

The *Adsyl* and *Clyrell* Advantage

Boost Performance with a Advanced Sealing Resins from Industry
Leader LyondellBasell



What customers tell us about *Adsyl* and *Clyrell* grades

Nowdays flexible packaging industry asks for polyolefin sealant materials with low seal initiation temperatures (SIT), no stickiness, high clarity, high purity plus additional properties of the film surface. That is why LyondellBasell has developed a broad range of skin resins offering a vast array of functionalities – marketed under the well-established *Adsyl* and *Clyrell* brands.

With increasing interest expressed by convertors and end-users of plastic packaging products, our recent research and development has developped non-phthalate catalysts to cover all PP applications.

As a result of the progressive introduction of these latest generation non-phthalate catalysts, LyondellBasell will be able to supply “non-phthalate” *Adsyl* and *Clyrell* grades where Customers and End Users find value in the final applications.



Through different comonomer compositions, *Adsyl* advanced polyolefins offer a complete range of seal initiation temperatures combined with relatively high melting temperatures. The resulting favorable balance of thermal and mechanical properties outperforms standard polypropylene and polyethylene, making *Adsyl* Low Sealing Temperature resins the materials of choice for bi-oriented polypropylene films (BOPP) as well as for Cast and Blown unoriented films.

In co-extruded BOPP, cast film, and Double Bubble applications, *Adsyl* is mainly used as skin layer material. While the core layer supplies the necessary mechanical properties, the skin layers provide either sealing functionality or a receptive layer that can be optimized for metallization, printing, lamination and more.

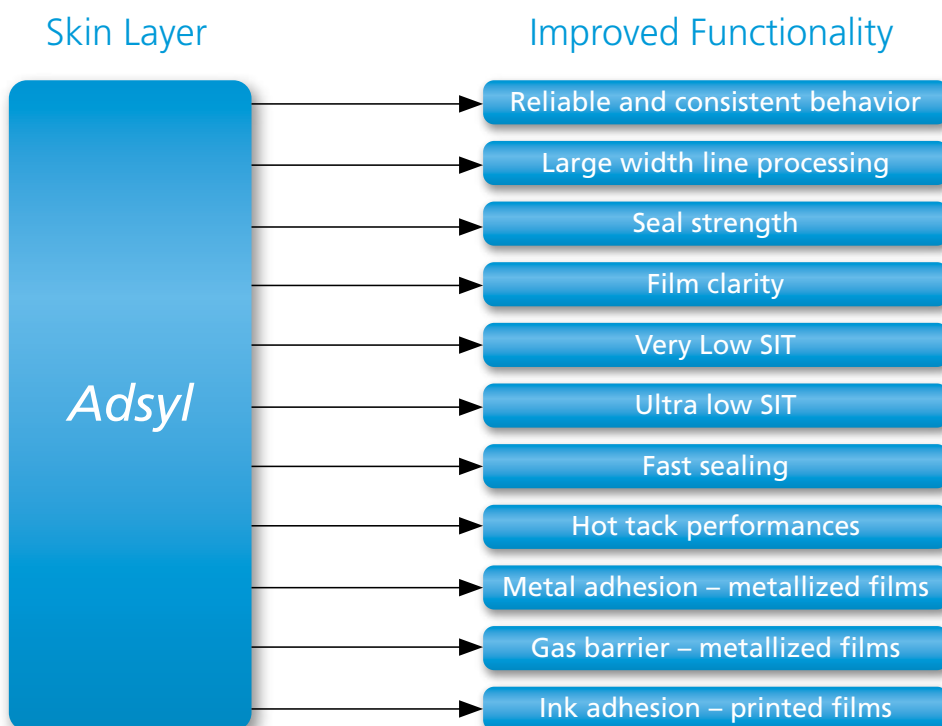
For applications, where a low SIT is not required, the *Clyrell* grades complement this comprehensive range of *Adsyl* products:

What customers tell us about *Adsyl* grades:

