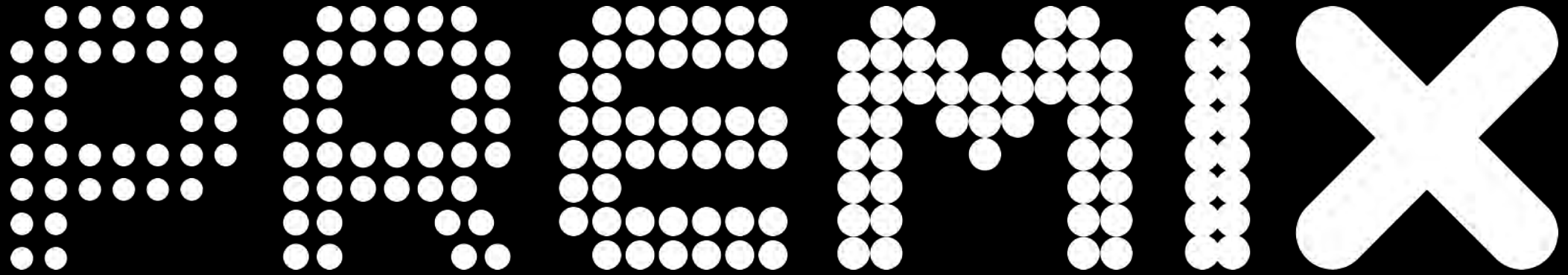


Conductive PRE-ELEC® Concentrates


"Creating a safe society
with functional materials"

PRE-ELEC® carbon black concentrates are

- ecological
- economical
- customizable choice

Concentrates are an excellent way to reduce raw material costs. In PRE-ELEC® concentrates, the carbon black content has been optimized to the highest possible level without impairing processability. To ensure maximum cost efficiency, recycled plastics or regrind from customers own processes can be used for dilution. One small, yet innovative step, can lead to significant cost savings.

Our material solutions enable sustainable and functional applications for a safe society.

Premix's portfolio offers conductive concentrates for **high volume applications**, especially for **films, sheets and filaments**.

The materials are excellent for e.g. **FIBC (type C) applications, pallets, pipes, drums, trays, cans and other generic shapes**.

The advantages
Why concentrates?

One product, multiple solutions

- Compounds are designed for specific applications -> suboptimal performance for other applications
- Customer can tailor the properties by using a dilution plastic of their choice
- Premix primarily offers functionality, e.g., conductivity. With concentrates we offer the same conductivity with less freights
- Built-in possibility to use local raw materials and own production off-streams

Sourcing for a large amount of product variants is complex and costly. Using concentrates makes the process simpler and more manageable

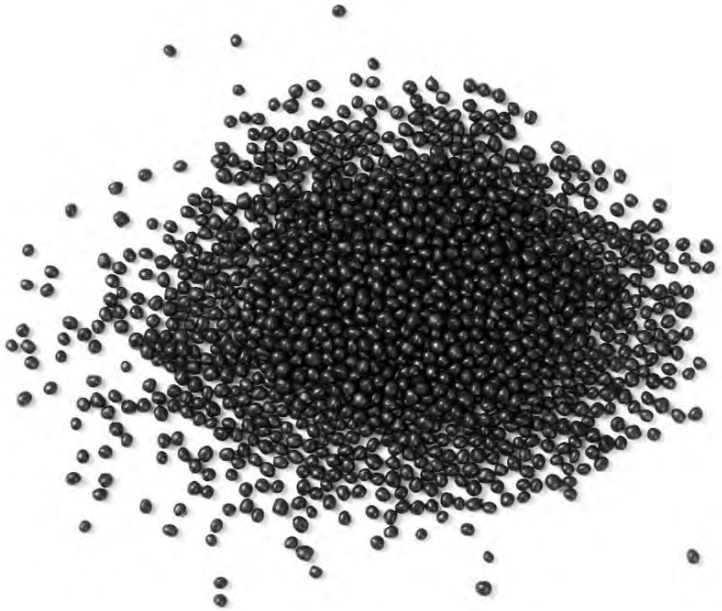
- Finding a suitable conductive compound is always trickier than basic raw material sourcing
- Conductivity and other properties can easily be tweaked with slight changes to dilution polymers
- Using concentrates helps protect the IPR of the solutions ("solution privacy")
- Conductive concentrates can be used in combination with flame retardant and other additive masterbatches

