

INEOS

Olefins & Polymers Europe

Your partner in

**CAPS &
CLOSURES**

Polyolefins –
the material of choice
for caps & closures

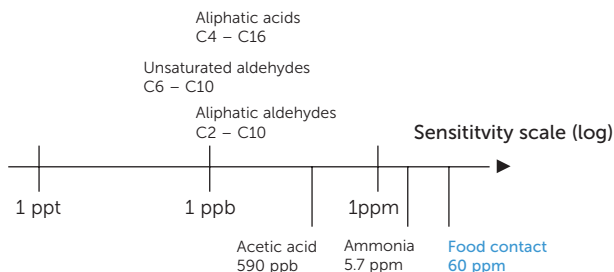
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Organoleptic resins for beverage caps

The consistency of beverages is preserved by using Eltex® HDPE or PP 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 Eltex® grades are quality controlled for each and every batch.

Eltex® Superstress™ HDPE Organoleptic

Test Method	MFR <i>190°C/2.16kg g/10min</i> ISO 1133	Density <i>kg/m³</i> ISO 1872	Typical Applications	Slip Additive
Superstress™ CAP602	0.8	953	Carbonated high pressure water & soft drinks	○
Superstress™ CAP602S2	0.8	953		●
Superstress™ CAP508	1.8	953		○
Superstress™ CAP508S2	1.8	953		●
Superstress™ CAP508S3	1.8	953		●

Eltex® HDPE Organoleptic

Test Method	MFR <i>190°C/2.16kg g/10min</i> ISO 1133	Density <i>kg/m³</i> ISO 1872	Typical Applications	Slip Additive
HD5130EA-B	2.4	952	Carbonated high pressure water & soft drinks	○
B4020N1331	2.2	952		○
B4020N1332	1.9	952		●
B4020N1343	2.2	952		●
HD5240EA-B	4	950	Slightly carbonated drinks/juices	○
HD5240GA-B	4	950		●
HD6070EA-B	7.6	960	Still mineral water	○
HD5211EA-B	11	951		○
HD5211GA-B	11	951		●

Eltex® P PP Organoleptic Random Copolymer (RCP)

Test Method	MFR <i>230°C/2.16kg g/10min</i> ISO 1133	Flex Mod <i>23°C MPa</i> ISO 178	Typical Applications
CAP912	13	1100	Transparent closures for non CSD: water, juices, functionalised beverages
203-OR25	25	1100	

ELTEX® Superstress™ CAP grades

An outstanding solution for the next generation of beverage caps

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

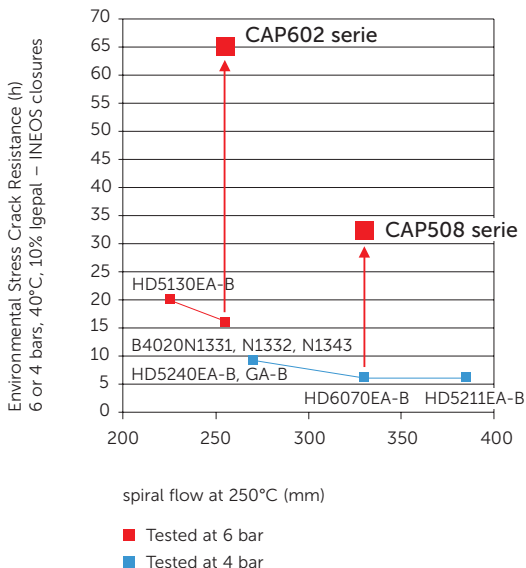
- **Excellent stress crack resistance** offering the opportunity of either down-gauging resulting in new optimized caps design or improved performance under more severe storage conditions (higher temperature in hot countries) or higher carbonation levels
- **Excellent organoleptic properties** at the same unmatched quality level as all the INEOS O&P Eltex® caps grades
- **Good processability** in injection and compression molding of caps

INEOS O&P proposes two families of Eltex® Superstress™ grades:

Eltex® Superstress™ CAP602 (MFR 2 like resins), providing outstanding stress crack resistance, especially recommended in case of significant weight reduction and/or high carbonation level

Eltex® Superstress™ CAP508 (MFR 8 like resin), displaying a new optimization of enhanced ESCR and improved processability which offers new possibilities for cap design and performance, combined with easier processing

Eltex® Superstress™



These high performance Eltex® Superstress™ grades are produced into INEOS O&P 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.



