THERMAX

TULSION®

ION EXCHANGE RESINS

Summarized Data Sheet

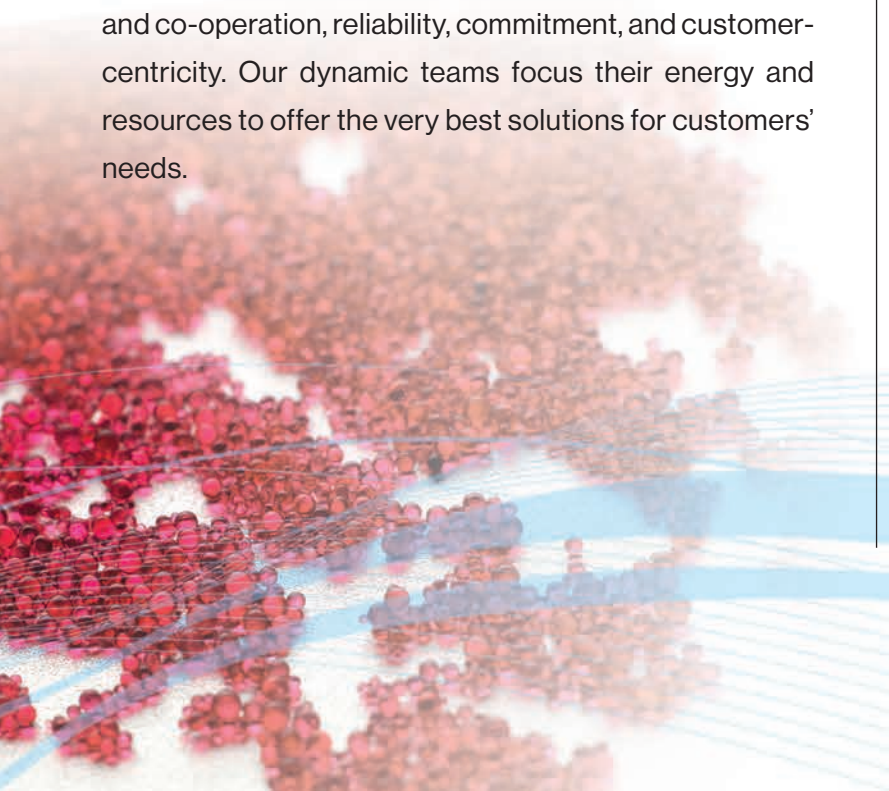
Welcome to Thermax - an engineering company providing sustainable solutions in energy and environment. The company's vision for the future is firmly anchored in the belief that to stay competitive, companies need to adopt sustainable development practices.

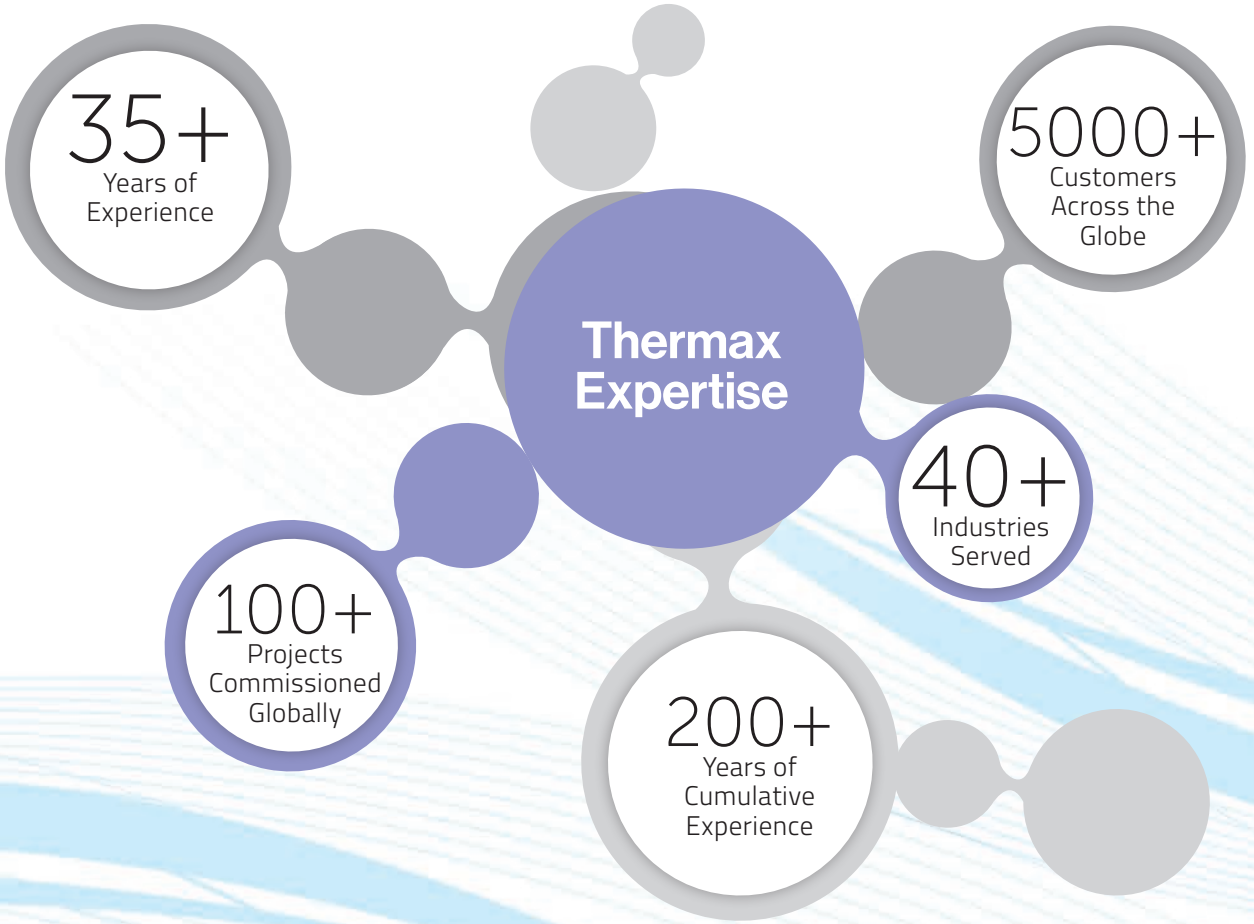
The systems, products and services developed by Thermax help industry achieve better resource productivity and improve bottom lines, while maintaining a cleaner environment. Even as we convert costs to profits, we help to protect the environment in our own ways. A win-win for industry and the society at large.

