

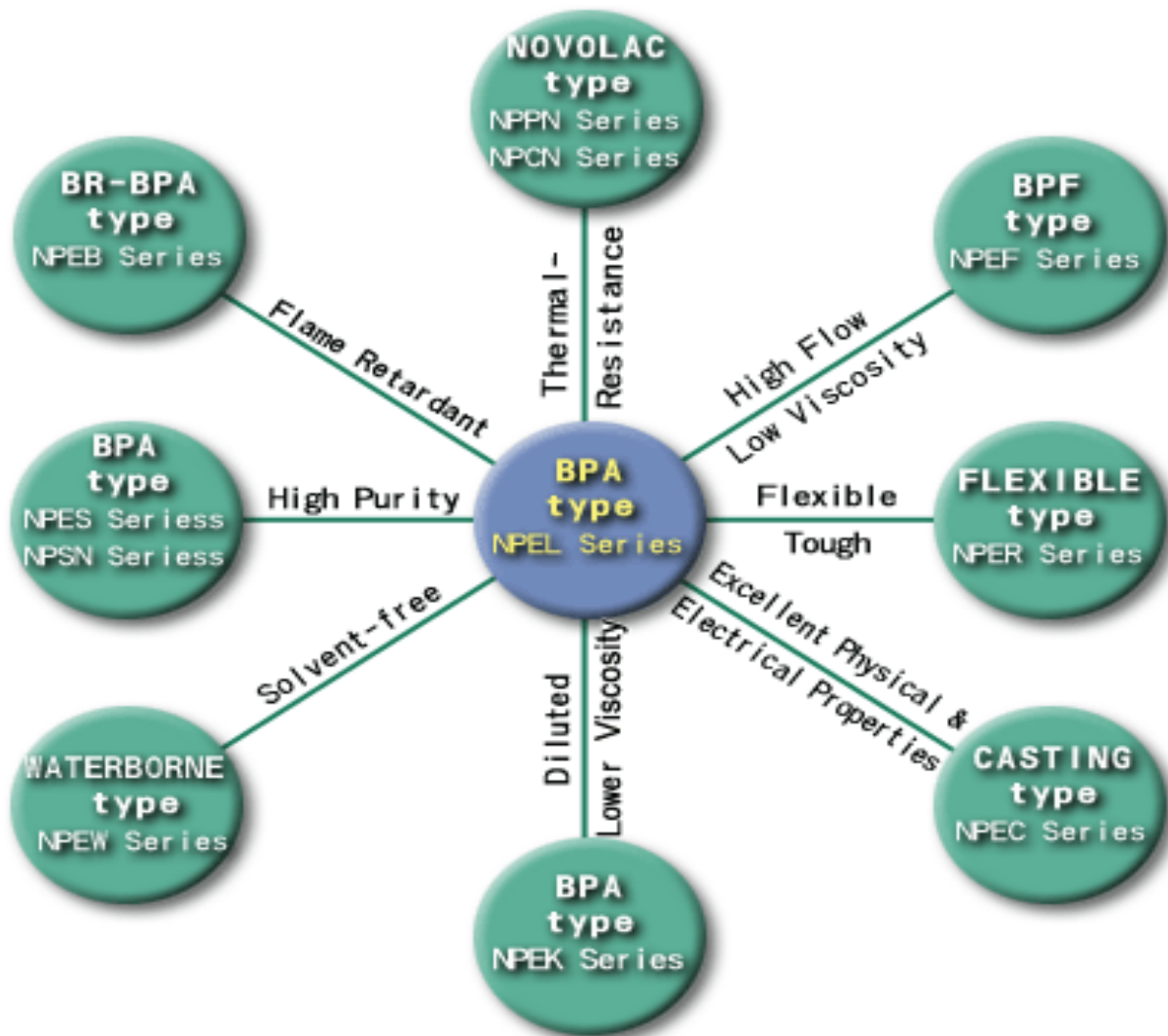
### NAN YA EPOXY RESIN PRODUCT SERIES

Our EPOXY RESINS are manufactured using new technology licensed from Japan. The latest quality control system, DCS (Distribution Computer System) ensure that each and every batch conforms to very exact standards.

