

INEOS

Olefins & Polymers Europe

Your partner in

CAPS & CLOSURES

**Polyolefins – the
material of choice**

INEOS

We offer a wide range
of high value polyolefins
solutions for Caps &
Closures applications.

INEOS Olefins & Polymers Europe

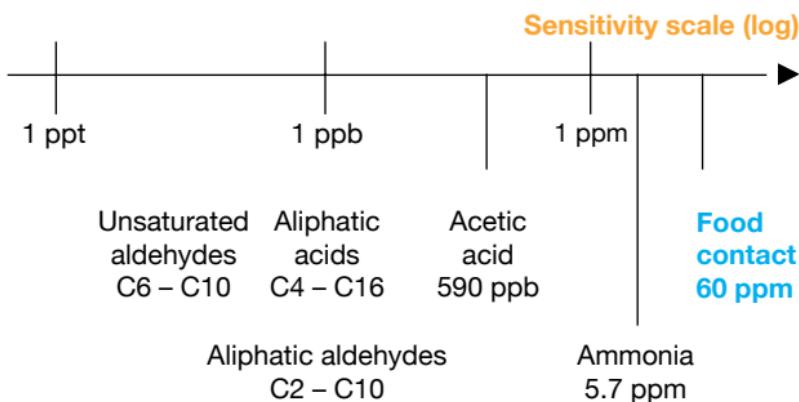


Organoleptic Resins for Beverage Caps

The consistency of beverages is preserved by using ELEX[®] HDPE organoleptic beverage caps grades:

- Consumers are becoming more sensitive to the organoleptic properties of plastic containers. Plastic 'off-taste' may inadvertently signal to consumers a lack of purity and contamination of the product.
- Conforming to the food contact regulations is mandatory. However even extremely low levels (ppb or even lower) of certain chemicals may lead to off-taste.

Human odor threshold in air



Typical levels of organoleptic detection 5 ppb or less
-> 10,000 times less than food approval specification limits

- Organoleptic properties are about human perception based mainly on two senses: taste and odor. They can be assessed by a human panel. Analytical tools can help understanding (VOC testing) but can not predict human organoleptic perception.
- Consistency of organoleptic properties is only reached by a deep knowledge and systematic control of relevant manufacturing conditions.
- Organoleptic properties of ELEX[®] grades are quality controlled for each and every batch.

Tethered caps for Beverages

- / EU Directive 2019/904 on Single Use Plastics (SUP): by July 2024, all SUP beverage containers with capacity up to 3 liters require closure to remain attached on bottle → **tethered caps**.
- / INEOS Olefins & Polymers has a wide range of mono-modal or bimodal grades suitable for **tethered caps**.
- / Many **tethered caps** have been designed using **ELTEX®** material:
 - / Suitability and efficiency proven
 - / The link to prevent packaging litter



Courtesy: Sources ALMA & Betapack

ELTEX® Superstress™ HDPE Organoleptic

Test Method	MFR 190 °C/ 2.16 kg g/10min ISO 1133	Density kg/m ³	Typical Applications	Slip Additive
Superstress™ CAP602	0.8	953		○
Superstress™ CAP602S2*	0.8	953	Highly carbonated water and/or drinks	●
Superstress™ CAP508	1.8	953		○
Superstress™ CAP508S2*	1.8	953		●
Superstress™ CAP508S3	1.8	953		●
Superstress™ CAP311	4	960	Still mineral water, juices & slightly carbonated drinks	○
Superstress™ CAP311S1*	4	960		●

ELTEX® HDPE Organoleptic

Test Method	MFR 190 °C/ 2.16 kg g/10min ISO 1133	Density kg/m ³	Typical Applications	Slip Additive
B4020N1331	2.2	952		○
B4020N1332*	1.9	952	Carbonated water and/or drinks	●
B4020N1343	2.2	952		●
HD5240GA-B*	4	950	Slightly Carbonated drinks & juices	●
HD6070EA-B	7.6	960		○
HD5211EA-B	11	951	Still mineral water	○
HD5211GA-B*	11	951	Juices	●
HD5226EA-B	26	953	Still mineral water	○

