

Non-Halogen Phosphoric Acid Esters

< > : Measurement condition

Products	Formula mol.weight	Specifications								Typical Properties				Containers	Description	Uses
		Appearance	Color APHA	Specific Gravity 20/20°C	Acid value KOH mg/g	Heating Loss % 125°C × 3hrs	Refractive Index n _D	Water Content %	P%	Boiling Point °C	Freezing Point °C [Viscosity mPa·s/25°C]	P %	Flash Point °C			
TMP Trimethyl phosphate	$O=P(OCH_3)_3$ 140	Colorless clear liquid	≤30	1.215±0.005	≤0.2	—	1.395±0.002	Water Content % ≤0.2	P% ≥21.0	180 ~ 195 (101kPa)	≤-70 [2.0]	22.1	—	220kg Drum	Relatively low boiling point. Completely soluble in water. Low viscosity. High phosphorus content. Good compatibility with various synthetic resins. Purity Wt % ≥99.0	Plasticizer with flame retarding for thermosetting resins such as rigid polyurethane foam and unsaturated polyester resins.
TEP Triethyl phosphate	$O=P(OC_2H_5)_3$ 182	Colorless clear liquid	≤20	1.071±0.003	≤0.05	—	1.403±0.002	—	—	216 (101kPa)	-56 [1.6]	17.0	111	210kg Drum	Soluble in organic solvent as well as water. Low viscosity.	
TPP Triphenyl phosphate	$O=P(OC_6H_5)_3$ 326	White flake	—	—	≤0.03	—	—	Chloride not cause turbidness	Melting Point °C ≥48.5	399 (101kPa)	—	9.5	225	25kg Paper bag *1 500kg	Flaky solid material. Good compatibility with nitrocellulose, acetylcellulose and polyvinylchloride. Low volatility. Bringing water resistance and oil resistance.	Plasticizer with flame retarding for phenolic resin, epoxy resin, various engineering plastics, acetate plastics and synthetic rubber.
TCP Tricresyl phosphate	$O=P(OC_6H_4CH_3)_3$ 368	Colorless to light yellowish clear liquid	≤50	1.170±0.010	≤0.05	≤0.10	1.557±0.003	Color after heated 150°C × 1hr · APHA ≤60	Volume resistivity 30°C Ω cm ≥5×10 ⁹	241 ~ 255 (0.53kPa)	≤-20 [58]	8.4	240	220kg Drum	Bringing heat resistance and electric insulation property to polyvinylchloride. Flame retarding. Very high performance for extreme pressure in addition to lubrication.	Plasticizer with flame retarding for agricultural polyvinylchloride film, phenol resin, epoxy resin and various engineering plastics. Non-flammable hydraulic oil. Additive for extreme pressure lubricant oil.
TXP Trixylenyl phosphate	$O=P[OC_6H_3(CH_3)_2]_3$ 410	Colorless to yellowish clear liquid	≤200	1.145±0.025	≤0.1	≤0.15	1.552±0.003	—	—	— (*2 0.27kPa) (240 ~ 260)	-15 [172]	7.6	253	220kg Drum	Low volatility. High performance for water resistance. Flame retarding. Good extreme pressure lubrication same as TCP.	
CDP Cresyl diphenyl phosphate	$O=P \begin{cases} (OC_6H_5)_2 \\ OC_6H_4CH_3 \end{cases}$ 340	Colorless to light yellowish clear liquid	≤50	1.210±0.005	≤0.05	≤0.15	—	—	—	— (*2 0.53kPa) (245)	-30 [36]	9.1	240	220kg Drum	Effective in polyvinylchloride. Bringing cold resistance and stain resistance. Higher phosphorus content, lower viscosity and better flame retarding than TCP.	Plasticizer with flame retarding for polyvinylchloride, phenolic resin, epoxy resin and various engineering plastics.
DAIGUARD-1000 Non-halogen phosphoric acid ester	—	(White powder)	—	—	(≤0.5)	—	—	Water Content % (≤0.5)	Melting Point °C (≥125)	—	129	9.6	254	20kg Paper bag	Solid at room temperature, easily impregnated in polyester fiber, and does not bleed out easily after impregnation. Higher concentration of flame retardant to be impregnated in flame proofing in same bath treatment helps increase the concentration of flame retardant to be impregnated. This provides excellent flame resistance for polyester fiber.	Flame retardant for same bath treatment of polyester fiber.
PX-110 Cresyl, di-2,6-xylene phosphate	$O=P \begin{cases} [OC_6H_3(CH_3)_2]_2 \\ OC_6H_4CH_3 \end{cases}$ 396	Colorless to yellowish clear liquid	—	1.160±0.020	≤0.10	—	—	Water Content % ≤0.10	Viscosity mPa·s/25°C 1,200 ~ 1,800	—	-14	7.8	256	220kg Drum	Excellent hydrolysis resistance results in high insulation.	Used in a wide range of thermosetting resins such as phenol, epoxy and polyurethane resin or various engineering plastics.

