

Properties	Symbol & unit	NCE40	NCE41	NCE46 <sup>*</sup>	NCE51 NCE51f	NCE53	NCE55	NCE56	NCE57 <sup>*</sup>	NCE59 <sup>*</sup>	NCE80	NCE81
DIELECTRIC PROPERTIES (tolerances +/- 10%)												
Relative Dielectric Constant	$\epsilon_{T33}^T / \epsilon_0$ —	1250	1350	1300	1900	1600	5000	2900	1800	2900	1100	1020
Dielectric Loss Factor	$\text{tg}\delta [10^{-4}]$	25	40	30	150	130	220	140	170	190	26	17
Dielectric Loss Factor at 400V/mm	$\text{tg}\delta [10^{-4}]$	140	200								80	60
ELECTROMECHANICAL PROPERTIES (tolerances +/- 5%)												
Coupling Factors**	$k_p$	0.58	0.57	0.57	0.65	0.56	0.62	0.64	0.59	0.64	0.56	0.55
	$k_{31}$	0.34	0.33	0.33	0.38	0.32	0.39	0.37	0.33	0.37	0.31	0.30
	$k_{33}$	0.70	0.68	0.68	0.74	0.65	0.72	0.74	0.70	0.75	0.69	0.69
	$k_t$	0.50	0.50	0.47	0.50	0.47	0.50	0.50	0.47	0.52	0.47	0.47
Piezoelectric Charge Constants	$-d_{31} [10^{-12} \text{ C/N}]$	140	130	130	195	150	260	250	170	240	110	100
	$d_{33} [10^{-12} \text{ C/N}]$	320	310	290	443	360	670	580	425	575	270	255
Piezoelectric Voltage Constants	$-g_{31} [10^{-3} \text{ Vm/N}]$	11	11	11	13	9	9	9	11	10	11	11
	$g_{33} [10^{-3} \text{ Vm/N}]$	27	25	28	26	23	19	20	27	23	28	28
Frequency Constants	$NE_p [\text{m/s}]$	2160	2280	2230	1925	2180	1970	2000	2010	1970	2300	2320
	$ND_t [\text{m/s}]$	1980	2000	2040	2000	2040	1990	2030	1950	1960	2130	2130
	$NE_1 [\text{m/s}]$	1470	1600	1500	1370			1530	1400	1410	1630	1630
	$ND_3 [\text{m/s}]$	1340	1500	1800	1320			1400	1500	1500	1500	1500
PHYSICAL PROPERTIES (tolerances +/- 5%)												
Mechanical Quality Factor	$Q_m$	700	1400	>1000	80	80	70	80	80	90	1200	1400
Density	$\rho [10^3 \text{ kg/m}^3]$	7.75	7.90	7.70	7.85	7.60	8.00	7.65	7.70	7.45	7.73	7.73
Elastic Compliances	$sE_{11} [10^{-12} \text{ m}^2/\text{N}]$	13	13	13	16	16	17	18	17	17	16	16
	$sE_{33} [10^{-12} \text{ m}^2/\text{N}]$	17	16	20	19	18	21	20	23	23	17	17
Curie Temperature	$T_c [^\circ\text{C}]$	318	284	330	360	340	159	242	350	235	307	307

\*) For multilayer components only.

\*\*) Measured in accordance with standard EN 50324.