TYPICAL PROPERTIES

Laripur series

General properties

	abrasion resistance	hydrolysis resistance	cold flexibility	tear resistance	cold impact resistance	oxidation resistance	microbe resistance	thermal resistance	hot compression resistance	oils/fats resistance	acid/base resistance	outdoor resistance
20 standard adipate ester	++	0	0/+	++	0	++	0	+	0/+	++	0	0
25 special adipate ester	++	+	+	++	0/+	++	+	++	0/+	+/++	0/+	0/+
2102 polycaprolactone ester	++	+/++	+	++	+/++	++	+	++	+	+/++	+	+
50 modified ester	++	+	+	++	++	+/++	+	+	0	++	+	+
15/18 plasticized ester	++	+	++	++	++	+	0/+	+	0	0/+	0	0
60 PTMG polyether	++	++	+/++	+/++	+	0	++	0	0/+	+	++	+/++
Seal grades	++	+/++	+/++	++	++	+	+	++	++	++	+	+

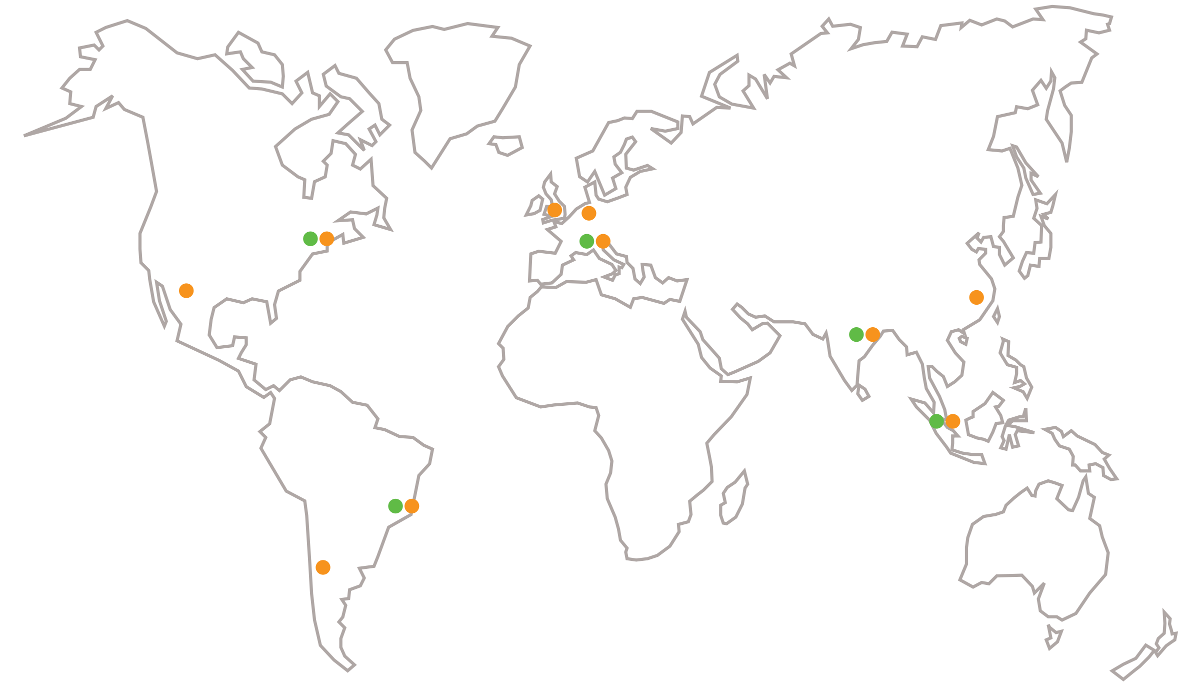
++ excellent + good 0 sufficient - poor

*Please keep the above indications just as indicative, even considering the behaviour of **TPU** grades can change significantly inside the same range.*

