Basic Properties and Characteristics of JSR NBR

AN	MV	Grade	AN (%)	Mooney Viscosity ML(1+4) 100℃	Stabilizer	Product form		Polymer Characteristics	300% Tensile Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (DuroA)
Ultra high nitrile	Low-Mooney	N215SL	48	45	Non-stain	Bale		Fuel oil resistance, oil resistance, excellent Processability	15.8	19.2	430	81
High-nitrile	High-Mooney	N222SH	43	85	Non-stain	Bale		Mold fouling resistance, press molding air defect reduction	18.1	21.0	390	72
		N220SH	41.5	80	Non-stain	Bale		Representative high-nitrile NBR, high-MV type	18	22.5	430	73
		N221H	41.5	75	Slightly-stain	Bale		Excellent mold releasing properties	16.3	21.6	460	70
		N224SH	37	70	Non-stain	Bale		Mold fouling resistance, sharp vulcanization	17.5	22.1	410	72
	Medium-Mooney	N220S	41.5	56	Non-stain	Bale		Representative high-nitrile NBR	17.3	22.7	470	72
	Low-Mooney	N222L	43	45	Slightly-stain	Bale		Excellent processability, gas permeability resistance, mold fouling resistance	15.9	19.7	410	76
Medium high-nitrile	High-Mooney	N238H	35	77	Slightly-stain	Bale		N230S high-MV type, press molding air defect reduction	16.6	20.3	380	68
		N232SH	35	77	Non-stain	Bale		N232S high-MV type	16.6	21.3	410	69
		N237H	34	72	Slightly-stain	Bale		Sharp vulcanization, mold fouling resistance, heat resistance	17.4	22.4	400	70
		N236H	32	72	Slightly-stain	Bale		N237H low-nitrile type	17.8	21.8	370	70
	Medium-Mooney	N230S	35	56	Non-stain	Bale		Representative medium high-nitrile NBR	16.2	22.1	440	70
		N232S	35	54	Non-stain	Bale		Water resistance, metal corrosion resistance	18.4	22.5	390	70
		N237	34	56	Slightly-stain	Bale		N237H low-MV type	13.7	18.3	430	68
		N233	32	59	Slightly-stain	Bale		Excellent balance of oil and cold resistance	14.4	19.7	470	69
	Low-Mooney	N230SL	35	42	Non-stain	Bale		Representative medium high-nitrile NBR, low-MV type, excellent Processability	15.3	20.2	420	70
		N231L	34	45	Slightly-stain	Bale		Excellent mold releasing properties	14.4	19.9	430	68
		N230SV	35	32	Non-stain	Bale		Representative medium high-nitrile NBR, low-MV type, high flowability	12.4	18.0	480	68
		N239SV	33.5	30	Non-stain	Bale		Processability excellent balance of oil and cold resistance, high flowability	13.3	17.8	470	69
Medium-nitrile	High-Mooney	N241H	29	75	Slightly-stain	Bale		N241 high-MV type	16.7	21.4	390	69
	Medium-Mooney	N242S	29	56	Non-stain	Bale		Mold fouling resistance, sharp vulcanization	15.4	19.1	400	69
		N241	29	56	Slightly-stain	Bale		Mold fouling resistance, sharp vulcanization	15.3	19.7	400	70
		N240S	26	56	Non-stain	Bale		Representative medium-nitrile NBR, cold resistance, high rebound resilience	15.1	19.7	400	68
Low-Nitrile	Medium-Mooney	N250S	19.5	63	Non-stain	Bale		Cold resistance, water resistance, metal corrosion resistance	15.9	18.1	340	67
		N260S	15	62	Non-stain	Bale		Extreme cold resistance, water resistance, metal corrosion resistance	12.4	16.6	320	64
	Low-Mooney	N250SL	19.5	43	Non-stain	Bale		N250S low-MV Type	14.6	17.6	370	68

＊This data indicates representative physical properties, and does not signify product specifications.