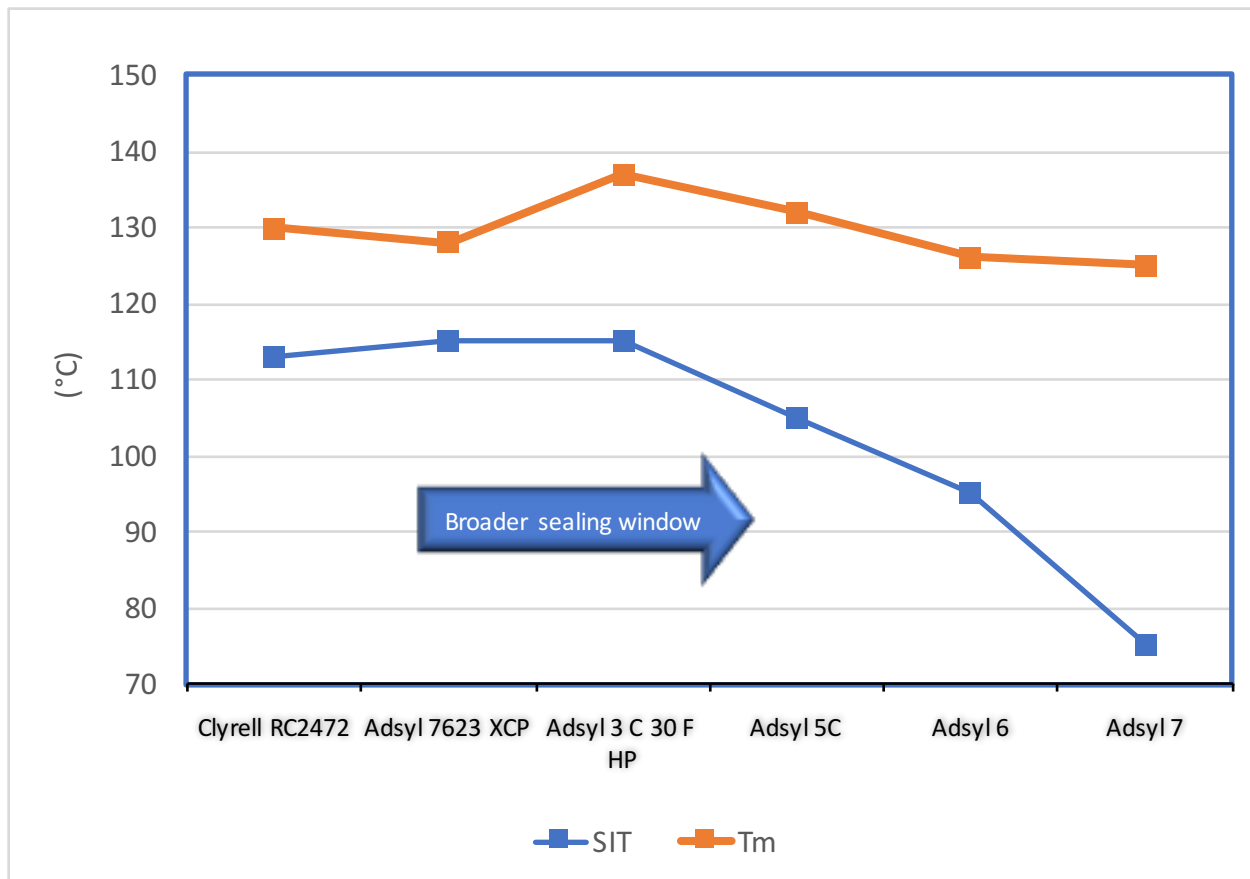
- *Adsyl* 3C30F HP Increase gas barrier properties for metallized BOPP film and improve metal surface energy retention
- *Adsyl* 5C ST improves transparency of coextruded films
- *Adsyl* 5C ST fits with the processability requirements of the largest and fastest BOPP lines
- *Clyrell* RC2472 improves the ink adhesion in BOPP printing
- *Clyrell* RC1908 improves optics, impact and tear resistance in CPP lines
- *Adsyl* 5 Low SIT combined with high seal strength and hot tack improve the seal integrity of BOPP film

Adsyl grades have been successfully used in other film application areas such as:

- Shrink film – where faster shrinkage can be obtained at lower temperatures
- Blown film – as the non-fusion external layer of PE shrink films
- FFS film – *Adsyl* 5Q39F blown film grade offers numerous benefits for this application



Adsyl offers a broad range of Sealing Initiation Temperature



LyondellBasell test
All measurements carried out using an internal.
Thickness 25 micron, Bopp
Norm ASTM F 2029 / ASTM F 88
Sealing pressure= 1 bar Speed separation = 100mm/min
Dwell time= 0.5 sec Initial grip distance= 50mm Sample width= 15mm

Main Product Portfolio

Phthalate grade name	Non Phthalate grade name	MFR [g/ 10'] 230 °C/2,16 kg	Tm	SIT	Additives	Features / Application
RANDOM COPOLYMERS – FUNCTIONAL SKIN LAYER						
<i>Clyrell</i> RC112E	NC	1.7	130	115	CSNA	Highly modified Random Copolymer – Shrink Film
<i>Clyrell</i> RC112L	NC	7.0	130	115	CSNA	Improved Print Adhesion and Quality
RANDOM COPOLYMERS – METALLIZABLE LAYER						
<i>Adsyl</i> 3 C 30 F HP	<i>Adsyl</i> AL 3 C 90 F HP	5.5	137	115	CSNA	High Barrier Metallized Film
<i>Clyrell</i> RC213M	<i>Clyrell</i> RC213M	10.0	140	120	CSNA - AB	High Barrier Metallized Film
MEDIUM SIT TERPOLYMER – SEALING LAYER						
<i>Adsyl</i> 7423 XCP	NC	5.5	132	115	CS - AB	Treatment retention – Coex Film, Metallized Film
LOW SIT TERPOLYMERS – SEALING LAYER						
<i>Adsyl</i> 5 C 30 F	<i>Adsyl</i> 5 C 90 F	5.5	132	105	CS	Coex Film, Metallized Film
<i>Adsyl</i> 5 C 37 F	<i>Adsyl</i> 5 C 97 F	5.5	132	105	CS - S, AB	Coex Film
<i>Adsyl</i> 5 C 39 F	<i>Adsyl</i> 5 C 99 F	5.5	132	105	CS - AB	Coex Film – Metallized Film
<i>Adsyl</i> 5 C 33 F	<i>Adsyl</i> 5 C 93 F	5.5	132	105	CSNA	Coex Film – Metallized Film
<i>Adsyl</i> 5 C 30 F ST	<i>Adsyl</i> 5 C 90 F ST	6.0	132	105	CS	High processability – Fast lines – Coex, Metallized Film
<i>Adsyl</i> 5 C 37 F ST	<i>Adsyl</i> 5 C 97 F ST	6.0	132	105	CS - S, AB	High processability – Fast lines – Coex Film
<i>Adsyl</i> 5 C 39 F ST	<i>Adsyl</i> 5 C 99 F ST	6.0	132	105	CS - AB	High processability – Fast lines – Coex, Metallized Film
VERY LOW SIT TERPOLYMER – SEALING LAYER						
<i>Adsyl</i> 6 C 30 F	NC	5.5	126	95	CS	Fast packaging – Excellent optics
<i>Adsyl</i> 6 C 30 F HP	NC	5.5	126	92	CS	Fast packaging – Excellent optics
ULTRA LOW SIT TERPOLYMER – SEALING LAYER						
<i>Adsyl</i> 7 C 30 F	NC	5.5	125	75	CSNA	Fast packaging – Excellent optics

