Technical Data Sheet: Neuthane 200 Series

TDI – Ester Prepolymers & TDI - Caprolactone Ester Prepolymers

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QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001:2015

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Neuthane 200 Series TDI - Ester Prepolymers (70 - 95 Shore A)

Properties

The Neuthane 200 series are high perfomance TDI – ester prepolymers designed to produce items for use in arduous application areas

They offer:

- a high level of physical properties
- good cut and abrasion resistance
- good chemical resistance
- hardness range from 75 - 95A (MOCA)
- hardness range from <40 – 60A (TMP)

Typical Applications

- Medium load roller coverings (e.g. steel industry – dry application areas)
- Roller coverings where lubricants are present (e.g. aluminium manufacture)
- Wheels (e.g. pallet truck)
- Mining and quarrying (e.g. screen decks, scraper blades)
- Oil and gas industry (e.g. gaskets, pipe pigs)
- Press blocks
- Paper converting (e.g. anvil rollers)

Processing

Processing can be by hand or by dispensing machine.

Hand Processing

- Melt prepolymer at 50-70°C for 12-24 hours (as a guide the grades with the lower NCO value will take longer to melt than those with higher NCO values)
- Heat the prepolymer and curative to the recommended temperature
- Add pigments and Antifoam, as applicable, whilst mixing
- It is recommended that air be removed from the prepolymer under vacuum prior to addition of the curative
- Add the curative and thoroughly mix ensuring that no unmixed material is left on the container sides (if necessary the mix can be transferred to a second clean container and mixed again)
- Remove air under vacuum
- Cast into moulds, preheated to the recommended temperature
- Cure as recommended

Special Considerations

Processing

- Avoid prolonged storage of prepolymers at elevated temperatures. This will result in low hardness and lower properties of the cured material
- Avoid moisture contamination of all materials
- Part used containers should be flushed with dry nitrogen and resealed immediately after use

Alternatives

- ***Humid/Wet*** - PTMEG ether based systems should be considered: Neuthane 100 [TDI], Neuthane 600 [MDI] or Neuthane 500 [Aliphatic]
- ***Dynamic / Resilience –*** PTMEG ether based materials should be considered: Neuthane 100 [TDI], Neuthane 600 [MDI] or Neuthane 801 [MDI Quasi]
- ***Non MOCA*** – MDI based systems should be considered: Neuthane 700 [Prepolymer] and 802 [Quasi]

COST	PROCESSING	ABRASION	DYNAMIC	RESILIENCE	SOLVENT	HUMID/WET	TEMPERATURE	UV STABILITY

Key Excellent / Good | Good / Average | Average / Poor

Neuthane 200 Series TDI - Ester Prepolymers (70 - 95 Shore A)

Neuthane		223	225	235S	235S	235
%NCO (mid-point)	%	2.3	2.5	3.5	3.5	3.5
Curative		**E300 (CA6)**	**MOCA**	**MOCA**	**E300 (CA6)**	**MOCA**
Mix Ratio Curative per 100 Parts Resin	%	5.6	7.5	10.6	8.5	10.6
Recommended Stoichiometry	by weight	95	95	95	95	95
Resin Temperature	°C	70	85	85	80 - 90	85
Curative Temperature	°C	40	110	110	40	110
Recommended Mould Temperature	°C	90	95	95	90	95
Viscosity @ 100°C (prepolymer)	cps	850	1030	860	1050	950
Pot life (on a 500g mix)	minutes	10 - 20	17	15	13	7.5
Recommended Cure Temperature / Time	°C / hrs	90 - 100 / 16	95 / 16	95 / 16	90 - 100 / 16	95 / 16