*1 Flexible container bag

*2 Vapor pressure

Non-Halogen Phosphoric Acid Polyesters (1)

Products	Formula	Specifications						Typical Properties				Containers	Description	Uses	
		Appearance	Color APHA	Specific Gravity 20/20°C	Acid value KOH mg/g	Water Content %	Viscosity mPa·s/25°C	P %	Freezing Point °C	Viscosity mPa·s/25°C	P %				Flash Point °C
CR-733S(RDP) Aromatic polyphosphate	$O=P(OC_6H_5)_2$ O C ₆ H ₄ O O=P(OC ₆ H ₅) ₂	Colorless to light yellowish clear liquid	≤80	1.306±0.010	≤0.5	≤0.15	Viscosity mPa·s/25°C 500 ~ 800	P % ≥10.5	-13	—	10.9	302	220kg Drum	High performance for heat resistance and lower volatility than TPP and TXP, due to its condensed structure.	Flame retardant for various engineering plastics and synthetic fiber.
CR-741(BDP) Aromatic polyphosphate	$(C_6H_5O)_2P(O)OC_6H_4C(CH_3)_2$ C ₆ H ₄ OP(O)(OC ₆ H ₅) ₂	Colorless to yellowish clear liquid	—	1.260±0.010	≤0.2	≤0.10	—	—	4~5	2,300 (40°C)	8.9	334	220kg Drum	High hydrolytic stability and heat resistance and bringing high insulation property, due to its condensed structure. TPP Content % ≤1.00	
PX-200(RDX) Aromatic polyphosphate	$[(CH_3)_2C_6H_3O]_2P(O)OC_6H_4OP(O)OC_6H_3(CH_3)_2$	White powder to granule	*≤100	—	≤0.5	≤0.5	Melting point °C ≥92	P % ≥8.7	—	—	9.0	308	25kg Paper bag	High hydrolytic stability and heat resistance.	

* Xylene dissolved color

Plasticizers and Solvents

Flame Retardants

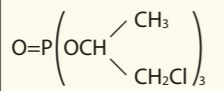
Metal Extractants

Resin Modifiers

Others

Halogen Containing Phosphoric Acid Ester

< > : Measurement condition
() : Typical value

Products	Formula mol.weight	Specifications							Typical Properties					Containers	Description	Uses
		Appearance	Color APHA	Specific Gravity 20/20°C	Acid value KOH mg/g	Water Content %	Heating Loss % 105°C ×3hrs	Refractive Index n _D ²⁰	Freezing Point °C	Viscosity mPa·s/25°C	P %	Halogen %	Flash Point °C			
TMCPP Tris(chloropropyl) phosphate	 328	Colorless to light yellowish clear liquid	≤50	1.293±0.005	≤0.10	≤0.10	≤0.30	1.463±0.003	-40	69	9.5	Cl 32.5	210	250kg Drum	High hydrolytic stability. Low volatility.	Flame retardant for polyvinylchloride, rigid polyurethane foam, polyester and epoxy resin.

Halogen Containing Phosphoric Acid Polyesters

Products	Formula	Specifications							Typical Properties				Containers	Description	Uses
		Appearance	Color APHA	Specific Gravity 20/20°C	Acid value KOH mg/g	Water Content %	Viscosity mPa·s/25°C	Freezing Point °C	P %	Halogen %	Flash Point °C				
CR-504L Chlorine containing aliphatic polyphosphate	—	Colorless to light yellowish clear liquid	≤80	1.330±0.010	≤0.30	≤0.10	800 ~ 1,100	-10	10.8	Cl 23.5	236	250kg Drum	High performance for scorch resistance and high hydrolytic stability. Extremely low volatility.	Flame retardant for various urethane resins such as flexible polyurethane foam, elastomer, paint and molded article.	
CR-570 Chlorine containing aliphatic polyphosphate-phosphonate	—	Colorless to light yellowish clear liquid	—	1.326±0.010	≤0.10	≤0.10	2,000 ~ 6,000	≤-20	12.5	Cl 26.2	214	250kg Drum	Fine containing proportion of phosphorus and halogen. High performance for flame retarding and scorch resistance.	Flame retardant for urethane resins such as flexible and rigid polyurethane foam, elastomer, paint, molded article, as well as unsaturated polyester, epoxy resin and acryl resin.	

Non-Halogen Phosphoric Acid Polyesters (2)

Products	Formula mol.weight	Specifications							Typical Properties				Containers	Description	Uses
		Appearance	Color APHA	Specific Gravity 20/20°C	Acid value KOH mg/g	Water Content %	Viscosity mPa·s/25°C	P %	Freezing Point °C	P %	Hydroxyl Value KOH mg/g	Flash Point °C			
DAIGUARD-580 Non-Halogen aliphatic poly phosphate	—	Colorless to yellowish brown liquid	—	1.235±0.015	≤0.30	≤0.20	2,500 ~ 5,500	—	—	12	≤151	193	220kg Drum	Non-halogen type flame retardant containing hydroxy group with high performance of flame retardancy.	Flame retardant for urethane resins in general, such as flexible polyurethane foam, elastomer, paint and processed article.
DAIGUARD-880 Non-Halogen aliphatic poly phosphonate phosphate	—	*Colorless to light yellowish clear liquid	≤100	1.125±0.005	≤0.2	≤0.5	150 ~ 350	≥14.8	-4	15.5	—	217	200kg Drum	Non-halogen type flame retardant with. Low viscosity. High phosphorus content and high performance of flame retarding.	
DAIGUARD-850 Aliphatic phosphoramidate	—	White powder	—	—	—	—	—	≥16.0	258.5	17.1	—	222	10kg Paper bag	Non-halogen flame retardant that contains phosphorous and nitrogen atoms. Solid at room temperature. High boiling point and low solubility in water and organic solvents.	Flame retardant for backside coating of polyester fiber, synthetic leather and foamed urethane.

*DAIGUARD-880 might be crystallized below 10 °C.