



# OPPANOL® for Insulating Glass Sealants

Ludwigshafen, 28 July 2020

**Fuel and Lubricant Solutions**

**COMPONENTS**  
for Fuel and Lubricant Solutions

- Polyisobutenes
- Esters and PAGs
- Antioxidants
- Viscosity Modifiers
- Performance Additives

A collage of three images: a laboratory flask with yellow liquid, a pile of white powder, and a close-up of a car engine.

**FORMULATIONS**  
for Fuel and Lubricant Solutions

- Coolants and Brake Fluids
- Fuel Performance Packages
- Aviation Fuel Additives
- Refinery Additives
- Lubricants

A collage of two images: a gas station with a red roof and a blue car parked in front of it.

A detailed image of a car engine mounted on a metal stand, positioned in front of the two people.A man in a blue jumpsuit, a woman in a black blazer, and a man in a grey suit are standing and talking. The man in the jumpsuit is gesturing with his hands.

# OPPANOL<sup>®</sup>

## in Insulating Glass and Photovoltaic Sealants

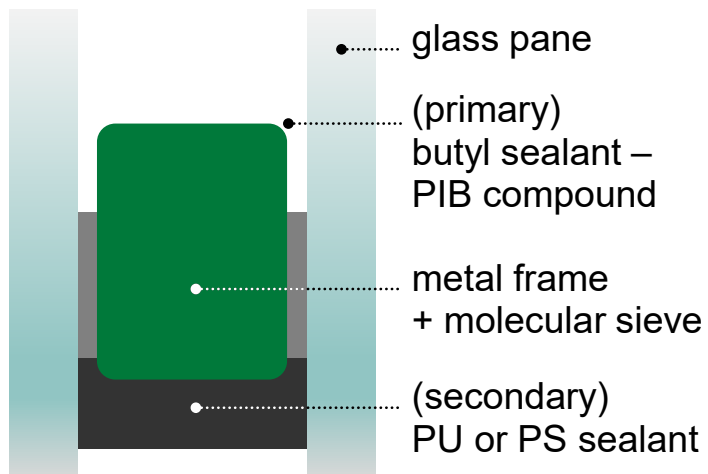
### Advantages of using OPPANOL<sup>®</sup> in Insulating Glass Sealants

- Forms a barrier to moisture and gas
- Strong adhesion to any surfaces
- High water resistance
- Resistance to aqueous chemical solutions
- Low thermal conductivity
- Energy efficiency
- Narrow molecular weight distribution
- Low gas content

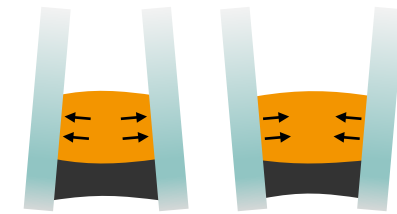
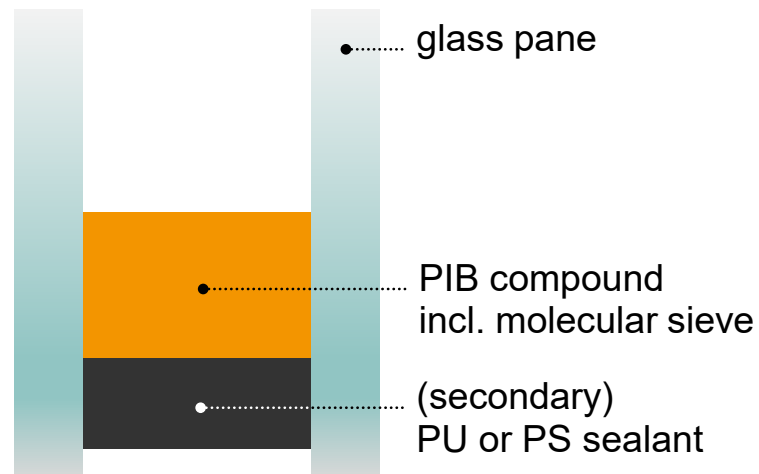


# OPPANOL® in Insulating Glass and Photovoltaic Sealants

## Traditional Sealant System



## Thermoplastic Spacer – TPS



### Additional TPS benefits

- freedom of design (curves etc.)
- thermal separation of panes
- flexibility in manufacturing process
- low thermal conductivity

