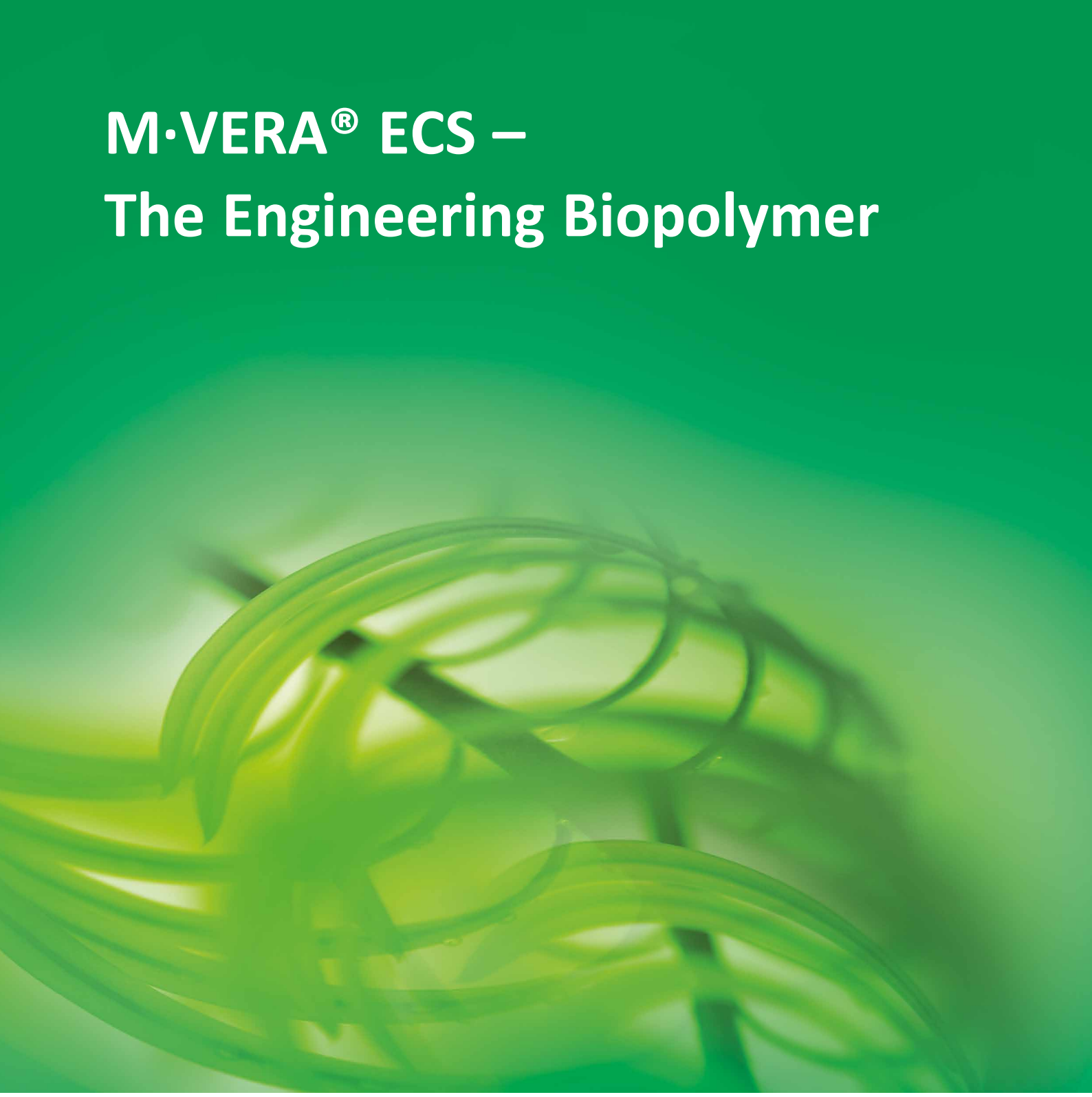
M·VERA® ECS –
The Engineering Biopolymer



BIO-FED
Think Sustainable

BIO-FED
Branch of AKRO-PLASTIC GmbH

Product Characterisation

Although sebacic acid-based polyamides were developed and commercialised as early as the 1950s, they remained niche products on the market, since it was large-scale industrial production of standards that was promoted. In recent years, however, the plastics processing industry has seen a steadily growing interest in materials based on renewable resources. As part of its commitment to meeting these requirements, BIO-FED focuses on the development, compounding and marketing of bio-based and/or biodegradable plastics, initiating a renaissance of this material.