Main applications

	technical items	heels	shoe soles	soccer soles	ski boots	wheels, casters	bellows	seals	cattle tags	tubes	cables	transmission belts
20 standard adipate ester	●	□	●	●		●						
25 special adipate ester	□	●	□	□	□	□	●	●	●	□	●	●
2102 polycaprolactone ester	□						□	●		□		□
50 modified ester	●				□							
15/18 plasticized ester	●		□									
60 PTMG polyether	□		●	●	□		●	●	□	□	□	
Seal grades	●							□				

● possible application □ recommended application



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More information about Coim product range on **coimgroup.com**

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Laripur

TYPICAL PROPERTIES

coim

General presentation of Laripur series

Laripurs are thermoplastic polyurethanes and consequently combine the working technology of thermoplastic products together with the well-known features of polyurethanes i.e.

- excellent abrasion resistance
- great flexibility and constancy at various temperatures
- good compression set resistance
- good water and light resistance
- good resistance to oils, fats and many types of solvent.

Depending on their chemical nature **Laripurs** can be grouped into several categories where the material formulations can be variously balanced to give the typical properties of polyurethanes as above.
Laripurs cover a wide range of hardness from 60 Shore A to 75 Shore D. An important property of the **Laripur** products is the total absence of plasticizers. There are however plasticized grades available which are suitable for specific applications.
The raw materials used in the manufacture of **Laripurs** are isocyanates, chain extenders and polyols, which are reacted in carefully controlled conditions in order to ensure the highest possible quality and consistency of the end product.
By varying the quantity of the components in the formulation of the polyurethane, it is possible to cover a wide range of applications giving different mechanical and chemical resistances.

The general characteristics of each Series are as follows:

Series 15 and 18 plasticized ester
Products based on saturated polyester and containing a small amount of plasticizer,they have been specially developed to fill a gap between rubber materials and polyurethanes. They combine to give a very soft grade but with polyurethane's typical features such as good flexibility and abrasion resistance, while maintaining short processing times. This can be particularly applied to the shoe industry where **TPUs** guarantee excellent adhesion to the two-component PU without applying any primer.

Series 20 standard ester
Products based on standard grade saturated polyester. These show strong resilience and tear resistance, excellent abrasion resistance and good stability in water, solvents, light and oxidation.

Series 25 special ester
Products based on special grade saturated polyester. The features are similar to those of **Series 20** but are characterized by a higher resistance to hydrolysis failure and improved flexibility at low temperatures.

Series 2102 polycaprolactone ester
Products based on polycaprolactones. They behave roughly in the same way as **TPU** in the **Special Ester Series** but exhibit a higher resistance to hydrolysis failure.

Series 50 modified ester
Products are obtained by homogenously incorporating small quantities of particular technopolymers in some rigid types belonging to the **Special Ester Series**. They couple their elevated hardness with an excellent cold impact resistance.

Series 60 and 2103 ether
Products based on quality polyether. In comparison with the **Ester Series**, they show a better resistance to hydrolysis and microbiological attack, a very good cold flexibility but a lower resistance to oxidation.

Products for gaskets
These are specially developed **TPUs** for manufacturing hydraulic gaskets or any other application where a high compression set, resistance to oils and/or high temperatures, is required. Two products based on polycaprolactone (2202-95A and 107- 93A) plus one based on ether (2203-93A) belong to this group depending on the application.

Alloys
These are homogenous mixtures of other technopolymers with **TPU** in a variable ratio, the characteristics of which can vary considerably dependent on the nature of the binder.

Special uses
These grades cover the **Series 40 Ester specification** for calendering and soluble grades for the production of synthetic leather.

Others
Other **Laripur** ranges are commercially available and are intended for special applications.

Economic applications
These **TPUs** are available on demand according to the application.

The characteristics in this technical data sheet are determined upon conditioned materials and mostly represent the average values found in the evaluation of a significative number of production lots.
The present technical note has been written basing on our best knowledge but is not released as a specification for the above mentioned materials.
The international standards here indicated have to be intended as a refernce to carry out the various tests but the choice of available options and any possible variation are mentioned in our respective internal standards.
Even if we guarantee the quality constancy of the Laripur indicated in the above list we periodically take the liberty to issue up-to-date version of the same.
Laripur shelf-life has to be considered as six months from date of delivery.