# OPPANOL®

## in Insulating Glass and Photovoltaic Sealants

### Energy efficiency durability

#### Lowest heat transmission rate

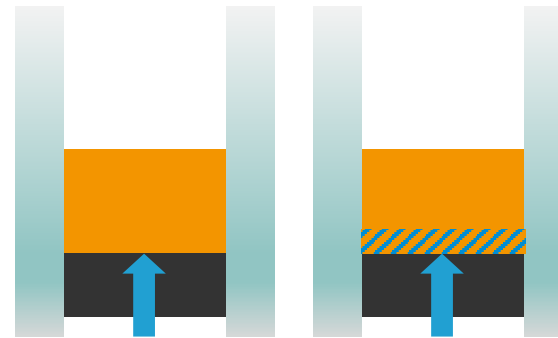
- Eliminating metal component
- Greatly reduced heat transfer via sealant, condensation and mold formation



NO-Metal Super Spacer provides superior thermal performance.

#### Lowest desiccant saturation rate

- Efficiency durability due to great barrier performance
- Desiccant does not get saturated → no fogging



# OPPANOL®

## in Insulating Glass and Photovoltaic Sealants

**There are many spacer technologies available in the commercial market**

Warm Edge Thermoplastic spacer system is the technology that:

- Uses PIB based primary sealant
- Has no metal content
- Could have secondary sealant of Si, PU or Polysulfide
- Is automatically dispensed
- Has the least gas leakage rate

# OPPANOL®

## in Insulating Glass and Photovoltaic Sealants

### Advantages of using OPPANOL® in Solar Panel Manufacturing

PV cells need to pass Damp Heat and Thermal Cycling Test to meet service life requirements

- OPPANOL® does not brittle at temperatures as low as -40°C like EVA can. It remains durable at wide range of temperatures and protects the PV cell from humidity damage.

PV Cells can corrode because of moisture penetration

- OPPANOL® has a very low MVTR as opposed to PVB and EVA. Thus, it will prevent moisture from seeping into the sensitive photovoltaic cell. By being the ultimate moisture barrier ingredient, it will help make your PV cell have the same efficiency for years.

# OPPANOL®

## in Insulating Glass and Photovoltaic Sealants

### General

Formulations contain mixtures of different MM OPPANOL® grades or only one grade (e.g. B 15)

**Generic example:**

- 40% OPPANOL® B 15
- 20% OPPANOL® B 10
- 40% Carbon black
- additives: antioxidants, UV stabilizer

**Oppanol grades:**

- OPPANOL® B 15 (60-80%)
- OPPANOL® B 12 (10-20%)
- OPPANOL® B 10 (10-20%)

