Polynt Intermediates

Plasticizers
GPP & SPP

POLYNT INTERMEDIATES & SPECIALTIES

Contents

Production Site

EMEA - Polynt S.p.A. (San Giovanni Valdarno)

Polynt Reichhold Group

After the merger on May 2017 the new Polynt-Reichhold Group is a global Company in the Intermediates, Coating and Composite Resins, Thermoset Compounds, Gel-coats and niche Specialties. This combination enhances the Group's leading position as a global vertically integrated specialty chemicals player, with significant global presence in Europe, North America and Asia, a strategy initiated by Polynt with the successful integration of PCCR and CCP in the last years and now further reinforced by Reichhold's global scale, extensive product portfolio and R&D competencies.

Polynt-Reichhold Group is known for its superior quality and impressive range of products and with its excellent distribution network it can provide first-class service to customers whatever their market. Customer Service and Technical Service teams are renowned for their customer focus, offering the best service even after products have left manufacturing.

The Group strives to keep customers satisfied, assisting them in producing premium quality products every time they use its products. Product innovation is important for the Group's business and it's the reason for which it constantly works with customers to find solutions to problems. Introducing new or improved products ensures that Polynt-Reichhold Group continue not only to deliver what the market wants and needs, but also when it is wanted and needed.

What are Plasticizers?

Plasticizers are substances added to synthetic resins to increase their flexibility, workability and distensibility. Plasticizers are often described as softeners.

In the 1920's, researchers discovered that many esters of the polycarboxylic acid group, such as phthalic acid and phosphoric acid, were able to react with high polymers to form a homogeneous physical compound. Polyvinyl Chloride (PVC) shows a unique capacity to absorb alkyl esters in its polymer structure, creating a flexible and durable material with outstanding properties and versatility. Plasticized PVC, also known as soft PVC or vinyl, is still the most commonly used thermoplastic material throughout the world.
Around 90% of all Plasticizers are used in the production of flexible PVC. Minor applications include rubber, adhesives, sealants, paints, lacquers and lubricants.

In order to obtain a soft PVC the Plasticizers must have the following essential performance properties:

- Compatibility with the PVC matrix
- Efficiency
- Low tendency toward volatility/migration
- Resistance to extraction by oils, fats, hydrocarbons, aqueous solutions
- Stability to heat and UV light
- Resistance to hydrolysis and oxidation
- Low plastisol viscosity

Thanks to its comprehensive product portfolio, proven expertise and experience, Polynt can provide the most suitable Plasticizer for any application.

GPP - General Purpose Plasticizers

General Purpose Plasticizers are obtained by reacting Phthalic Anhydride with branched alcohols. These are the world's most commonly used plasticizers, and they find application in many end-uses, such as electric cable sheathing, flooring, wall coverings, coated fabrics, vinyl skins, shoes and garden hoses.

The GPP product range includes:

- DIPLAST® NS (Di-isononylphthalate, DINP) - One of the most commonly used plasticizers for PVC and other polymers.Thanks to its well balanced overall processability and performance properties it finds a wide range of indoor and outdoor applications, such as wire and cable, film and sheet, flooring, tubing, and sportswear.
- DIPLAST® RS (Di-2-propylheptylphthalate, DPHP) - Compared to the other General Purpose Plasticizers, it benefits from a better UV light resistance and a lower volatility, making it suitable for relatively high temperature applications, such as wire and cables, automotive interior trims, as well as outdoor applications like roofing membranes and tarpaulins.
- DIPLAST® O/MG (Bis-2-ethylhexylphthalate, DOP or DEHP) - Manufactured, analyzed and delivered under a specific procedure in order to obtain a very high-purity product free from antioxidants, it is suitable for the manufacturing of PVC medical devices under the provisions of the current EU and International Regulations.

Example of GPP flooring application

SPP - Special Purpose Plasticizers

Special Purpose Plasticizers are obtained by reacting Phthalic Anhydride, Trimellitic Anhydride or Adipic Acid with alcohols and/or glycols. The SPP product range includes: Linear Phthalates, Trimellitates, Polymeric and Adipates.