Processing
Extrusion, percolation and viscosity

Processing of conductive concentrates

Critical factors in extrusion

a. MFR of the dilution polymer as close to concentrate as viable
b. Melting point of dilution polymer should not be lower than that of concentrate
c. Feeding/compression zone settings are critical for homogenization
d. Moisture is a bigger threat compared to compounds
e. Quality of granulation (shape and size distribution)
f. Avoiding segregation of components prior feeding

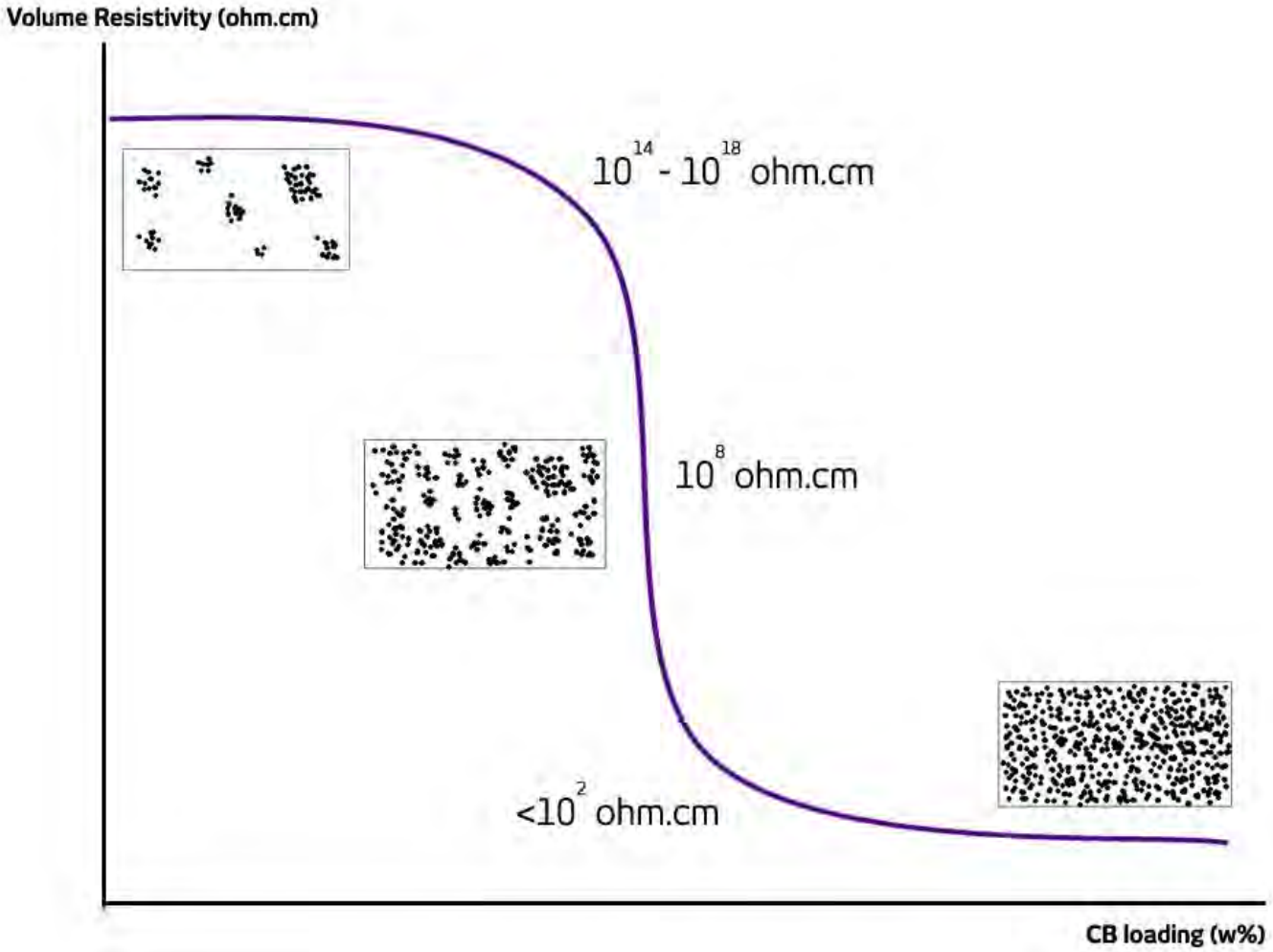


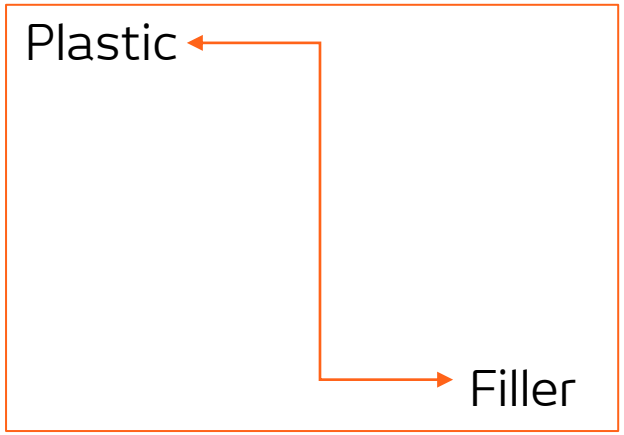
Typically conventional machines are suitable for conductive masterbatches.

Injection moulding

