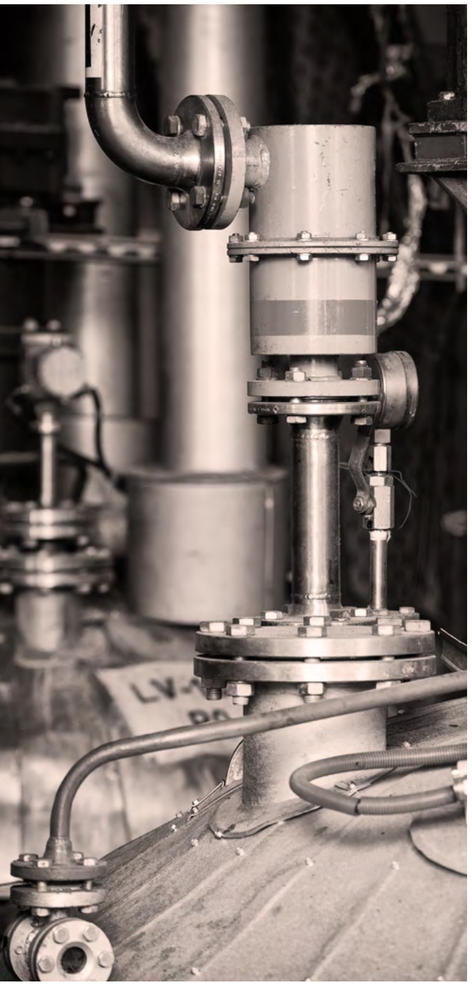

LERG®

# POLYESTER RESINS



## LERG IS THE LARGEST MANUFACTURER OF POLYESTER RESINS IN POLAND

We are the market leader in the synthetic resin industry in Poland. Our standing as a manufacturer and supplier of products tailored to the customer needs across our sectors is backed by more of 80 years of experience and expertise. Our product portfolio today features approx. 600 products, including polyester resins, novolak resins, phenolic resins, resins for wood-based and insulation materials, formalin, as well as Polfill®-branded range dedicated for car body and paint renovation. Our products all find their applications in various industries.

For years now, we have been growing and expanding a leading and secure business within the LERG Chemical Group, which operates to enable entry into new product and sales markets domestically and across a range of geographies.

Currently, the Company's offer covers the following types of polyester resins:

- ESTROMAL® unsaturated polyester resins for a wide range of applications, made in the following starting-material varieties: orthophthalic, terephthalic, isophthalic, ISO/NPG, DCPD, vinyl ester,

- ESTROFTAL® saturated polyester resins for use in paints and varnishes.



## OUR EXPORT SALES ACCOUNTS FOR APPROX. 50% OF POLYESTER RESIN OUTPUT PROGRESS

PORTUGAL, SPAIN,
FRANCE, ITALY,
GREAT BRITAIN,
GERMANY, CZECH REPUBLIC,
HUNGARY, SERBIA, SLOVAKIA,
ROMANIA, UKRAINE,
BELARUS, LITHUANIA,
ESTONIA, RUSSIA,
KAZAKHSTAN, LATVIA,
NETHERLANDS, DENMARK

# MODERNITY

With advanced fully automated installations, which were upgraded and extended in 2008, the quality standard for the resins on our offer have improved and our manufacturing capacities have increased multi-fold. These efforts have let us grow the pool of satisfied Customers year on year. We are especially proud to operate the most advanced filtration system for PET-based resins, the only solution of this type on the European scale, which ensures 100% removal of solids residues generated in the starting material glycolysis process.



# TECHNOLOGY

In view of the wide range of applications of polyester resins and a high specialization of production profiles at our commercial partners, LERG's R&D department experts work closely with Customers on the ongoing basis to tailor resin specifications to their needs. Each of our partners may operate their unique production process that requires adjustments in standard resin parameters, and we understand it. We have the know-how and capability to make such tailored modifications for them. LERG technology experts provide Customers with professional assistance for new or existing process development, and technical and application training for ESTROMAL® resin processing.