Special Purpose Plasticizers find application where specific performance properties are needed or desired, such as:

- Aging resistance to high temperatures
- Low fogging and volatility
- Low temperature flexibility
- Extraction resistance in case of contact with solvents, oils and hydrocarbons
- Migration resistance into other polymers
- Weathering resistance

Example of SPP application: metal cap closure for the food industry realized by *Crown Cork* (Italy)

SPP - Linear Phthalates

These Phthalates are obtained by reacting Phthalic Anhydride with predominantly linear aliphatic alcohols. Compared to the branched Phthalates with the same molecular weight, Linear Phthalates benefit from lower volatility, good low temperature flexibility, and good weathering resistance.

They find application in PVC roofing, textile fabrics, anti-fogging synthetic leathers for car interiors, and automotive cables and harnesses.

The SPP - Linear Phthalates product range includes:

- DIPLAST® L9-11 - A Phthalate based on predominantly linear C9-C11 alcohols; suitable for outdoor and automotive applications
- DIPLAST® L11 - A Diundecyl Phthalate that is currently the most referenced plasticizer for T2 class automotive cables and harnesses due to its outstanding balance of high temperature resistance and low temperature flexibility. Thanks to its low fogging and viscosity properties, it also finds application for automotive interior trims such as seats and door panels.

SPP - Trimellitates

Trimellitate Plasticizers are produced by reacting Trimellitic Anhydride with Aliphatic Linear or Branched alcohols. The Trimellitates offer a unique combination between the processability properties typical of General Purpose Plasticizers and the performance properties typical of polymeric plasticizers. These include for example efficiency, low temperature flexibility, high temperature resistance, low migration and extraction resistance.

Thanks to these properties Trimellitates find particular application in the production of high temperature electrical cables (in accordance with the relevant CEI, BS, VDE and UL standards), including automotive cables and harnesses.

Trimellitates also find application in the manufacturing of anti-fogging vinyl skins for car interiors (particularly instrument panels) and in many other compounds (foils, profiles, gaskets, etc.) that have to meet stringent

requirements in terms of thermal resistance, low volatility and low tendency to migration.
The SPP Trimellitates product range includes:

- DIPLAST® TM (tris-2-ethylhexyltrimellitate, TOTM or TEHTM) - Suitable for wire and cable, automotive cables and harnesses (T2 class), and car interiors applications
- DIPLAST® TM/MG (tris-2-ethylhexyltrimellitate, TOTM and TEHTM) - Manufactured, analyzed and delivered under a specific procedure to ensure a product of very high purity and free from antioxidants; recommended when TEHTM is requested for the manufacture of medical devices
- DIPLAST® TM8-10 (trimellitate of linear C8 and C10 alcohols) - Recommended for manufacturing automotive cables and harnesses (especially the T3 class) and car interiors
- DIPLAST® TM8 (tri-n-octyl trimellitate) - Particularly suitable for car interiors applications thanks to its processability, anti-fogging properties, and low temperature resistance
- DIPLAST® TINTM/ST (tri-isononyl trimellitate) - Suitable for high temperature wire and cable including wiring harnesses and for car interiors applications.

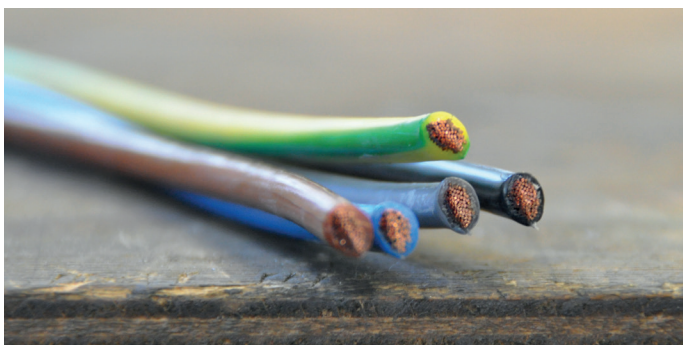
Three examples of plasticizer applications: medical applications, cling film and tensile structure.

EMEA - Italy

Since 1970 Polynt Group has been a leading manufacturer of Plasticizers and is one of the world's leading producers of Trimellitates, which is integrated in Trimellitic Anhydride.
We originally started manufacturing general purpose plasticizers at our San Giovanni Valdarno plant in the 80's, where during the 90's we introduced the SPP range.
Thanks to our expanded production capacity and the improvement of Phthalic and Trimellitic Anhydride equipment and manufacturing technology, Polynt San Giovanni Valdarno plant represents a reliable plasticizers supplier for both EU and Export markets, providing high quality products.