* This grade is strongly not recommended to be used for the water caps market



ELTEX® Superstress™ CAP Grades

An outstanding solution for the next generation of beverage tethered caps

As the historical leading company in the supply of resins for organoleptic beverage caps and thanks to continuous innovation, INEOS Olefins & Polymers Europe has responded to market requests and created **ELTEX® Superstress™** grades which offer:

- ✓ **Excellent Stress Cracking Resistance** offering the opportunity of either down-gauging resulting in new optimized caps design or improved performance under more severe storage conditions (higher temperature in hot countries) or higher carbonation levels.
- ✓ **Excellent organoleptic properties** at the same unmatched quality level as all the INEOS Olefins & Polymers Europe ELTEX® caps grades.
- ✓ **Good processability** in injection and compression moulding of caps.



INEOS Olefins & Polymers Europe proposes three families of ELTEX® Superstress™ grades:

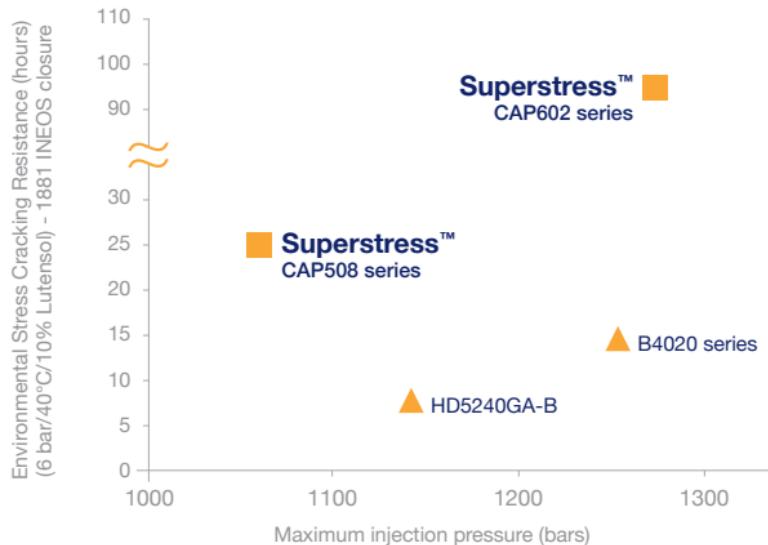
- / **ELTEX® Superstress™ CAP602** (MFR 2-like resin), outstanding ESCR, especially recommended in case of significant weight reduction and/or high carbonation level.
- / **ELTEX® Superstress™ CAP508** (MFR 8-like resin), enhanced ESCR – processability balance offering new possibilities for still and carbonated cap designs, combined with easier processing.
- / **ELTEX® Superstress™ CAP311** (MFR 11-like resin), excellent processability, high rigidity and enhanced ESCR, especially suited for still mineral water and slightly carbonated beverages.

These high performance ELTEX® Superstress™ grades are produced using INEOS Olefins & Polymers Europe proprietary leading edge processes and are disclosed by some or all of the following European patents and patent applications:

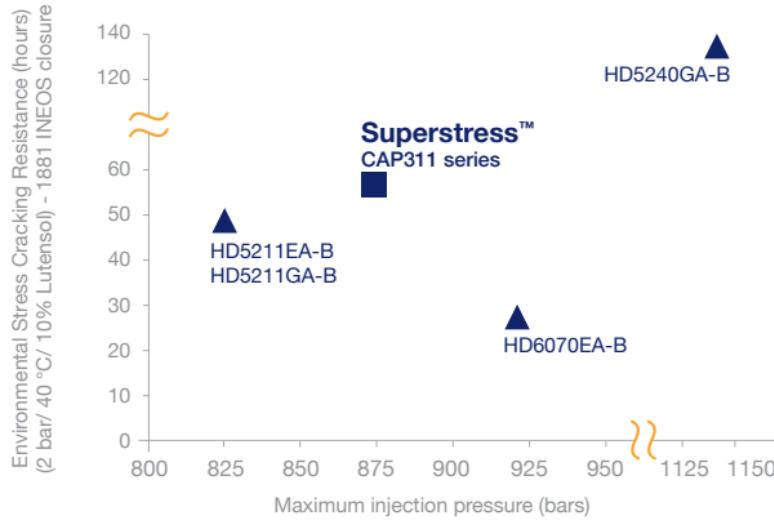
EP603935B, EP1364971A, EP1420046A,
EP1482008A, EP1544244A, EP1441959B,
EP1462378A, EP1468932A, EP1278797B
and EP1149134B.

