



KANE ACE[®] PA-40

Processability Modifier for PVC



INTRODUCTION

KANE ACE PA-40 is Acrylic processing aid for PVC developed by KANEKA. KANE ACE PA-40 improves wide range of PVC processability resulting in better surface finish and physical properties. KANE ACE PA-40 shows its advantage especially in Semi-rigid and Soft PVC applications.

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1. Powder Properties

Grade		PA-40	PA-20
Item			
Apparent Specific Gravity		0.418	0.495
Particle Size Distribution (%)	16 Mesh on	0	0
	32 "	1	0
	60 "	17	27
	100 "	28	42
	145 "	20	15
	280 "	24	10
	280 " Pass	10	6
Average PSD D 50 (μ)		160	185

2. Physical properties in Rigid PVC

2—1. Gelation behavior by Plastmill

Item \ Grade	PA-40	PA-20
Time for Max. torque (sec.)	96	152
Max. torque (kg · m)	5.61	5.31
* Constant torque (kg · m)	3.94	3.69

* 10 Min. after Max. torque.

Formulation

PVC (KV=57 KANE VINYL S-1007)	:	100	PHR
Octyl-tin mercaptide (TVS #8831)	:	1.5	〃
Epoxidized soyabean oil (O-130S)	:	1.5	〃
Eester of fatty acid (LoxiolG-11)	:	1	〃
Ester of montanic acid (Wax-E)	:	0.5	〃
Processing aid	:	5	〃

Test Conditions

Equipment	:	Labo plastmill model 30C150 (TOYO SEIKI SEISAKU-SHO,LTD.)
Chamber temperature	:	160°C
Charged amount	:	62g
Rotor speed	:	30 r.p.m.
Pre-heating	:	3min.

2—2. Die-swell by rod extrusion

Item	Grade	PA-40	PA-20
	Die-swell (D/Do)	1.7	1.5

Formulation

Same as 2—1.

Test Conditions

Equipment : Labo plastmill model
30C150 (TOYO SEIKI SEISAKU-SHO,LTD.)
Test temperature : C1 =160°C, C2 =160°C, C3 =170°C, D=180°C
Screw type : C.R.=2.7
Screw r.p.m. : 30 r.p.m.
Die-swell = $\frac{\text{diameter of extruded Rod (D)}}{\text{diameter of die opening (D}_0\text{)}}$

2—3. Transparency

Item \ Grade	PA-40	PA-20
Transparency (%)	72	75
Haze (%)	9	8

Formulation

PVC (KV=57 KANE VINYL S-1007)	:	100	PHR
Octyl-tin mercaptide (TVS #8831)	:	1	∕
Eester of fatty acid (LoxiolG-11)	:	0.8	∕
Ester of montanic acid (Wax-E)	:	0.2	∕
Processing aid	:	5	∕

Processing conditions

Roll	:	170°C× 5 min.
Pressing	:	180°C×15 min.

3. Physical properties in Semi-rigid and Soft PVC

3—1. Roll sheet surface / Flow of rolling bank

Item \ Grade	PA-40	PA-20	Non-PA
Surface finish of sheet	○	△	××
Flow of rolling bank	○	△	××

(good : ○ > △ > × > ×× : poor)