	APPLICATIONS	PRODUCT FAMILY NAME
GPP	**Automotive:** door panels, seats, arm rests, visors, underbody coating	DIPLAST® RS (or DPHP), DIPLAST® NS (or DINP)
GPP	**Building & Construction:** flooring film and sheet	DIPLAST® NS (or DINP), DIPLAST® RS (or DPHP)
GPP	**Electronic & Electrical:** wire and Cables	DIPLAST® NS/ST, DIPLAST® RS/ST
GPP	**Industrial**	DIPLAST® NS, DIPLAST® RS
GPP	**Medical Applications**	DIPLAST® O/MG (or DOP or DEHP)
GPP	**Polymers & Plastics**	DIPLAST® NS (or DINP), DIPLAST® RS (or DPHP)
GPP	**Sport & Leisure**	DIPLAST® NS, DIPLAST® RS
SPP	**LINEAR PHTHALATES**	
SPP	**Automotive:** dashboard, door panels, seats, arm rests, visors, cables and harnesses	DIPLAST® L9-11, DIPLAST® L11, DIPLAST® L11-ST
SPP	**Building & Construction:** roofing membranes, tensile structures, coated fabrics	DIPLAST® L9-11
SPP	**Electronic & Electrical:** wires and cables	DIPLAST® L11-ST
SPP	**Industrial**	DIPLAST® L9-11
SPP	**Sport & Leisure**	DIPLAST® L9-11
SPP	**TRIMELLITATES**	
SPP	**Automotive:** dashboard, cables and harnesses	DIPLAST® TM, DIPLAST® TM/ST, DIPLAST® TM8, DIPLAST® TM8-10/ST, DIPLAST® TINTM/ST
SPP	**Electronic & Electrical:** high temperature cables, low migrating cables	DIPLAST® TM, DIPLAST® TM/ST, DIPLAST® TM8-10/ST, DIPLAST® TINTM/ST
SPP	**Lubricants**	DIPLAST® TM, DIPLAST® TM8-10/ST, DIPLAST® TM10, DIPLAST® TM13
SPP	**Medical applications**	DIPLAST® TM/MG
SPP	**POLYMERIC AND ADIPATES**	
SPP	**PVA Emulsions**	Polimix® 800/P
SPP	**Building & Construction:** roofing, membranes, industrial membranes, tensile structures, tubes, profiles	Polimix® 150 N, Polimix® 740 N, Polimix® 300, Polimix® 850 F, Polimix® 200/ST
SPP	**Electronic & Electrical:** cables for construction sector, automotive industry; cables resistant to oils, to migration	Polimix® 150 N, Polimix® 400 F, Polimix® 300, Polimix® 740 N, Polimix® 850 F
SPP	**Films & Coatings:** adhesive tapes and sheets, insulating tapes for electrical use, PVC sheets for advertising signs, conveyor belts	Polimix® 80, Polimix® 150 N, Polimix® 740 N, Polimix® 200/ST
SPP	**Food contact:** cling films, gaskets for metal lids, conveyor belts	DIPLAST® D/MG, Polimix® 400 F, Polimix® 850F, Polimix® 100F, Uraplast® S5640
SPP	**Medical applications**	DIPLAST® D/MG

For further information please contact us



Italian Premium Plasticizers - DIPLAST® TM/MG (TEHTM / TOTM)

The Right Plasticizer with Superior Performance for the Medical Devices Industry

TEHTM is a non-phthalate substance increasingly used as an alternative to DEHP and other phthalates in the manufacture of plastics for medical device use, such as blood bag systems, platelet pool bags, transfusion systems, enteral and parenteral tubing sets, haemodialysis tubing sets, tubolars, endotracheal tubes, valves and connectors.

Exposure to plasticizers is due to a migration process, whose rate may be controlled both by the ease of loss from the PVC surface and by the rate of diffusion of plasticizer from the interior of the PVC mass to the surface.
Plasticizers can migrate out of the PVC medical device material, particularly when it comes into contact with media containing fats or materials such as blood being contained by the PVC device. Based on its relatively high molecular weight and bulky structure, TEHTM is considered particularly resistant to migration.