A characteristic property of M·VERA® ECS (PA 6.10) is that it has a renewable-resource content of up to 60 % and therefore fulfils the current definition of a bioplastic[1]. The plant-based raw material used is sebacic acid, synthesised from castor oil which is obtained from the seeds of Ricinus communis, the castor oil plant.

From a technical standpoint, M·VERA® ECS closes the gap between PA 6/PA 6.6 and PA 12. It is characterised by significantly lower moisture absorption compared to PA 6 and PA 6.6. At 23 °C and 50 % relative humidity, typical values for these product types are 3 % and 2.8 %, respectively. With a value of approximately 1.4 %, PA 6.10 absorbs just half as much moisture and can therefore be used as an engineering material in applications requiring a high dimensional consistency. Moreover, it exhibits excellent cold impact resistance. Other outstanding characteristics include very good chemical resistance due to the structure of the polymer and high hydrolysis resistance, although it can be processed like all common polyamides.

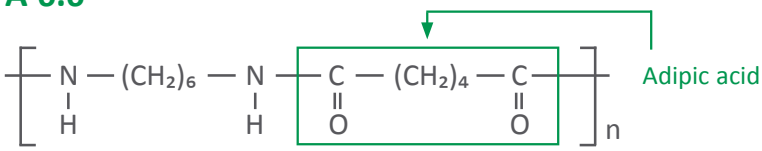
The materials from the PA 6.10 product family are further characterised by exceptional dimensional stability, good surface quality, good abrasion resistance and wear behaviour, and an improved carbon footprint. This is due to the fact that the plant-based raw materials have already removed CO_2 from the environment during their growth phase.

The product portfolio currently includes three variants:

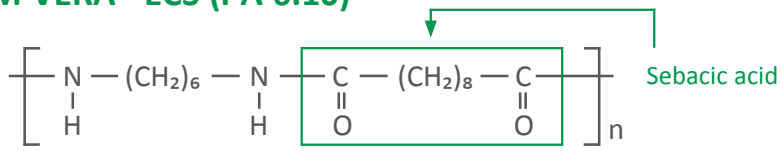
- M·VERA® ECS1001 non-reinforced
- M·VERA® ECS1002 with 8 % glass fibre content
- M·VERA® ECS1002 with 30 % glass fibre content

All three products are approved for contact with food.

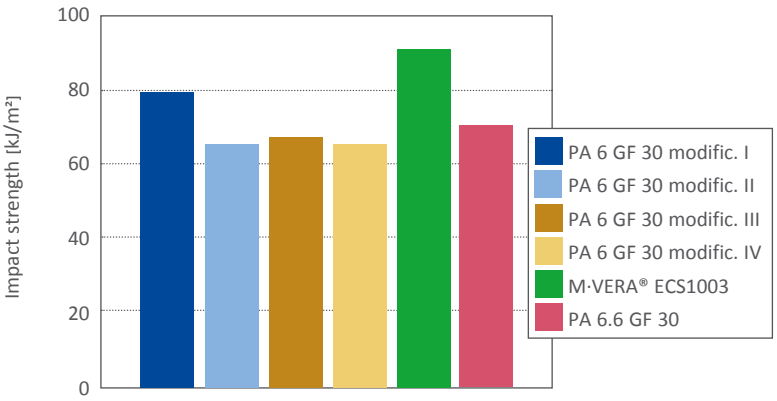
PA 6.6



M·VERA® ECS (PA 6.10)