In addition to the above-mentioned list; MFR should be chosen to suit the product's dimensions. Too high shearing, back- or holding pressure should be avoided to ensure carbon black structure's integrity. More precise processing instructions available in DataCenter.

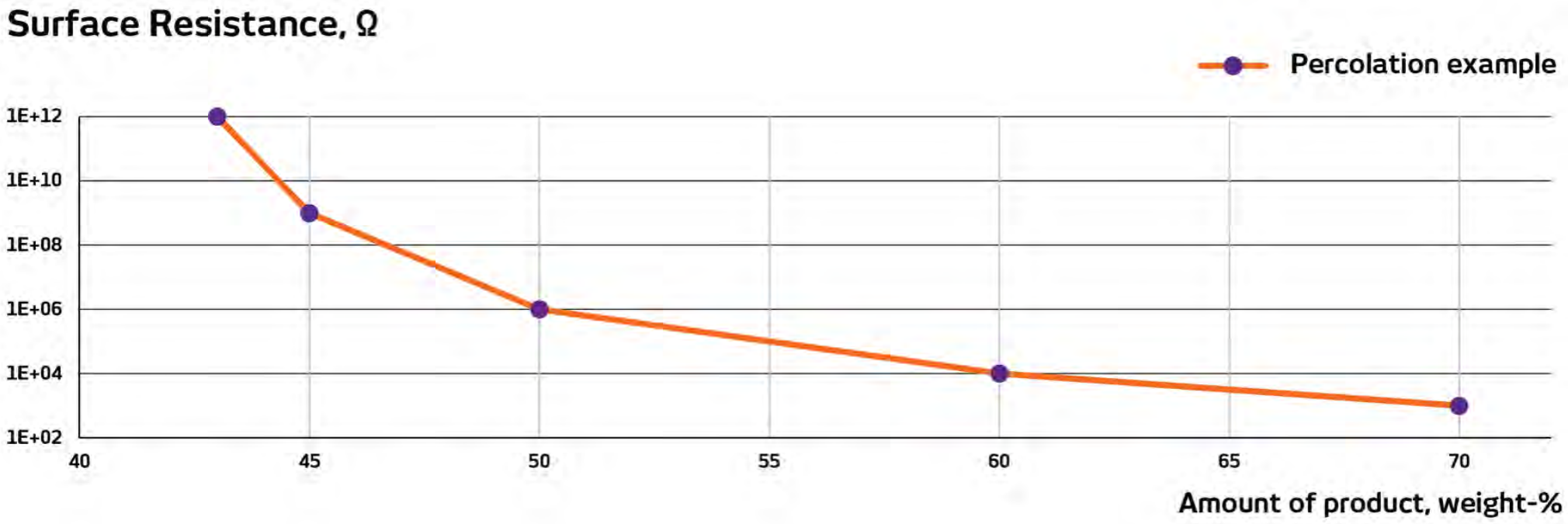
Percolation curve





Percolation: making conductive paths across the material via carbon black particles.

Dilution graph



End-product and its processability is a sum of 1) concentrate amount, 2) dilution polymers and 3) dilution polymer MFR range. The graphs are product-specific and provided in the concentrates' technical datasheets.

Dilution versatility example

HDPE concentrate can be diluted with various polymer-bases to achieve different end-product properties > wide product portfolio with single specialty product.