Non-organoleptic resins for caps & closures

Rigidex® HDPE

Test Method	MFR <i>190°C/2.16kg g/10min</i> ISO 1133	Density <i>kg/m³</i> ISO 1872	Typical Applications
HD5130EA	2.4	952	Detergents, Chemicals, Cosmetics
HD5050EA	4.0	950	Motor oil, Chemical
HD6070EA	7.6	960	Over caps, Edible oil
HD5211EA	11	951	Over caps
HD5218EA	18	952	Over caps, Milk, Cosmetics
HD5226EA	26	953	Over caps, Milk

LDPE

23L430	4.1	924	Lids for glass bottles, HOD, teats in sport caps, spouts
19N430 & 19N930	7.5	920	
18R430	15	918	
23T930	22	923	
23W930	36	924	
24W930	55	924	
23X930	70	924	

Metallocene LLDPE

PF1315AA	15	914	Flexibility, very high stress cracking resistance
PF1320AA	20	913	Flexibility, very high stress cracking resistance, good flowability



Non-organoleptic resins for caps & closures

PP Homopolymer (HPP)

Test Method	MFR <i>230°C/2.16kg g/10min</i> ISO 1133	Flex Mod <i>23°C MPa</i> ISO 178	Properties
100-GA02	2.0	1450	General Purpose
100-GA04	4.0	1400	General Purpose
100-GB06	6.0	1450	General Purpose
100-GA09	9.0	1450	General Purpose
101-SA09	9.0	1450	Slip agent
100-GA12	12	1400	General Purpose
100-CB25	25	1500	Nucleated, anti-static
100-GB25	25	1200	General Purpose
100-HR25	25	1800	High rigidity, anti-static
100-GA35	35	1350	General Purpose
100-CA50	50	1550	Nucleated, anti-static
194-NA25	25	1750	Improved clarity

PP Random Copolymer (RCP)

200-CA13	13	1100	Very high clarity, anti-static
240-CA12	13	850	Very high clarity, anti-static, improved impact
200-CA25	25	1100	Very high clarity, anti-static
200-CA40	40	1100	Very high clarity, anti-static, high flow
222-CC50	50	1100	Very high clarity, anti-static, very high flow
Rigidex® P 240-HP25	25	1150	Improved impact, increased productivity, high clarity, anti-static

PP Impact Copolymer (ICP)

401-NA06	6	1200	Nucleated
400-CB08	8	1200	Nucleated, anti-static
402-CB12	12	1350	
400-CA25	25	1550	Nucleated, anti-static, good dimensional stability
Rigidex® P 451-HP40	40	1300	Nucleated, anti-static, high flow
401-CB50	50	1300	
Rigidex® P 450-HP60	60	1400	
Rigidex® P 450-HP90	90	1350	Low warpage, nucleated, anti-static, very high flow
Rigidex® P CAP906S	6	1500	Nucleated, antistatic, slip agent - Double piece CSD closures for injection or compression moulding
500-GA20	20	1000	Very high impact resistance

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 range Test Method	MFR 190°C/2.16kg	Density kg/m ³	Properties
	ISO 1133	ISO 1872	
Eltex [®] MED PH23T630	22	923	High flexibility, excellent flow, easy filling of long-flow paths. Radiation resistant up to 35 kGy. HDPE High Flow. Good rigidity. High Purity. Medium ESCR. High flow. High Purity. Medium ESCR. Medium flow. High Purity. Very good ESCR. Lower flow.
Eltex [®] MED HD5226EA-M	26	953	
Eltex [®] HD5211EA-B	11	951	
Eltex [®] HD6070EA-B	7.6	960	
Eltex [®] HD5130EA-B	2.4	952	

Caps & closures for primary pharmaceutical packaging


PP range Test Method	MFR 230°C/2.16kg g/10min	Flex Mod 23°C MPa	Properties
	ISO 1133	ISO 178	
Eltex [®] MED 100-MG25	25	1200	HPP. Narrow MWD. Good fluidity. Non-nucleated HPP. Medium melt flow. Good dimensional stability. HPP. Medium melt flow. Excellent optical properties; slip agent
Eltex [®] MED 100-MG12	12	1400	
Eltex [®] MED 100-MG03	3.0	1450	
Eltex [®] MED 240-MS23	23	980	

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.

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INEOS is one of the world's largest chemical companies. Founded in 1998, the company employs 15,000 people and has turnover of around 47 billion US Dollars.

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INEOS Olefins & Polymers Europe is a business leading European producer of olefins and polyolefins.

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INEOS Olefins & Polymers Europe offers a full range of high valued polyolefins solutions for selected market applications like beverage caps, pipes, packaging, automotive, through a dedicated sales, marketing and technical team focused on these market segments.

Building on our leading technology, strong product development capability and willingness to create value and strong relationship with customers and end-users, INEOS Olefins & Polymers Europe is committed to serving the current and future needs of the global caps market along the value chain.

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.

For Technical Data Sheets, Safety Data Sheets and Product Liability Statements visit us at www.ineospolyolefins.com

For any further information please contact us at IneosPofCSC@ineos.com

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