Polish Chemicals And Rubber	Technical Export Conditions	WTO-3/02

RUBBER SHEETS

1. Goal
These technical export conditions define requirements concerning rubber sheets with- and without plies.

2. Application
Rubber sheets are used in production of washers, pads, gaskets and sealing, working in static and non-streched conditions.

3. Types of rubber sheets.
Depending on the kind of rubber used for production of rubber sheets, we can distinct following types of rubber sheets, marked with the below-mentioned symbols:
SBR – sterol-butadiene rubber
NBR – *(NBR/SBR*) – nitrile-butadiene rubber
EPDM – ethylene-propylene-diene monomer
CR – *(CR/SBR* – chloroprene rubber
NR-L – *(NR/SBR)* – isoprene rubber

4. Kinds of rubber sheets
Rubber sheets of the same hardness, however of different properties, are marked by Roman numerals.
Abrasion-resistant rubber sheets are marked by symbol: AA.

5. Appearance
Rubber sheets are black, with exception of NR-L ones, which are grey-yellow (as natural colour). However other colours of rubber sheets can be agreed with the Receivers/Customers.
The upper side of rubber sheets can be protected by talc against gluing, although the layer of talc may not be too thick.
Rubber sheets can be smooth on both the sides, or with textile impression on 1 or on both the sides.

Polish Chemicals And Rubber	Technical Export Conditions	WTO-3/02

RUBBER SHEETS

6/ Dimensions and tolerances

Thickness	Tolerance	Width	Tolerance	Length	Tolerance	Plies
mm		mm		mm		
1	± 0,3	1200 or 1000	± 30	10.000	± 100	
1,5						1
2						
2,5						
3						1 or 2
3,5						
4						
5	± 0,5			5.000	± 50	
6						
8						
10	± 0,8					
12	± 1,2					
15	± 1,5	1000		1000	± 30	
20	± 2,0					
25	± 2,5					
30	± 3,0					
35	± 3,5					
40	± 3,5					
50	± 4,0					

Production of sheets in other dimensions and tolerances is also possible, after additional agreement between Producers and Receivers.

7. Requirement parameters (standards) for production of rubber sheets.

- SBR – type - as table 1
- NBRR – type - as table 2
- EPDM – type - as table 3
- CR – type - as table 4
- NR-L – type - as table 5

SBR	***Table 1***	Page 3/8	WTO-3/02

Eigenschaften		**Type**							**Test-methode acc. to:**
		I	**II**	**III/AA**	**IV**				
Hardness, °ShA (H)	50±5	65±5	65±5	65±5	65±5	70±5	80±5	85±5	PN-80/C-04238
Tensile strength (TS_b), MPa, min	4	4	4	10	2	4	7	7	PN-ISO 37
Elongation (E_b), %, min	300	150	150	200	100	150	100	100	PN-ISO 37
Elasticity by Schob (η_{0Sch}), %, min	25	25	25	25	15	25	15	15	PN-97/C-04255
Deformation resistance after permanent strain at 70°C after 24 h (ε_{ct}), %, max.	40	30	30	25	40	30	25	25	PN-ISO 815
Ageing in air at 70 °C after 72 h (SC)									
ΔTS_b, %, max	±30	±30	±30	±30	±30	±30	±30	±30	
ΔE_b, %, max	-50	-50	-50	-50	-50	-50	-50	-50	PN-ISO 188
ΔH, °ShA, max	±10	±10	±10	±10	±10	±10	±10	±10	
Brittleness temperature (T_k), °C, max	-35	-30	-30	-40	-30	-30	-30	-30	PN-79/C-04237 sheet 1
Density (ρ), Mg/m^3, max	1.30	1.35	1.45[X]	1.25	1.60	1.55	1.35	1.45	PN-ISO 2781+AC1:1996
Abrasion (Ks), mm^3, max	>300	>300	>300	150	>300	>300	>300	>300	PN-ISO 4649/1999

III/AA abrasion - resistant sheets

[X] for colorful rubber sheets density max. 1.60 Mg/m^3

NBR	***Table 2***	Page 4/8	WTO-3/02

Properties		**Typ**			**Test-methode acct. to:**
		I	**II**		
Hardness, °ShA (H)	50±5	65±5	65±5	80±5	PN-80/C-04238
Tensile strength (TS_b), MPa, min	4	5	3	7	PN-ISO 37
Elongation (E_b), %, min	200	200	200	100	PN-ISO 37
Elasticity by Schob (η_{0Sch}), %, min	25÷40	25÷40	25÷40	15÷30	PN-97/C-04255
Deformation resistance after permanent strain at 70°C after 24 h(ε_{ct}), %, max					PN-ISO 815
bei 70 °C nach 24 h	40	40	50	50	
bei 100 °C nach 24 h	-	60	70	70	
Ageing in air at 70 °C after 72 h (SC)					
ΔTS_b, %, max	±30	-	-	-	
ΔE_b, %, max	-50	-	-	-	PN-ISO 188
ΔH, °ShA, max	±10	-	-	-	
bei 100 °C nach 72 h					
ΔTS_b, %, max	-	±30	±30	±30	
ΔE_b, %, max	-	-50	-50	-50	
ΔH, °ShA, max	-	±10	±10	±10	
Oil-resistance Öl IRM 903 (ΔV), %, max					
bei 23 °C nach 72 h	+5	+5	+5	+5	PN-ISO 1817
bei 70 °C nach 72 h	+30	-	-	-	
bei 100 °C nach 72 h	-	+30	+30	+30	
Brittleness temperature (T_k), °C, max	-35	-35	-35	-30	PN-79/C-04237 sheet 1
Density (ρ), Mg/m^3, max	1.35	1.35	1.50	1.45	PN-ISO 2781+AC1:1996