INSTRUMENTAL ANALYSIS LABORATORY:
ICP-OES SPECTOMETRIC TESTING


INSTRUMENTAL ANALYSIS LABORATORY: GC-FID, GPC, GC-MS, HPLC CHROMATOGRAPHIC TESTING

# ESTROMAL® POLYESTER RESINS - APPLICATIONS

## POLYMER CONCRETE

This modern product of a multitude of applications is used with a range of highly reactive resins with the parameters closely adjusted to the individual Customer's requirements. Polymer concrete is an excellent material for the manufacture of pipes, sewer wells, manholes, linear drainage, fencing, etc.

## POLYESTER-GLASS LAMINATES

ESTROMAL® ortho- and terephthalic resins for the production of polyester-glass laminates are pre-accelerated, thixotropic resins with reduced styrene emission during processing. Structural orthophthalic resins used in the production of floating equipment are certified by DNV.



## CIPP RESINS

This modern technology goes with a range of resins with high mechanical and chemical properties. Each product can be closely tailored to our Customer's requirements. Our ESTROMAL® resins show good processing properties and finished products reveal excellent parameters, in particular for chemical resistance and mechanical strength.

## MINING

We offer polyester resins used as a binder in the production of mining loads (cartridges). These resins are characterised by a low viscosity, high stability in time and excellent strength parameters.

## FANCY GOODS

Polyester resins designed for processing by casting and centrifugal moulding methods. These are medium-reactive orthophthalic resins, colourless, characterized by flexibility and transparency.

# ESTROMAL® POLYESTER RESINS - APPLICATIONS

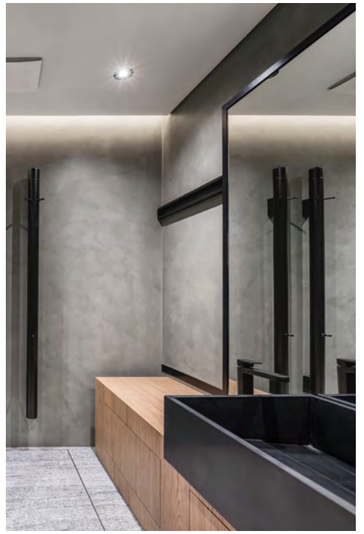
## RTM COMPOSITES

Our ESTROMAL® resins are characterized by low viscosity, very good mechanical properties and a high HDT. They are perfect for the production of repeatable and precision components in the RTM technology, such as housings and car body parts.

## BATHTUBS AND SHOWER TRAYS

ESTROMAL® resins designed for the reinforcement of ready-made acrylic products, i.e. bathtubs and shower trays. They are characterized by a low exothermic peak and good adhesion to acrylic and ABS.





## PAINTS AND VARNISHES

At the core of our offer is the range of ESTROFTAL® resins intended for the production of alkyd paints. We have also prepared a „high solid" resin version for the most demanding Customers.

## ARTIFICIAL MARBLE

When the mixture is prepared, polyester resins accept large amounts of fillers, and during post-curing, they are characterized by a low exothermic peak. Finished products show minimal shrinkage.

## CASTINGS

Terephthalic-based polyester resins are characterized by excellent processing properties. They offer low viscosity, and a specially selected mixture ensures short post-curing times.

# CONSTRUCTION RESINS

## ESTROMAL

| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **11.LM-01/1** | ORTO | 1100-1500 | 25-35 | 95 | 60 | 110 | 64 | 2 |
| **11.LM-01/W50** | ORTO | 1100-1500 | 50-60 | 100 | 60 | 103 | 64 | 2 |
| **11.LM-02** | ORTO | 1100-1500 | 20-30 | 120 | 60 | 103 | 64 | 2 |
| **17.LM-06** | IZO | 10 000-12 000 | 20-35 | 150 | 90 | 130 | 70 | 3 |
| **17LM-07** | IZO | 10 000-12 000 | 28-33 | 140 | 95 | 125 | 75 | 2,5 |
| **DL.115-3/1** | DCPD | 500-650 | 30-38 | 140 | 85 | 110 | 60 | 2,2 |
| **DL.115-3/5** | DCPD | 500-650 | 16-24 | 140 | 85 | 110 | 60 | 2,2 |
| **DL.115-5/4** | DCPD | 500-650 | 30-38 | 130 | 85 | 110 | 60 | 2,2 |
| **DL.115-5/5** | DCPD | 500-650 | 20-35 | 130 | 85 | 110 | 60 | 2,2 |
| **DL.115-8/W** | DCPD | 450-550 | 35-45 | 130 | 85 | 110 | 60 | 2,2 |
| **DL.116-5/3** | DCPD | 500-650 | 20-35 | 130 | 85 | 110 | 60 | 2,2 |
| **DL.145-2** | TERE/DCPD | 1100-1500 | 25-35 | 120 | 60 | 75 | 40 | 1,8 |
| **14.LM** | TERE | 1100-1500 | 15-30 | 120 | 72 | 90 | 40 | 2 |
| **14.LM-01** | TERE | 1100-1500 | 20-30 | 120 | 78 | 100 | 40 | 2 |
| **14.TA-01** | TERE/IZO | 650-750 | 26-32 | 200 | 120 | 115 | 75 | 2,3 |