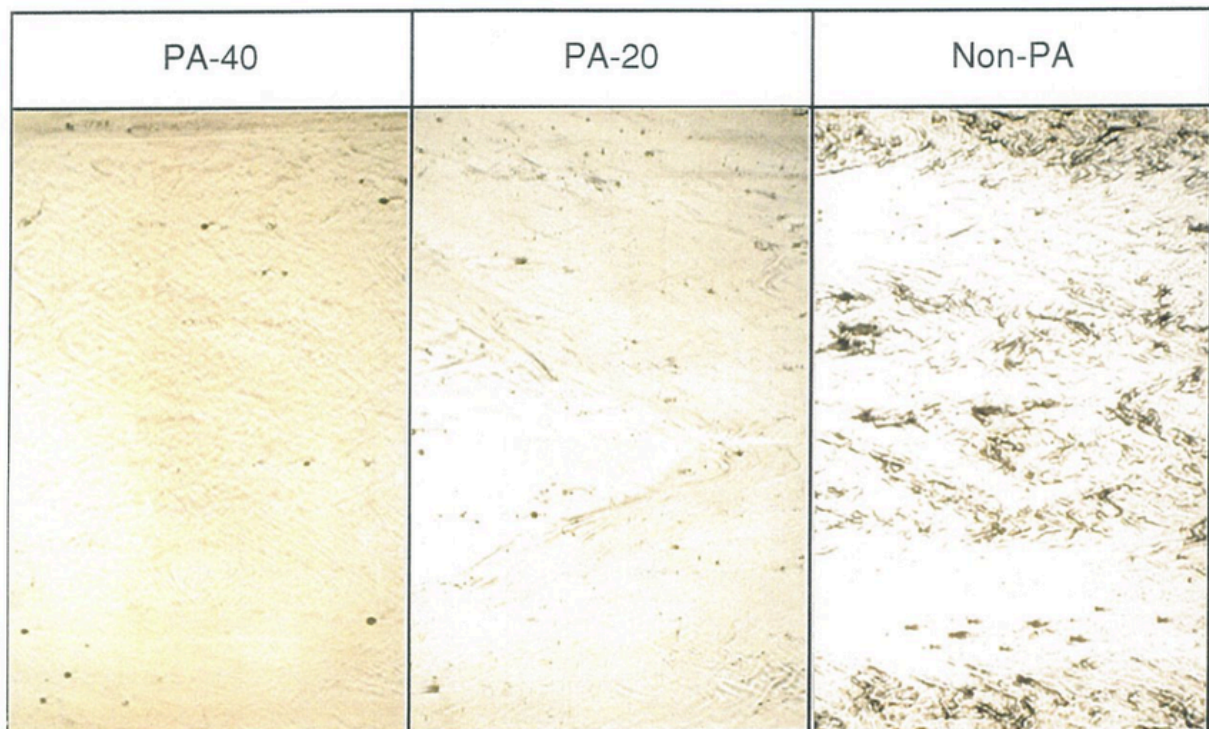
Formulation

PVC (KV=71 KANE VINYL S-1003)	:	100	PHR
Ba-Zn Stabilizer (AC-186)	:	3	〃
DOP	:	40	〃
Processing aid	:	0, 10	〃