Classification	Grade	AN (%)	Mooney Viscosity ML(1+4) 100℃	Stabilizer	Product form		Polymer Characteristics	300% Tensile Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (DuroA)
Heat resistance	N520	41	51	Stain	Sheet		Excellent heat resistance	14.1	20.4	520	72
	N530	35	52	Stain	Sheet		N520 medium high-nitrile type	12.9	19.7	470	70
	N640	25	50	Slightly-stain	Bale		Excellent heat resistance, acrylate-modified NBR	—	14.8	300	63
Resin-modifying	N202S	40	57	Non-stain	Bale		Partial cross-linked type, for PVC modification	—	14.9	260	75
	T496	30	56	Non-stain	Bale		N202 with improved cold resistance, low compression set	—	11	170	74
	N210S	30	54	Non-stain	Bale		Partial cross linking type, for PVC modification, excellent sheet surface smoothness	—	14.4	180	72
	PN30A	Medium High	—	Non-stain	Powder		N230S powder type	—	—	—	—
	PN20HA	High	—	Non-stain	Powder		N220SH powder type	—	—	—	—
Adhesion	T4103	41	73	Non-stain	Bale		Excellent adhesive properties	17.3	21.9	420	70
Liquid form	N280	32	—	Non-stain	Liquid		Medium high-nitrile liquid form type	—	—	—	—

＊This data indicates representative physical properties, and does not signify product specifications.

[Vulcanization]
20-minute press vulcanization at 160 ℃

[Combination]
NBR100, zinc oxide 5, stearic acid 1, SRF carbon 60, DOP 5, sulfur 0.5, vulcanization accelerator TT 1.5, vulcanization accelerator C Z2.0, with a total of 175.0