Thermax's business portfolio includes products for heating, cooling, water and waste management, and specialty chemicals. The company also designs, builds and commissions large boilers for steam and power generation, turnkey power plants, industrial and municipal wastewater treatment plants, waste heat recovery systems and air pollution control projects.

Thermax Chemicals is Asia's leading manufacturer of Tulsion® ion exchange resins.

Our business is about providing 'effective customer solutions' through innovation and development, service and co-operation, reliability, commitment, and customer-centricity. Our dynamic teams focus their energy and resources to offer the very best solutions for customers' needs.





QUALITY POLICY

We at Thermax Limited, Chemical Division hereby commit to develop, manufacture, deliver and apply Specialty Chemicals, Performance Chemicals in Oil Field, Fuel and Water Management to meet customer expectation.

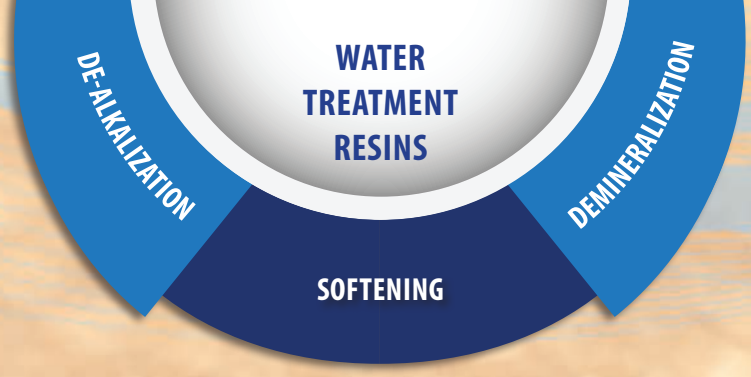
Further, we are committed to comply with the requirements of ISO 9001 and continually improve the effectiveness of the Quality Management System by establishing and reviewing quality objectives.

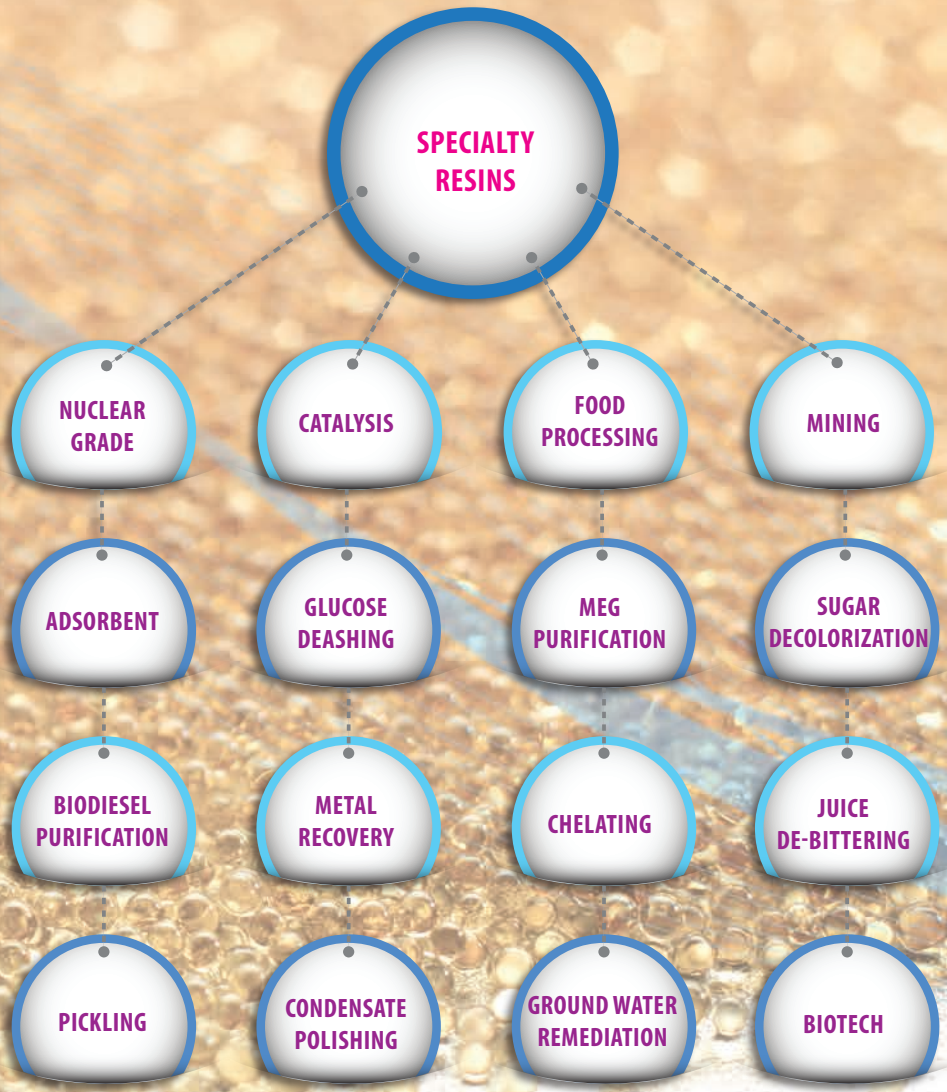
We shall ensure that quality policy is communicated and understood by all our employees. This policy shall be reviewed periodically for its continuing suitability.