Qualified technicians employing GPC, DSC, TMA, LC, GC, etc. and other electronic, thermal and physical testing instruments strictly control production and work together with customers to develop a growing number of end users.

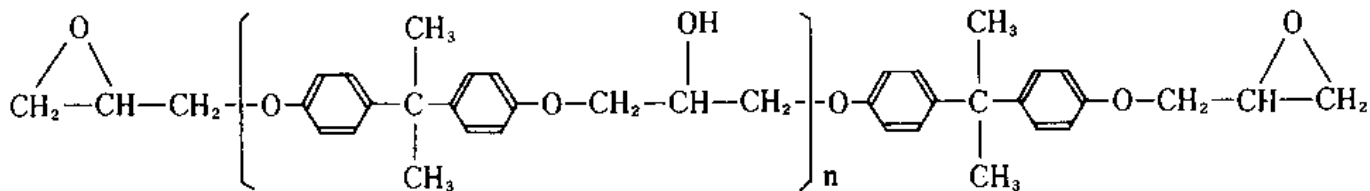
A wide range of EPOXY RESIN types are produced to fulfill every end use category. Our resins are second to none throughout the world on quality, performance and price.

For responding to meet the strong market demand and customer's request, we always do our best to increase EPOXY volume and quality up-grade aggressively. Now including Miliaiu plant, the total capacity will reach up to 200,000 metric tons annually from 2002, which will make NAN YA become one of the major epoxy manufacturers in the world. Furthermore, for ensuring the stable supply of our raw materials, we have built not only BPA expansion plant (90,000 TPA), but also new ECH plant (80,000 TPA), which has been scheduled since 1999 and 2001, as well. In the other hand, the improvement of quality is the important work, too. After passing the International Standard ISO-9002 certification in May 1993, we also have passed the ISO-14001 certificate in Oct 1997. With the encouragement of international certificate, we have enormous confidence to do much better on customer's service and environmental production worldwide.



## SOLID BPA TYPE EPOXY RESIN

Solid BPA type EPOXY RESINS are manufactured by taffy method. Low viscosity and excellent adhesive strength provide for suitable applications of coatings requiring high-nonvolatility and low-viscosity. Chemical Structure:



### NPEL GENERAL SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	VISCOSITY (cps, at 25°C)	COLOR (Gardner)	COMMENTS
NPEL-127	176-184	8000-11000	1MAX.	Low viscosity, standard BPA type resin
NPEL-127E	176-184	8000-11000	1MAX.	Low viscosity, standard BPA type resin of electronic grade
NPEL-128	184-190	12000-15000	1MAX.	"Standard" BPA type resin
NPEL-128E	184-190	12000-15000	1MAX.	Standard BPA type resin of electronic
NPEL-128R	184-194	12000-16000	1MAX.	Less-crystallizable, suitable for flooring engineerings, adhesives
NPEL-128S	205-225	19000-24000	1MAX.	Non-crystallizable resin.
NPEL-134	230-270	O~U*	1MAX.	Semi-solid resin, suitable for adhesives, laminates
NPEL-134L	230-245	O~U*	1MAX.	Similar to NPEL-134, lower viscosity
NPEL-231	184-194	--	1MAX.	Precatalyzed, standard BPA type resin

\*:Gardner-Holdt method (70% N.V butyl carbitol solution)

### NPES GENERAL SERIES: ( TAFFY METHOD )

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	SOLUTION VISCOSITY* (at 25°C)	SOFTENING POINT (°C)	COLOR (Gardner)	COMMENTS
NPES-301	450-500	D-G	60-70	1MAX.	Low molecular weight, standard BPA type resin
NPES-302	600-700	G-K	75-85	1MAX.	For powder coatings
NPES-303	800-900	O-S	85-98	1MAX.	For powder coatings
NPES-304	900-1000	Q-U	91-102	1MAX.	For powder coatings, epoxy esters

\*: Gardner-Holdt method (40% N.V. butyl carbitol solution)