EPDM	***Table 3***	Page 5/8	WTO-3/02

Properties						**Test-methode acc. to:**
Hardness, °ShA (H)	50±5	60±5	65±5	80±5	90±5	PN-80/C-04238
Tensile strength (TS_b), MPa, min	5	5	5	5	6	PN-ISO 37
Elongation (E_b), %, min	300	300	200	200	100	PN-ISO 37
Elasticity by Schob (η_{0Sch}), %, min	25	20	15	15	10	PN-97/C-04255
Deformation resistance after permanent strain at 70^{O}C after 24 h(ε_{ct}), %, max						PN-ISO 815
bei 70 °C nach 24 h	40	40	40	40	40	
bei 100 °C nach 24 h	80	60	60	60	60	
Ageing in air at 70 °C after 72 h (SC)						
ΔTS_b, %, max	±30	±30	±30	±30	±30	
ΔE_b, %, max	-50	-50	-50	-50	-50	PN-ISO 188
ΔH, °ShA, max	±10	±10	±10	±10	±10	
Brittleness temperature (T_k), °C, max	-40	-40	-40	-40	-35	PN-79/C-04237 Blatt 1
Density (ρ), Mg/m^3, max	1.30	1.25	1.30	1.40	1.40	PN-ISO 2781+AC1:1996

Properties	**Required parameters**			**Test-methode acc. to:**
Hardness, °ShA (H)	50±5	65±5	80±5	PN-80/C-04238
Tensile strength (TS_b), MPa, min	6	6	6	PN-ISO 37
Elongation (E_b), %, min	250	200	150	PN-ISO 37
Elasticity by Schob (η_{0Sch}), %, min	25	25	25	PN-97/C-04255
Deformation resistance after permanent strain at $70^{O}C$ after 24 h(ε_{ct}), %, max				PN-ISO 815
bei 70 °C nach 24 h	40	40	40	
bei 100 °C nach 24 h	60	60	60	
Ageing in air at 70 °C after 72 h (SC)				
ΔTS_b, %, max	±30	±30	±30	
ΔE_b, %, max	-50	-50	-50	PN-ISO 188
ΔH, °ShA, max	±10	±10	±10	
Brittleness temperature (T_k), °C, max	-30	-30	-30	PN-79/C-04237 sheet 1
Density (ρ), Mg/m^3, max	1.40	1.40	1.45	PN-ISO 2781+AC1:1996

Properties	**Required parameters**		**Test-methode acc. to:**
Hardness, °ShA (H)	45±5	60±5	PN-80/C-04238
Tensile strength (TS_b), MPa, min	5	6	PN-ISO 37
Elongation (E_b), %, min	500	300	PN-ISO 37
Elasticity by Schob (η_{0Sch}), %, min	25	25	PN-97/C-04255
Deformation resistance after permanent strain at 70^{O}C after 24 h(ε_{ct}), %, max bei 70 °C nach 24 h	50	40	PN-ISO 815
Ageing in air at 70 °C after 72 h (SC) ΔTS_b, %, max ΔE_b, %, max ΔH, °ShA, max	 ±30 -50 ±10	 ±30 -50 ±10	 PN-ISO 188
Brittleness temperature (T_k), °C, max	-35	-35	PN-79/C-04237 sheet 1
Density (ρ), Mg/m^3, max	1.45	1.55	PN-ISO 2781+AC1:1996

8. Joining strength between rubber and textile plies

For SBR- and NR-L sheets - not less than 1 kN/m
For other sheets – not less than 0,5 kN/m

9. Not allowed production errors

Error	Not allowed parameters
Blisters	over 1 cm² surface and more than 3 blisters pro 1 m^2, for SBR sheets – not more than 5 blisters pro 1 m^2
Cavities and bulbs	Over 1 cm² surface and depth (or height) over: - 0,3 mm – for sheets up to 6 mm thickness - 0,5 mm – for sheets 6 – 10 mm thickness 1,0 mm for sheets over 10 mm thickness Not more than 3 cavities/bulbs pro 1 m^2 , and for SBR sheets not more than 5 cavities/bulbs pro 1 m^2
Folding tracks after calender leaving	Over 0,2 mm depth(or height) and over 100 mm length – not more than 1 pro 1 m^2
Foreign bodies: - metallic - non-metallic	Not allowed Of diameter over 1 mm – not more than 3 bodies pro 1 m^2
Non-symmetric position of textile plies	Over 20% from the symmetry axis

10. Packing

Rubber sheets are rolled into a roll of equal edges. Subject agreement with Customer, sheets up to 3,5 mm thickness can be rolled on cardboard cores. Rolls should be tied up with a cord. Subject agreement with Customer, rolls can be put vertically on a wooden pallet of 120 x 80 cm size. Than rolls are covered with stretch-foil and secured around with a band, so they make, together with a pallet, a stable and compact packing unit.
Sheets in size 1000 x 1000 mm should be put on a pallet *(of 1050 x 1050 mm size)* and stacked up to the height of 1,2 m. Such pallet should be secured around by a band .
Other packing methods can be also implemented, upon agreement between Seller and Customer.

11. Changes in the text of this document, in comparison with previous version.

One point concerning marking of the goods was cancelled. Marking of the goods should be each time agreed with the Customer.
Changes in names of the rubber sheets were also introduced.
The physical and chemical properties of rubber sheets were updated.