**Manufacturing process:** melting process in mixers / extruders



# OPPANOL®

## in Insulating Glass and Photovoltaic Sealants

Values are indicative and vary with different Staudinger index

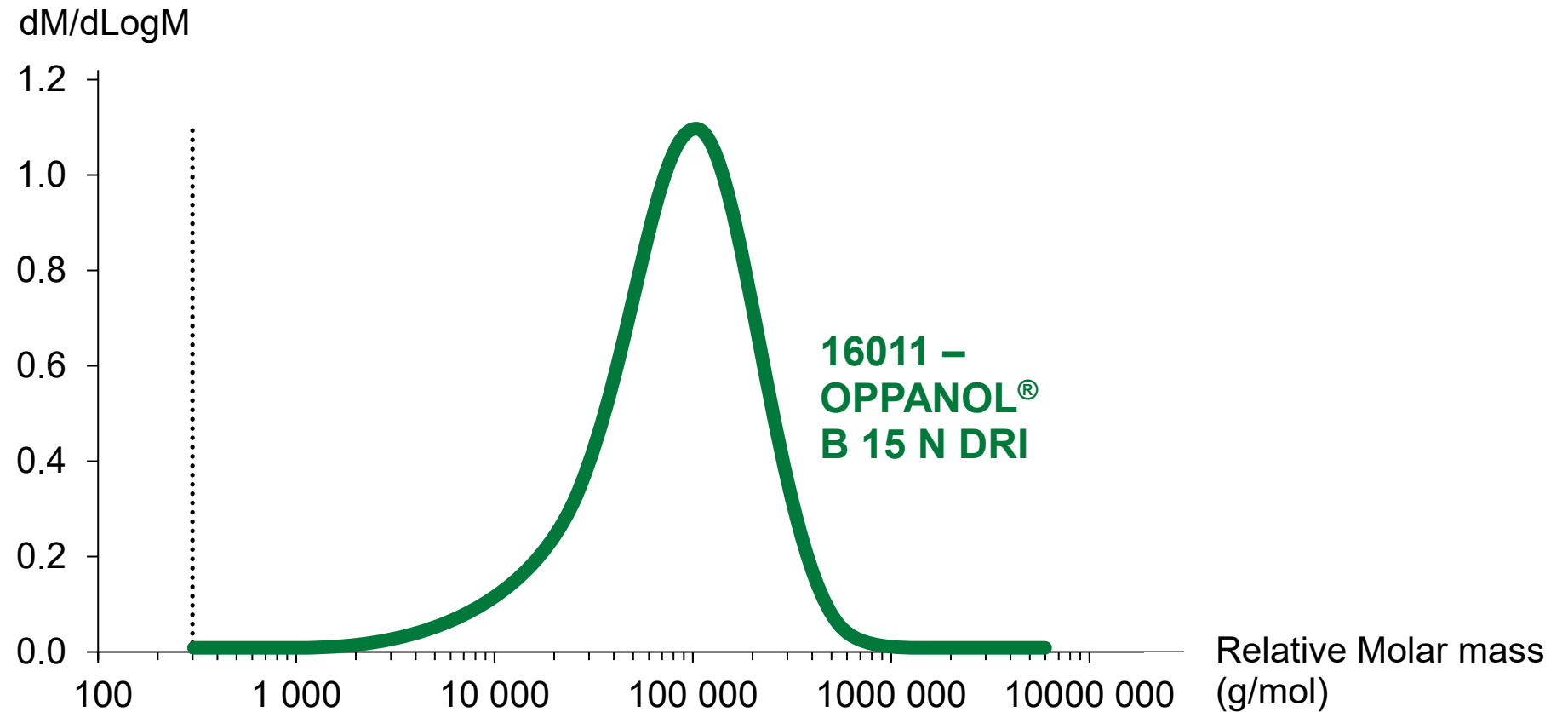
Temperature	B 10 N	B 11 SFN	B 12 N	B 13 SFN	B 14 SFN	B 15 N
70 °C	1.660.000	3.590.000	5.705.000			
80 °C	925.000	2.050.000	3.170.000	5.185.000		
90 °C	544.500	1.190.000	1.830.000	3.095.000		
100 °C	339.000	731.500	1.110.000	1.865.000	4.070.000	
110 °C	215.000	461.500	707.500	1.190.000	2.580.000	3.640.000
120 °C	140.500	307.000	476.000	787.500	1.690.000	2.315.000
130 °C	94.880	204.000	315.000	518.500	1.140.000	1.575.000
140 °C	66.334	142.500	215.500	361.000	788.000	1.085.000
150 °C	47.040	98.360	153.000	263.000	545.000	760.000
160 °C	34.400	72.974	108.260	181.500	399.000	537.000
170 °C	25.800	54.067	82.350	141.000	280.500	399.500
180 °C	19.720	40.080	64.700	98.780	209.500	311.500
190 °C	15.060	30.560	46.960	75.067	159.000	245.000
200 °C	11.840	23.600	38.050	56.240	120.500	187.500
J <sub>0</sub> [cm³/g]	29,55	33,64	36,61	39,79	45,35	48,60