Impact Strength after 200 Hours in $ZnCl_2$ Solution

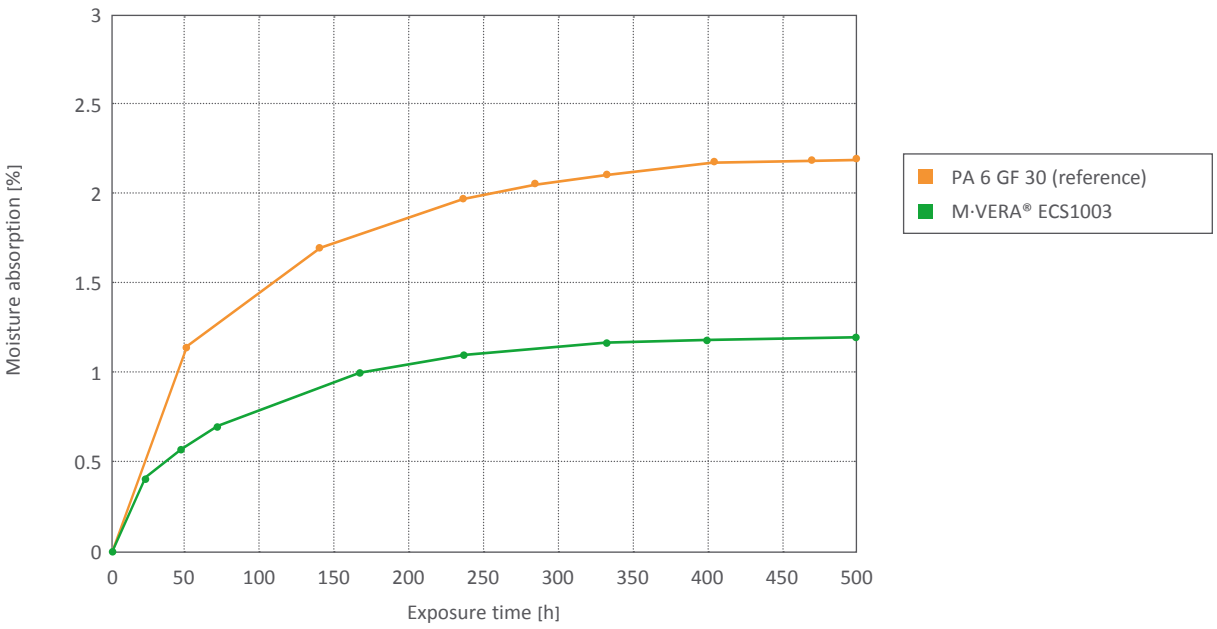


M·VERA® ECS1003 exhibits significantly better impact strength compared to PA 6/PA 6.6 GF 30

[1] = definition of Bioplastics according to Prof. Dr. Ing. H.-J. Endres, FH Hannover

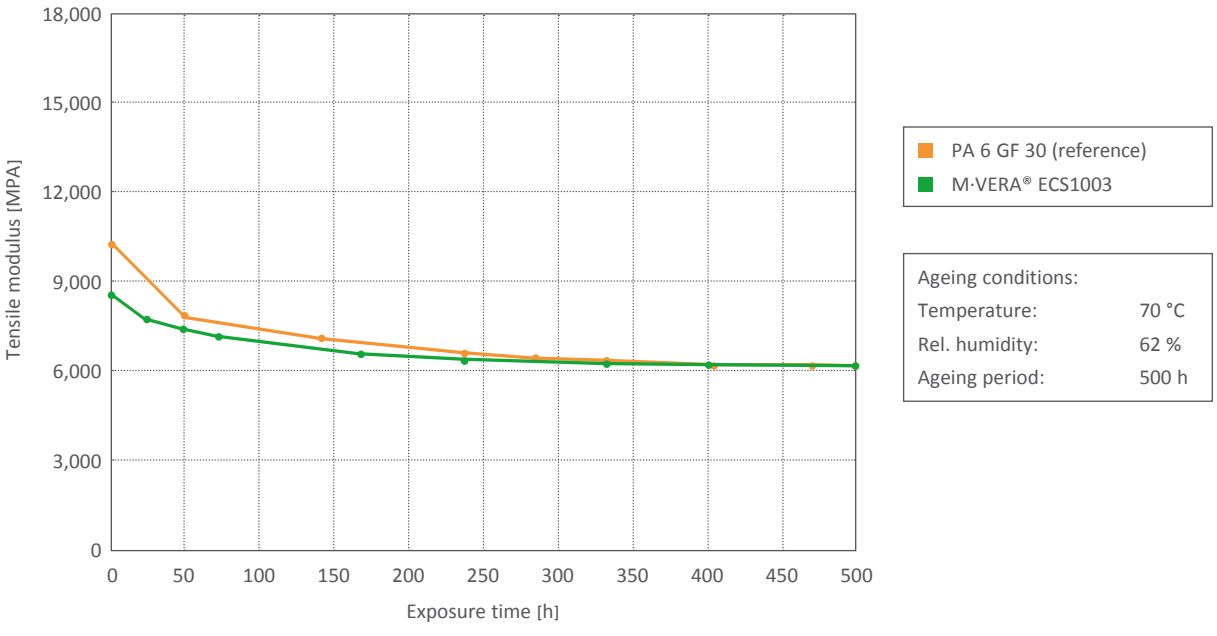
A comparison of technical properties shows the outstanding differences between M·VERA® ECS1003 and comparable a PA 6 compound:

Moisture Absorption vs. Exposure Time – 500 h at 70 °C and 62 % Rel. Humidity



M·VERA® ECS1003 absorbs approx. 50 % less moisture than a PA 6 GF 30

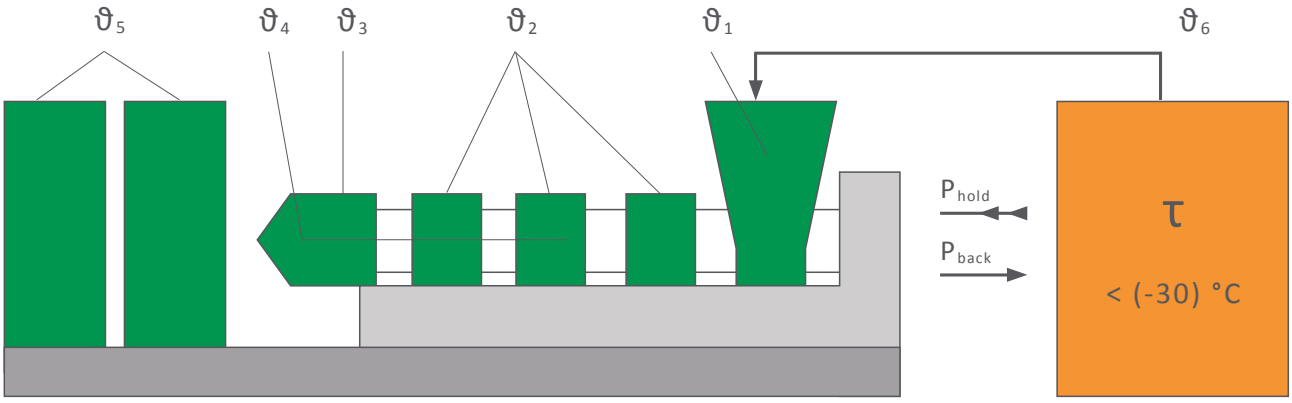
Tensile Modulus as a Function of Exposure Time



Following moisture absorption, tensile modulus in M·VERA® ECS1003 decreases significantly less than in PA 6 GF 30

Processing Recommendations

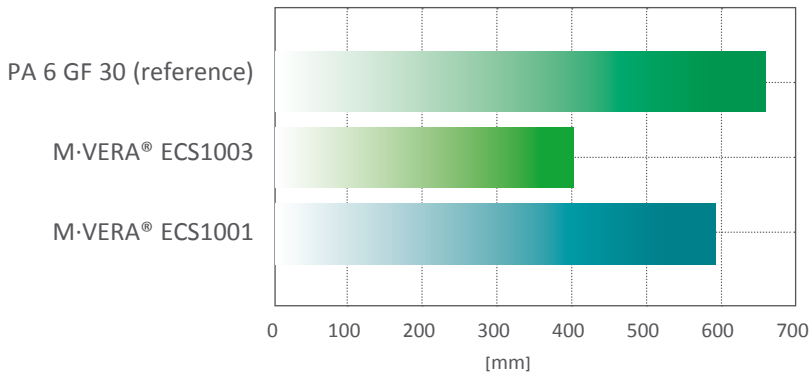
M·VERA® ECS can be processed on commercially available injection moulding machines with standard screws according to the recommendations of the machine manufacturer. Please refer to the table below for our recommended machine, mould and dryer settings (see diagram):



		M·VERA® ECS
Flange	ϑ_1	60 – 80 °C
Sector 1 – sector 4	ϑ_2	220 – 300 °C
Nozzle	ϑ_3	240 – 295 °C
Melt temperature	ϑ_4	260 – 310 °C
Mould temperature	ϑ_5	70 – 100 °C
Drying	ϑ_6	80 °C, up to 4 h
Holding pressure, spec.	P_{hold}	300 – 800 bar
Back pressure, spec.	P_{back}	50 – 150 bar

The specified values are for reference values. For increasing filling contents the higher values should be used.
For drying, we recommend using only dry air or a vacuum dryer. Processing moisture levels between 0.02 and 0.1 % are recommended.
The drying time of freshly-opened bags is up to 4 h. It is recommended to use opened bags completely.
Material processed from silo or boxes requires a minimum drying time of 4 h.