### NPSN SOLUTION SERIES: ( TAFFY METHOD )

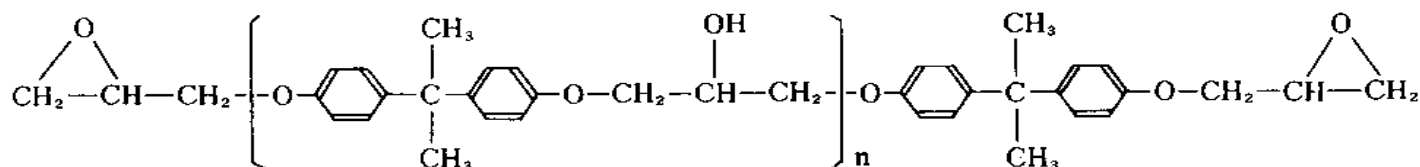
TRADE NAME	EPOXY EQUIVALENCY* (g/eq)	VISCOSITY (cps, at 25°C)	COLOR (Gardner)	NON-VOLATILITY (wt%)	COMMENTS
NPSN-301X65	450-500	800-1700	1MAX.	65±1	Xylene type varnish
NPSN-301X75	450-500	6000-14000	1MAX.	75±1	Xylene type varnish

\*: EPOXY EQUIVALENCY is based on solid resins

\*\* :Solvent type is subject to customers requirement.

## ● HIGH QUALITY SOLID BAP TYPE EPOXY RESIN

High quality solid BPA type EPOXY RESINS are manufactured with BPA and "standard" liquid BPA type EPOXY RESIN in different ratios to improve the qualities of material purity and their cured properties such as adhesive performance and water resistance. They are widely used in powder coatings, can coatings, epoxy-esters, paints, etc. Chemical structure:



### NPES GENERAL SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	SOLUTION VISCOSITY* (at 25°C)	SOFTENING POINT (°C)	COLOR (Gardner)	COMMENTS
NPES-901	450-500	D-F	64-74	1MAX.	For vinyl esters, CFRP, paints
NPES-902	600-650	I-M	82-92	1MAX.	For coatings
NPES-903	700-750	N-R	90-98	1MAX.	For powder coatings
NPES-903H	740-800	P-S	92-100	1MAX.	For powder coatings
NPES-904	780-850	S-W	96-107	1MAX.	For powder coatings, epoxy esters
NPES-904H	840-900	V-X	100-112	1MAX.	For powder coatings, epoxy esters
NPES-907	1500-1800	Z-Z2	120-130	1MAX.	For can coatings
NPES-907L	1400-1600	Y-Z1	115-125	1MAX.	For can coatings
NPES-909	1800-2500	Z3-Z5	130-150	1MAX.	For PCM, can coatings
NPES-909H	2100-2500	Z3-Z5	135-150	1MAX.	For can coatings
NPES-660U	500-560	—	90-98	2MAX.	Multifunction modified type
NPES-661H	710-740	—	98-108	3MAX.	Multifunction modified type
NPES-662H	750-850	—	110-120	2MAX.	For pipe coating, Multifunction modified type

\*: Gardner-Holdt method (40%N.V. butyl carbitol solution)

### NPES LOW VISCOSITY / HIGH FLOW SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	SOLUTION VISCOSITY*1 (at 25°C)	SOFTENING POINT (°C)	FORD CUP VISCOSITY*2 (second)	COMMENTS
NPES-601	500-600	G-I	74-82	—	Relatively less block, for laminates, paints
NPES-602	600-700	I-K	75-86	—	High flow for powder coatings
NPES-603	700-800	J-M	85-95	—	High flow for powder coatings
NPES-604	800-900	P-R	90-100	—	High flow, for powder coatings, epoxy esters
NPES-605	900-1000	S-V	95-108	—	High flow, for powder coatings, epoxy esters
NPES-607	1650-1900	Y-Z1	120-135	—	For can coatings
NPES-609A	2400-3000	—	135-150	28-36	Flexible type for can coatings
NPES-609D	2400-3000	—	135-150	34-46	Flexible type for can coatings

\*1: Gardner-Holdt method (40% N.V. butyl carbitol solution)

