SINTOPOL® polyurethane resins

For modern printing inks in flexible packaging

Since 1985
Italian manufacturer

Global reach
Resins sold worldwide

Leader in Italy
PU resins for inks

Company overview

Who we are and what we do

SINTOCHEM (Italy) has been producing and commercialising special resins for ink formulations since 1985.

- Resins for printing inks used in flexible packaging
- Worldwide sales; leadership in the Italian polyurethane market for inks
- High quality standards and strong focus on R&D
- Complete product choice with a wide range of properties
- Pure aromatic polyurethane resins
- Pure aliphatic polyurethane resins
- Semi-aliphatic polyurethane resins
- Two-component pure polyester and polyester blend resins

What customers value

Performance
Cohesion, adhesion, fast drying

Consistency
Quality standards & repeatability

Innovation
Continuous product development

Versatility
Flexography & rotogravure

SINTOPOL® in one slide

Non-reactive polyurethane resins for modern printing inks

Designed for flexography and rotogravure on a wide range of plastic films

1

Solubility & drying

Good solubility and fast solvent release for efficient production.

2

Cohesion

Excellent film cohesion supports robust ink performance.

3

Adhesion

Efficient adhesion on multiple plastic films and printing supports.

A brief overview of the world of inks

How the market evolved and why liquid inks matter

The global market pushed printing inks from a local approach to international requirements.

Over the last decades, liquid inks grew significantly especially in packaging.

European inks market

> 1 million tons
Turnover > €4 billion

1 **Globalization**

International requirements & supply chains

2 **Packaging growth**

Liquid inks expanded with flexible packaging

3 **Technology shift**

Fast printing → new resin performance needs

SINTOPOL® polyurethanes

Compatibility, cohesion, adhesion, and efficient processing

Key characteristics

- Non-reactive polyurethane resins with special compatibility to nitrocellulose
- Excellent cohesion and effective adhesion
- Good solubility, low odour, fast solvent release
- Suitable for internal and external printing
- Many grades available as 100% solid content (no volatile solvent)

Operational benefits

Fast drying inks
Suitable for > 300 m/min printing rate

High throughput

Heat & seal resistance

Hot-sealing resistance and strong adhesion across many plastic films.

Product range & hardness sequence

From softer (plasticising) to harder (higher adhesion) about aromatic SINTOPOL®

SOFTER FILM → HARDER FILM

SP 75 LV	SP 75	MD 95	MD 100	MD 110	MD 120

General guidance:

- Softer grades often perform better as plasticisers
- Harder grades are typically less flexible and offer superior adhesion properties

SINTOPOL® grades are designed to provide different hardness and viscosity to meet printing requirements.

Solubility & performance

Fast drying, strong adhesion and thermal resistance about aromatic SINTOPOL®

Solubility

SINTOPOL® resins are easily soluble in moderately polar solvents:

Ketones • Esters • Ethers • Alcohols

Solubility in ethyl alcohol increases as:

SP 75LV > SP 75 > MD 95 > MD 100 > MD 110 > MD 120

Performance highlights

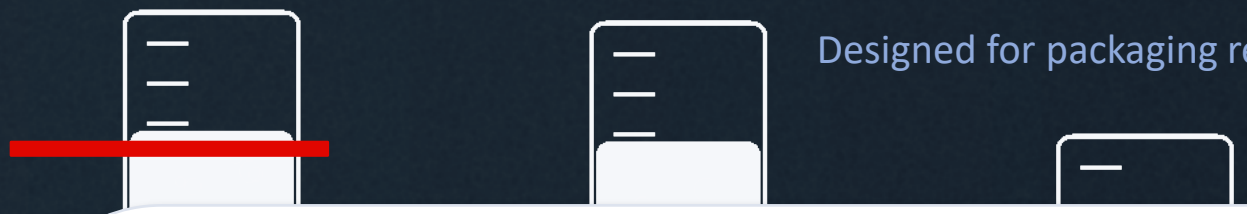
- Very fast dry-times
- Suitable for printing rates > 300 m/min
- High hot-sealing resistance

Thermo-sealing resistance (NC inks modified with SINTOPOL® + TiO_2):

- 120–130°C for ~1–2 seconds
- With cross-linking catalyst: > 180°C after 24–48 hours

Thermal resistance can also increase by using a higher nitrocellulose percentage where possible.