Brookfield viscosity  
in mPas



# OPPANOL® in Insulating Glass and Photovoltaic Sealants

## Molecular weight distribution

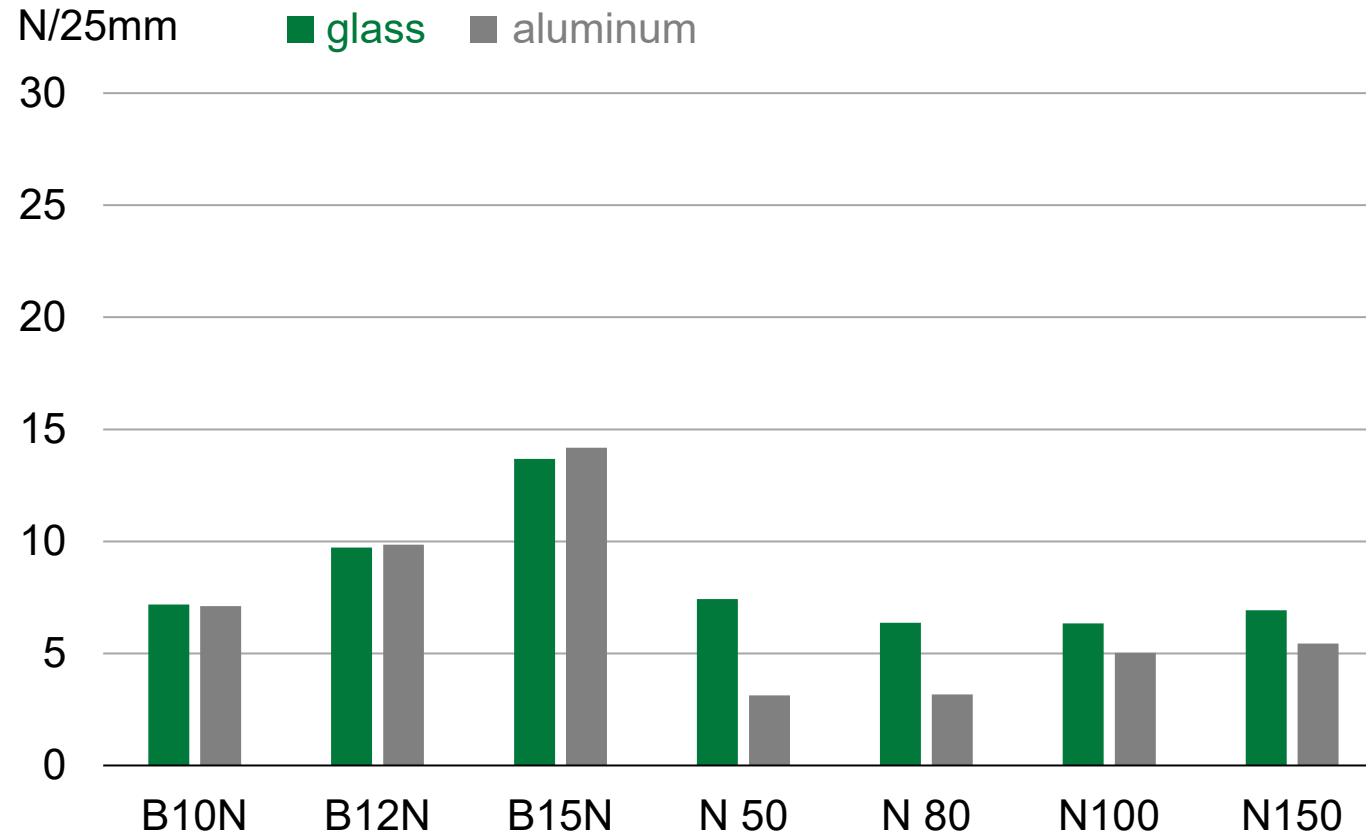


# OPPANOL<sup>®</sup>

## in Insulating Glass and Photovoltaic Sealants

### Finat FTM 1 Peel adhesion (180°)

quantifies the  
permanence  
of adhesion  
or peelability



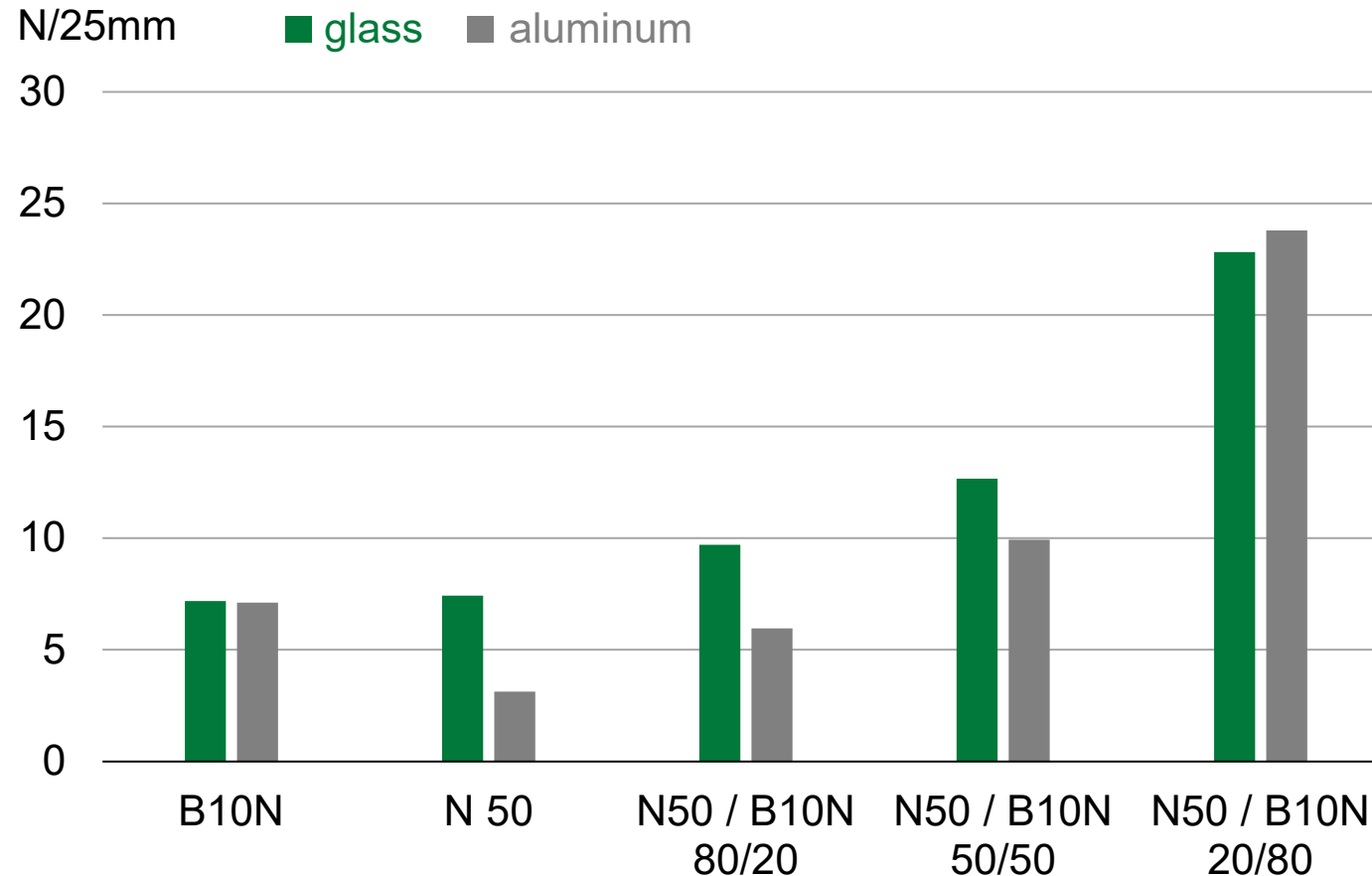
# OPPANOL<sup>®</sup>

## in Insulating Glass and Photovoltaic Sealants

### Mixtures MM/HM Finat FTM1

Higher values can be achieved by combining the products

Exemplary  
OPPANOL<sup>®</sup>  
B 10 N / N 50



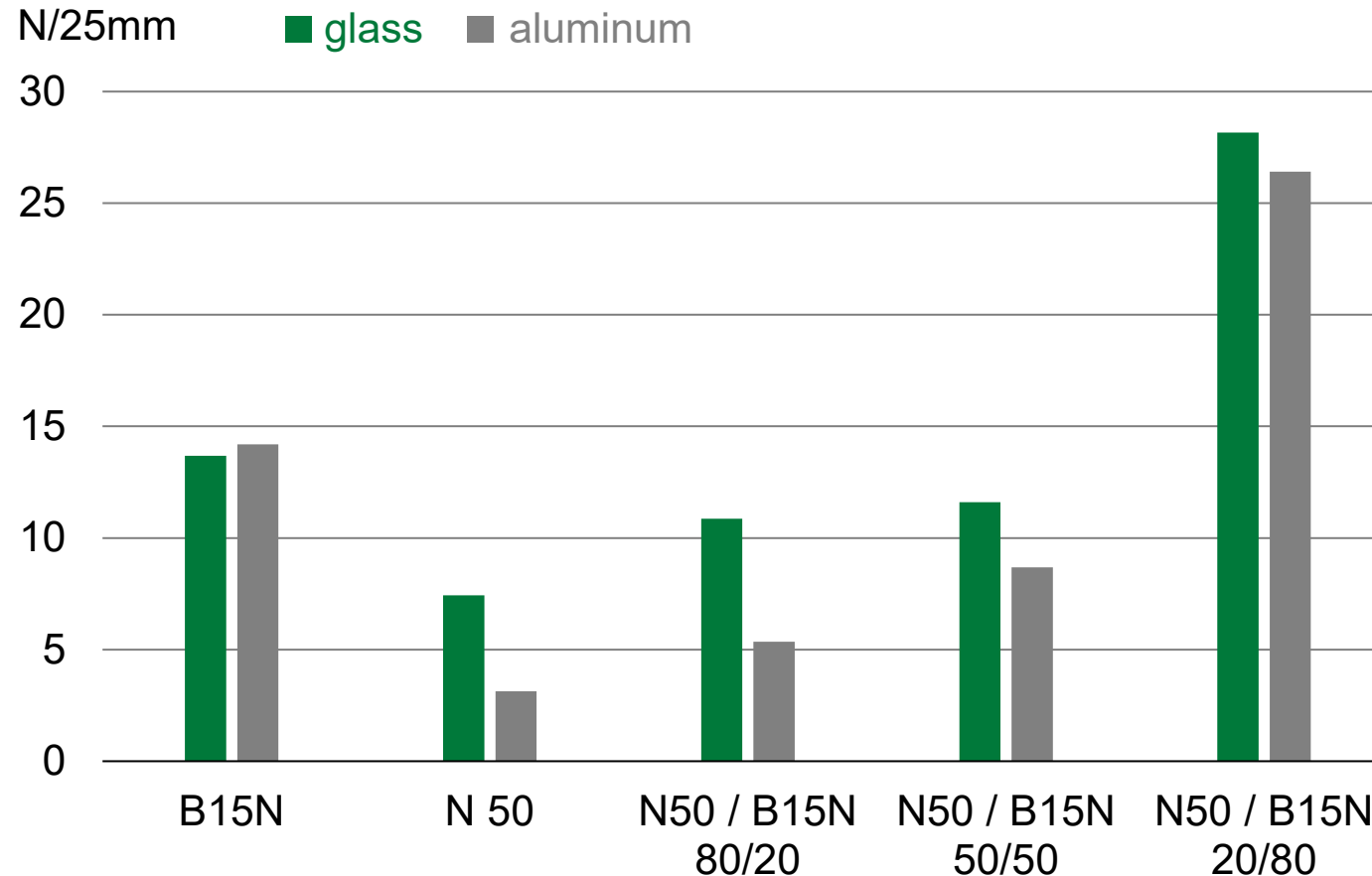
# OPPANOL<sup>®</sup>

## in Insulating Glass and Photovoltaic Sealants

### Mixtures MM/HM Finat FTM1

Higher values can be achieved by combining the products

Exemplary  
OPPANOL<sup>®</sup>  
B 15 N / N 50



# Disclaimer

The declaration and information given herein is exclusively provided for our customers and the respective competent authorities.

It is not intended for publication either in printed or electronic form (e.g. via Internet) by any third party. Neither partial nor full publication is allowed without the prior written permission of BASF.

The data indicated above are the results of our investigations, correspond to the state-of-the-art and are based on our current knowledge and experience. The data refer to the state of the laws at the date of issue.

BASF produces a wide variety of high quality polyisobutylenes marketed by BASF under the trademark OPPANOL® that satisfy the manifold requirements of our customers, including products that may meet the specifications for use in food, medical, pharmaceutical or cosmetics applications.

BASF has proven expertise in supporting and working with our customers in the innovative use and application of our materials.

However, BASF has not designed or tested its OPPANOL® grades with respect to special requirements related to their use in medical devices (defined in the European, US or other local medical device legislation), pharmaceuticals and cosmetics.