\*2: NO.4. FORD CUP method

# ● HIGH QUALITY SOLID BAP TYPE EPOXY RESIN

## NPES MASTER BATCH SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	MELT VISCOSITY* (ps, at 150°C)	SOFTENING POINT (°C)	COMMENTS
NPES-902p	700-750	18-28	85-95	For powder coatings, with 2% flow agent
NPES-903p	750-800	20-30	85-97	For powder coatings, with 2% flow agent
NPES-924	720-770	20-35	85-97	For powder coatings, with 10% flow agent

\*: I.C.I. viscometer method at 150

## NPSN SOLUTION SERIES:

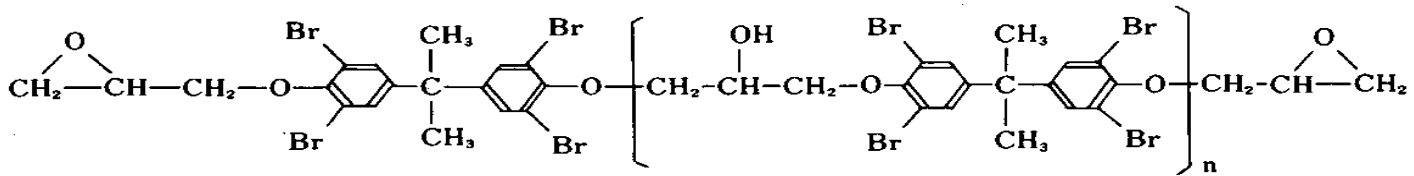
TRADE NAME	EPOXY EQUIVALENCY* (g/eq)	VISCOSITY (cps, at 25 )	COLOR (Gardner)	NON-VOLATILITY (wt%)	COMMENTS
NPSN-134X80	230-270	800-1400	1MAX.	80±1	Xylene type varnish
NPSN-134X85	230-270	2000-5000	1MAX.	85±1	Xylene type varnish
NPSN-134X90	230-270	10000-30000	1MAX.	90±1	Xylene type varnish
NPSN-900X75	450-500	2500-4500	1MAX.	75±1	Low viscosity xylene type varnish
NPSN-901X65	450-500	1000-1800	1MAX.	65±1	Xylene type varnish
NPSN-901X75	450-500	8000-15000	1MAX.	75±1	Xylene type varnish
NPSN-901E70	450-500	3000-4000	1MAX.	70±1	ECS type varnish
NPSN-901H75	450-500	8000-15000	1MAX.	75±1	Xylene type varnish, good wetting for high filler
NPSN-901M75	450-500	3000-8000	1MAX.	75±1	MIBK type varnish
NPSN-901S75	450-500	13000-25000	1MAX.	75±1	BCS type varnish
NPSN-901K80	450-500	4000-13000	1MAX.	80±1	MEK type varnish
NPSN-902X70	600-650	8000-18000	1MAX.	70±1	Xylene type varnish
NPSN-902X75	600-650	20000-50000	1MAX.	75±1	Xylene type varnish
NPSN-921X75	450-500	4000-15000	1MAX.	75±1	Xylene type varnish
NPSN-607B50	1650-1900	—	1MAX.	50±1	BCS/Xylene type varnish.
NPSN-609B45	2400-3000	2000-6000	1MAX.	45±1	BCS/Xylene type varnish.
NPSN-609B50	2400-3000	4000-11000	1MAX.	50±1	BCS/Xylene type varnish.
NPSN-907B50	1500-1800	2000-8000	1MAX.	50±1	BCS/Xylene type varnish.

\*: EPOXY EQUIVALENCY is based on solid resins.

## BROMINATED TYPE EPOXY RESIN

Brominated EPOXY RESINS provide excellent flame retardant because of the bromine content. NON FLAMMABLE, however the excellent properties in physics and electronics are the same as BPA-ECH types. Low bromine types are used for flame retardant electrical laminates. High bromine types are used for flame retardant engineering plastics, paper phenolic laminates and electrical moldings, etc.