Compliance, storage & certifications



Designed for packaging requirements and quality systems

Storage

All **SINTOPOL®** grades are stable for one to two years, depending on the type, if stored properly in a cool, dry place and in their original packaging.

Regulatory & product statements

- Made of substances allowed for components of food packaging goods (FDA: 21 CFR 175.105; 21 CFR 175.300)
- Produced without Tin catalysts; no organotin compounds
- Produced in compliance with Community Directive 2002-72-CE and subsequent revisions.
- Comply with REACH, Swiss Ordinance and International regulations.

Certifications

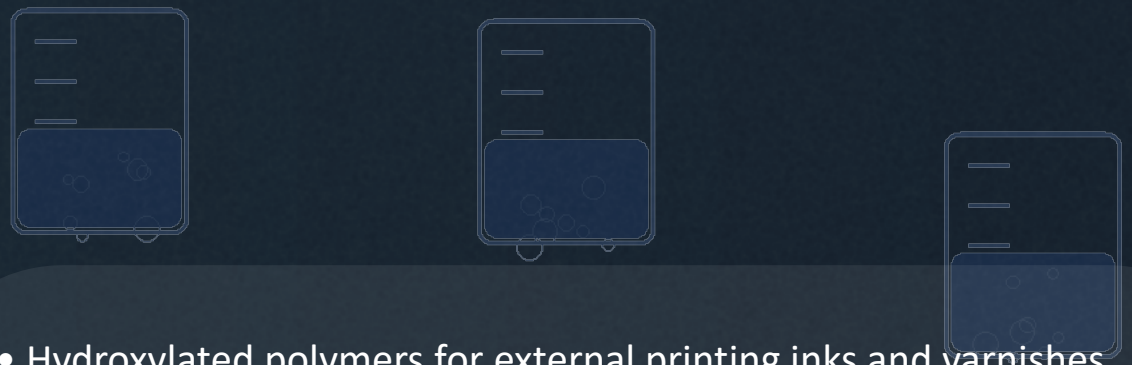
CERTIQUALITY
IS MEMBER OF
CISQ FEDERATION

CERTIFIED QUALITY
MANAGEMENT SYSTEM

CERTIQUALITY

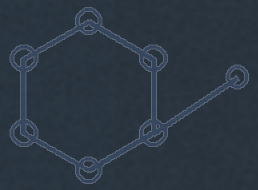
UNI EN ISO **9001:2015**

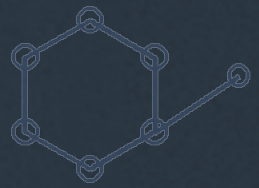
Beyond SINTOPOL®

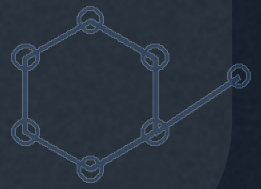


- Hydroxylated polymers for external printing inks and varnishes
  – High gloss and scratch resistance

- SINTOPOL® E 222/100% (saturated polyester resin) OH Reactive
  – Used for 2-component inks (2K), typically cross-linked with isocyanate adducts







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Thank you

Technical appendix

Printing supports & recommended ink systems (flexible packaging)

Based on SINTOCHEM technical notes

Flexible packaging: main printing supports

In flexography and rotogravure it is possible to print on a wide range of flexible substrates and in laminations.

Paper & cardboard

- Absorbent supports
- Often used coated or laminated
- Need good coat adhesion

Cellulose films (cellophane)

- Transparent, thermo-stable
- Barrier variants (moisture / oxygen)
- Used also for twist-wrap

Thin aluminium / metallized films

- Excellent light & gas barrier
- Sensitive to surface oils (pretreat)
- Metallized films reduce weight

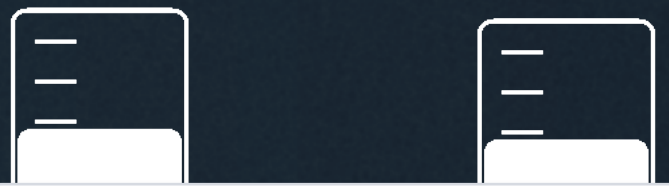
Plastic films

- PE, PP, PET, PA (and variants)
- Often require surface pretreatments
- Selected ink systems by film type

Flexible packaging frequently uses multi-layer structures (laminates or co-extrusions) to combine properties.