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# RESINS

## FOR POLYMER CONCRETE

| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **14.PB-06** | TERE | 200-400 | 8-20 | 170 | 95 | 125 | 75 | 3,5 |
| **14.PB-06/C1** | TERE | 300-400 | 5-10 | 150-180 | 95 | 125 | 75 | 3,5 |
| **14.PB-06 K-1** | TERE | 170-225* | 12-16 | 140-180 | 95 | 125 | 75 | 3,5 |
| **14.PB-06 T-100/S-100** | TERE | 300-400 | 10-15 | 140-180 | 120 | 110 | 55 | 2 |
| **14.H-LV** | TERE | 180-250 | 7-12 | 150-190 | >90 | >120 | 70 | >3,0 |
| **1457** | TERE | 260-300 | 4-6 | 160 | 90 | 100 | 50 | 2 |
| **1458** | TERE | 250-320 | 2'-2'40" | 220 | 90 | 110 | 55 | 2,5 |
| **14.V-1** | TERE | 255-265 | 8-10 | 180-195 | 95 | 130 | 75 | 2,8 |
| **11.AN-1** | ORTO | 250-300 | 1-2 | 165-195 | 90 | 125 | 70 | 2,2 |
| **FLR-2** | OTRO | 300-400 | 10-20 | 70-95 | - | - | - | 30 |
| **11.RT** | ORTO | 350-450 | 11-18 | 90-115 | 90 | 130 | 67 | 2,5 |
| **11.V-3** | ORTO | 190-250 | 2-3 | 210 | 90 | 115 | 65 | 2,3 |
| **11.ONT-1** | ORTO/NPG | 300-400 | 10-20 | 140-180 | 90 | 130 | 70 | 2,5 |
| **17.GE-09/UV** | IZO/NPG | 500-800 | 1-3 | 170-200 | 100 | 130 | 75 | 3 |
| **171.GE-03/1** | IZO/NPG | 240-280 | 14-18 | 140-180 | 90 | 120 | 70 | 3 |