Chemical structure:



### NPEB SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	SOFTENING POINT (°C)	BROMINE CONTENT (wt%)	COMMENTS
NPEB-340	330-380	46-64	46-50	Pure DGE-TBA
NPEB-400	380-420	64-74	46-50	For laminates(paper)
NPEB-408	700-850	100-130	48-52	Flame-retardant for engineering plastics
NPEB-450	410-440	60-80	18-21	For laminates(FR--4)
NPEB-460	455-475	65-80	19-22	For laminates (UL-94, V-O, etc)
NPEB-530H	700-800	90-100	57-60	For powder coatings
NPEB-461	—	98-108	57-60	Low molecular weight, end-capped, suitable as a flame retardant additive in ABS, HIPS
NPEB-461L	—	93-99	58-62	Similar to NPEB-461, lower molecular weight
NPEB-461S	—	78-88	53-59	Low molecular weight, partially end-capped by TBP, suitable as a flame retardant additive in ABS, HIPS which require high Melt Flow Index or good light durability
NPEB-462	—	115-125	57-60	Medium molecular weight, end-capped, suitable as a flame retardant additive in ABS, Nylon
NPEB-463	—	106-115	57-60	Medium molecular weight, partially end-capped, it provide better adhesion and heat stability, suitable as a flame retardant additive in ABS, PBT, HIPS
NPEB-464	—	131-141	54-59	High molecular weight, end-capped, suitable as a flame retardant additive in ABS. ABS-PC. PBT

### NPEB SOLUTION SERIES:

TRADE NAME	EPOXY EQUIVALENCY* (g/eq)	VISCOSITY (cps, at 25°C)	NON-VOLATILITY (wt%)	BROMINE CONTENT (wt%)	COMMENTS
NPEB-400T60	380-420	5-30	60±1	45-50	Toluene solution cut, suitable as a flame retardant for paper phenolic laminate
NPEB-400T80	380-420	300-1000	80±1	46-50	Toluene solution cut, suitable as a flame retardant for paper phenolic laminates
NPEB-400K60	380-420	5-30	60±1	46-50	MEK solution cut. suitable as a flame retardant for paper phenolic laminates
NPEB-440K80	400-440	1600-2600	80±1	19-22	MEK solution cut, suitable for laminates (FR-4)
NPEB-450A80	410-440	800-1800	80±1	18-21	Standard brominated epoxy resin in acetone,suitable for CCL
NPEB-450K80	410-440	1200-2200	80±1	18-21	MEK solution cut
NPEB-452A80	410-440	800-1800	80±1	18-21	Acetone solution cut, outstanding flame retardant and UV-block, suitable for laminates

TRADE NAME	EPOXY EQUIVALENCY* (g/eq)	VISCOSITY (cps, at 25°C)	NON-VOLATILITY (wt%)	BROMINE CONTENT (wt%)	COMMENTS
NPEB-453A80	425-455	1600-2600	80±1	18-21	Modified NPEB-450 A80, suitable for UV-block property
NPEB-457A80	410-460	800-2400	80±1	18-21	Low resin-flow type, for prepreg
NPEB-460A80	455-475	500-1500	80±1	19-22	Acetone solution cut
NPEB-471A80	185-215	200-300	80±1	18-20.5***	High Tg : 150°C, suitable for CCL, Formula NPEB-471A80 : NPED-411 A60=100 : 130
NPEB-472PA70	200-230	900-1900	70±1	18-20.5**	High Tg : 175°C, suitable for CCL, Formula NPEB-472PA70 : NPED-412P A60=100 : 100.6
NPEB-481A80	420-440	1500-2300	80±1	19-21	High Tg : 150°C, brominated epoxy resin suitable for CCL
NPED-411A60	180-210(OH VALUE)	10-40	60±1	18-20.5**	High Tg : 175°C, suitable for CCL, Formula =100 : 130
NPED-412PA60	190-220(OH VALUE)	45-75	60±1	18-20.5**	High Tg : 175°C, suitable for CCL, Formula NPEB-472PA70 : NPED-412P A60=100 : 100.6

