, phthalate-free, suitable for clear applications, EU and REACH compliant
Plastiguard® PA20	OIT	Antifungal	0.4-1	Liquid	Clear solution, low treatment levels, EU and REACH compliant
Plastiguard® PA10	OIT	Antifungal	0.8-2	Liquid	Clear solution, EU and REACH compliant
Plastiguard® PL202	DCOIT	Antifungal	0.5-1	Paste	Compatible with moisture curing properties, EU and REACH compliant
Plastiguard® T10	DCOIT	Antifungal	0.8-2	Liquid	Clear solution, good weatherability, EU and REACH compliant

Please note that biocide usage is regulated by local governmental agencies. Ask your Troy representative about products available in your local market.

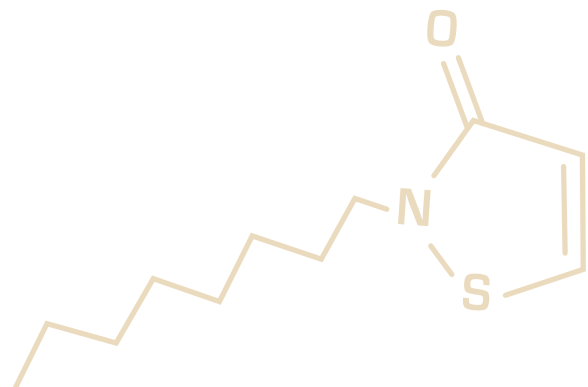
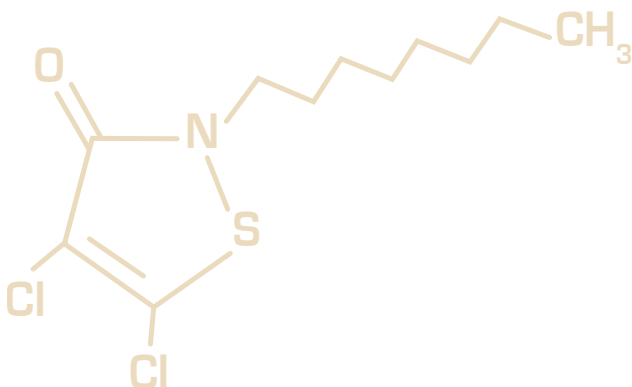
Troy offers a broad range of isothiazolinone-based antimicrobials under its Micropel® and Plastiguard® lines. DCOIT and OIT provide effective antifungal performance in a broad range of systems, and remain popular antimicrobials worldwide.

Benefits of Isothiazolinones:

- Strong antifungal performance
- Worldwide availability



PVC Applications				Other Non-PVC Applications				Product Name
PVC Compounds	PVC Coated, Laminated & Expanded Fabric	PVC Waterproof Membrane	Vinyl Floorcovering & Wallcovering	Silicone Sealants	PU-Based Sealants	PU Coated Fabrics	Solvent-Based Roof Coatings	
✓	✓		✓					Micropel® DC10D0TP
	✓	✓	✓					Micropel® DC4DIDP
✓	✓	✓	✓					Micropel® IT20DINCH
✓	✓	✓	✓					Micropel® IT20ESO
	✓		✓					Micropel® IT9D0TP
	✓		✓					Micropel® IT8D0TP
	✓	✓	✓					Micropel® IT4DIDP
	✓		✓					Micropel® IT4D0TP
	✓		✓					Micropel® IT4ESO
✓	✓	✓	✓	✓	✓	✓	✓	Plastiguard® PA20
✓	✓	✓	✓	✓	✓	✓	✓	Plastiguard® PA10
				✓				Plastiguard® PL202
✓	✓	✓	✓	✓	✓	✓	✓	Plastiguard® T10



IPBC-Based Protection

Product Name	Chemical Active	Performance	Typical Use Range (% w/w)	Physical Form	Key Benefits
Micropel® A285	IPBC	Antifungal	1-3	Liquid	Free from isothiazolinones, EU and REACH compliant
Micropel® 3500	IPBC BCM	Antifungal	1-3	Powder	Phthalate-free, flame retarding properties
Micropel® 2050	IPBC BIT	Broad-Spectrum	1-3	Liquid	Phthalate-free, wide spectrum activity, EU and REACH complaint
Plastiguard® 642VP	IPBC Folpet	Antifungal	1-3	Pellet	Isothiazolinone-free, phthalate-free universal carrier, PVC-free, good weatherability, low migrating properties, suitable for outdoors, EU and REACH compliant
Plastiguard® 73L	IPBC Folpet	Antifungal	1.5-3	Dispersion	Isothiazolinone-free, good weatherability, low migrating properties, suitable for outdoors, EU and REACH compliant