LARIPUR

CHARACTERISTIC	UNIT	STANDARD ADIPATE ESTER						SPECIAL ADIPATE ESTER										POLYCAPROLACTONE ESTER	MODIFIED ESTER			PLASTICIZED ESTER								PTMG POLYETHER										SEAL GRADES		UNIT	CHARACTERISTIC
		LPR8020	LPR8520	LPR9020	LPR5020	LPR5520	LPR6520	LPR7025	LPR8025	LPR9025	LPR4525	LPR5225	LPR5525	LPR5725	LPR5925	LPR6325	LPR72D25	LPR2102-85AE	LPR5450	LPR5850	LPR6650	LPR6515	LPR7015	LPR6518	LPR5018B	LPR6018B	LPR6518B	LPR7018B	LPR7518B	LPR7560	LPR8860	LPR9060	LPR9060EM	LPR9060EF	LPR9060HFM	LPR2103-90AE	LPR5260	LPR5760	LPR6260	LPR6560	LPR70D60	LPR2203-93A	LPR107-93A		
Specific gravity DIN 53479	gr/cm³	1.21	1.22	1.23	1.23	1.24	1.25	1.18	1.19	1.20	1.22	1.22	1.23	1.23	1.23	1.24	1.25	1.16	1.18	1.18	1.20	1.18	1.19	1.19	1.18	1.19	1.19	1.19	1.19	1.10	1.12	1.12	1.10	1.14	1.22	1.14	1.15	1.16	1.17	1.18	1.20	1.14	1.19	gr/cm³	Specific gravity DIN 53479
Shore hardness DIN 53505	A D	82	86	91	50	57	65	70	84	90	46	51	53	56	59	62	67	84	53	58	63	65	70	66	52A	63A	68A	71A	75A	77	86	86	88	87	89	90	50	56	60	65	72	92	93	A D	Shore hardness DIN 53505
Abrasion loss DIN 53516	mm³	30	35	35	35	40	40	30	30	30	35	35	35	35	40	40	40	30	40	40	40	35	40	35	80	50	50	50	45	35	35	35	30	40	50	35	35	35	35	35	40	30	35	mm³	Abrasion loss DIN 53516
Tensile modulus DIN 53504 50%	N/mm²	4.7	5.7	7.9	9.0	16.7	21.0	2.8	4.3	6.4	10.7	12.2	13.6	15.5	17.3	20.5	26.5	4.5	13.1	16.8	21.9	1.8	2.5	1.8	1.4	1.9	2.1	2.6	3.2	3.6	5.3	5.3	5.6	5.4	7.6	8.3	10.3	16.4	18.2	23.9	31.6	9.0	9.2	N/mm²	Tensile Modulus DIN 53504 50%
DIN 53504 100%	N/mm²	6.0	7.4	9.6	11.3	19.1	23.0	3.9	5.6	7.8	12.9	14.5	16.0	18.0	20.7	23.4	28.2	6.5	15.3	19.4	23.8	2.7	4.0	2.7	2.1	2.6	3.1	3.8	4.7	5.0	7.2	7.0	7.4	7.2	9.9	10.4	12.2	20.8	23.0	27.7	34.4	11.2	1.5	N/mm²	DIN 53504 100%
DIN 53504 300%	N/mm²	11.3	14.7	17.8	25.6	35.5	42.8	10.1	13.7	18.6	27.9	34.6	40.5	43.9	46.7	48.9	50.5	16.0	34.0	43.0	46.5	7.2	9.8	5.0	4.0	4.7	6.1	7.9	8.9	9.1	14.1	13.2	13.5	13.3	13.3	21.2	23.5	45.4	49.7	54.6	57.8	21.4	24.2	N/mm²	DIN 53504 300%
Tensile strength DIN 53504	N/mm²	46.1	48.0	52.2	55.8	59.8	65.5	42.0	53.2	55.2	56.8	60.7	63.2	64.5	66.8	69.8	71.2	53.2	60.8	62.8	65.5	35.6	40.2	30.7	20.0	33.5	35,2	41.1	43.5	40.7	52.3	44.4	50.2	48.1	34.3	52.0	54.8	61.7	65.8	66,3	74.8	51.1	54.5	N/mm²	Tensile strength DIN 53504
Elongation at break DIN 53504	%	600	580	570	510	480	440	680	620	580	530	480	460	440	410	400	380	520	470	440	410	610	580	880	900	910	780	790	700	690	540	650	620	635	615	550	530	410	390	350	340	460	520	%	Elongation at break DIN 53504
Tear strength DIN 53515	N/mm	72	86	103	120	155	190	70	82	101	120	140	155	162	170	190	220	70	125	160	185	42	47	45	31	37	47	48	56	55	72	65	72	68	61	85	110	140	170	180	230	80	100	N/mm	Tear strength DIN 53515