*HÖPPLER VISCOSITY

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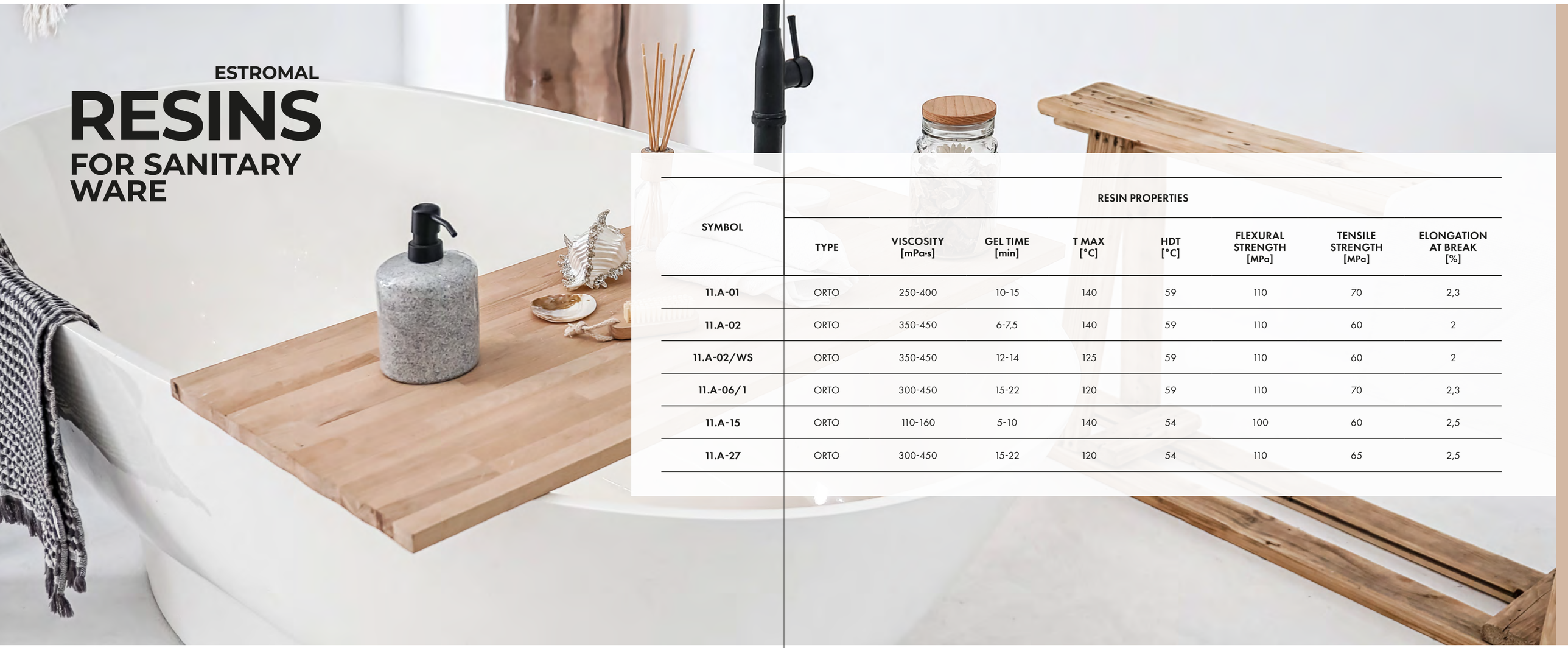
# RESINS

## FOR SANITARY WARE



| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **11.A-01** | ORTO | 250-400 | 10-15 | 140 | 59 | 110 | 70 | 2,3 |
| **11.A-02** | ORTO | 350-450 | 6-7,5 | 140 | 59 | 110 | 60 | 2 |
| **11.A-02/WS** | ORTO | 350-450 | 12-14 | 125 | 59 | 110 | 60 | 2 |
| **11.A-06/1** | ORTO | 300-450 | 15-22 | 120 | 59 | 110 | 70 | 2,3 |
| **11.A-15** | ORTO | 110-160 | 5-10 | 140 | 54 | 100 | 60 | 2,5 |
| **11.A-27** | ORTO | 300-450 | 15-22 | 120 | 54 | 110 | 65 | 2,5 |

# CASTING RESINS

## ESTROMAL

| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **A.023** | ORTO | 250-350 | 15-20 | 170 | 70 | 90 | 55 | 2,2 |
| **11 AM/R** | ORTO | 250-300 | 24-27 | 135 | 60 | 120 | 60 | 2,2 |
| **11.OD-02** | DCPD | 150-250 | 7-12 | 150 | 88 | 100 | 55 | 2 |
| **EPS** | ORTO | 300-400 | 10-20 | 160 | 70 | 120 | 60 | 2 |
| **14.90/3** | TERE | 270-320 | 2'50''-3'20'' | 160 | 60 | 110 | 60 | 3,2 |
| **1456** | TERE | 190-210 | 8-12 | 130 | 70 | 80 | 35 | 2 |

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# RESINS
## FOR THE MINING INDUSTRY

| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [s] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **14.ON-09** | TERE | 300-400 | 45-75 | - | 85 | 100 | 50 | 2 |
| **14.ON-05** | TERE | 340-400 | 50-80 | - | 80 | 120 | 65 | 3,5 |
| **14.PB-06T100/S100** | TERE | 330-400 | 20-40 | - | 105 | 110 | 55 | 2 |
| **14.ON-09 TIX** | TERE | 5000-6500 | 15-30 | - | 85 | 100 | 50 | 2 |

