

3M Science.
Applied to Life.™

▶ 3M™ Dyneon™ Fluoropolymer Dispersions

Building tomorrow by progressing today.

Advanced and sustainable coating solutions.

Covering values to protect integrity.

Welcome to the world of our 3M™ Dyneon™ Fluoropolymers – efficient and ecologically friendly materials for high-end coating applications. For more than 25 years Dyneon sets benchmarks in the development and sustainable processing of high performance materials. In doing so, we are a technology leader and your ideal partner when it comes to requirements such as low friction, high durability, outstanding thermal properties and chemical inertness. As a 3M company, we are a global player and supplier to a broad field of continuously innovating industries like automotive, chemical processing, consumer products, construction, electrical and electronic engineering, and semiconductor manufacturing.

The following pages will provide you with sufficient information about our range of coating-related products to give you a brief overview and allow you to find the ideal materials for your business.



The right raw materials for demanding applications.

The unique properties of 3M™ Dyneon™ PTFE (polytetrafluoroethylene) make it an indispensable material for modern industry. PTFE offers exceptional characteristics like a nearly universal chemical resistance, a wide service temperature range from -200 °C to +260 °C combined with a high flame resistance and excellent dielectric properties. In addition, 3M™ Dyneon™ PTFE Dispersions show no embrittlement or aging and due to their ultra-smooth surfaces they reduce the total cost of ownership of equipment. Through continuous research and development, Dyneon seeks to improve the properties of its PTFE Dispersions, PFA, FEP and THV Fluorothermoplastic Dispersions, Micropowders and PFA electrostatic coating powders. As an innovation leader for the process technology used in manufacturing fluoropolymers, Dyneon reaffirms its commitment to customers and the environment.

The Dyneon Vision

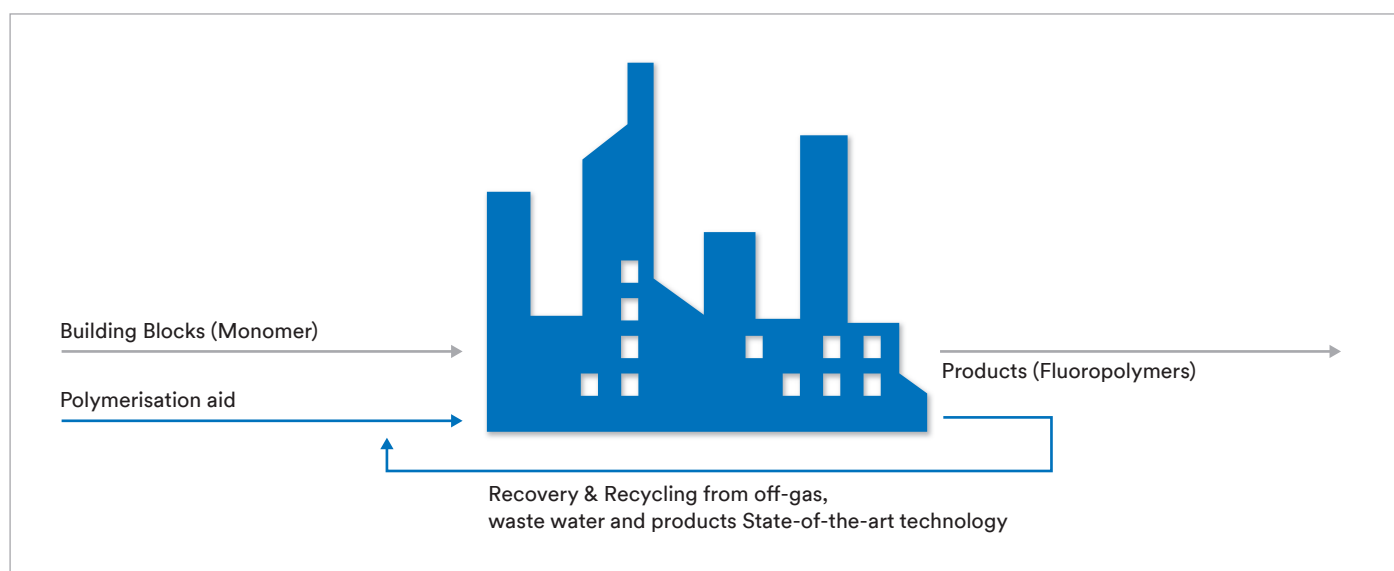
To be the most innovative and differentiated provider of fluoropolymers, additives and related products to customers seeking custom solutions for applications requiring multi-faceted performance in harsh chemical and thermal environments.