QUALITY OBJECTIVES

Our Quality Objectives:

1. To implement, maintain and continually improve Quality System as per requirements of the Quality Standard of ISO 9001.
2. To achieve consistent Quality.
3. To enhance customer satisfaction.
4. To improve the effectiveness of existing processes.
5. To innovate products & processes to meet the customer needs.





SOFTENING CATION EXCHANGE RESINS

Tulsion®	Type	Matrix Structure	Functional Group	Ionic Form Supplied	Screen Size US Mesh	Particle Size mm (Min. 95%)	Stability Max Temp °F / °C	pH Range	Total Exchange Capacity meq/ml. (min)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
T-42	Strong Acid	Polystyrene Copolymer	Nuclear Sulphonic	Sodium	16-50	0.3-1.2	280/140	0-14	2.0	51-53 810-850	$Na^+ \rightarrow H^+$ 7	45±3	High capacity gel cation exchange resin, with optimum operating capacities.	Industrial and domestic softening at relatively low regeneration costs .
T-52	Strong Acid	Polystyrene Copolymer	Nuclear Sulphonic	Sodium	16-50	0.3-1.2	280/140	0-14	2.1	52-54 830-860	$Na^+ \rightarrow H^+$ 6	43±3	High capacity gel cation exchange resin, with high operating capacities.	Domestic softening for chlorinated water.
CX0-9 Na	Weak Acid	Polyacrylic Copolymer	Carboxylic	Sodium	16-50	0.3-1.2	210/100	5-14	4	42-44 670-710	$H^+ \rightarrow Na^+$ 100	47±3	High capacity acrylic weak acid cation exchange resin with excellent physical and chemical stability.	Industrial and domestic softening at relatively low regeneration costs.

DEMINERALIZATION CATION EXCHANGE RESINS

Tulsion®	Type	Matrix Structure	Functional Group	Ionic Form Supplied	Screen Size US Mesh	Particle Size mm (Min. 95%)	Stability Max Temp °F / °C	pH Range	Total Exchange Capacity meq/ml. (min)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
T-42	Strong Acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.8	50-52 H^+ 800-840 H^+	$Na^+ \rightarrow H^+$ 7	52±3	High capacity gel cation exchange resin with excellent physical and chemical properties.	Softening, multiple and mixed bed demineralisation, dealkalization, chemical processing etc.
CX0-9	Weak Acid	Polyacrylic Copolymer	Carboxylic	Hydrogen	16-50	0.3-1.2	210/100	5-14	4.0	42-44 Na^+ 670-710 Na^+ 46-48 H^+ 730-770 H^+	$H^+ \rightarrow Na^+$100	47±3	High capacity acrylic weak acid cation exchange resin with excellent physical and chemical stability.	Water deionization, selective heavy metal removal. Softening of high salinity waters in sodium cycle.
CX0-12	Weak Acid	Polyacrylic Copolymer	Carboxylic	Hydrogen	16-50	0.3-1.2	210/100	5-14	4.2	47-49 750-790	$H^+ \rightarrow Na^+$ 75	45±3	High capacity acrylic weak acid cation exchange resin with excellent physical and chemical stability	Water deionization, dealkalization selective heavy metal removal. Softening of high salinity waters in sodium cycle.
CX0-12 MP	Weak Acid	Polyacrylic Copolymer	Carboxylic	Hydrogen	16-50	0.3-1.2	210/100	5-14	4.1	47-49 750-790	$H^+ \rightarrow Na^+$ 70	47±3	Macropous acrylic weak acid cation exchange resin with excellent physical and chemical stability.	Water deionization, dealkalization selective heavy metal removal. Softening of high salinity waters in sodium cycle.
T-54	Strong Acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	2.0	50-52 800-840	$Na^+ \rightarrow H^+$ 6	52±3	High capacity gel cation exchange resin, with optimum operating capacities	Softening, multiple and mixed bed demineralisation, dealkalization, chemical processing etc.
T-52	Strong Acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.9	50-52 800-840	$Na^+ \rightarrow H^+$ 7	48±3	High capacity gel cation exchange resin, with optimum operating capacities	Softening, multiple and mixed bed demineralisation, dealkalization, chemical processing etc.
CX0-14 MP H	Weak Acid	Polystyrene Copolymer	Carboxylic	Hydrogen	16-50	0.3-1.2	210/100	5-14	2.6	47-49 750-790	$H^+ \rightarrow Na^+$ 70	56±3	Macropous acrylic weak acid cation exchange resin with excellent physical and chemical stability.	Water deionization, dealkalization selective heavy metal removal. Softening of high salinity waters in sodium cycle.

