

At **Soremag**, we hot-cast our polyurethane **rollers** and **molded parts**. The **diisocyanate** (MDI, TDI, PPDI, NDI) forms the rigid backbone — thermal resistance, load and fatigue — while the **polyol** (ester or ether) governs resistance to water, chemicals and solvents.



Soremag workshop — hot casting and hardness testing of polyurethane rollers and molded parts.

General data. The values in this sheet are recognized material-level trends; actual performance depends on the formulation, hardness, curative and post-cure — **several recipe developments can target different properties**. Soremag formulates to spec.

WHY POLYURETHANE? (VS RUBBER)

On a roller (covering)

- › **Abrasion:** typically lasts **3 to 4×** longer than rubber in abrasive environments — less downtime.
- › **Load:** carries far heavier loads without crushing — heavy industry (metallurgy, mining).
- › **Non-marking:** leaves no marks (unlike black rubbers) — paper, textile, finished goods.
- › **Cut / tear:** resists better, and a nick does not propagate as it does on rubber.
- › **Chemistry:** better resistance to oils, greases, ozone and some solvents.

On a molded part

- › **Hardness range:** from very soft (Shore A) to plastic-hard (Shore D) while keeping elasticity.
- › **Metal adhesion:** bonds to metal inserts far better than rubber — cored wheels, motor mounts.
- › **Reduced tooling:** cast at low temperature and atmospheric pressure → cheaper molds (resin, aluminum).
- › **Machinability:** hard parts can be machined (milling, turning) almost like metal for tight tolerances.

CHOOSING THE RIGHT SYSTEM: ESTER VS ETHER

Polyester (ester)

Superior mechanical robustness: cut, tear, sliding abrasion, sealing against oils, fuels and aliphatic solvents. Good dry aging. Weak point: sensitivity to hot water (hydrolysis).

Polyether (ether)

Preferred in wet or washed environments: remarkable resistance to hydrolysis and microbial attack, higher rebound, low heat build-up, low-temperature flexibility. Pure mechanical strength and hydrocarbon resistance lower than ester.

HOT CAST VS COLD CAST — THE SOREMAG PROCESS

Hot cast

The Soremag industrial standard

- › Prepolymers and curatives heated ($\approx 70\text{--}120\text{ }^{\circ}\text{C}$), mixed, then cured several hours in an oven.
- › **Extreme mechanics** (abrasion, tear, impact) and **superior dynamics**: handles hysteresis where a cold-cast PU would melt.
- › **Massive load capacity** without permanent set · **very high hardness** (up to Shore D) with impact resistance.

Cold cast

For context

- › Two liquids (A + B) curing at room temperature — simple, economical, fast demolding.
- › Ideal for **prototyping**, **soft molds**, static parts and electronic potting.
- › But **low dynamic durability**: wears or degrades quickly in industrial settings.

The verdict — for a conveyor roller or a part subject to friction, impact or heavy loads, **hot casting is the way to go**: it's our standard. Cold casting, while simpler, would wear out fast under dynamic stress. This hot-cast mastery is what sets **Soremag** apart.

CHEMICAL & ENVIRONMENTAL RESISTANCE

	MDI ester	MDI ether	TDI ester	TDI ether	PPDI	NDI
Cold water (short contact)	G	VG	G	VG	VG	G-VG
Immersion / constant humidity	P-F	E	P-F	E	VG	F-G
Hydrolysis / hot water	P	VG	P	VG	VG	F-G
Steam	NR	P	NR	P	F-G	F
Oils & greases	VG	G	VG	G	VG	VG
Diesel & fuels	G-VG	F-G	G-VG	F-G	G-VG	G
Aliphatic solvents	G-VG	F-G	G-VG	F-G	G-VG	G
Aromatic solvents	P	P	P	P	F-P	F-P
Ketones, MEK, chlorinated solv.	NR	NR	NR	NR	P-NR	P-NR
Weak dilute acids	G	F-G	G	F-G	G	G
Strong acids	NR	NR	NR	NR	NR	NR
Ozone	G-VG	G-VG	G-VG	G-VG	G-VG	VG
Low temperature (flexibility)	F	VG	F	VG	G-VG	F-G
Continuous heat	G	G	G	G	VG	G-VG

E Excellent VG Very good G Good F Fair P Poor NR Not recommended

PHYSICAL & MECHANICAL PROPERTIES

	MDI ester	MDI ether	TDI ester	TDI ether	PPDI	NDI
Abrasion	VG	G-VG	VG	VG	E	E
Cut	VG	G	VG	G-VG	E	E
Tear	VG	G	VG	G-VG	E	E
Tensile strength	VG	G-VG	VG	G-VG	VG	E
Rebound / resilience	F-G	VG	F-G	VG	VG-E	E
Low hysteresis (heat build-up)	F	G-VG	F	G-VG	VG-E	E
Dynamic fatigue (flex)	F-G	VG	G	VG	E	E
Compression set	G	G-VG	G	G-VG	E	E
Load capacity	G-VG	G-VG	G-VG	G-VG	G-VG	E
Heat resistance (service)	G	G	G-VG	G-VG	E	VG
Dimensional stability	G	G	G	G	VG	VG-E
Castability	VG	VG	VG	VG	F	F-P
Material cost	\$\$	\$\$	\$\$	\$\$\$-\$\$\$\$	\$\$\$\$	\$\$\$\$

Material cost: \$\$ economical → \$\$\$\$\$ premium. Low hysteresis = E means little heat build-up (advantage).

SELECTION RULES

Water rule Constant humidity, frequent washdowns, hydrolysis → POLYETHER (MDI ether or TDI ether)	Oil rule Oils, greases, diesel, aliphatic solvents → POLYESTER (TDI ester or MDI ester)
Dynamic-load rule Heavily loaded rollers, heavy wheels, high speed → NDI first, otherwise PPDI	Thermal & fatigue rule Continuous service > 90 °C, extreme flexing → PPDI

Choosing by need: economical wear part (no water) → MDI/TDI ester · standard roller or idler → MDI/TDI ether · scrapers, wiper blades, abrasive & oily environments → TDI ester · heavy material-handling wheel / NVH → NDI · high-performance seals and thermal resistance → PPDI · ketones, chlorinated solvents or strong acids → polyurethane is not suitable (consider FKM, PTFE...).

SOREMAG EXPERTISE & FORMULATION
Each system is available in many hardness and recipe variants; **FDA / food-contact** and **antistatic / conductive** grades on request. All these systems are based on aromatic isocyanates and **yellow** under UV with no notable loss of mechanical properties. Handling is regulated (diisocyanates — REACH training required). Non-contractual document — indicative values; testing under real conditions recommended.