Environmental Stress Cracking Resistance (hours)
(6 bar/40°C/10% Lutensol) - 1881 INEOS closure

ESCR - Processability in CSD caps



ESCR - Processability in still beverages caps



Courtesy:
Sources ALMA & Betapack



Non-organoleptic Resins for Caps & Closures

RIGIDEX® HDPE

	MFR 190 °C/ 2.16 kg g/10min ISO 1133	Density kg/m ³	Typical Applications
Test Method		ISO 17855-1	
HD5050EA	4	950	Motor oil, chemicals
HD6070EA	7.6	960	Over caps, edible oil
HD5211EA	11	951	
HD6012EA	12	960	
HD5218EA	18	952	Over caps, milk, cosmetics
HD5226EA	26	953	
HD5231EA	31	953	

LDPE

17L430	4	918	
23L430	4.5	924	
19N430 & 19N930	7.5	920	Lids for glass bottles, HOD,
20N430	8.5	920.5	teats in sport caps, spouts
18R430	15	918	
23T930	22	923	
24W930	55	923	

Metallocene LLDPE

PF1315AZ	15	914	Applications
PF1320AZ	20	913	requiring higher ESCR than LDPE



PP Homopolymer (HPP)

Test Method	MFR 230 °C/ 2.16 kg g/10min ISO 1133	Flex Mod 23 °C MPa ISO 178	Properties
100-GB06	6	1450	General purpose
100-GA09	9	1500	General purpose
101-SA09	9	1450	Slip agent
100-AA12	12	1450	anti-static
100-GA12	12	1400	General purpose
100-CB25	25	1500	Nucleated, anti-static
100-GB25	25	1200	General purpose
180-HR25	25	1800	High rigidity, anti-static
194-NA25	25	1750	Improved clarity
100-CA50	50	1550	Nucleated, anti-static

PP Random Copolymer (RCP)

200-CA10	10	1200	High clarity, anti-static
200-CA13	13	1100	High clarity, anti-static
240-CA12	13	850	High clarity, anti-static, improved impact
200-CA20	20	900	High clarity, anti-static
200-CA25	25	1100	High clarity, anti-static
205-CA25	25	1100	Very high clarity, anti-static
200-CA40	40	1100	High clarity, anti-static, high flow
205-CA40	40	1100	Very high clarity, anti-static, high flow

PP Impact Copolymer (ICP)

Test Method	MFR 230 °C/ 2.16 kg g/10min ISO 1133	Flex Mod 23 °C MPa	Properties
RIGIDEX® P CAP986S	6.5	1500	Nucleated, antistatic, slip agent - Double piece CSD closures for injection or compression moulding
400-CB08	8	1200	
402-CB12	12	1350	Nucleated, anti-static
540-NA13	13	1150	Nucleated, Very High Impact
400-CA25	25	1550	Nucleated, good dimensional stability
500-GA20	25	1000	Very high impact resistance
RIGIDEX® P 451-HP40	40	1350	Nucleated, anti-static, high flow
401-CB50	50	1300	
RIGIDEX® P 450-HP60	65	1400	Low warpage, nucleated, anti-static, very high flow
RIGIDEX® P 480-HP90	90	1350	



Caps & Closures Resins for medical and pharmaceutical Applications

INEOS Olefins & Polymers Europe has developed an extended range of polyolefins for use in pharmaceutical and medical applications – ELTEX® MED. The main advantages offered by Eltex® MED range to the market are:

- / Dedicated materials, sales and technical support
- / Grades guaranteed with long term availability
- / Compliance with the European and U.S. pharmacopoeia
- / All ELTEX® MED grades have been tested according to EUP & USP Class VI
- / Grades are fully supported by a wide range of documentation and certification