This property is particularly important for medical device applications, since it reduces the plasticizer's leachability from the medical device to its content (blood or its derivatives) and the subsequent transfer with the potential for accumulation in the human body. DIPLAST® TM/MG is the grade that Polynt Intermediates recommends when TEHTM is required for PVC medical compounds. It also gives good compatibility in high humidity conditions, in addition to good biocompatibility and gas permeability.

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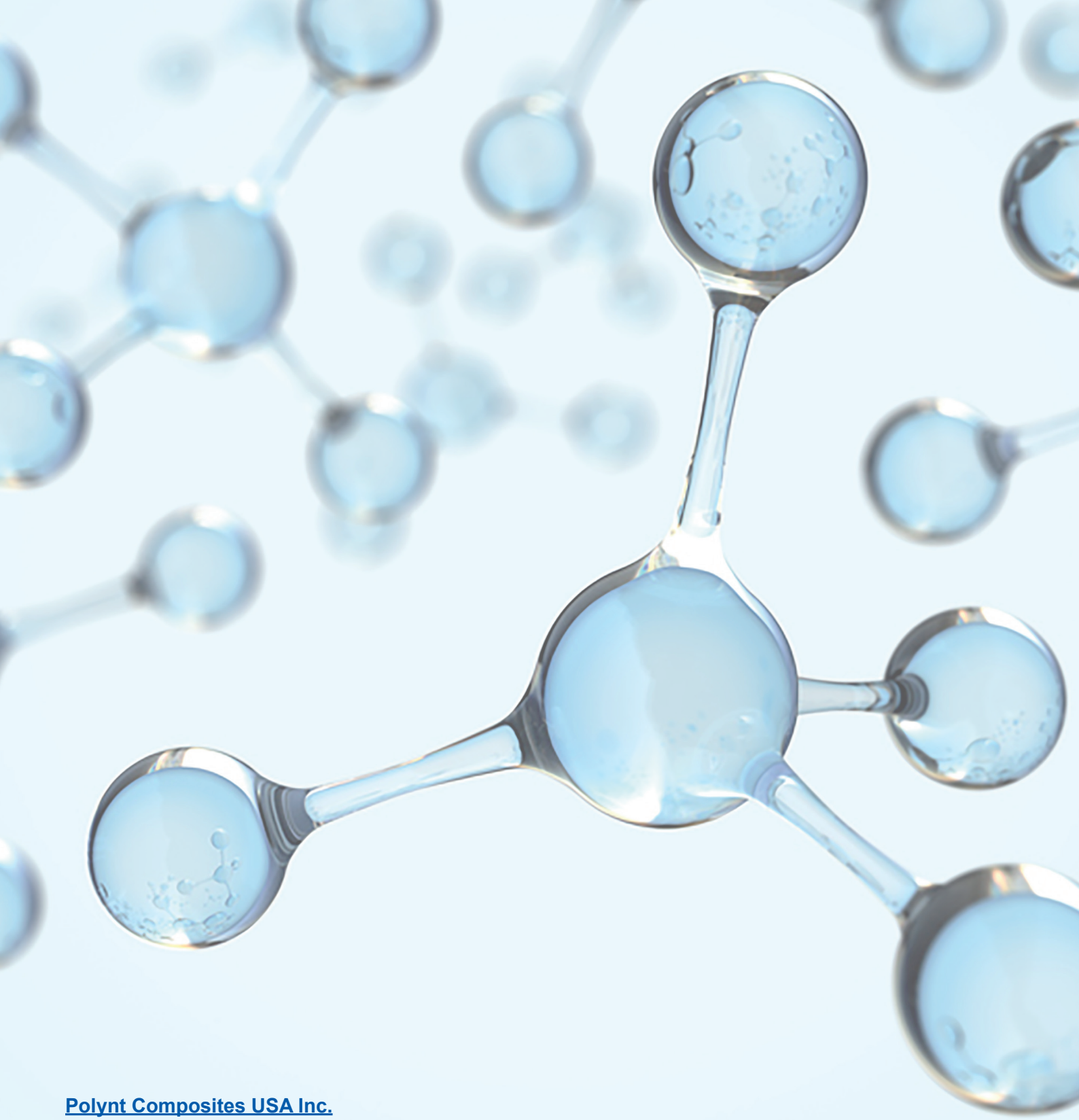

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