Paper & cardboard

Printing on absorbent supports: what matters and which inks are typically used.



Support requirements

- Uniform thickness
- Dimensional stability
- Smoothness & gloss (especially coated paper)
- Good coating adhesion

Ink requirements

- High gloss
- Rub & bend resistance
- Good adhesion
- Low solvent retention
- Thermo-resistance (for paper laminated with plastic films)

Typical system: Nitrocellulose-based inks, often modified (acrylic / polyurethane / ketonic resins)

Cellulose films (cellophane)

Key variants and ink requirements (incl. lamination / internal printing).

Why it is used

- Low thickness, good transparency
- Thermo-stable
- Can be lacquered to add thermo-sealing or barrier properties

Variants & typical applications

- Barrier to moisture: MS (incl. NC lacquer variants)
- Barrier to oxygen: XS (incl. PVDC lacquer variants)
- Twist-wrapping: P-MF (e.g., confectionery)

Ink requirements

- High gloss
- Thermo-resistance
- Blocking resistance
- Low solvent retention
- Suitable for laminations (internal printing requires adhesive–ink affinity)

Typical system: Nitrocellulose-based inks, modified (often with acrylic / polyurethane / ketonic resins)

Thin aluminium & metallized films

Barrier performance, pre-treatment needs, and typical ink systems.

Key properties

- Excellent gas & light barrier
- Good for aroma / fragrance protection
- Flexible, corrosion resistant
- Often needs polishing/calendering

Process notes

- Residual oily layer can hinder ink fixing
- Mitigation: remove oils or apply varnish primer
- Primer also protects from oxidation

Ink requirements & trends

- High gloss & transparency
- Flexibility and thermo-resistance
- Blocking resistance; low solvent retention
- Trend: metallized plastic films (PET / PA / OPP) — lighter, but thinner Aluminium layer can reduce thermo- and gas-barrier performance

Typical systems: Plastified nitrocellulose inks (often modified with acrylic / polyurethane resins), incl. NC-primer routes

Plastic films (PE & PP)

Typical properties, pretreatments, and ink system families.

Polyethylene (PE)

Typical film types: LDPE • HDPE • LLDPE

- Extensibility; rub resistance
- Water resistance
- Impermeable to oxygen and CO_2
- Thermo-retractable (shrink films)

Inks & processing notes

- High gloss; flexibility; blocking resistance
- Surface pretreatments (e.g., corona) improve adhesion
- Common families: polyamide-based or nitrocellulose-based (plastified / PU-modified)

Polypropylene (PP)

Variants: oriented (OPP), co-extruded, coated, metallized…

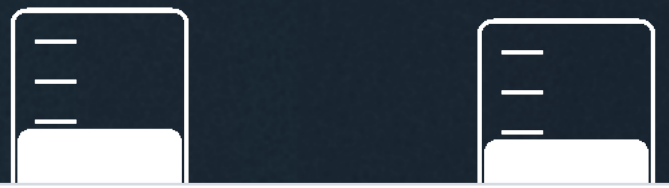
- Transparency
- Dimensional stability
- Thermo-sealing (when co-extruded)
- Gas permeability

Ink requirements & families

- High gloss; good solvent release
- Thermo-resistance; suitability to lamination
- Common families: nitrocellulose-modified (PU / cellulose esters), nitro-acrylic routes (often PU-modified)

PET & PA + lamination

Ink systems for high thermal demands and multi-layer structures.