HDPE	➢	Relatively high stiffness
LDPE	➢	Lower stiffness
EVA	➢	Polar-adhesion
PS + SBS	➢	Stiff thermoformable sheet

Processing effect of filling

- Filling causes **internal friction** in plastics. The effect's significance increases as the proportion of filler surface area to polymer surface area increases

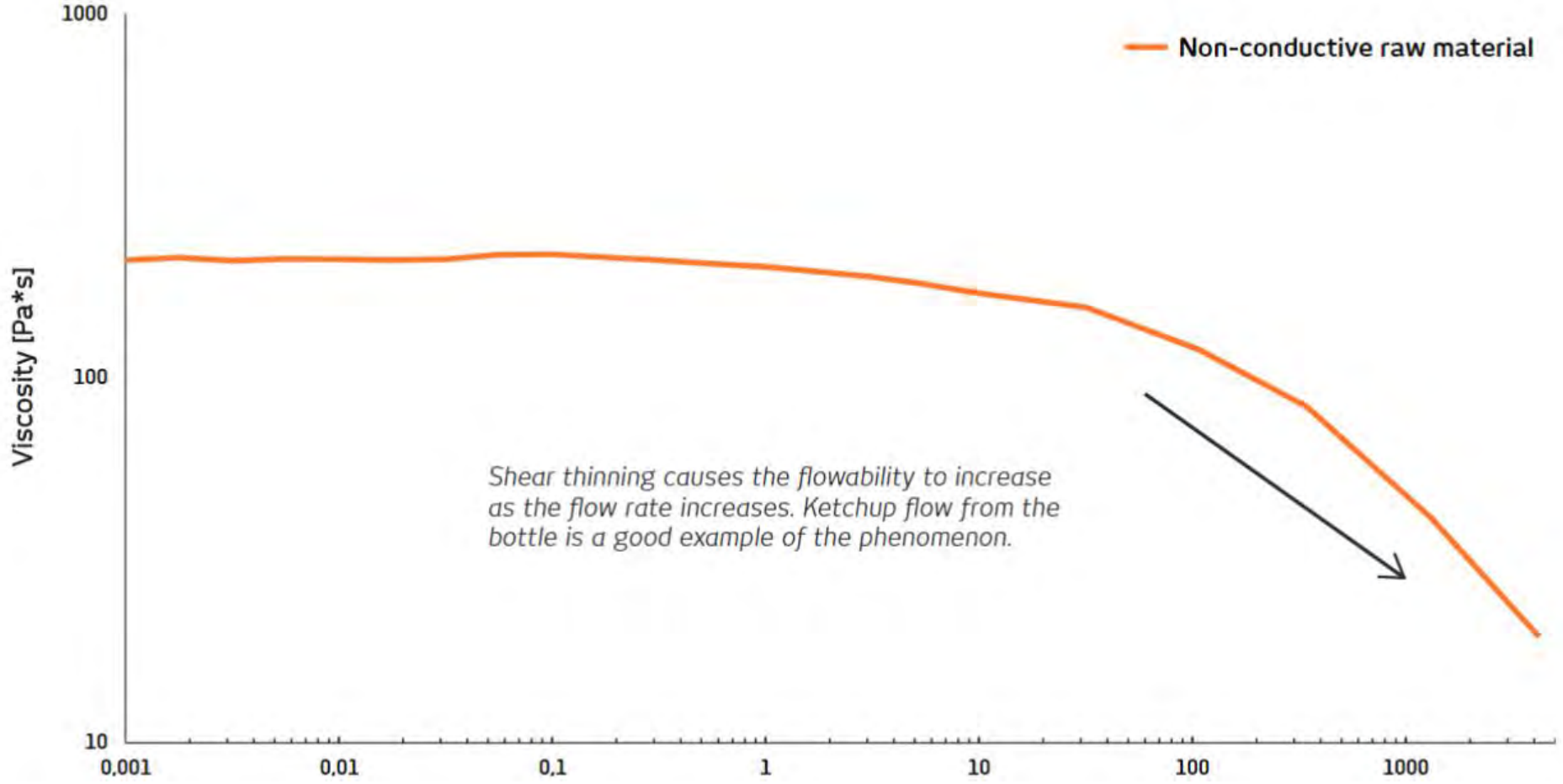
- Changes in melt temperature may be used to shift **the viscosity curve** up or down, but it does not remarkably change the shape of the curve

- Viscosity profile is affected by **multiple variables** including molecular weight distribution, branching of the polymer, temperature and the degree of filling

- Final product **after dilution will have significantly lower filling degree** causing the shape and position of the viscosity curve to change

- Viscosity curve or **MFR** of a concentrate is not a descriptive property of the product