# SOLID SURFACE RESINS

## ESTROMAL

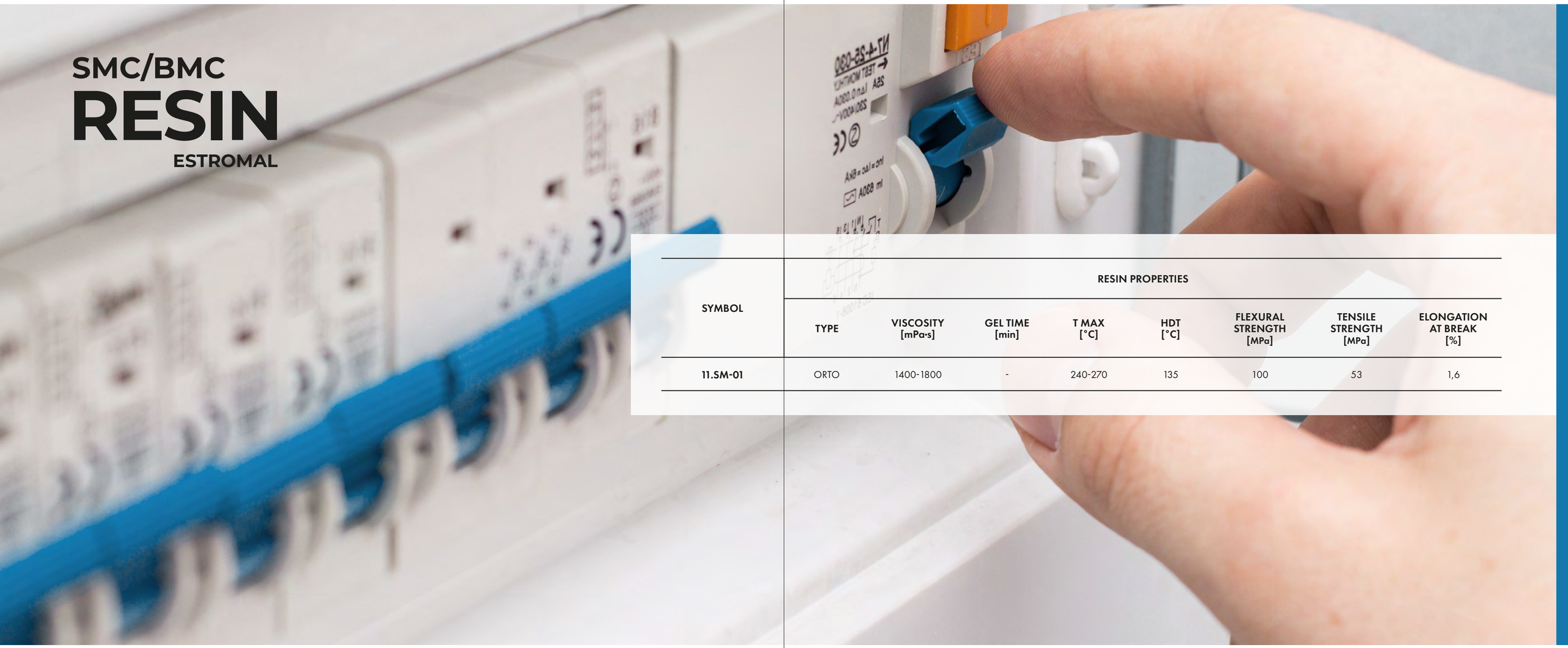
| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **171.SDF-01** | IZO/NPG | 550-650 | 8-20 | 160 | 70 | 110 | 63 | 2 |
| **171.SDF-06** | IZO/NPG | 600-800 | 15-20 | 165 | 70 | 110 | 63 | 2 |

# FIRE RETARDANT RESINS

## ESTROMAL

| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **14.CNP-03** | TERE | 1000-1500 | 15-25 | 140 | 80 | 80 | 40 | 1,3 |
| **11.DFR-01** | TERE/DCPD | 1500-3000 | 15-30 | 65 | 82 | 50 | 35 | 0,4 |

# SMC/BMC
# RESIN
## ESTROMAL



| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **11.SM-01** | ORTO | 1400-1800 | - | 240-270 | 135 | 100 | 53 | 1,6 |