DEMINERALIZATION ANION EXCHANGE RESINS

Tulsion®	Type	Matrix Structure	Functional Group	Ionic Form Supplied	Screen Size US Mesh	Particle Size mm (Min. 95%)	Stability Max Temp °F / °C	pH Range	Total Exchange Capacity meq/ml. (min)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
A23P	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type I	Chloride	16-50	0.3-1.2	175/80	0-14	1.25	42-44 670-710	$Cl^- \rightarrow OH^-$ 25	53±3	Porous strong base type I anion exchange resin. Excellent physical and chemical properties.	Multiple and mixed bed deionization, silica removal.
A-32	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type II	Chloride	16-50	0.3-1.2	140/60	0-14	1.3	43-45 690-720	$Cl^- \rightarrow OH^-$ 12	47±3	Tough gel, Type II strong base anion exchange resin. Excellent physical and chemical properties.	Multiple bed deionization
A-27 MP	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type I	Chloride	16-50	0.3-1.2	175/80	0-14	1.2	42-44 670-710	$Cl^- \rightarrow OH^-$ 9	58±3	Macroporous strong base type I anion exchange resin with excellent physical and chemical stability and resistance to organic fouling	Mulitiple bed deionization, delalkalization and silica removal.
A-27 Gel	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type I	Chloride	16-50	0.3-1.2	140/60	0-14	1.3	42-44 670-710	$Cl^- \rightarrow OH^-$ 9	50±3	Tough gel, strong base type I anion exchange resin. Excellent physical and chemical properties.	Multiple mixed bed de-ionization silica removal also applied in stream purification along with Tulsion T -42.
A-36 Gel	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type II	Chloride	16-50	0.3-1.2	105/40	0-14	1.3	43-45 690-720	$Cl^- \rightarrow OH^-$ 9	48±3	High efficient & durable type II, strong base exchange resin having excellent operating capacity & regeneration effciency at equivalent regeneration level.	Besides its primary aplication in water treatment it is also used in de-alkalization process.
A-36 MP	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type II	Chloride	16-50	0.3-1.2	140/60	0-14	1.2	42-44 670-710	$Cl^- \rightarrow OH^-$ 9	50±3	Macroporous strong base type II anion exchange resin having high regeneration efficiency and resistance to organic fouling.	Multiple bed deionization, dealkalization.
A-2X MP	Weak Base	Polystyrene Copolymer	Tertiary Amine	Free Base	16-50	0.3-1.2	175/80	0-9	1.5	40-42 640-670	$FB^- \rightarrow Cl^-$ 20	47±3	Macroporous weak base anion exchange resin, excellent regeneration efficiency. Resistance to organic fouling.	Deionization of high EMA waters.
A-10X MP	Weak Base	Polyacrylic Copolymer	Polyamine	Free Base	16-50	0.3-1.2	140/60	0-9	2.5	43-45 690-720	$FB^- \rightarrow Cl^-$ 23	52±3	Macroporous acrylic weak base anion exchange resin with high organic removal efficiency.	Deacidification and deionization of high EMA, high organics water.
A-20 X Gel	Weak Base Anion	Polyacrylic Copolymer	Tertiary Amine	Free Base	16-50	0.3-1.2	140/60	0-5	1.6	43-45 690-721	$FB^- \rightarrow Cl^-$ 24	50±5	Effectively used for treatment of high organic waters.	Used in water treatment applications for the removal of free mineral acids.
A-23	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type I	Chloride	16-50	0.3-1.2	175/80	0-14	1.3	42-44 670-710	$Cl^- \rightarrow OH^-$ 20	53±3	Tough gel, stong base type I anion exchange resin. Excellent physical and chemical properties.	Multiple and mixed bed deionization, silica removal. Also applied in process stream purification along with Tulsion T-42.

MIXED BED RESINS

Tulsion®	Type	Matrix Structure	Functional Group	Ionic Form Supplied	Screen Size US Mesh	Particle Size mm (Min. 95%)	Stability Max Temp °F / °C	pH Range	Total Exchange Capacity meq/ml. (min)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
MB-104	Strong Acid Strong Base Mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	Li^+/OH^- form Mixture	16-50	0.3-1.2	175/80	0-14	1.8/1.0 Li^+/OH^-	44-47 700-750	NA	—	Intimate mixture strong acid T-46 Li^+ form and strong base A-33 OH^- form containing in a 1:2 volume ratio.	Final polishing of circulating water in nuclear industry.
MB-106	Strong Acid Strong Base Mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	H^+/OH^- form Mixture	16-50	0.3-1.2	175/80	0-14	1.8/1.0 H^+/OH^-	44-47 700-750	NA	—	Intimate mixture strong acid T-46 Li^+ form and strong base A-33 OH^- form containing in a 1:2 volume ratio.	Final polishing of circulating water in nuclear industry
MB-108 (BG)	Strong Acid Strong Base mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	Free Base (OH) and $/H^+$	16-50	0.3-1.2	175/80	0-14	1.8/1.0 H^+/OH^-	44-47 700-750	NA	—	High purity mixed bed resin with highly Effective separation. Volume ratio 1:2 (T-46 Black : A-33 Gold).	Used in high purity water applications.
MB-108 P	Strong Acid Strong Base mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	H^+/OH^- form Mixture	16-50	0.3-1.2	175/80	0-14	1.8/1.0 H^+/OH^-	44-47 700-750	NA	—	Intimate mixture of strong acid T-46 H^+ form and strong base Type I (A-33) OH^- form in a 1:2 volume ratio.	Used in high purity water applications.
MB-115 (BG)	Strong Acid Strong Base mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	H^+/OH^- form Mixture	16-50	0.3-1.2	175/80	0-14	1.8/1.0 H^+/OH^-	44-47 700-750	NA	—	Intimate mixture of stong acid T-46 H^+ form and strong base Type I (A-33) OH^- form in a 1:1.5 volume ratio.	For production of ultra pure water.
MB-1228	Strong Acid Strong Base Mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	H^+/OH^- form Mixture	16-50	0.3-1.2	175/80	0-14	1.8/1.0 H^+/OH^-	44-47 700-750	NA	-	Intimate mixture of strong acid T-42 NS H^+ form and strong base Type I A-24 OH form in a 1:2 volume ratio.	Ultra pure resins to be used in point of use ultrapure water producing system.
MB-110	Strong Acid Strong Base Mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	H^+/OH^- form Mixture	16-50	0.3-1.2	175/80	0-14	1.8/1.0 H^+/OH^-	44-47 700-751	NA	-	Intimate mixture of strong acid T-46 H^+ form and strong base Type I (A-33) OH form in a 1:1 volume ratio.	Composed of super regeneration cation and anion to produce pure water with conductivity < 0.1 micro siemens/cm2
MB-115	Strong Acid Strong Base Mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	H^+/OH^- form Mixture	16-50	0.3-1.2	175/80	0-14	1.8/1.0 H^+/OH^-	44-47 700-751	NA	-	Intimate mixture of strong acid T-46 H^+ form and strong base Type I (A-33) OH form in a 1:1.5 volume ratio.	For production of ultra pure water.
MB-114	Strong Acid Strong Base Mixture	Polystyrene Copolymer	Nuclear Sulphonic /Quaternary Ammonium Type I	H^+/OH^- form Mixture	16-50	0.3-1.2	175/80	0-14	1.8/1.0 H^+/OH^-	44-47 700-751	NA	-	Intimate mixture of strong acid T-46 H^+ form and strong base Type II (A-32) OH form in a 1:2 volume ratio.	For production of ultra pure water.