Viscosity curve
Rotational + capillary



Physics of viscosity curve

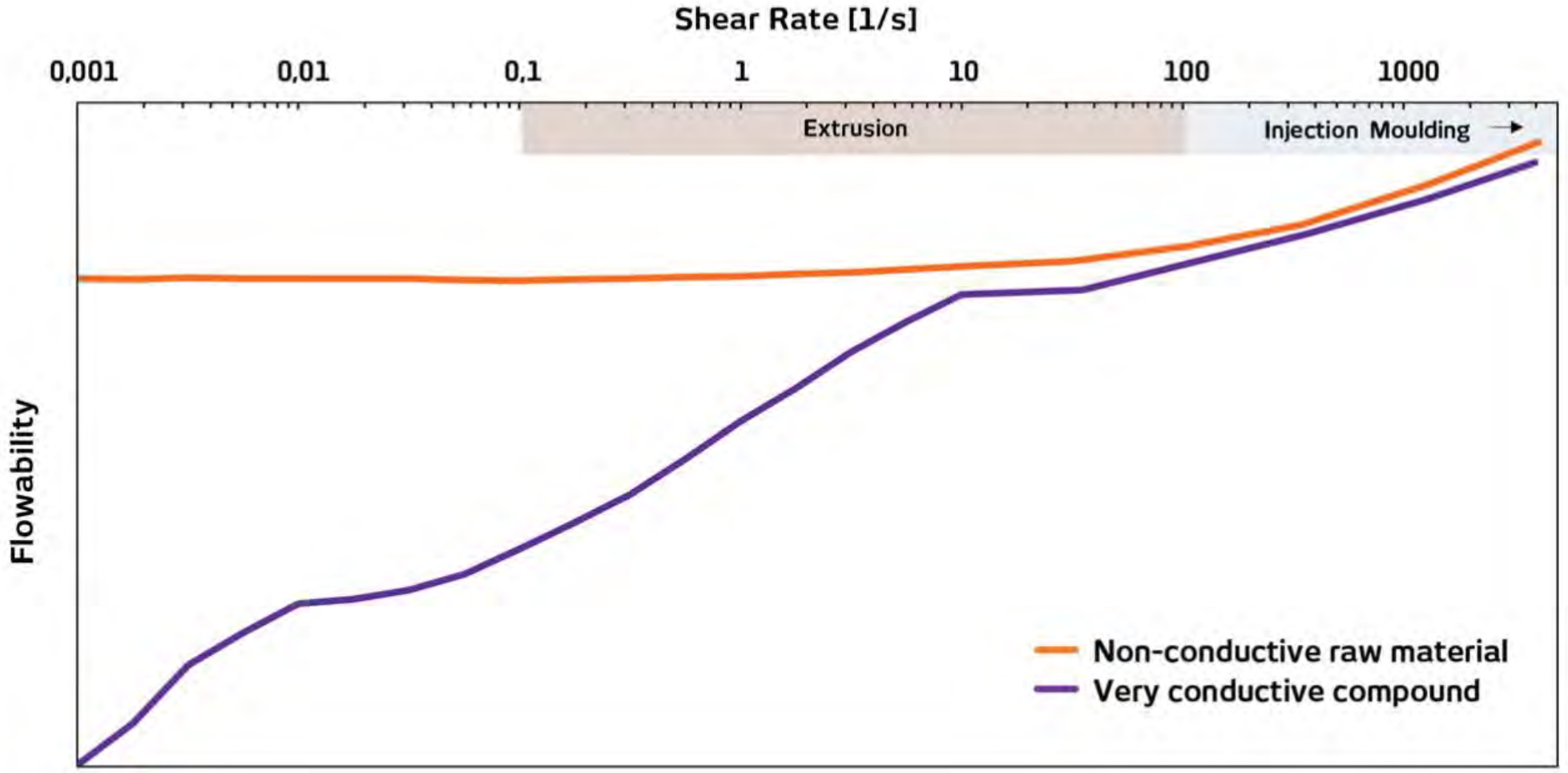
- Lower shear rate equals to slower speed of material
- High viscosity -> thick melt, for example toothpaste, pudding...
- Low viscosity -> liquidy melt, for example water, olive oil...

Shear rate ranges correlate to different processing methods

- < 1 - the material under atmospheric forces, e.g., gravity
- 1 < 100 - material in typical profile extrusion
- 100 < 100000 - injection moulding

Plastics, especially filled plastics, are typically shear thinning fluids. In other words, by pushing harder, thinner the melt becomes.