CSNA = Calcium Stearate Not Added, CS = Calcium Stearate, AB = Anti-block additive, S = Slip agent, NC = Not Converted

Product Benefits vs. Standard Resins



Adsyl 3 HP

Adsyl 3C30F HP is intended for the metallizable skin layer of metallized films with superior performances. Very high barrier properties can be reached thanks to a smooth surface and strong Aluminum adhesion; both of these are obtained through a specific copolymeric structure with respect to the comonomer type and distribution. The melting temperature has also been increased which also adds the benefit of a higher thermal stability during the post conversion steps to the metallized films.

Adsyl 7423 XCP

Adsyl 7423 XCP sealing resin with MEDIUM seal initiation temperature (SIT 115°C) are commonly utilized for the treated layer of coex films, providing a surface suitable for printing and lamination purposes. It is already formulated with an antiblocking additive level suitable for the majority of uses.

Clyrell RC2472

Clyrell RC2472, a new PP random copolymer, is used by customers in BOPP film applications for its excellent ink adhesion, wide range of color transfers and surface finish desirable for multicolor, high quality printing.

Clyrell RC1890

Clyrell RC1890 is used by customers as a functional skin layer providing medium SIT (115°C) or as a softener or modifier for the core layer of blown asn cast film. It delivers good shrink performance when used in double bubble film applications and/or shrink hood blown film as non collant layer.

Adsyl 5C

Adsyl 5C sealing resins with LOW Seal Initiation Temperature (SIT 105°C) are commonly utilized in the majority of BOPP films applications.

In this well established and consolidated market they are considered as the benchmark because of their high consistency and reliability in terms of quality and performance.

The new Adsyl 5C 33 F, is the latest Adsyl 5 Type grade, specially designed for use as a sealing or metallized layer in co-extruded film applications; it does not contain slip or anti-block additives and Calcium Stearate is not added.



Adsyl 5C ST

Adsyl 5C ST sealing resins with LOW sealing initiation temperature (SIT 105°C) have been specifically developed for smooth processing on the new state of the art BOPP lines with high width and speed (10 m, >400 m/min), where conventional terpolymers show many limitations.

The controlled rheology structure of the Adsyl 5C ST allows an even distribution of the skin material, reducing the film defects during the stretching steps.

The film haze is reduced providing higher clarity films.

The improvement in the thickness profile is also achievable on conventional BOPP lines at lower speed.



Adsyl 6 and 7

Adsyl 6 and 7 sealing resins with VERY LOW and ULTRA LOW seal initiation temperature (SIT range from 95°C to 75°C) can be successfully utilized for the production of films with demanding sealing properties. The low sealing temperature is required in many packaging lines where a wider sealing window can provide more operating flexibility to reach very high speed.

Adsyl 6 C 30 F HP, the latest Adsyl 6 type grade introduced, has a lower SIT (92°C) compared to Adsyl 6 C 30 F (95°C) making it the best choice for very high speed packaging lines when it is not necessary a ultra-low SIT.



ABOUT US

LyondellBasell (NYSE: LYB) is one of the largest plastics, chemicals and refining companies in the world. Driven by its employees around the globe, LyondellBasell produces materials and products that are key to advancing solutions to modern challenges like enhancing food safety through lightweight and flexible packaging, protecting the purity of water supplies through stronger and more versatile pipes, improving the safety, comfort and fuel efficiency of many of the cars and trucks on the road, and ensuring the safe and effective functionality in electronics and appliances. LyondellBasell sells products into more than 100 countries and is the world's largest producer of polymer compounds and the largest licensor of polyolefin technologies. In 2019, LyondellBasell was named to Fortune magazine's list of the "World's Most Admired Companies."

More information about LyondellBasell can be found at www.LyondellBasell.com.

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