CONDENSATE POLISHING RESINS

Tulsion®	Type	Matrix Structure	Functional Group	Ionic Form Supplied	Screen Size US Mesh	Particle Size mm (Min. 95%)	Stability Max Temp °F / °C	pH Range	Total Exchange Capacity meq/ml. (min)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
T-48	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	100-400 +100=nil	0.03-0.15	320/160	0-14	4.5 meq/gm	NA	NA	60 ±5	Strong acid cation exchange resin supplied in powder form	Condensate polishing deploying precoat filter process
T-50	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	20-40	0.42-0.85 (85%)	250/120	0-14	1.8	51-53 800-840	$Na^+ \rightarrow H^+$ 7	52±3	Strong acid cation exchange resin having controlled particle size cut.	High flow, deep bed condensate polishing
T-52	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.9	52-54 830-860	$Na^+ \rightarrow H^+$ 6	48±3	Higher cross-linked strong acid cation exchange resin having excellent resistance to oxidizing agents and temperature	Multiple & mixed bed demineralization operating under rigorous conditions
T-42 MP	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen Sodium	16-50	0.3-1.2	250/120 H^+ 280/140 Na^+	0-14	1.7 Na 1.63H	50-52 H^+ 800-830 H^+ 52-54 Na^+ 830-870 Na^+	$Na^+ \rightarrow H^+$ 6	56±3H^+ 53±3 Na^-	Macroporous strong acid cation exchange resin with excellent physical and chemical characteristics	High flow condendate polishing, continuous Ion exchange systems and chemical processing
A-21	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type I	Chloride	20-40	0.42-0.85 (82%)	175/80	0-14	1.3	42-44 670-710	$Cl^- \rightarrow OH^-$ 20	53±3	Strong base gel Type I anion exchange resin with excellent bead strength and controlled particle size	High flow, deep bed condensate polishing
A-21 MP	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type I	Chloride Carbonate	20-40	0.42-0.85 (82%)	175/80 Cl^-	0-14	1.2	42-44 670-710	$Cl^- \rightarrow OH^-$ 10	58±3	Macroporous strong base Type I anion exchange resin with superior bead strength and controlled particle size.	High flow, deep bed condensate polishing
T-87 MP	Strong Acid	Polystyrene Copolymer	Nuclear sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.95	50-52 H^+ 800-840 H^+	$Na^+ \rightarrow OH^+$ 10	52±3	Large pore structure with high exchange capacity, Suitable to operate under high pressure	Used for applications of high velocity linear flows in condensate polishing units, also suitable for high pressure CPU.
A-21 MP (S04)	Strong Base	Polystyrene Copolymer	Quaternary Amine	S04	16-50	0.3-1.2	140/60	0-14	1.2	42-44 670-710	$Cl^- \rightarrow OH$ 9	53±3	High capacity with excellent resistance to attrition and osmotic shock	Used in condensate polishing plants particularly suitable for high pressure CPU units.
T-53	Strong Acid	Polystyrene Copolymer	Nuclear sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	2.1	50-52 H^+ 800-840 H^+	$Na^+ \rightarrow$ H 6	45±3	High capacity gel cation exchange resin, with high operating capacities	Softening, multiple and mixed bed demineralisation, dealkalization, chemical processing etc.
T-55	Strong Acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	2.2	50-52 H^+ 800-840 H^+	$Na^+ \rightarrow$ H 6	45±3	High crosslinked Nuclear grade gel type strong acid cation exchange resin having excellent resistant to oxidizing agents with high operating capacity.	Used in non-regenerable single bed or mixed bed nuclear system.