Plastic flowability as a function of flow speed



The PRE-ELEC® portfolio
Concentrates for various applications

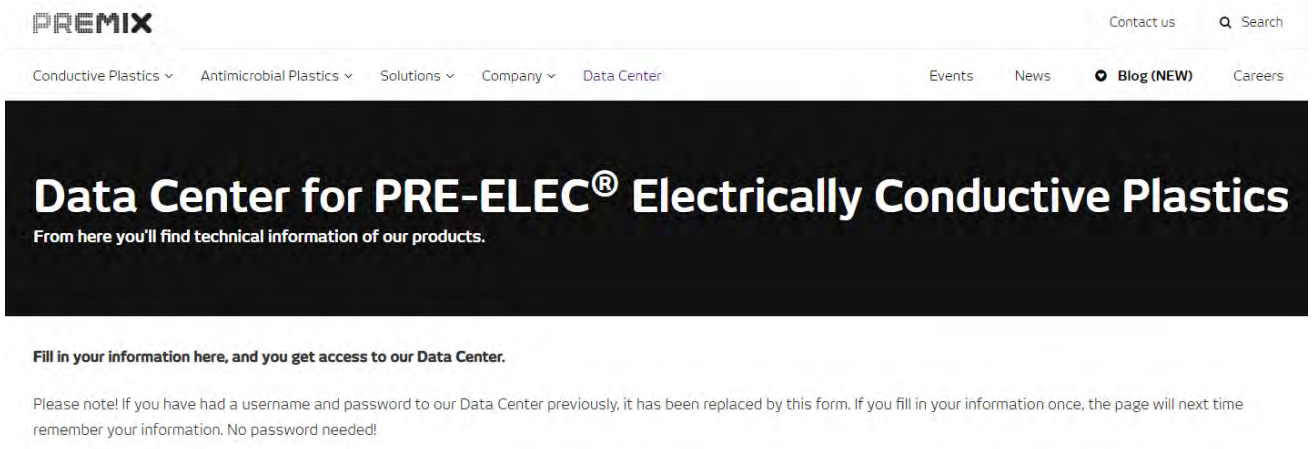
Conductive PRE-ELEC® Concentrates

Product	Base polymer	Injection moulding	Extrusion	Surface finish	Special properties	Target application
PRE-ELEC® CP 1316	EVA	++	++	++	Foaming base material	EVA foam applications
PRE-ELEC® PA 1411	PA-6	++	++	+++	Wide operation temperatures, excellent mechanical properties, easy to paint	General grade
PRE-ELEC® PE 1250	PE-HD	++	++	++	Economical version of PE 18800	Pipes, profiles, sheets
PRE-ELEC® PE 18594	PE-HD	++	++	++	Economical HDPE	Thermoformed trays
PRE-ELEC® PE 18800	PE-HD	-	+++	+++	Excellent durability and melt strength (blow moulding)	Drums, canisters, pipes, cables
PRE-ELEC® PE 17693	PE-LLD	-	+++	+++	Flexible and resilient, good fatigue behaviour	Flexible tubes and hoses
PRE-ELEC® PE 17840	PE-LLD	-	+++	++	Can be diluted with PP, PE, ABS (incl SBS). Economical	Films, sheets, filaments
PRE-ELEC® PE 17800	PE-LD	++	++	+++	Foaming base for 2-step process	PE foam applications (chemical cross-linking)
PRE-ELEC® PP 18999	PP	+++	-	+	High flowability, economical, impact modified	Pallets, boxes
PRE-ELEC® PP 18900	PP	++	++	+++	Excellent surface quality	Corrugated boards
PRE-ELEC® PP 1353	PP	++	++	++	Good stretchability	Monofilament for big bags type C
PRE-ELEC® PP 15392	PP	++	++	++	High flexibility and resilience	Corrugated board

Premix Data Center
Technical datasheets

In our Data Center, we have collected **technical information** about our products for you, including **processing instructions** for PRE-ELEC® conductive compounds and concentrates.

https://premixgroup.com/data-center




Premix Oy
Pioneering since 1980s

Premix Oy – Your reliable material supplier

European market leader and global forerunner in **Electrically Conductive Plastics**.
Strong focus on developing future material solutions.

The newly invested state of the art machinery makes Premix **one of the strongest producer of conductive PP- and PE-compounds.**

Long-term expertise in polymer compounding; product development and material processing know-how.

Technical support available for trial runs.

Wide distributor network, local representative in various countries.

Responsible Care
Our commitment to sustainability

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001:2015

PREMIX

Family owned, independent company

Established 1980

110 employees

Sales revenue 46 M€ (2020)

Production capacity 70 kt/a

LET'S MAKE
A GOOD MIX

www.premixgroup.com