Hardness	**DIN 2240-91**	Shore A	70	76	85	83	86
	DIN 2240-91	Shore D	-	-	-	-	-
100% Modulus	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	381 (2.63)	480 (3.3)	760 (5.2)	-	840 (5.8)
300% Modulus	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	590 (4.07)	770 (5.3)	1310 (9.1)	970 (6.7)	1420 (9.8)
Tensile Strength	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	2161 (14.9)	5400 (37.3)	7400 (51.0)	5800 (40.0)	7360 (50.7)
Elongation at Break	BS 903 Pt A2 - ISO 37	%	965	750	570	700	630
Tear Strength	BS 903 Pt A3 - ISO 34-1	lb/in (KN/m)	353 (63)	340 (59.5)	475 (83.5)	460 (80.5)	495 (86.8)
Compression Set	BS903 Pt A6 - ISO 815	%	43.8	27	37	-	35
Abrasion loss	DIN 53516	mm³	21	43	42	-	40
Resilience	ASTM D 2632-92	%	51	40	30	-	36
Specific Gravity		g/cm³	1.15	1.23	1.24	1.24	1.24

Neuthane 200 Series TDI - Ester Prepolymers (76 - 95 Shore A)

Neuthane		235TS	242S	242	254	254
%NCO (mid-point)	%	3.5	4.2	4.2	5.4	5.4
Curative		**MOCA**	**MOCA**	**MOCA**	**MOCA**	**E300 (CA6)**
Mix Ratio Curative per 100 Parts Resin	%	10.6	12.7	12.7	16.3	13.1
Recommended Stoichiometry	by weight	95	95	95	95	95
Resin Temperature	°C	85	80	80	80	80 - 90
Curative Temperature	°C	110	105	105	110	40
Recommended Mould Temperature	°C	90	95	95	95	90
Viscosity @ 100°C (prepolymer)	cps	950	700	830	450	800
Pot life (on a 500g mix)	minutes	9	8	5	4.5	5
Recommended Cure Temperature / Time	°C / hrs	90 / 16	95 / 16	95 / 16	95 / 16	90 - 100 / 16

Hardness	**DIN 2240-91**	Shore A	86	92	93	95	93
	DIN 2240-91	Shore D	-	-	-	45	-
100% Modulus	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	500 (3.45)	1330 (9.2)	1400 (6.7)	2020 (13.9)	-
300% Modulus	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	1100 (7.59)	2600 (18.0)	2670 (18.4)	4210 (29)	3300 (22.8)
Tensile Strength	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	5700 (39.33)	8700 (60.0)	8110 (56.0)	9030 (62.2)	6000 (41.4)
Elongation at Break	BS 903 Pt A2 - ISO 37	%	550	500	520	460	500
Tear Strength	BS 903 Pt A3 - ISO 34-1	lb/in (KN/m)	410 (71.8)	610 (107.5)	660 (115.7)	715 (125.2)	550 (96.3)
Compression Set	BS903 Pt A6 - ISO 815	%	27	32	28	29	-
Abrasion loss	DIN 53516	mm³	-	42	40	38	-
Resilience	ASTM D 2632-92	%	40	25	27	30	-
Specific Gravity		g/cm³	1.24	1.27	1.27	1.28	1.28

Neuthane 200 Series TDI - Ester Prepolymers (40 - 60 Shore A with TMP & Plasticiser)

Properties

The Neuthane 200 series cured with TMP and plasticised produces low hardness polyurethanes with (in the case of Neuthane 234 and 242) exceptional solvent swell resistance.

They offer:

- long pot life
- excellent solvent swell resistance
- good cut resistance
- hardness range from <40 - 60A
- the option to be combined with fillers to reduce cost and improve grinding characteristics (Neuthane FP3)

Typical Applications

- Lacquer and paint applicator rollers and wheels (Neuthane 235, 234 & 242)*
- Isostatic bage (Neuthane 235)
- Printing rollers

Processing

Processing can be by hand or by dispensing machine.