CATALYTIC GRADE ION EXCHANGE RESINS

Tulsion®	Type	Matrix Structure	Functional Group	Ionic Form Supplied	Screen Size US Mesh	Particle Size mm (Min. 95%)	Stability Max Temp °F / °C	pH Range	Total Exchange Capacity meq/ml. (min)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
T-56 MP	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.63	52-54 830-870	$Na^+ \rightarrow H^+$ 7	56±3	Macroporous catalytic grade strong acid cation exchange resin supplied in wet form. Also supplied in dry form containing moisture less than 2%	Cataysis of organic reactions in aqueous and non-aqueous media
T-38	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.4	47-49 750-790	$Na^+ \rightarrow H^+$ 11	65±3	High purity, low cross linked strong acid cation exchange	Catalyst for Bisphenol A reactions.
T-3825	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2 (98%)	250/120	0-14	0.675	43-45 690-720	$Na^+ \rightarrow H^+$ 15	79±3	High purity, low cross linked strong acid cation exchange	Catalyst for Bisphenol A reactions.
T-62MP (Dry)	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-40	0.3-1.2 0.42-1.2 (97%)	265/130	—	4.8 (meq / dry gm)	—	NA	1	Specially developed resin for phenol alkylation	Phenol Alkayation, Isoboryl acetate synthesis. Reaction of non-polar media.
T-63 MP (Dry)	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-40	0.3-1.2 0.42-1.2 (96%)	265/130	—	4.8 (meq / dry gm)	—	NA	1	High Porosity resin	Phenol Alkayation, Isoboryl acetate synthesis. Reaction of non-polar media.
T-66MP (Dry)	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-40	0.3-1.2 0.42-1.2 (97%)	265/130	—	5.0 (meq /dry gm)	—	NA	1	Resin with low porosity and high surface area	phenol Alkayation, for reaction of relatively polar reactants.
T-3830	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	265/130	0-14	3.5	47-49 750-790	$Na^+ \rightarrow H^+$ 11	65±3	Promoted catalyst supplied in wet form	Bisphenol-A synthesis.
A-74 MP	Strong Base	Polystyrene Copolymer	Quatemary Ammonium Type I	Hydroxide	16-50	0.3-1.2	175/80	0-14	1.0	42-45 670-720	$Cl^- \rightarrow OH^-$ 21	60±3	Macroporous catalytic grade type I strong base anion.	Condensation type of reaction.
A-3003	Strong Base	Polystyrene Copolymer	Quatemary Ammonium Type I	Hydroxide	16-50	0.3-1.2	140/60	0-14	1.0	42-44 670-710	$Cl^- \rightarrow OH^-$ 20	70±3	Catalytic grade type I strong base anion.	Aldol condensation type reactions
A-8X MP	Weak Base	Polystyrene Copolymer	Tertiary Amine	Free Base	16-50	0.3-1.2	175/80	0-14	1.3	40-42 640-680	FB $\rightarrow Cl^-$ 18	55±3	Macroporous catalytic grade weak base anion exchange resin.	MEG purification and deacidification of aqueous and non-aqueous media
T-6812 MP (Dry)	Strong acid	Polystyrene copolymer	Nuclear sulphonic	Hydrogen	16 - 40	0.425 - 1.2	265/130	0 -14	5.2 (meq/gm)	—	—	2	High Porosity resin	Phenol alkylation, esterification reactions
T-6812 MP (wet)	Strong Acid	Polystyrene copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.95	50-52 800-840	$Na^+ \rightarrow H^+$ 7	52±3	Higher total acid capacity	especially developed for phenol purification, phenol alkilation and MTBE production.
T-8052 MP	Strong Acid	Polystyrene copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.95	50-52 800-840	$Na^+ \rightarrow OH^+$ 8	56±3	Large pore structure with high exchange capacity	Used in polar and non polar media.
T-6813 MP (wet)	Strong Acid	Polystyrene copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.95	50-52 800-840	$Na^+ \rightarrow OH^+$ 9	52±3	Higher total acid capacity	Especially developed for phenol purification, phenol alkilation and MTBE production.
T- 77 MP	Strong Acid	Polystyrene copolymer	Nuclear Sulphonic	Hydrogen	16-50	0.3-1.2	250/120	0-14	1.75	50-52 800-840	$Na^+ \rightarrow OH^+$ 10	52±3	Large pore structure with high exchange capacity	Used in polar and non polar media.

ADSORBENT RESINS

Tulsion®	Type	Matrix structure	Functional group	Ionic form	Screen Size US Mesh	Paricle size mm (Min. 95%)	Stability Max Temp °F / °C	pH range	Specific Surface Area m^2/gm(min.)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
ADS-400	Polyacrylic adsorbent	Polyacrylic Copolymer	NIL	NA	18-50 18-40 (90%)	0.3-1.0	205/95	0-14	375	43-47 700-750	NA	62±3	High organic removal capacity	Removal of hydrophilic chemicals from Industrial waters
ADS-600	Polystyrenic adsorbent	Polystyrenic Copolymer	NIL	NA	18-50 18-40 (85%)	0.4-1.0	300/150	0-14	550	43-47 700-750	NA	55-60	High organic removal capacity	Removal of hydrophobic chemicals from Industrial waters
ADS-800	Polystyrenic adsorbent	Polystyrenic Copolymer	NIL	NA	18-50	0.3-1.0	300/150	0-14	750	40-44 640-710	NA	53-58	Polystyrene resin with high organic removal capacity	Removal of hydrophobic chemicals from Industrial waters
ADS 800 EP	Polystyrenic adsorbent	Polystyrenic copolymer	NIL	NA	18-50	0.3-1.0	300/150	0-14	750	40-44 640-710	NA	53-58	Polystyrene resin with high organic removal capacity	Removal of hydrophobic chemicals from Industrial waters
PCP-1200	Weak Base	Polystyrene Copolymer	Tertiary Amine	Free base	16-50	0.3-1.2	300/150	0-14	1000	43-47 700-750	NA	63±3	Polystyrene resin with high organic removal capacity	Removal of hydrophobic chemicals from Industrial waters. Liquid glucose decolorization
PCP-540	NA	Polystyrene Copolymer	NIL	NA	16-50	0.3-1.2	300/150	0-14	1150	43-47 700-752	NA	63±3	High organic removal capacity	Removal of hydrophobic chemicals from Industrial waters.