Leading the way with sustainable production.

The environmental, economic, and social dimensions of sustainability have inspired Dyneon researchers to produce fluoropolymers without the use of PFOA. They succeeded in developing a new emulsifier for fluoropolymer production. This emulsifier exhibits a significantly improved Environmental, Health and Safety profile, whilst maintaining the properties of well established fluoropolymer products to their full extent. Dyneon was therefore able to comply with the U.S. Environmental Protection Agency's voluntary PFOA Stewardship Program's goals seven years ahead of time. We believe that creating and maintaining sustainable technology in chemical manufacturing processes is a cornerstone for sustaining today's society. Dyneon supports this basic approach with the most advanced process technology. Our containment technology removes and recovers the new emulsifier from process off-gas and waste water, minimizes the release into the environment, and recycles the emulsifier into the manufacturing process.

Our Product Stewardship Strategy

- ▶ Dyneon replaced PFOA (Perfluorooctanoic acid) in the manufacture of its entire product portfolio with the new emulsifier at the end of 2008 voluntarily, seven years earlier than required
- ▶ Dyneon has a sophisticated system in place for the recapture and re-use of the new emulsifier in our processes
- ▶ Dyneon operates an advanced system to minimize the release of the new emulsifier into the environment
- ▶ Dyneon has made its emulsifier containment technology available to others through licence
- ▶ Dyneon has developed new to the industry recycling technology for PTFE which has been available for semi commercial use since the end of 2015
- ▶ Dyneon has eliminated the use of APEO (Alkyl Phenyl Ethoxylates) in the production of its entire product portfolio



3M™ Dyneon™ PTFE and Fluorothermoplastics

Dispersions with improved properties for innovative metal coating solutions.

3M™ Dyneon™ PTFE Dispersion TF 5135GZ

Benchmark for non-stick coating systems. Unique property of this formulation grade is the extremely high stability in metal coating systems versus shear and solvents, combined with excellent good coating results in terms of resistance, film build and non-stick properties.

3M™ Dyneon™ PTFE Dispersion TF 5070GZ

The small particle size of TF 5070GZ permits the formulation of coating systems with bimodal particle size distribution. This, combined with the low molecular weight of the polymer, can improve packing density in the coating, reduce the initial sintering temperature and result in superior oil and scratch resistance. It can also enhance the slide performance and result in glossier surfaces.

3M™ Dyneon™ Fluoroplastic PFA 6900GZ

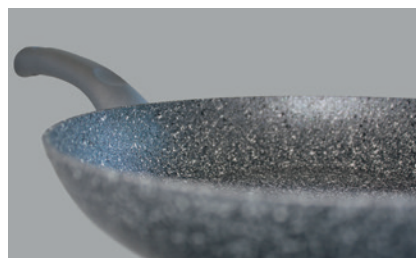
Our most important additive for non-stick coating formulations. Using PFA 6900GZ can improve corrosion resistance, substrate bonding, gloss and non-stick properties. This additive is suitable for any non-stick coating application.

3M™ Dyneon™ Fluoroplastic FEP 6300GZ

The main unique property of FEP 6300GZ is to increase coating performance in metal coating systems. It is recommended for bakeware applications.