In view of the many factors that may affect the processing and use of our OPPANOL®, the data in this publication do not relieve processors of the responsibility to carry out their own inspections and tests, neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose.

Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior notice and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient to ensure that all proprietary rights, laws and legislation are observed.

BASF does not recommend the use of or claim the suitability of OPPANOL® in a specific application and, therefore, the decision to use OPPANOL® is solely at the customer's own risk. It is the responsibility of the customer to determine whether their manufacturing process and the end application using OPPANOL® is safe, lawful and technically suitable for the intended use. BASF extends no warranties or guarantees, express or implied, concerning the suitability of OPPANOL® for any specific application, especially for a possible use in medical, pharmaceutical or cosmetics applications. Moreover, BASF does never supply its OPPANOL® products for the manufacture of implants.

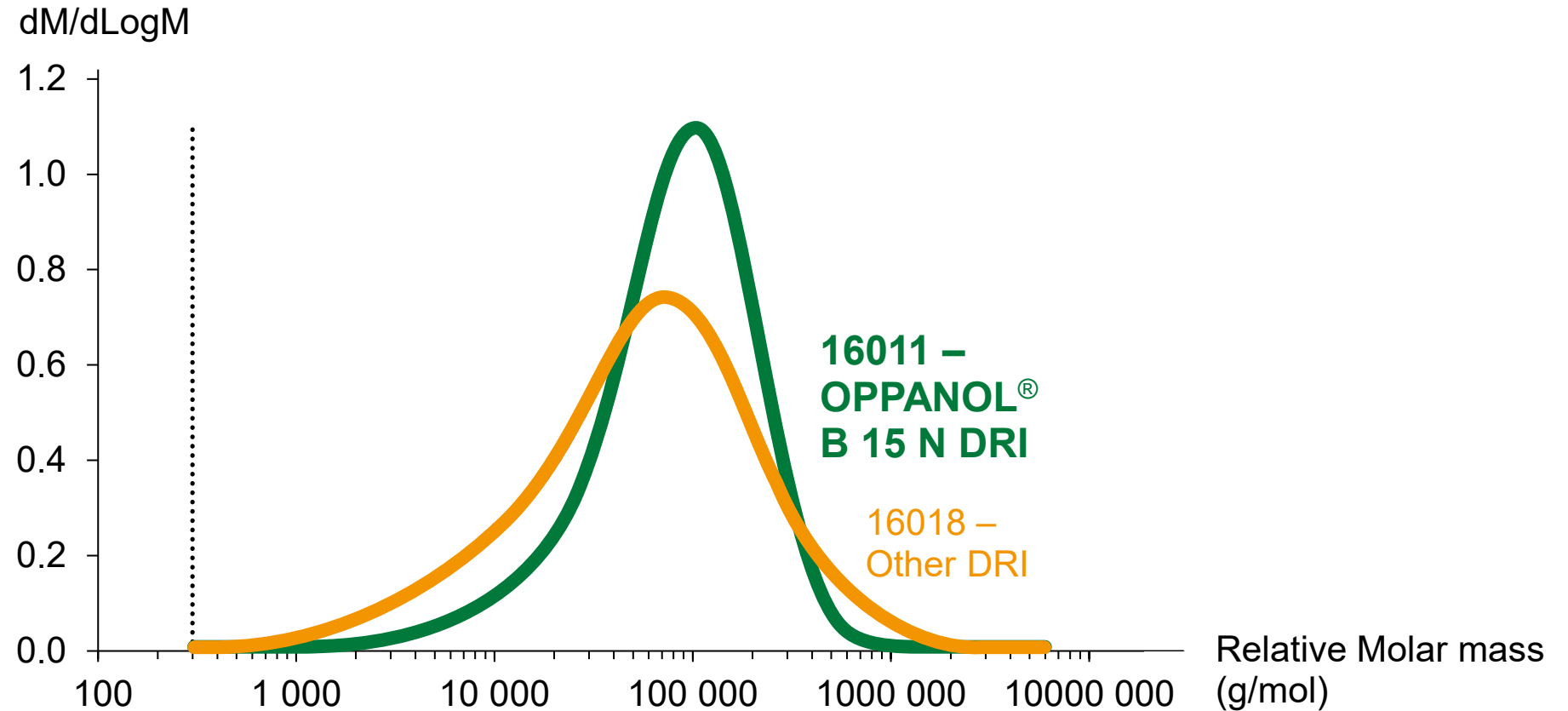


We create chemistry

# OPPANOL® in Insulating Glass and Photovoltaic Sealants

## Molecular weight distribution

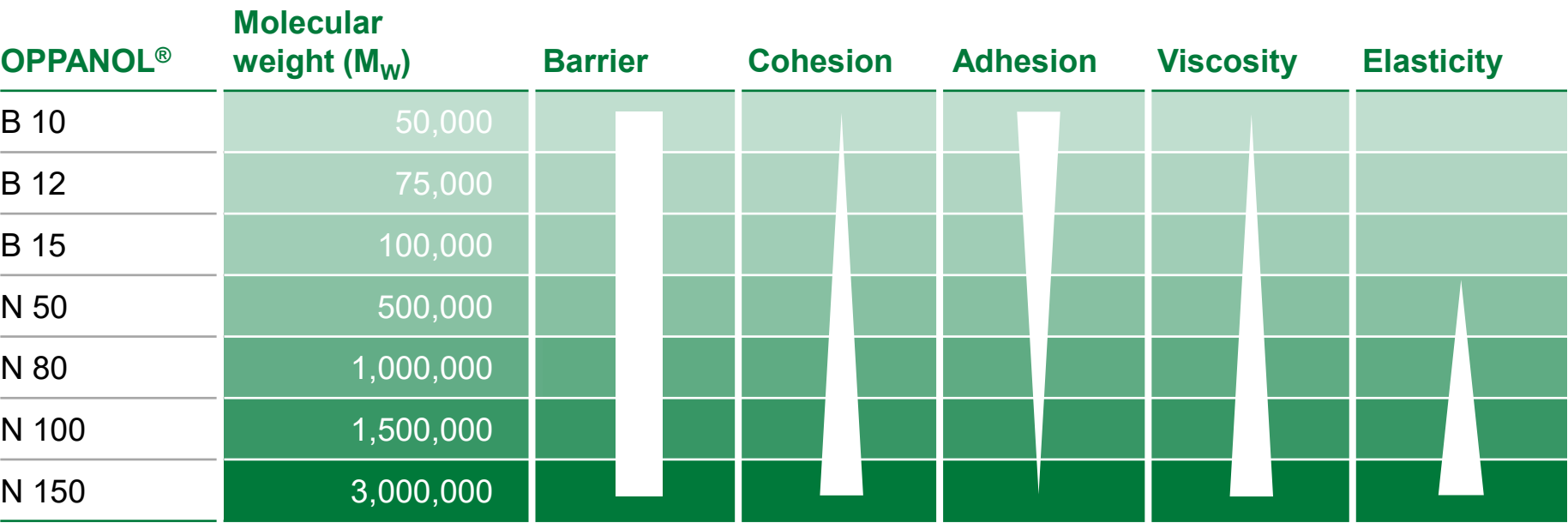