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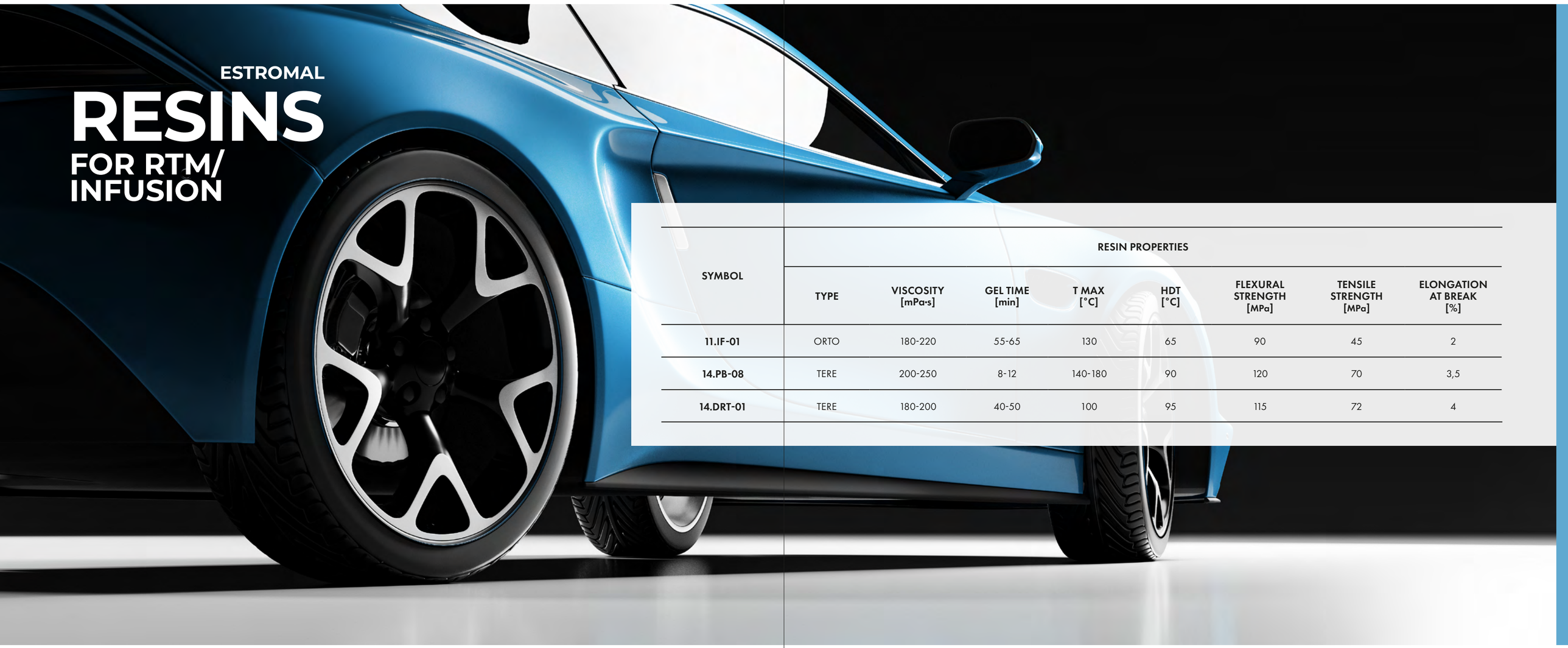
# RESINS
## FOR RTM/ INFUSION



| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **11.IF-01** | ORTO | 180-220 | 55-65 | 130 | 65 | 90 | 45 | 2 |
| **14.PB-08** | TERE | 200-250 | 8-12 | 140-180 | 90 | 120 | 70 | 3,5 |
| **14.DRT-01** | TERE | 180-200 | 40-50 | 100 | 95 | 115 | 72 | 4 |