3M™ Dyneon™ Fluoroplastic PFA 6503PAZ

PFA 6503PAZ is a fluoroplastic powder for electrostatic powder coating applications and is designed especially for thin film applications.



3M™ Dyneon™ PTFE and Fluorothermoplastics

Dispersions with improved properties for innovative impregnation applications.

3M™ Dyneon™ PTFE Dispersion TF 5033Z

As a specialty PTFE dispersion TF 5033Z makes it comparatively easy to initiate and control the coagulation step in aqueous compounding processes of fluoropolymers for the engineering and automotive industry, e.g. in self lubrication and slide bearing applications.

3M™ Dyneon™ PTFE Dispersion TF 5060GZ

The main advantage of TF 5060GZ is its wetting performance and inherent film formation thickness.

3M™ Dyneon™ Fluoroplastic PFA 6910GZ

The nano particle size (90nm) of PFA 6910GZ makes it a unique product which allows the use in impregnation of surfaces like anodized alumina, gaskets e.g. to close the smallest pores of such surfaces and provide improved sliding properties for such parts.



3M™ Dyneon™ PTFE and Fluorothermoplastics

Dispersions with improved properties for innovative cloth coating in industry and architecture.

3M™ Dyneon™ PTFE Dispersion TF 5041GZ

TF 5041GZ is recommended for use as an intermediate coat when coating on heavy weight glass cloth fabrics used e.g. in architectural applications. Because of the incorporated Dyneon filler system and the increased viscosity, pick up is dramatically improved during the coating process.

3M™ Dyneon™ PTFE Dispersion TF 5060GZ

The unique characteristic of TF 5060GZ is its wetting performance and inherent film formation thickness. This product is suitable for top coat dispersion due to the excellent re-wetting properties.

3M™ Dyneon™ Fluoroplastic PFA 6900GZ

PFA 6900GZ is ideal for sealing fabric surfaces and, when used as a top coat, enables weldability of fabrics in cloth coating applications.

3M™ Dyneon™ Fluoroplastic FEP 6300GZ

Much like PFA 6900GZ, FEP 6300GZ is a dispersion ideally used for sealing fabric surfaces in cloth coating applications. When used as a top coat it enables weldability of the fabric.

3M™ Dyneon™ Fluoroplastic THV 340Z

The distinctive feature of THV 340Z is its very low melting point compared to other fluoropolymers. This is an advantage in the coating of woven or non woven materials with a lower melting point, e.g. PET.

3M™ Dyneon™ PTFE Micropowders

Micropowders with enhanced properties for use in coating and impregnation, lubricants, antifriction, ink and paint applications.

Dyneon TF 9201Z

TF 9201Z is recommended for use in a variety of lubricants (oils, greases or dry) and for non-stick and antifriction sprays.

Dyneon TF 9202Z

TF 9202Z is suitable for use in a variety of lubricants (oils, greases or dry) and for non-stick and antifriction sprays.

Dyneon TF 9205

TF 9205 is a degraded micropowder is designed for use in printing inks and antifriction coatings in the non-food sector.

Dyneon TF 9207Z

TF 9207Z can be used as universal grade for many lubricant applications (oils, greases or dry) and for printing inks plus non stick and antifriction coatings/sprays.



3M™ Dyneon™ PTFE Dispersions.

Typical properties (not for specification purposes)

Property (average values)	Method	Unit	TF 5135GZ ¹⁾	TF 5033Z ¹⁾	TF 5041GZ ¹⁾	TF 5060GZ ¹⁾	TF 5070GZ ¹⁾
Solid Content	DIN EN ISO 12086	%	58	24	58	59	50
Emulsifier			non-ionic	ionic	non-ionic	non-ionic	non-ionic
Emulsifier content	DIN EN ISO 12086	%		5			
	Dyneon internal	%	5.5		6	8	8
Viscosity	DIN EN ISO 3219	mPas	12	n.a.	130	25	12
pH value	DIN ISO 976		>9	>9	>9	>9	>9
Density	DIN 51757	g/cm ³	1.6	1.1	-	1.5	1.4
Particle size	DIN ISO 13321	nm	190	195	-	210	120