Typical Properties of JSR NBR Non-vulcanized and Vulcanized Rubber

Grade	Raw Polymer		Compound (non-vulcanized)											Compound (vulcanized)													Grade
	AN (%)	Mooney Viscosity ML (1+4) 100℃	Mooney Viscosity ML (1+4) 100℃	Mooney Scorch Test ML1-125℃		JSR Mold Curast Test 160℃		Mill Contraction 50℃	Extrusion Test 80℃ 25rpm			Flow Rate 80℃ 100kg (Kokashiki Flow Tester)		Tensile Test					IRM901 70 Hours at 120 ℃				IRM903 70 Hours at 120 ℃				
				V_m	t_5 (Minutes)	$t_c(10)$ (Minutes)	$t_c(90)$ (Minutes)	(%)	Extrusion Length (cm/min.)	Extrusion Volume (cc/min.)	Die Swell (%)	$Q\times10^4$ (cc/sec.)		S_{100} (MPa)	S_{300} (MPa)	TS (MPa)	E_b (%)	H_A (DuroA)	S_{CTB} (%)	S_{CEB} (%)	S_H (Point)	$\triangle V_{100}$ (%)	S_{CTB} (%)	S_{CEB} (%)	S_H (Point)	$\triangle V_{100}$ (%)	
N215SL	48	45	53	23	16	2	8	25	362	381	110	115		4.7	15.8	19.2	430	81	-8	-40	2	-4	-1	-24	-8	6	N215SL
N222SH	43	85	79	52	12	2	6	53	393	433	117	49		4.2	18.1	21.0	390	72	-15	-37	3	-3	-17	-22	-5	7	N222SH
N220SH	41.5	80	81	49	17	2	6	40	328	402	145	35		4.0	18	22.5	430	73	-8	-38	0	-3	-11	-23	-8	8	N220SH
N221H	41.5	75	79	48	19	3	6	39	415	440	115	13		3.3	16.3	21.6	460	70	-3	-31	4	-2	-2	-19	-3	9	N221H
N224SH	37	70	74	44	14	2	5	41	337	366	117	18		3.9	17.5	22.1	410	72	-2	-33	-1	-2	-12	-23	-9	16	N224SH
N220S	41.5	56	62	36	18	2	6	34	407	427	110	115		3.7	17.3	22.7	470	72	0	-39	2	-2	-12	-31	-7	8	N220S
N222L	43	45	52	28	16	2	9	31	337	349	107	170		3.9	15.9	19.7	410	76	0	-33	1	-4	-12	-19	-10	9	N222L
N238H	35	77	78	53	14	2	5	49	247	297	140	30		3.5	16.6	20.3	380	68	9	-14	3	-3	-13	-14	-8	17	N238H
N232SH	35	77	81	52	17	2	7	51	293	322	130	25		3.1	16.6	21.3	410	69	2	-32	1	-3	-15	-16	-8	15	N232SH
N237H	34	72	78	48	20	3	5	43	394	399	103	48		3.3	17.4	22.4	400	70	-7	-30	1	-3	-22	-27	-12	19	N237H
N236H	32	72	79	49	19	2	4	45	393	383	95	83		3.5	17.8	21.8	370	70	-5	-27	1	-1	-23	-25	-12	24	N236H
N230S	35	56	60	35	17	2	5	44	382	407	113	60		3.2	16.2	22.1	440	70	-13	-38	0	1	-12	-21	-10	16	N230S
N232S	35	54	66	41	18	2	5	46	322	352	118	39		3.6	18.4	22.5	390	70	-7	-30	2	-4	-22	-27	-10	17	N232S
N237	34	56	63	37	19	3	4	59	349	349	90	64		2.8	13.7	18.3	430	68	4	-28	2	-3	-8	-14	-8	17	N237
N233	32	59	68	44	20	3	6	30	446	337	63	90		3	14.4	19.7	470	69	-2	-26	2	-1	-13	-16	-10	17	N233
N230SL	35	42	47	26	17	2	5	43	432	411	90	80		3.2	15.3	20.2	420	70	-3	-31	0	-3	-17	-21	-13	16	N230SL
N231L	34	45	48	28	21	3	5	46	415	400	93	49		3.0	14.4	19.9	430	68	-11	-38	0	0	-27	-31	-12	19	N231L
N230SV	35	32	40	20	18	2	5	45	455	420	60	96		2.6	12.4	18.0	480	68	5	-26	-1	-3	-9	-15	-12	15	N230SV
N239SV	33.5	30	39	29	15	2	5	31	341	293	69	370		3.6	13.3	17.8	470	69	2	-31	-1	-1	-10	-16	-14	21	N239SV
N241H	29	75	82	53	14	2	5	43	333	342	165	15		3.6	16.7	21.4	390	69	-4	-26	-1	1	-29	-29	-12	26	N241H
N242S	29	56	65	43	14	2	5	30	437	348	71	109		3.3	15.4	19.1	400	69	-4	-20	-1	0	-16	-12	-15	23	N242S
N241	29	56	64	39	15	2	5	44	363	355	96	70		3.4	15.3	19.7	400	70	6	-22	-3	0	-21	-22	-15	27	N241
N240S	26	56	61	39	17	2	4	42	417	372	78	65		3.2	15.1	19.7	400	68	-10	-28	0	1	-20	-23	-18	34	N240S
N250S	19.5	63	70	46	22	3	5	46	303	335	121	25		3.4	15.9	18.1	340	67	-1	-19	-7	6	-34	-32	-17	54	N250S
N260S	15	62	67	45	16	3	5	47	255	309	139	91		2.7	12.4	16.6	320	64	-14	-18	-10	16	-48	-43	-20	85	N260S
N250SL	19.5	43	56	39	21	3	5	37	344	274	70	251		3.2	14.6	17.6	370	68	-5	-18	-6	6	-45	-35	-25	57	N250SL
N520	41	51	67	40	6	1	3	31	387	396	104	56		3.9	14.1	20.4	520	72	-5	-44	3	-2	-7	-27	-5	10	N520
N530	35	52	58	38	6	1	3	41	358	376	112	54		3.3	12.9	19.7	470	70	11	-24	2	-1	-14	-19	-11	17	N530
N640	25	50	41	26	18	3	8	59	311	408	160	95		3.6	—	14.8	300	63	-4	-31	2	-5	-12	-13	-9	14	N640
N202S	40	57	97	80	13	3	6	1	749	409	2	35		6.6	—	14.9	260	75	-10	-32	2	-4	-7	-23	-5	10	N202S
T496	30	56	91	83	13	2	5	3	432	177	5	507		5.5	—	11	170	74	21	-24	-1	0	-1	-8	-10	20	T496
N210S	30	54	99	80	11	2	5	9	600	343	14	10		7.1	—	14.4	180	72	-8	-26	3	-1	-32	-33	-6	23	N210S
T4103	41	73	69	51	13	2	6	52	272	363	161	6		3.5	17.3	21.9	420	70	-17	-40	3	-3	-9	-21	-2	7	T4103
NV80G	Medium	65	74	45	17	3	6	33	464	376	62	74		6.0	18.0	20.9	400	76	2	-34	1	-5	-2	-16	-13	19	NV80G
NV72G	Medium High	75	86	48	19	3	6	19	417	357	73	40		12.7	19.6	19.9	370	86	19	-31	2	-5	6	-13	-12	13	NV72G
NV73G	Medium High	68	68	39	19	3	6	16	437	372	70	70		10.6	18.7	19.3	400	82	15	-48	7	-9	9	-22	-6	7	NV73G
NV75G	Medium	68	72	46	17	3	5	20	550	402	46	105		10.5	19.0	20.6	370	82	11	-42	5	-8	-13	-21	-11	13	NV75G
NV76G	Medium	60	67	43	17	3	6	15	610	397	30	95		9.6	18.3	18.7	340	82	10	-39	6	-9	4	-18	-9	10	NV76G
NV60G	High	63	67	36	17	2	8	12	496	398	61	115		13.1	—	17.4	290	88	26	-43	9	-8	23	-20	2	0	NV60G

*This data indicates representative physical properties, and does not signify product specifications.