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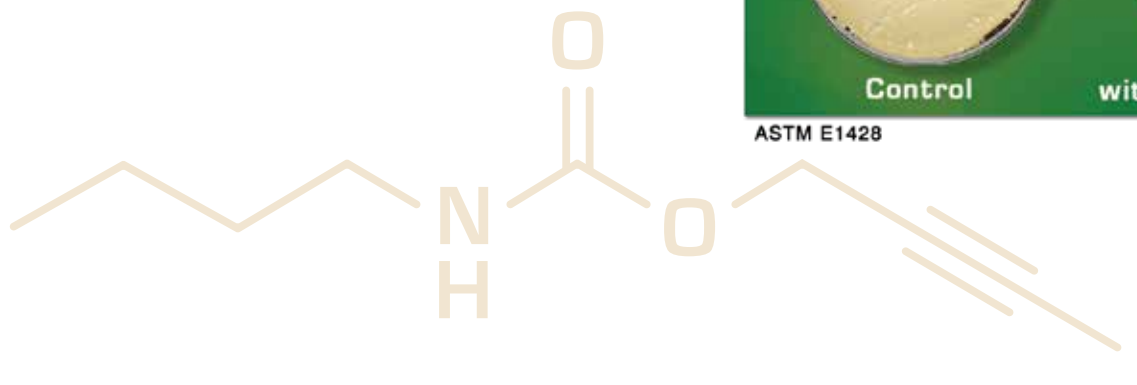
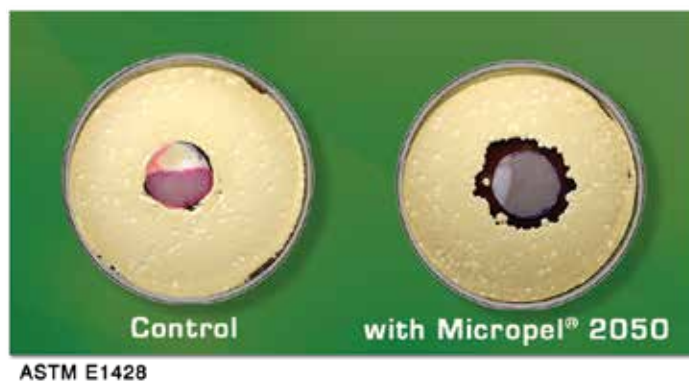
Iodopropynyl butylcarbamate (IPBC) is one of the leading biocides in numerous industries, including paints & coatings and personal care, as well as plastics. Invented by Troy Corporation, IPBC is highly effective against mold and mildew growth, and also has safer use attributes and cost-efficiency. As such, IPBC is a well-established and preferred active chemistry favored by formulators worldwide.

Benefits of IPBC

- Excellent protection against mold & mildew
- Combination products with broad efficacy
- Long-term protection
- Approved for use in all global markets

Micropel 2050

- Antimicrobial protection against bacteria, mold, & mildew
- Plasticized in a phthalate-free carrier
- Effective against pink stain



PVC Applications					Other Non-PVC Applications					Product Name
PVC Compounds	PVC Coated, Laminated & Expanded Fabric	PVC Co-Extruded Fibers	PVC Waterproof Membrane	Vinyl Floorcovering & Wallcovering	TPE-Based Compounds	Wood Plastic Composites	Adhesives	PU Foams	PU Roof Coatings	
✓	✓		✓	✓						Micropel® A285
✓						✓				Micropel® 3500
	✓		✓	✓			✓	✓	✓	Micropel® 2050
✓		✓	✓		✓					Plastiguard® 642VP
✓	✓		✓	✓						Plastiguard® 73L

The Troy Advantage

World-Class Products, Services, & Support

Troy Corporation is a global manufacturer with a history of innovation and development of advanced preservatives and additives that enhance end-use products, including PVC and other plastics. Troy augments its portfolio of products with world-class technical services that enable customers in over 100 countries worldwide to achieve excellent results cost-effectively.

Troy's special areas of expertise include:

- Prevention of microbial degradation in PVC and related materials
- Global regulatory support with regional and national expertise
- Worldwide technical services including microbiology & analytical laboratories





The Gold Standard for Performance

Services

As a Performance Partner, Troy offers a variety of services to support our product line of preservatives and additives to meet customer needs and provide market solutions.

Troy invites you to take advantage of the Troy services that can help you achieve your market objectives.

- Technical Service representatives can provide formulation assistance, product evaluation, and microbiological, analytical, and field testing to assist you in developing an optimum formulation that meets your product objective.
- Regulatory support is offered globally with regional and national expertise to meet your needs.
- R&D scientists work to anticipate future industry needs and develop innovative technology. Contact your Troy representative to discuss your unique requirement that may not be met by materials currently on the market. In fact, Troy may have just what you need already under development and if not, may be able to work with you to achieve your objective.
- A global supply network is in place to ensure product availability and fast delivery. Contact your local representative to ensure the product you need is available when you need it.

Contact your nearest Troy representative for immediate assistance or visit us online at www.troycorp.com. When visiting the website, become a registered user to obtain access to a wide range of resources.

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