3M™ Dyneon™ Fluoroplastic Dispersion

Property (average values)	Method	Unit	PFA 6900GZ	PFA 6910GZ	FEP 6300GZ	THV 340Z
Solid content	DIN EN ISO 12086	%	50	50	55	50
Emulsifier			non-ionic	non-ionic	non-ionic	ionic
Emulsifier content	Dyneon internal	%	7	9	7	5
Viscosity	DIN EN ISO 3219	mPas	9	12	18	7
pH value	DIN ISO 976		>9	>9	>9	>9
Density	DIN 51757	g/cm ³	1.4	1.4	1.4	1.4
Particle size	DIN ISO 13321	nm	200	90	125	120

3M™ Dyneon™ PTFE Micropowder

Property	Method	Unit	TF 9201Z	TF 9202Z	TF 9205	TF 9207Z
Average particle size	ISO 13320	µm	9	4	8	4
Primary particle size	DIN ISO 13321	nm	200	200	-	120
Bulk density	DIN EN ISO 60	g/l	350	280	400	260
Specific surface area BET	DIN ISO 9277	m ² /g	10	12	2	17
Melting point	DIN EN ISO 12086	°C	330	330	325	330
Melt flow rate MFR ¹⁾	DIN EN ISO 1133	g/10 min	<2	6	12	4
Thickening effect			very good	very good	good	excellent
Food contact use	FDA ²⁾ EU ³⁾		yes	yes	no	yes

3M™ Dyneon™ Fluoroplastic

Property	Method	Unit	PFA 6503PAZ
Melting point	ASTM D 4591	°C (°F)	308 (586)
MFR (372 °C/5kg)	ASTM D 1238	g/10 min	3
Bulk density	DIN 53466	g/l	800
Particle size		µ	30

¹⁾ The measurements are carried out at 372 °C with different test weights and nozzle diameters. The melt viscosity of micropowders can be calculated from the melt flow rate (MFR) by Hagen Poiseuille's law to obtain an indication of molecular weight. The molecular weight of the micropowder products increases in the following order: TF 9205, TF 9207Z, TF 9202Z, TF 9201Z.

²⁾ These products comply with 21 CFR 177.1550 and may be used as articles or components of articles intended to contact food subject to the provisions, including specifications, conditions of use, and limitations, if any, in this regulation.

³⁾ The monomers used for the production of these products comply with EU-Directive 2002/72/EC about materials and articles made of plastics and intended to come into contact with foodstuffs or toys and with the new edition of the German „Bedarfsgegenständeverordnung“ of December 23rd, 1997.

Technical Information and Test Data

Technical information, test data, and advice provided by Dyneon personnel are based on information and tests we believe are reliable and are intended for persons with knowledge and technical skills sufficient to analyze test types and conditions, and to handle and use raw polymers and related compounding ingredients. No license under any Dyneon or third party intellectual rights is granted or implied by virtue of this information.

General recommendations on health and safety in processing, on work hygiene and on measures to be taken in the event of accident are detailed in our material safety data sheets.

You will find further notes on the safe handling of fluoropolymers in the brochure "Guide for the safe handling of Fluoropolymers Resins" by PlasticsEurope, Box 3, B-1160 Brussels, Tel. +32 (2) 676 17 32.

The present edition replaces all previous versions. Please make sure and inquire if in doubt whether you have the latest edition.

Important Notice

All information set forth herein is based on our present state of knowledge and is intended to provide general notes regarding products and their uses. It should not therefore be construed as a guarantee of specific properties of the products described or their suitability for a particular application. Because conditions of product use are outside Dyneon's control and vary widely, user must evaluate and determine whether a Dyneon product will be suitable for user's intended application before using it. The quality of our products is warranted under our General Terms and Conditions of Sale as now are or hereafter may be in force.

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