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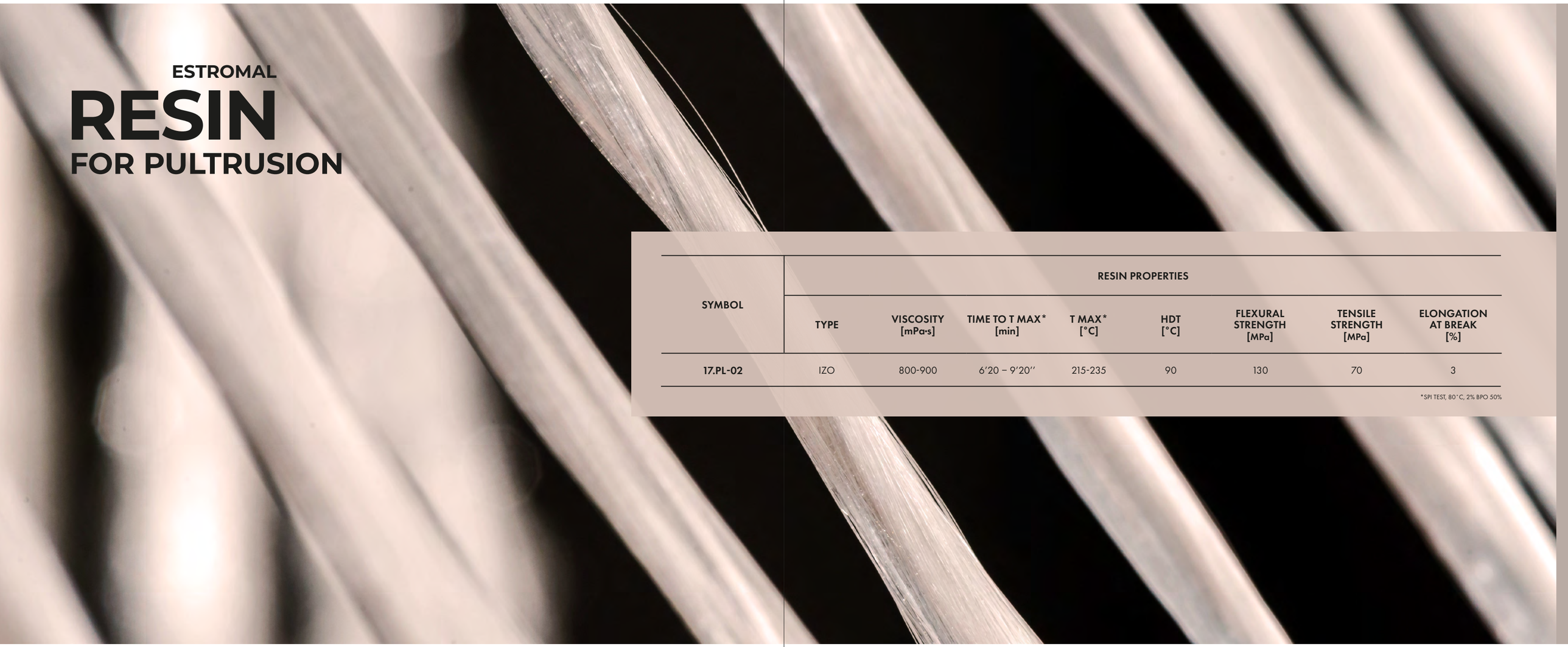
# RESIN
## FOR PULTRUSION