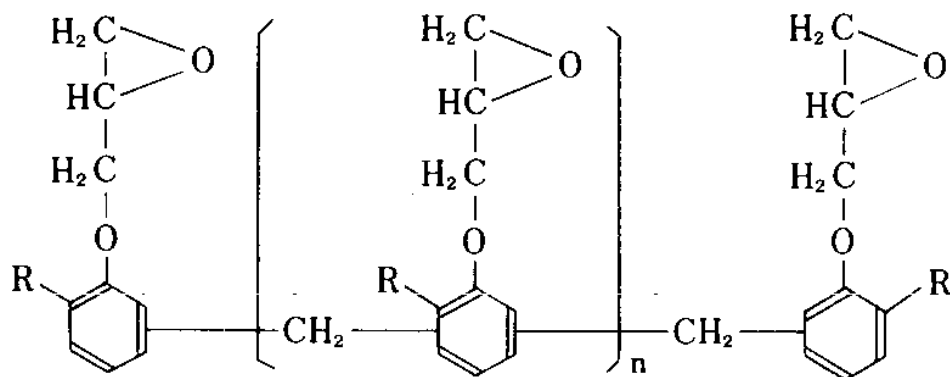
\*: EPOXY EQUIVALENCY is based on solid resins.

\*\*Brominate content is tested by mixing NPEB-472PA70 : NPED-412P A60

\*\*\*Brominate content is tested by mixing NPEB-471A80 : NPED-411A60

## NOVOLAC TYPE EPOXY RESIN

NPPN & NPCN series are multifunctional epoxy resins produced from phenol & O-cresol novolac respectively. They provide outstandingly thermal and corrosion resistance. Widely used in IC encapsulation, Laminated board, vinyl ester, etc. Chemical structure:



### NPPN SERIES:

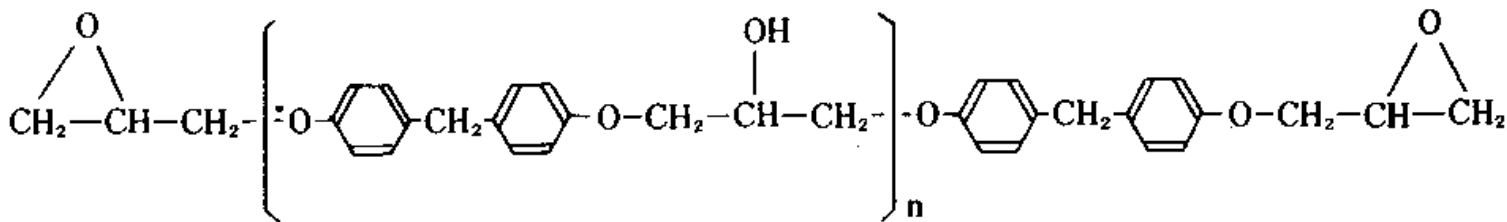
TRADE NAME	EPOXY EQUIVALENCY (g/eq)	SOLUTION VISCOSITY	COLOR (Gardner)	NON-VOLATILITY (wt%)	COMMENTS
NPPN-431A70	200-240	—	—	70±1	Tetrafunction resin, excellent for heat-resistance and UV-block
NPPN-631	168-178	1100-1700*1	2MAX.	—	Low viscosity phenolic novolac type
NPPN-638	170-190	H-K*	3MAX.	—	Standard phenolic novolac type
NPPN-638A80	170-190	—	3MAX.	80±1	Acetone type varnish
NPPN-638K80	170-190	—	3MAX.	80±1	MEK type varnish
NPPN-638S90	170-190	—	5MAX.	90±1	BCS type varnish

\*1: Brookfield viscometer method (cps, at 52°C)

\*2: Gardner-Holdt method (60% N.V. butyl carbitol solution)

## BPF TYPE EPOXY RESIN

BPF type EPOXY RESINS provide more excellent properties of lower-viscosity/higher-flow than BPA type series. they are suitable for used in solventfree coatings, moldings, castings, adhesions. Excellent flexibility and adhesive strength make them suitable for use in buildings, electrical insulation materials, etc. Chemical structure:



### NPEB SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	VISCOSITY (cps, at 25°C)	COLOR (Gardner)	COMMENTS
NPEF-157	175-185	3000-5000	3MAX.	BPA/BPF resins blended type, for use in electric castings
NPEF-164X	185-205	700-1100	3MAX.	C12-C14 alkyl glycidyl ether diluted type
NPEF-165	160-180	700-1100	3MAX.	Butyl glycidyl ether diluted type
NPEF-170	160-180	2000-5000	3MAX.	Standard BPF type resin
NPEF-175	160-180	2000-5000	3MAX.	Less crystallizable
NPEF-176	170-190	3000-5000	3MAX.	BPA/BPF resins blended type, for use in electric castings
NPEF-180	170-190	5000-7000	3MAX.	Less crystallizable
NPEF-185	170-190	6000-8000	3MAX.	BPA/BPF resins blended type, for use in electric castings
NPEF-187	175-185	6000-12000	3MAX.	BPA/BPF resins blended type, for use in electric castings
NPEF-198	180-186	10000-14000	1MAX.	BPA/BPF resins blended type, for use in electric castings
NPEF-500	164-170	400-600	2MAX.	BPA/BPF resins blended type, for use in civil engineerings

## FLEXIBLE TYPE EPOXY RESIN

Flexible type EPOXY RESINS may be modified by DIMER ACIDS, PU, RUBBERS. That will produce various FLEXIBLE EPOXY RESINS to be used.

### NPEB SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	SOFTENING POINT (°C)	VISCOSITY (cps, at 25°C)	COLOR (Gardner)	COMMENTS
NPER-133	195-240	—	20000-30000	1MAX.	Flexible EPU modifier for use in adhesives
NPER-133L	195-240	—	10000-16000	1MAX.	Flexible EPU modifier for use in adhesives
NPER-133M	195-240	—	50000-70000	1MAX.	Flexible EPU modifier for use in adhesives
NPER-172	600-700	semi-solid	—	6MAX.	Dimer acid modified DGEBA
NPER-1021	1100-1300	100-120	—	5MAX.	Liquid rubber modified DGEBA
NPER-450	400-500	—	250,000-400,000	12MAX.	Rubber modified DGEBA (CTBN)

## CASTING TYPE EPOXY RESIN

EPOXY RESINS cured with anhydride hardeners give excellent electrical properties for casting. NPEC series resins are specially formulated to be used in castings. Cause the low exotherm and shrinkage after hardening, they are suitable for used in transformers, resistors, switching devices, etc. requiring ultimate reliability.

### NPEC SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	VISCOSITY (cps, at 25°C)	COLOR (Gardner)	COMMENTS
NPEC-123	170-190	5000-7000	1MAX.	Standard resin for electronic castings
NPEC-124	170-190	4000-6000	1MAX.	Low viscosity, standard resin for electronic castings
NPEC-125	184-187	9000-11000	1MAX.	Electronic casting
NPEC-195	370-420	50-60 °C* (Softening point)	1MAX.	Solid resin for big size machine's castings
NPEC-205	210-250	900-1500	1MAX.	Good flexibility, low viscosity
NPEC-220	180-195	10000-15000	1MAX.	For small size machine's castings
NPEC-225	185-200	10000-15000	1MAX.	For middle size machine's castings
NPEC-230	185-230	10000-15000	1MAX.	For middle size machine's castings
NPEC-236	160-180	800-1700	1MAX.	Low viscosity, for electronic castings
NPEC-882	--	900-1200	Brown	Distribution Transformer, coil by filament winding process. NPEC-882:NPED-442=100:87
NPEC-838	--	--	Brown	Prefilled resin and hardner for CT or PT castings, formula NPEC-838:NPED-441=1:1

## WATERBORNE TYPE EPOXY RESIN

Waterborne type EPOXY RESINS are developed not only the limitations of government regulations but also the environmental concerns. To replace the organic solvents with water can provide many benefits such as low odor, low VOC levels, easy clean-up, safe handling, etc. SOLVENT-FREE EPOXY RESINS get more and more important in many areas of our lives. We study and provide many WATERBORNE type EPOXY RESINS of different characteristics summarized below.