in comparison with  
other in the market  
available PIB





# OPPANOL®

## Typical properties



Vapor barring and low-temperature elasticity are common to all grades, giving the product several distinctive and practical characteristics

The resinous OPPANOL® grades B 10 to B 15 provide tack (stickiness) and adhesion to formulations. Rubber like characteristics are provided with increasing molecular weight

# Partner for Fuel And Lubricant Solutions Components and Formulations

## COMPONENTS

for Fuel and Lubricant Solutions

Polyisobutenes

Esters  
and PAGs

Antioxidants

Viscosity  
Modifiers

Performance  
Additives



## FORMULATIONS

for Fuel and Lubricant Solutions

Coolants and  
Brake Fluids

Fuel  
Performance  
Packages

Aviation  
Fuel Additives

Refinery  
Additives

Lubricants



**BASF**  
We create chemistry

# Partner for Fuel And Lubricant Solutions

## Components and Formulations

### COMPONENTS

for Fuel and Lubricant Solutions

Polyisobutenes

Esters and PAGs

Antioxidants

Viscosity Modifiers

Performance Additives



### FORMULATIONS

for Fuel and Lubricant Solutions

Coolants and Brake Fluids

Fuel Performance Packages

Aviation Fuel Additives

Refinery Additives

Lubricants