Hand Processing

- Melt prepolymer at 60-70°C for 16-24 hours
- Heat the prepolymer and curative to the recommended temperature
- Remove moisture from plasticiser or FP3 (after blending) under vacuum at 110-120°C
- Add pigments and Antifoam, as applicable, whilst mixing
- Add the curative and thoroughly mix ensuring that no unmixed material is left on the container sides (if necessary the mix can be transferred to a second clean container and mixed again)
- If using more than one mix, blend to ensure homogeneity and mix again.
- Remove air under vacuum
- Cast into moulds, preheated to the recommended temperature
- Cure as recommended

Special Considerations

Processing

- Avoid prolonged storage of prepolymers at elevated temperatures. This will result in low hardness and lower properties of the cured material
- Avoid moisture contamination of all materials
- Part used containers should be flushed with dry nitrogen and resealed immediately after use

Alternatives

- ***Abrasion / Cut resistance*** - Neuthane 802 system [MDI Quasi] will offer an advantage
- ***Humid / Wet*** – PTMEG ether based systems should be considered: Neuthane 801 [MDI Quasi] or Neuthane 600 [MDI Prepolymer with Neuthane CA curative]

COST	PROCESSING	ABRASION	DYNAMIC	RESILIENCE	SOLVENT	HUMID/WET	TEMPERATURE	UV STABILITY

Key

Excellent / Good	Good / Average	Average / Poor

Neuthane 200 Series TDI - Ester Prepolymer (cured with Neuthane TMP/TIPA & Plasticiser)

Neuthane		235S	235S	242S	242S	242	254
%NCO (mid-point)	%	3.5	3.5	4.2	4.2	4.2	5.4
Curative *		**TMP / TIPA**	**TMP / TIPA**	**TMP / TIPA**	**TMP / TIPA**	**TMP / TIPA**	**TMP / TIPA**
Mix Ratio Curative per 100 Parts Resin	by weight	4.06	4.06	4.87	4.87	4.87	6.26
Neuthane Plasticiser per 100 Parts Resin	by weight	0	20	0	20	20	0
Resin Temperature	°C	85	85	90	90	85	85
Curative Temperature	°C	70	70	70	70	70	70
Plasticiser Temperature	°C	-	85	-	90	90	-
Recommended Mould Temperature	°C	110	110	110	110	110	110
Viscosity @ 100°C (prepolymer)	cps	860	860	700	700	830	450
Pot life (on a 500g mix)	minutes	30	30	30	30	30	30
Recommended Cure Temperature / Time	°C / hrs	110 / 22	110 / 24	110 / 20	110 / 22	110 / 24	110 / 24

* For a detailed study on the effects of stoichiometry in relation to cured hardness stability please refer to Technical Library Document 027

Hardness	**DIN 2240-91**	Shore A	50	40	62	55	53	65
100% Modulus	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	184 (1.26)	141 (0.97)	359 (2.47)	248 (1.71)	203 (1.40)	402 (2.77)
300% Modulus	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	333 (2.29)	251 (1.73)	1078 (7.43)	631 (4.35)	450 (3.10)	3000 (20.68)
Tensile Strength	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	2484 (17.12)	2055 (14.16)	5541 (38.20)	2257 (15.56)	2331 (16.07)	4298 (29.63)
Elongation at Break	BS 903 Pt A2 - ISO 37	%	567	673	371	408	491	311
Tear Strength	BS 903 Pt A3 - ISO 34-1	lbf/in (KN/m)	153 (26.79)	125 (21.89)	219 (38.35)	178 (31.17)	143 (25.04)	175 (30.64)
Specific Gravity		g/cm³	1.19	1.18	1.20	1.19	1.19	1.19

Neuthane 200 Series TDI - Caprolactone Ester Prepolymers (60 - 95 Shore A)

Properties

The Neuthane 200 Caprolactone series are high perfomance TDI – ester prepolymers designed to produce items for use in arduous application areas. They offer advantages over conventional ester TDI prepolymers in several key areas.

They offer:

- a high level of physical properties
- good cut and abrasion resistance
- good chemical resistance
- good low temperature flexibility
- low viscosity and long pot life*
- improved hydrolysis resistance*
- improved dynamic performance*
- low hardness with MOCA

* Compared with conventional TDI ester prepolymers

Typical Applications

- Medium load roller coverings (e.g. steel industry)
- Roller coverings where lubricants are present (e.g. Dioctyl Sebacate)
- Mining and quarrying (e.g. screen decks, scraper blades)
- Oil and gas industry (e.g. gaskets)

Processing

Processing can be by hand or by dispensing machine.