NUCLEAR GRADE ION EXCHANGE RESINS

Tulsion®	Type	Matrix Structure	Functional Group	Ionic Form Supplied	Screen Size US Mesh	Particle Size mm (Min. 95%)	Stability Max Temp °F / °C	pH Range	Total Exchange Capacity meq/ml. (min)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
T-46	Strong acid	Polystyrene Copolymer	Nuclear Sulphonic	Lithium Hydrogen	16-50	0.3-1.2	250/120	0-14	1.8 H^+	50-52 800-840	$Na^+ \rightarrow H^+$ 7	50±3 52±3	Strong acid cation exchange resin having a minimum of 99% of its exchange sites in H^+/Li^+ form with high bead strength.	Treatment of circulating water in nuclear industry
A-33	Strong Base	Polystyrene Copolymer	Quatemary Ammonium Type I	Hydroxide	16-50	0.3-1.2	175/80	0-14	1.0	42-44 670-710	$Cl^- \rightarrow OH^-$ 20	70±3	Strong base gel Type I anion exchange resin having minimum 90% of its exchange sites in OH^- form and less than 1% sites in Cl^- form with high bead strength.	Treatment of circulating water in nuclear industry
IANR 333(OH) UPS	Strong Base	Polystyrene Copolymer	Quaternary Ammonium Type 1	Hydroxide	16-50	0.4 to 1.2	140/60	0-14	1.1	42-44 670-710	$Cl^- \rightarrow$ OH 20	65+3	Strong base gel Type I anion exchange resin having minimum 90% of its exchange sites in OH^- form and less than 1% sites in Cl^- form with high bead strength	Treatment of circulating water in nuclear industry
IANR 52 H UPS	Strong cation	Polystyrene copolymer	Nuclear Sulphonic	Hydroxide	16-50	0.4 to 1.2	250/120	0-14	1.9	50-52 800-840	$Na^- \rightarrow H^+$ 6	48±3	Strong acid cation exchange resin having a minimum of 99% of its exchange sites in H+/Li+ form with high bead strength.	Treatment of circulating water in nuclear industry

SPECIAL GRADE ION EXCHANGE RESINS

Tulsion®	Type	Matrix structure	Functional group	Ionic form	Screen Size US Mesh	Paricle size mm (Min. 95%)	Stability Max Temp °F / °C	pH range	Total exchange capacity (meg/ml.min)	Backwash Settled Density lbs/cft g/l	Reversible Swelling % Approx	Moisture Content % Approx	Features	Applications
A-62MP	Strong Base	Cross linked polystyrene	Quarternary Ammonium	Chloride	16-50	0.3-1.2	195/90	0-14	1.0	43-47 700-750	—	52±3	Premium grade resin for nitrate removal food grade version for potable water treatment is also available	Selective removal of nitrate from industrial water and domestic drinking water
A-23P (Sulphite)	Strong Base	Polystyrene Copolymer	Quarternary Ammonium	Sulfite	16-50	0.3-1.2	140/60	0-14	0.8	42-44 670-710	—	—	For disolved oxygen removal	Dissolved oxygen removed for very low conductivity water requirements.
A-30 MP	Strong Base	Cross linked Polyacrylic	Quarternary Ammonium	Chloride	16-50	0.3-1.2	140/60	0-14	0.7	43-47 700-750	—	67±3	Acrylic resin with high organic removal capacity	Decolorization of aqueous solution, sugar melt Decolorization
A-72 MP	Strong Base	Polystyrene Copolymer	Quarternary Ammonium Type I	Chloride	16-50	0.3-1.2	175/80	0-14	1.0	42-45 670-720	$Cl^- \rightarrow OH^-$ 20	60±3	Macroporous strong base Type I anion exchange resin with controlled pore size	Tanin removal from ground water used for color removal from sugar syrup.
A - 722 MP	Strong Base	Polystyrene Copolymer	Quarternary Ammonium Type I	Chloride	16-50	0.4 -1.2	175/80	0-14	1.0	42-45 670-720	$Cl^- \rightarrow OH^-$ 20	60±3	Macroporous strong base Type I anion exchange resin with controlled pore size	Used for color removal from sugar syrup.
CH-87	Chelating	Cross linked polystyrene	Flouride selective	—	16-50	0.3-1.2	140/60	7-11	—	52-54 830-860	NA	45±3	Selective removal of fluoride from water	Removal of flouride from domestic drinking water.
CH-90	Chelating	Polystyrene Copolymer	Imminodiacetic acid	Sodium	16-50	0.3-1.2	175/80	0-14	2.0	45-50 720-790	$H \rightarrow Na$ 30 +/- 5%	48±3	Special resin for selective removal of transition metals	Brine purification in chloro alkali industry.
CH-93	Chelating	Cross linked polystyrene	Amino methyl phosphoric	Sodium	16-50	0.3-1.2	175/80	0-14	2.0	45-50 720-760	$H \rightarrow Na$ 35-40%	50±3	Special resin having more pronounced affinity for Ca+& Mg than IDA type resin	Brine decalcification in chloro alkali industries.
CH-95	Chelating	Polystyrene Copolymer	Isothiouronium	Chloride	16-50	0.3-1.2	175/80	0-7	1.25 meq/ml	47-50 760-800	—	50±3	Special resin for selective removal of mercury	Used for mercury removal from effluent in Chloro -alkali industry.
CH-97	Chelating	Cross linked polystyrene	Methylene thiol	Chloride	16-50	0.3-1.2	140/60	0-14	150 mg Hg/l	42-45 670-720	NA	40±3	Selective removal of mercury, regenerable resin	Removal of mercury in Chloro - alkali industry.
CH-99	Chelating	Cross linked polystyrene	Polyhydroxy amine	Chloride	16-50	0.3-1.2	175/80	7-11	0.8	43-47 700-750	NA	45±2	Selective removal of Boron	Removal of Boron from industrial water.
A 72 MP (HP)	Strong Base	Polystyrene Copolymer	Quaternary Ammonium type I	Chloride	16-50	0.3-1.2	175/80	0-14	0.6	42-45 670-720	$Cl^- \rightarrow OH^-$ 20	70-75	High porosity / High mechanical strength macroporous strong base anion exchange resin	Removal of colloidal silica. Used in semiconductor, medical & pharmaceutical field
IRR	Chelating Resin	Polystyrene Copolymer	N/A	N/A	16-50	0.3-1.2	175/80	0-14	N/A	42-45 680-720	—	50±5	It is premium grade resin media designed to provide greater matrix porosity & excellent catalytic properties to remove iron from ground water.	Removal of dissolved iron (Fe II) from potable water / ground water.
T-4213 MP	Strong acid	Polystyrene copolymer	Sulphonic	Hydrogen	16-40	0.4 - 1.2	250/120	0-14	1.7	51-53 810-850	$H^+ \rightarrow Na^+$ 10% max.	50± 3	Macroporous cation exchange resin	Sugar de-ashing
A-2X MP R	Weak base anion	Cross linked polystyrene	Tertiary amine	Free base form	16-40	0.4 - 1.2	175/80	0-9	1.6	40-44 640-710	$FB \rightarrow Cl^-$ 20%	47±3	High capacity macroporous weak base anion exchange resin.	Liquid glucose and sorbitol application