Flexural modulus ISO 178	N/mm²				75	180	360				100	115	145	190	220	350	640		159	270	410															96	170	250	400	950	45	65	N/mm²	Flexural modulus ISO 178
+Torsion Test DIN 53447 +20° C DIN 53447 -20° C	N/mm² N/mm²				20 190	46 354	77 454					26 169	40 262	44 288	58 370	80 460	125 500		37 170	67 306	105 414															22 113	40 205	56 252	87 330	232 472			N/mm² N/mm²	Torsion Test DIN 53447 +20° C DIN 53447 -20° C
Ratio -20° C/+20° C					9.5	7.7	5.9					6.5	6.4	6.4	6.4	5.7	4.0		4.6	4.6	3.9															5.2	5.1	4.5	3.8	2.0				Ratio -20° C/+20° C
Vicat softening point ISO 306	°C	84	86	100	105	126	150	60	73	104	120	127		138	146	156	185	89	104	120	152									70	77	80	87	100	84	98	120	130	133	138	152	145	175	°C	Vicat softening point ISO 306
Compression set DIN 53517 70h/23° C DIN 53517 22h/70° C DIN 53517 70h/100° C	%	18 41	21 43	22 45	24 50			23 58	20 42	24 45	28 48	25 45						17 36				22 41	24 42	23 46						22 50	23 44	25 45	26 46	24 42	28 51	22 48	27 50						16 28	17 18 38	%	Compression set DIN 53517 70h/23° C DIN 53517 22h/70° C DIN 53517 70h/100° C
Impact test ASTM D 256 -20° C	KJ/m²													5.5	5.0	4.7	3.5			12.6	8.8															10.5	9.2	8.1	7.5			KJ/m²	Impact test ASTM D 256 -20° C
Flammability test UL 94 (vertical burning)																															V-2	V-2	V-0	V-2	V-2									Flammability test UL 94 (vertical burning)
Processing: injection extrusion*		● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	●	●	●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●		Processing: injection extrusion*
Features:																																												Features:
O opaque (evaluated on 2 mm thick test plaques)																			●	●	●	●	●																					O opaque (evaluated on 2 mm thick test plaques)
T transparent (evaluated on 6 mm thick test plaques)		●	●					●	●									●						●	●	●	●	●	●	●	●	●		●	●	●	●	●					T transparent (evaluated on 6 mm thick test plaques)
EC food contact approved		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●												●	●	●			●	●	●	●	●	●				EC food contact approved
FDA food contact approved		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●												●	●	●			●	●	●	●	●	●				FDA food contact approved
NSF 61 drinkable water approved																														●		●			●	●	●	●	●	●				NSF 61 drinkable water approved
USP medical Class VI fitting																														●					●	●								USP medical Class VI fitting

*The grade also suitable for extrusion are indicated by the code EG or AE.