Hand Processing

- Melt prepolymer at 50-70°C for 12-24 hours (as a guide the grades with the lower NCO value will take longer to melt than those with higher NCO values)
- Heat the prepolymer and curative to the recommended temperature
- Add pigments and Antifoam, as applicable, whilst mixing
- It is recommended that air be removed from the prepolymer under vacuum prior to addition of the curative
- Add the curative and thoroughly mix ensuring that no unmixed material is left on the container sides (if necessary the mix can be transferred to a second clean container and mixed again)
- Remove air under vacuum
- Cast into moulds, preheated to the recommended temperature
- Cure as recommended

Special Considerations

Processing

- Avoid prolonged storage of prepolymers at elevated temperatures. This will result in low hardness and lower properties of the cured material
- It is important when processing Neuthane 230 that the correct temperatures are maintained. Failure to do so may result in incorrect cured hardness
- Avoid moisture contamination of all materials
- Part used containers should be flushed with dry nitrogen and resealed immediately after use

Alternatives

- ***Humid/Wet*** - PTMEG ether based systems should be considered: Neuthane 100 [TDI], Neuthane 600 [MDI] or Neuthane 500 [Aliphatic]
- ***Dynamic / Resilience*** – PTMEG ether based materials should be considered: Neuthane 100 [TDI], Neuthane 600 [MDI] or Neuthane 801 [MDI Quasi]
- ***Cost*** – Conventional ester based systems will offer a price advantage: Neuthane 200 [TDI], Neuthane 802 [MDI Quasi]
- ***Solvents*** – Conventional ester TDI offer the best performance

COST	PROCESSING	ABRASION	DYNAMIC	RESILIENCE	SOLVENT	HUMID/WET	TEMPERATURE	UV STABILITY

Key Excellent / Good | Good / Average | Average / Poor

Neuthane 200 Series TDI - Caprolactone Ester Prepolymers (60 - 95 Shore A)

Neuthane		230	230	232	244	255	255
%NCO (mid-point)	%	3.2	3.2	3.2	4.4	4.4	4.4
Curative		**MOCA**	**E300 (CA6)**	**MOCA**	**MOCA**	**MOCA**	**E300 (CA6)**
Recommended Stoichiometry	%	95	95	95	95	95	95
Mix Ratio Curative per 100 Parts Resin	by weight	9.92	7.95	9.7	13.3	16.6	13.3
Resin Temperature	°C	80	80	80	70	70	70
Curative Temperature	°C	105	40	110	110	110	90
Recommended Mould Temperature	°C	90	90	90	90	90	90
Viscosity @ 100°C	cps	650	650	710	500	500	300
Pot life (on a 500g mix)	minutes	18	13	14	9	9	6.5
Recommended Cure Temperature / Time	°C / hrs	90 / 20	90 / 20	90 / 18	90 / 18	90 / 18	90 / 18

Hardness	**DIN 2240-91**	Shore A	59	78	80	90	95	91
	DIN 2240-91	Shore D	-	-	-	-	-	-
100% Modulus	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	255 (1.76)	715 (4.93)	560 (3.9)	1200 (8.3)	1600 (11.0)	1570 (10.82)
300% Modulus	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	400 (2.76)	1260 (8.68)	1130 (7.8)	2500 (17.2)	3000 (20.7)	3280 (22.61)
Tensile Strength	BS 903 Pt A2 - ISO 37	lb/in² (Mpa)	2920 (20.13)	5685 (39.2)	6580 (45.4)	6700 (46.2)	7000 (48.2)	8700 (59.98)
Elongation at Break	BS 903 Pt A2 - ISO 37	%	475	517	400	350	300	489
Tear Strength	BS 903 Pt A3 - ISO 34-1	lb/in (KN/m)	172 (30.12)	392 (68.65)	350 (61.0)	490 (85.7)	550 (96.2)	617 (108.05)
Compression Set	BS903 Pt A6 - ISO 815	%	17	35	39	40	45	47.7
Abrasion loss	DIN 53516	mm³	38.3	54.8	49	49	49	58
Resilience	ASTM D 2632-92	%	24	50	42	35	33	25
Specific Gravity		g/cm³	1.12	1.11	1.14	1.14	1.14	1.14

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