Flow Length



Melt temperature:	270 °C
Mould temperature:	80 °C
Injection pressure:	750 bar
Cross section:	7*3.5 [mm²]
Moisture content:	0.06 – 0.07 %

Applications

Based on the technical properties shown for the M·VERA® ECS series, the following applications are possible:

Machine Construction and Tool-building
- Plugs
- Housings
- Functional parts
- Etc.

Food Industry
- Packaging
- Crates
- Containers for liquid
- Etc.

Sports and Leisure
- Gardening tools
- Bicycle accessories
- Etc.

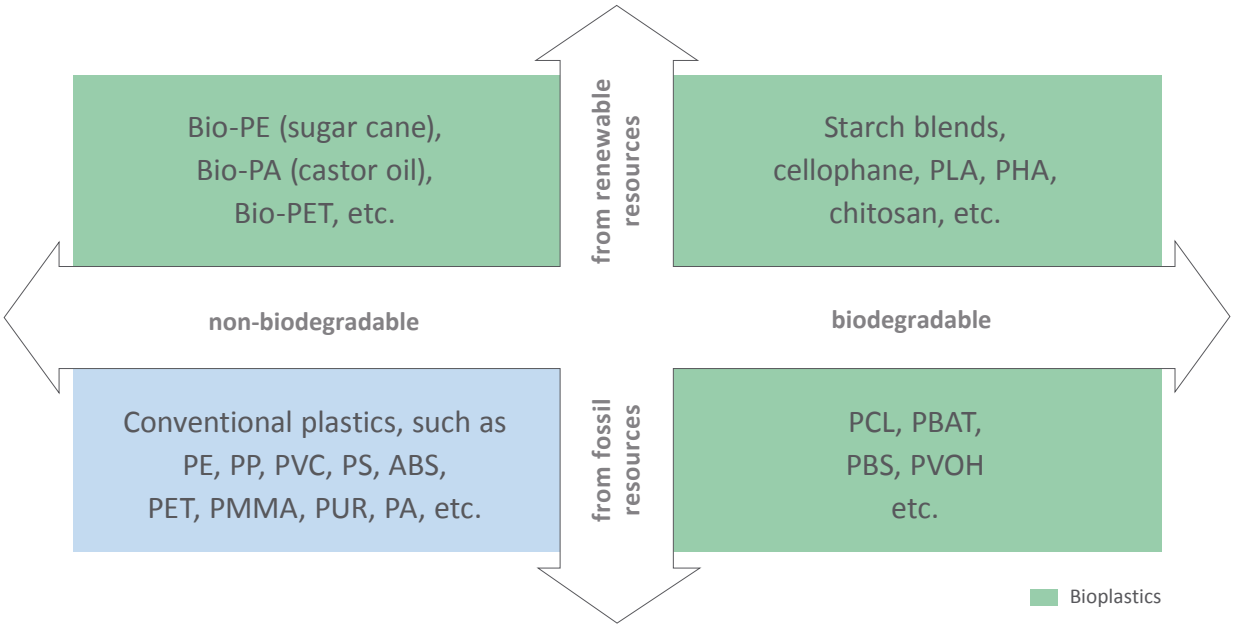
M·VERA® ECS is a bioplastic that meets today's standard definition. Like certain materials used in the packaging industry, however, the material is not biodegradable.

What distinguishes M·VERA® ECS is its reduced carbon footprint: the use of harmful CO_2 per tonne of polyamide produced from renewable resources is significantly lower compared to one tonne produced from fossil-based resources, without affecting the product's performance characteristics.

Definition

Bioplastics are materials which are biodegradable and/or produced based on renewable resources (biobased). These materials have properties similar to those of conventional plastics and can be warehoused in a comparable manner. They can be processed on standard plastics machines.

Bioplastics Coordinate System



We Will Be Pleased to Meet You!

BIO-FED
Branch of AKRO-PLASTIC GmbH

BioCampus Cologne · Nattermannallee 1
50829 Cologne
Germany
Phone: +49 221 888894-00
Fax: +49 221 888894-99
info@bio-fed.com
www.bio-fed.com

Here you can find further information – in other languages as well:

05/2017