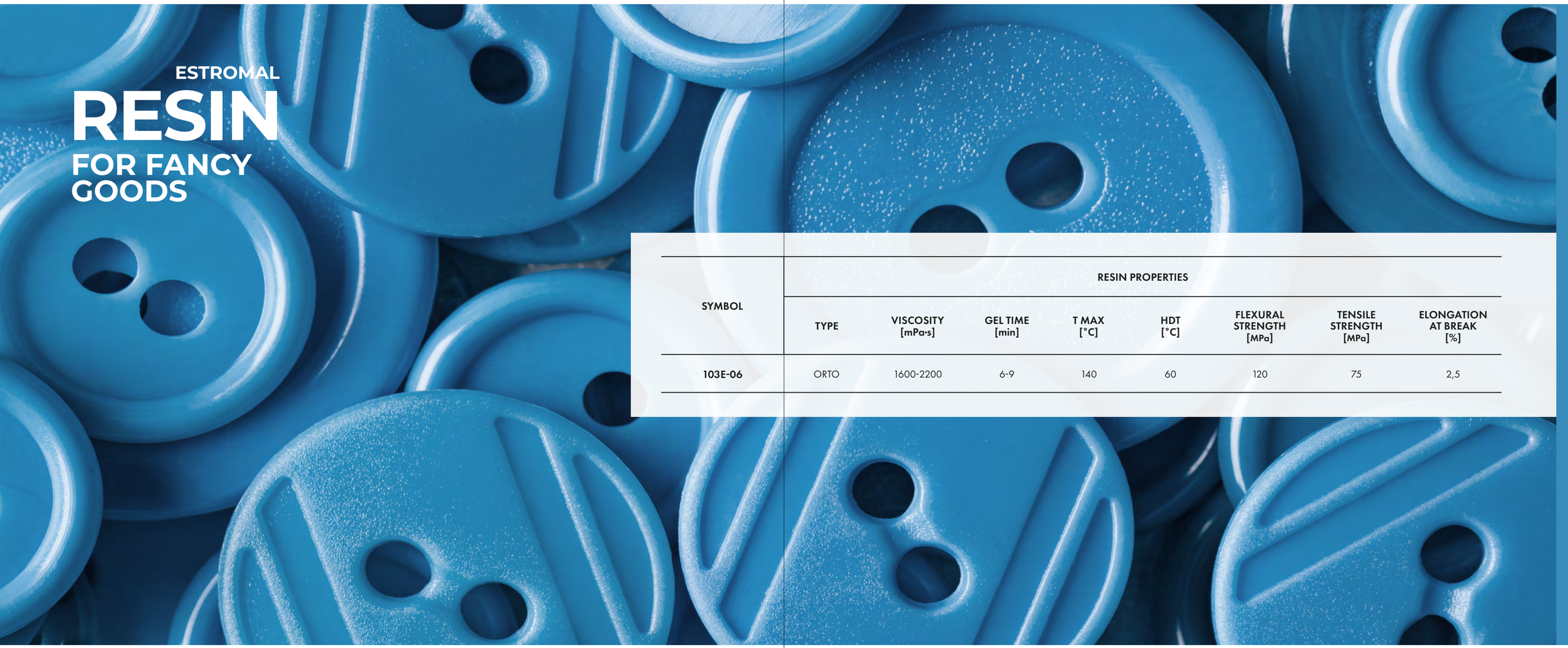
| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | TIME TO T MAX* [min] | T MAX* [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **17.PL-02** | IZO | 800-900 | 6'20 – 9'20'' | 215-235 | 90 | 130 | 70 | 3 |

*SPI TEST, 80°C, 2% BPO 50%

ESTROMAL

# RESIN

## FOR FANCY GOODS



| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| **103E-06** | ORTO | 1600-2200 | 6-9 | 140 | 60 | 120 | 75 | 2,5 |

# LOW STYRENE EMISSION (LSE) RESIN

ESTROMAL

| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| 11.R-S | ORTO | 900-1100 | 25-35 | 150 | 50 | 90 | 45 | 2 |

# STYRENE-FREE RESIN

ESTROMAL

| SYMBOL | RESIN PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | TYPE | VISCOSITY [mPa·s] | GEL TIME [min] | T MAX [°C] | HDT [°C] | FLEXURAL STRENGTH [MPa] | TENSILE STRENGTH [MPa] | ELONGATION AT BREAK [%] |
| BS-11 | ORTO/DCPD | 200-400 | 15-30 | 130 | 70 | 90 | 50 | 1,5 |

ESTROFTAL

# RESINS

## FOR PAINT AND LACQUERS

| SYMBOL | RESIN PROPERTIES | | | | | | |
|---|---|---|---|---|---|---|---|
| | APPEARANCE | COLOUR [IODINE SCALE] | DENSITY [g/cm³] | ACID NUMBER [mgKOH/g] | BROOKFIELD VISCOSITY SPL. 6/50 OBR [mPa·s] | SOLIDS CONTENT [%] | DRYING TIME [h] |
| **PLS 651 B-80** | CLEAR LIQUID | MAX 30 | 0,95 ±0,04 | MAX 10 | 4000-9000 | 78-82 | MAX 8 |
| **PS 623 B-70** | CLEAR LIQUID OF YELLOW COLOUR | MAX 10 | 0,94 ±0,04 | MAX 10 | 11000-17000 | 69,5-71,5 | MAX 8 |
| **PS 623 B-60** | CLEAR LIQUID | MAX 10 | 0,94 ±0,04 | MAX 10 | 450-650 s (TESTED WITH FORD VISCOSITY CUP) | 58-62 | MAX 8 |

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