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A-201 X MP	Weak Base	Polystyrene Copolymer	Tertiary amine	Free Base	16-50	0.3-1.2	140/60	0-5	1.7	43-45 690-720	$FB^- \rightarrow Cl$ 30	45±3	Macroporous Weak Base Anion resin with < 2% strong base capacity.	Used in chemical process of separation of acids from salts.
A-74 MP (S04)	Weak Base	Polystyrene Copolymer	Quaternary ammonium Type 1	SO_4	16-50	0.3-1.2	140/60	0-14	1	42-44 670-710	$Cl^- \rightarrow OH$ - 20	65±3	Used for regenerable mix beds in condensate polishing units. This resin has high operating capacity and low rinse requirements. This resin also exhibits better regeneration efficiency.	High flow, deep bed condensate polishing.
A-630	Strong Base	Polystyrene Copolymer	Quaternary ammonium Type 1	Cl	16-40	0.4-1.2	175/80	0-14	0.65	42-44 670-710	NA	45±3	Porous strong base type I anion exchange resin. Excellent physical and chemical properties.	Multiple and mixed bed deionization, silica removal.
CH-920 GA	Chelating	Polystyrene Copolymer	Spe.Galium Selective	H	16-50	0.3-1.2	210/100	5-14	1.5	47-49 750-790	NA	12+3	Weak Acid Cation rein with special legend attached to special ligand have higher affinity to Gallium in Bayer Liquor	Used for recovery of of Gallium from Bayer Liquor
TFR-93	Weak Acid Cation	Polystyrene Copolymer	phosphonic	Al	16-50	0.3-1.2	210/100	7-11	2.3	45-47 720-760	$H^- \rightarrow Na$ +35	42±3	capability of removing fluoride ions to the level as low as below one ppm even from high TDS feed water (>1000 PPM).	Used for selective removal of Fluoride ions from aqueous solutions.
T-202	Strong Acid	Polystyrene Copolymer	Nuclear Sulphonic	H	16-50	0.3-1.2	250/120	0-14	1.75	50-52 800-840	$Na^+ \rightarrow H$ 7	53±3	Stron Acid Cation Resin	Suitable for Biodiesel purification
RCX-5143	WBA	Polystyrene Copolymer	Quaternary Ammonium Type 1	Cl	16-50	0.3-1.2	175/80	0-9	1.2	42-44 670-710	$FB^- \rightarrow Cl$	40±3	Weak Base anion resin with Rodium slective funstional group	Recovery of rhodium indstrial process effluent
PCR-5320 PFS	SBA	Polystyrene Copolymer	Quaternary Ammonium Type 1	Cl	16-50	0.3-1.2	175/80	0-14	0.6	43-47 710-730	NA	52±3	High organic removal capacity	Suitable for removal perchlorate removal from ground water used for domestic use.
CH-88	Chelating	Polystyrene Copolymer	Nulcear Sulphonic	Al	16-50	0.3-1.2	210/100	5-14	1.8	47-49 750-790	NA	43±3	Low EDC fluoride selective chelating resin	Fluoride removal from potable water

A COMMITMENT TO QUALITY

Every batch of Tulsion Ion Exchange resin is manufactured under carefully controlled process parameters and follows a rigorous quality assurance protocol covering every raw material, intermediate stage products and all batches of the final product. All the engineers, operators and scientists take great care in processing every batch of resin to ensure that the produced lot of resin meets the high standard of quality that we specify and commit to the customer.

Every Tulsion Ion exchange resin product is developed by a team of experienced R&D scientists, manufactured by qualified production engineers, inspected by ever cautious QAC chemists and commissioned by expert technical services group so that the customers can use them without any hassles over a longer period of time.

We are proud to be a company that develops and supplies customer specific products with tailor made specifications on exclusive basis for a variety of end applications.

We believe greatly in system oriented working style, safe working conditions as well as environmental safety. As an obvious result, Thermax's chemical division manufacturing facility is certified for ISO 9001-2008, ISO 14001-2004 and OHSAS 18001-2007.

TULSION® Ion exchange resins are available in standard packing size as follows:

Fibre Drums	: 7 cft.
Polyethylene lined HDPE bags	: 1 cft.
Super Sacks	: 40 cft.
Polyethylene lined HDPE bags	: 25 ltr.
Super Sacks	: 1000 ltrs.
MS Drum	: 180 ltr.
HDPE Drum	: 200 ltr.

The data included herein are based on test information obtained by Thermax. These data are believed to be reliable but do not imply any warranty or performance guarantee. We recommend that the users determine performance by testing on their processing equipment.

We assume no liability or responsibility for patent infringement resulting from the use of any of our product. In view of our constant endeavor to improve the quality of our products, we reserve the right to alter or change specifications without prior notice.

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