[Vulcanization]
20-minute press vulcanization at 160 ℃

[Combination]
NBR 100, zinc oxide 5, stearic acid 1, SRF carbon 60, DOP 5, sulfur 0.5, vulcanization accelerator TT 1.5, vulcanization accelerator CZ 2.0, with a total of 175.0

Typical Properties JSR NBR Vulcanized Rubber

Grade	Raw Polymer: AN (%)	Raw Polymer: Mooney Viscosity ML(1+4) 100℃	Fuel Oil B 48 Hours at 40 ℃: SCTB (%)	Fuel Oil B: SCEB (%)	Fuel Oil B: SH (Point)	Fuel Oil B: ΔV100 (%)	Fuel Oil C 48 Hours at 40 ℃: ΔV100 (%)	Fuel Oil C/Ethanol(*1) 48 Hours at 40 ℃: ΔV100 (%)	Distilled Water 70 Hours at 70 ℃: ΔV100 (%)	Aging Test 70 Hours of Air Heat Aging at 120 ℃: ACTB (%)	Aging Test: ACEB (%)	Aging Test: AH (Point)	Compression Set Test(*2) 70 Hours: 100℃ CS (%)	Compression Set: 120℃ CS (%)	Tearing Test Angle Type: TR (KN/m)	Permanent set at 200% Elongation: TSE (%)	Rebound Resilience(*2): R (%)	Flex Test(*2): Occurrence (Thousand Times)	Flex Test(*2): Growth 2→15 mm (Thousand Times)	Brittle Temperature: Tb (℃)	Low-Temperature Torsion Test: t10 (℃)	Low-Temperature Torsion Test: t100 (℃)	Ozone Degradability Test 50 ppm 5 Hours at 40 ℃: Static 20% Elongation	Ozone: Dynamic 0 to 20% Elongation	Grade
N215SL	48	45	-29	-23	-21	16	31	48	3	1	-39	3	22	32	48	5	6	20	3	-8	-4	-11	C-3	C-3	N215SL
N222SH	43	85	-40	-32	-12	20	32	55	3	2	-28	6	15	19	51	3	18	9	1	-18	-12	-19	C-2	B-2	N222SH
N220SH	41.5	80	-41	-38	-13	20	33	58	2	6	-33	4	12	17	54	3	18	20	3	-18	-15	-19	C-3	C-3	N220SH
N221H	41.5	75	-52	-44	-12	23	39	60	2	6	-31	7	13	19	53	3	21	24	5	-17	-15	-22	C-3	C-3	N221H
N224SH	37	70	-46	-41	-14	28	47	68	2	5	-35	4	13	20	50	4	30	15	2	-26	-21	-26	C-3	C-3	N224SH
N220S	41.5	56	-37	-37	-14	20	34	59	2	5	-40	6	13	19	53	3	18	20	4	-18	-15	-23	C-3	C-3	N220S
N222L	43	45	-39	-30	-18	20	33	57	3	14	-24	3	17	24	51	7	13	15	2	-16	-12	-19	C-3	C-3	N222L
N238H	35	77	-67	-57	-11	29	49	78	2	3	-24	6	12	18	52	3	37	—	5	-31	-22	-28	C-3	C-3	N238H
N232SH	35	77	-51	-46	-10	28	50	75	1	4	-29	6	11	15	46	3	37	—	3	-31	-22	-28	C-3	C-3	N232SH
N237H	34	72	-61	-53	-12	30	52	90	2	4	-25	5	10	14	49	3	37	20	2	-28	-25	-29	C-3	C-3	N237H
N236H	32	72	-63	-55	-13	34	60	90	2	-1	-34	6	10	16	48	3	39	50	2	-32	-25	-31	C-3	C-3	N236H
N230S	35	56	-54	-47	-14	28	52	81	2	7	-36	6	12	18	52	3	34	30	7	-29	-23	-29	C-3	C-3	N230S
N232S	35	54	-55	-45	-12	28	50	88	1	6	-27	6	12	19	51	2	34	10	3	-27	-23	-27	C-3	C-3	N232S
N237	34	56	-52	-43	-12	30	50	79	2	7	-29	7	10	14	43	2	44	—	5	-34	-25	-31	C-3	C-3	N237
N233	32	59	-56	-52	-12	35	62	88	2	11	-24	5	11	16	53	2	44	30	3	-31	-28	-34	C-3	C-3	N233
N230SL	35	42	-56	-48	-14	28	50	82	2	0	-40	6	13	18	52	3	33	20	5	-28	-24	-30	C-3	C-3	N230SL