### NPEW SERIES:

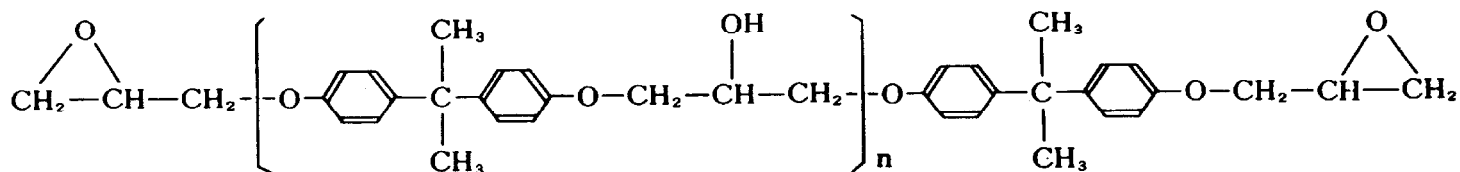
TRADE NAME	EPOXY EQUIVALENCY*1 (g/eq)	NON-VOLATILITY (wt%)	VOLATILE (wt%)	VISCOSITY (cps, at 25°C)	COMMENTS
NPEW-252	190-240	100	none	1000-2000	Lower than NPEW-254 in viscosity
NPEW-254	190-250	100	none	1500-4000	Low viscosity, excellent for operation
NPEW-258	190-240	100	none	12000-22000	Standard type (DGEBA)
NPEW-254W60	190-250	60±2	water	3000-13000	Same as NPEW-254, easily water-diluted
NPEW-258W60	190-240	60±2	water	6000-20000	Same as NPEW-258, easily water-diluted
NPEW-261W55	480-560	55±2	water*2	800-5000	Curing at ambient temperature, suitable for
NPEW-262W55	640-720	55±2	water*2	800-5000	Flexibility, curing at ambient temperature
NPEW-277W20	--	20±2	water*2	100MAX	Suitable for fiber saturation can and coil coatings

\*1: EPOXY EQUIVALENCY is based on solid resins

\*2: Hydrophilic alcohol

## BPA TYPE EPOXY RESIN

BPA type EPOXY RESINS are produced with Bisphenol-A and Epichlorohydrin by different ratios. Widely used in coatings, buildings, electrical insulations and stabilizers, etc. Chemical Structure:



### NPEK GENERAL LOW VISCOSITY SERIES:

TRADE NAME	EPOXY EQUIVALENCY (g/eq)	VISCOSITY (cps, at 25°C)	COLOR (Gardner)	COMMENTS
NPEK-110	176-186	1400-2400	1MAX.	Butyl glycidyl ether diluted type
NPEK-113	167-187	250-600	1MAX.	Lowest viscosity type
NPEK-114	190-210	600-1200	1MAX.	C12-C14 alkyl glycidyl ether diluted type
NPEK-114L	195-205	550-750	1MAX.	C12-C14 alkyl glycidyl ether diluted type
NPEK-114M	188-199	2100-2500	1MAX.	C12-C14 alkyl glycidyl ether diluted type
NPEK-114H	184-194	5100-5700	1MAX.	C12-C14 alkyl glycidyl ether diluted type
NPEK-115	175-195	600-1200	1MAX.	Butyl glycidyl ether diluted type
NPEK-116	180-200	600-1200	1MAX.	Odorless, high reactivity type
NPEK-117	175-185	1500-3500	1MAX.	Butyl glycidyl ether diluted type
NPEK-119	180-195	600-1200	1MAX.	Good wet effect, outstanding resistance to moisture
NPEK-120	180-190	7000-11000	1MAX.	Good wet effect, outstanding resistance to moisture
NPEK-129	183-195	10000-15000	1MAX.	Good wet effect, outstanding resistance to moisture
NPEK-131	162-182	700-1100	3MAX.	1,4 Butanediol diglycidyl ether diluted type
NPEK-132	180-194	700-1100	3MAX.	Cresyl glycidyl ether diluted type
NPEK-139	180-220	1500-2100	3MAX.	Glycidyl ester diluted type
NPEK-251	230-245	1300-1700	1MAX.	DBP modify type
NPEK-257	182-192	400-600	3MAX.	Cresyl glycidyl ether diluted type
NPEK-279	195-208	1000-1700	2MAX.	2-Ethyl hexyl glycidyl ether diluted type
NPEK-358	170-180	600-800	2MAX.	Good chemical-resistance, suitable for floorings