Polyester (PET)

- Transparency; stiffness
- Gas & moisture barrier
- Suitable for deep-freezing / pasteurization / sterilization (high use temperature)

Typical ink families

- Vinyl resins / PVB / film-forming polyurethane resins
- Nitrocellulose modified with film-forming PU (chemically treated PET)
- Saran/PVDC-coated PET uses specific routes (vinyl, PVB, NC+PU)

Polyamide (PA)

- Thermo-forming; transparency
- High punch resistance
- Chemical & mechanical resistance; barrier properties

Ink requirements

- Low solvent retention
- Blocking resistance
- Suitable for pasteurization / sterilization
- Often similar families to PET (vinyl / PVB / PU, or NC+film-forming PU)

Lamination & multi-layer structures

When a single film cannot satisfy all requirements, composite films are obtained by lamination (coupling) or co-extrusion. Adhesion is achieved with synthetic adhesives (thermoplastic or thermoset), commonly based on polyester, polyurethane, acrylic, or PVDC polymers.

SINTOPOL® General products

PRODUCT NAME	SOLIDS	SOLVENT	FILM-HARDNESS	USE and TIPICAL CHARACTERISTICS
SINTOPOL® DP 50/100%	100%	----------	Very soft	For production of predisperded and as substitute of monomeric plastifier in Nitro-Urethane systems.
SINTOPOL® SP 75/100%	100%	----------	Very soft	For production of flexo- and rotogravure inks for foodstuff-packaging. Improvement of gloss, blocking-resistance, heatsealresistance, adhesion on PE and on PP.
SINTOPOL® SP 75/80%EA	80%	Ethylacetate	Very soft	As above.
SINTOPOL® SP 75LV/100%	100%	----------	Very soft	As above.
SINTOPOL® SP 75LV/80%EA	80%	Ethylacetate	Very soft	As above.
SINTOPOL® DP 90/100%	100%	----------	Soft	For production of flexo and rotogravure inks. In combination with Nitrocellulose confer good adhesion on PE and on PP.
SINTOPOL® DP 102/75%EA	75%	Ethylacetate	Soft	As above.
SINTOPOL® MD 95/100%	100%	----------	Soft	For use as above, but with higher filmhardness. Excellent adhesion on treated polyolefines.Low odour.
SINTOPOL® MD 95/75%EA	75%	Ethylacetate	Soft	As above.
SINTOPOL® MD 100/100%	100%	----------	Soft	As above.
SINTOPOL® MD 100/80%EA	80%	Ethylacetate	Soft	As above.
SINTOPOL® MD 110/75%EA	75%	Ethylacetate	Hard	Special type for rotogravure and flexographic inks. Improved heat resistance. Other characteristics as above.
SINTOPOL® MD 120/60%EA	60%	Ethylacetate	Very hard	Intended for formulation of gravure inks with good adhesion on a wide range of packaging substrates. Other characteristics as above.
SINTOPOL® DP 160-C/45%EA	45%	Ethylacetate	Hard	Special semi-aliphatic PU for flexo and rotogravure inks. Intended for formulation of inks for pasteurization with good adhesion on PET and PA.
SINTOPOL® AD 164SH/45%EA	45%	Ethylacetate	Very hard	Special aliphatic polyester-polyether for flexo and rotogravure inks. Intended for formulation of inks for pasteurization and sterilization with very good adhesion on PE, PET, PP, OPA, Saranized or metalized films, paper and Aluminium. Good solvent release and excellent cohesion in laminations.
SINTOPOL® DP 166/42%EA	42%	Ethylacetate	Hard	As above with good solubility in Alcohol and good pigment wetting property.
SINTOPOL® DP 266/42%EA	42%	Ethylacetate	Very hard	Special aliphatic PU for flexo and rotogravure inks. Intended for formulation of inks for pasteurization and sterilization with very good adhesion on PE, PET, PP, OPA, Saranized or metalized films, paper and Aluminium. Due to its aliphatic nature, it has a very good resistance to UV. Good solvent release and excellent cohesion in laminations. Non-yellowing under effect of UV rays and the good resistance to saponification.
SINTOPOL® DP 180/30%EA	30%	Ethylacetate	Hard	As above with very High Molecular Weight and better lamination bond strength. Apt for mono-solvent systems. Modifier apt to viscosity increasing in system inks.

OH-reactive Resins :

SINTOPOL® E222/100%	100%	----------	----------	Partially tri-functional saturated polyester resin for formulation of two-components rotogravure inks. Good gloss and good hiding power.