N231L	34	45	-60	-51	-16	31	56	94	2	7	-30	6	15	20	48	3	38	30	8	-29	-26	-30	C-3	C-3	N231L
N230SV	35	32	-54	-48	-13	27	47	80	2	6	-33	4	14	19	47	3	33	—	11	-29	-24	-30	C-3	C-3	N230SV
N239SV	33.5	30	-56	-52	-17	34	58	91	2	6	-34	5	13	19	51	3	37	20	14	-35	-20	-29	C-3	C-2	N239SV
N241H	29	75	-60	-54	-14	39	69	97	2	7	-24	3	12	18	51	3	48	10	2	-37	-31	-36	C-3	C-3	N241H
N242S	29	56	-57	-54	-13	40	71	99	2	-1	-32	6	11	16	51	3	49	26	1	-39	-31	-38	C-3	C-3	N242S
N241	29	56	-59	-53	-16	43	73	95	2	13	-23	4	14	21	49	3	48	15	3	-39	-31	-36	C-3	C-3	N241
N240S	26	56	-62	-56	-16	48	84	102	3	-1	-36	7	13	21	47	2	50	20	3	-40	-34	-41	C-3	C-3	N240S
N250S	19.5	63	-65	-58	-16	69	109	119	1	-11	-35	5	12	19	45	3	58	30	2	-51	-42	-50	C-3	C-3	N250S
N260S	15	62	-64	-59	-18	96	145	152	1	-5	-28	4	14	18	42	1	57	2	1	-62	-51	-58	C-2	C-3	N260S
N250SL	19.5	43	-67	-66	-14	72	120	131	0	-10	-40	6	12	18	41	2	54	31	1	-49	-44	-52	C-3	C-3	N250SL
N520	41	51	-40	-33	-14	23	30	59	2	12	-28	5	13	20	52	3	15	30	15	-15	-14	-19	C-3	C-3	N520
N530	35	52	-49	-41	-15	31	50	81	2	15	-19	5	12	18	51	3	30	30	10	-27	-21	-27	C-3	C-3	N530
N640	25	50	-59	-49	-12	33	61	105	2	21	-15	5	12	18	39	2	35	60	2	-26	-25	-30	C-2	A-2	N640
N202S	40	57	-67	-56	-11	23	36	59	1	12	-31	5	12	17	28	—	20	1	1	-19	-13	-19	C-2	—	N202S
T496	30	56	-68	-65	-10	34	59	81	1	-49	-10	5	9	14	15	—	39	5	1	-23	-25	-33	C-3	C-3	T496
N210S	30	54	-72	-57	-11	34	49	79	1	8	-30	9	11	17	26	—	37	1	1	-27	-25	-32	C-3	C-3	N210S
T4103	41	73	-51	-46	-12	22	36	58	2	9	-26	7	11	17	49	3	22	29	2	-19	-15	-22	C-3	C-3	T4103
NV80G	Medium	65	-47	-43	-16	28	54	77	2	3	-35	2	23	30	53	6	36	20	2	-33	-26	-36	NC	B-2	NV80G
NV72G	Medium High	75	-30	-20	-19	21	39	63	2	17	-44	3	35	45	61	9	11	15	2	-16	-8	-19	NC	NC	NV72G
NV73G	Medium High	68	-25	-19	-15	14	32	54	2	16	-47	7	34	43	56	8	14	15	5	-21	-12	-29	NC	NC	NV73G
NV75G	Medium	68	-37	-31	-16	20	42	64	2	8	-32	3	32	44	53	10	22	20	2	-29	-20	-34	NC	NC	NV75G
NV76G	Medium	60	-29	-18	-16	18	39	58	2	13	-27	4	32	40	50	10	22	70	2	-34	-22	-35	NC	NC	NV76G
NV60G	High	63	-24	-17	-16	14	24	37	3	27	-35	4	42	49	54	12	9	15	2	-10	-9	-19	NC	NC	NV60G

Columns 4–13: Compound (non-vulcanized). Columns 14–25: Compound (vulcanized).

(*1) Fuel oil C/ethanol blend ratio = 80/20 (*2) 30 minute thick press vulcanization

*This data indicates representative physical properties, and does not signify product specifications.

[Vulcanization]
20-minute press vulcanization at 160 ℃

[Combination]
NBR 100, zinc oxide 5, stearic acid 1, SRF carbon 60, DOP 5, sulfur 0.5, vulcanization accelerator TT 1.5, vulcanization accelerator CZ 2.0, with a total of 175.0