PE ranges

Test Method	MFR 190 °C/ 2.16 kg g/10min ISO 1133	Density kg/m ³ ISO 17855-1	Properties
ELTEX® CAP508	1.8	953	High purity, very good ESCR, lower flow
ELTEX® MED PH19N630	7.5	920	LDPE for extrusion coating & injection moulding
ELTEX® HD6070EA-B	7.6	960	High purity, medium ESCR, medium flow
ELTEX® HD5211EA-B	11	951	High purity, medium ESCR, high flow
ELTEX® MED PH23T630	22	923	High flexibility, excellent flow, easy filling of long-flow paths, radiation resistant up to 35 kGy
ELTEX® MED HD5226EA-M	26	953	HDPE high flow, good rigidity

PP ranges

Test Method	MFR 230 °C/ 2.16 kg g/10min ISO 1133	Flex Mod 23 °C MPa	Properties
	ISO 178		
ELTEX® MED 100-MG03	3	1450	HPP, medium melt flow
ELTEX® MED 100-MG12	12	1400	Non-nucleated HPP, medium melt flow, good dimensional stability
ELTEX® MED 240-MS23	23	980	Excellent optical properties, slip agent
ELTEX® MED 100-MG25	25	1200	HPP, narrow MWD, good fluidity

Caps & Closures for primary rigid packaging

Each medical application has to be discussed with INEOS before having the final approval that INEOS will support the application. It will not be possible to get any pharmaceutical documentation without this agreement.

INEOS Olefins & Polymers Europe offers a full range of HDPE, PP, LDPE and LLDPE grades for caps & closures with demonstrated performances in all applications ranging from food and beverage, pharmaceuticals, personal care, household & chemicals, etc.

We are the market leader in polyolefins for beverage caps, especially for the applications requiring extremely pure grades for the preservation of the organoleptic properties of the beverage. The ELTEX® brand delivers a guaranteed level of organoleptic performance.



PE & PP Sustainable Solutions for Caps & Closures

INEOS O&P Europe offers a range of hybrid ready-made polyolefin compounds for rigid and flexible applications

Product benefits

- / Ready to use hybrid compounds based on Post-Consumer Recyclates (PCR)
- / Contains specially developed booster resin to outperform PCR properties
- / PCR sourced through collaboration and partnership with waste management companies and recyclers

Product features

- / Quality consistency
- / Easy processing
- / Properties of use matching industry standards
- / Not for use in direct contact with food

Recycl-IN rHDPE hybrid compound Caps-to-Caps

Caps recycling process



INEOS O&P Europe offers New Recycl-IN HDPE Hybrid with 50% PCR based on caps from PET bottles, tailored made for non-food caps applications & technical injection applications:

Test Method	MFR 190° C, 2.16kg g/10 min	Density kg/m ³ ISO 17855-1	PCR content %	Colour	Application
rHD5620BK	1.8	956	50	Black	Closures for motor oil, chemicals, injection moulding of technical parts, crates...

- ✓ Injectability performance close to ELTEX® Superstress™ CAP508
- ✓ ESCR of ELTEX® B4020N1331



Recycl-IN natural rPP hybrid compounds

	Type	MFR 230° C, 2.16kg g/10 min ISO 1133	Flex Mod 23° C Mpa ISO 178	N.Izod at RT kJ/m2 ISO 180/A	PCR con- tent %	Colour	Application
rPP1013	HPP	13	1550	3	70		Caps and closures, thin wall injection moulding, houseware containers, lids and pails, technical parts...
rPP2013	RCP	13	1150	4,2	70		
rPP2028	RCP	32	1150	4	70	Natural	
*rPP1025C	HPP	25	1900	2,7	70		
*rPP2030C	RCP	32	1150	4	70		Cosmetic

* Includes PCR with FDA NOL & extended Regulatory Certificate (SVHC, NIAS, migration test, safety assessment) on hybrid





About us

INEOS is one of the world's largest chemical companies, founded in 1998. INEOS Olefins & Polymers Europe is a leading producer of olefins and polyolefins.

INEOS Olefins & Polymers Europe offers a full range of high value polyolefins solutions for market applications such as food and industrial packaging, pipe and automotive through dedicated sales, and technical service teams.

INEOS is a safe and environmentally responsible company. We are engaged in developing our sustainable agenda to improve our operations and to implement sustainable solutions for our customers. This includes products that offer lightweighting, energy efficiency, durability (extended lifetime) or conservation of resources. We care.



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