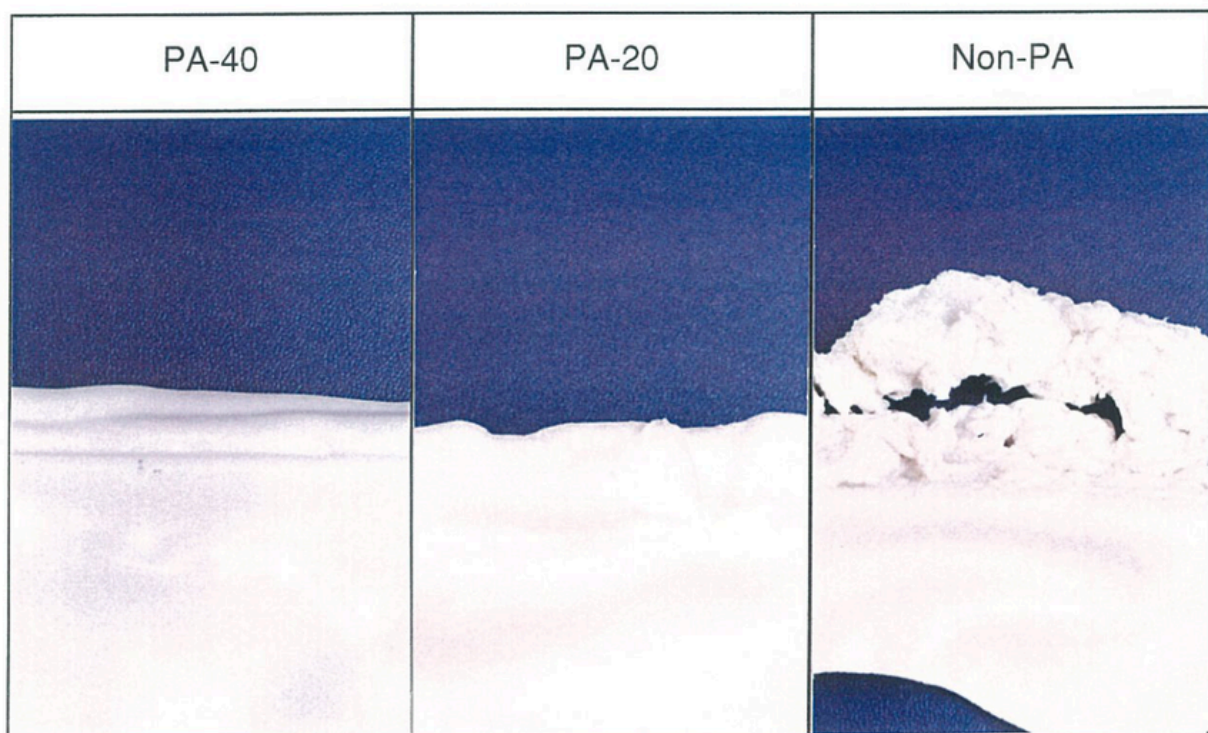
Test Conditions

Roll temperature	:	170°C
Roll r. p. m.	:	Front=14 r.p.m. , Back=16 r.p.m.
Milling time	:	3 min.

Rollsheet surface finish.



Flow of rolling bank.



3-2. Gelation behavior by Plastmill

Test condition	Dosage of DOP (PHR)	Dosage of PA (PHR)	Grade	PA-40	PA-20	Non-PA
			Item			
1	80	2	Time for Max. torque (sec.)	126	Not fusion	Not fusion
			Constant torque (kg · m)	2.47		
2	40	2	Time for Max. torque (sec.)	118	196	Not fusion
			Constant torque (kg · m)	2.15	2.12	
1	40	10	Time for Max. torque (sec.)	95	—	—
			Constant torque (kg · m)	2.00	—	—

Formulation

PVC (KV=71 KANE VINYL S-1003)	: 100	PHR
Ba-Zn stabilizer (AC-186)	: 3	〃
DOP	: 40, 80	〃
Processing aid	: 0, 2, 10	〃

Test conditions

Item	Condition	
	Condition-1	Condition-2
Equipment	Labo plastmill model 30C150 (TOYO SEIKI SEISAKU-SHO, LTD)	
Chamber temperature	130℃	140℃
Charged amount	38.5g	46.5g
Rotor speed	30 r. p. m.	
Pre-heating	2 min.	

3—3. Die-swell by rod extrusion

Item \ Grade		PA-40	PA-20	Non-PA
Die-swell (D/D ₀)	DOP 40 PHR	1.2	1.2	1.1
	DOP 80 PHR	1.4	1.3	1.3

Formulation

PVC (KV=71 KANE VINYL S-1003)	:	100	PHR
Ba-Zn stabilizer (AC-186)	:	3	〃
DOP	:	40, 80	〃
Stearic acid (H-St)	:	0.3	〃
Processing aid	:	0, 2	〃

Test conditions

Equipment	:	Labo plastmill model 30C150 (TOYO SEIKI SEISAKU-SHO, LTD.)
Extrusion temperature	:	C1 =140°C, C2 =150°C, C3 =160°C, D=160°C
Screw type	:	C.R.=2.7
Screw speed	:	30 r.p.m.

Die-swell = $\frac{\text{diameter of extruded Rod (D)}}{\text{diameter of die-opening (D}_0\text{)}}$

3—4. Fish-eye quality

Item	Grade	PA-40	PA-20
Fish-eye		290	1200

Formulation

PVC (KV=57 KANE VINYL S-1007)	:	100	PHR
Dibasic lead phosphite (DLP)	:	1	〃
Lead stearate (Pb-St)	:	0.5	〃
DOP	:	100	〃
Titanium oxide (TiO ₂)	:	0.3	〃
Carbon Black	:	0.02	〃
Processing aid	:	5	〃

Test conditions

Roll milling	:	140°C×7min.
Roll r. p. m.	:	Front=16 r.p.m. , Back=15 r.p.m.
Sheet thickness	:	0.3mm

3—5. Drooping at high temperature

Item	Grade		PA-40	PA-20	Non-PA
	Loading time (min.)				
Drooping (%)	5		8.1	13.7	15.2
	15		9.8	18.3	21.7
	25		12.7	30.0	34.1

Formulation

Same as 3—1.

Processing conditions

Roll : 170°C×5 min.

Roll r. p. m. : Front=16 r.p.m. , Back=14 r.p.m.

Test conditions

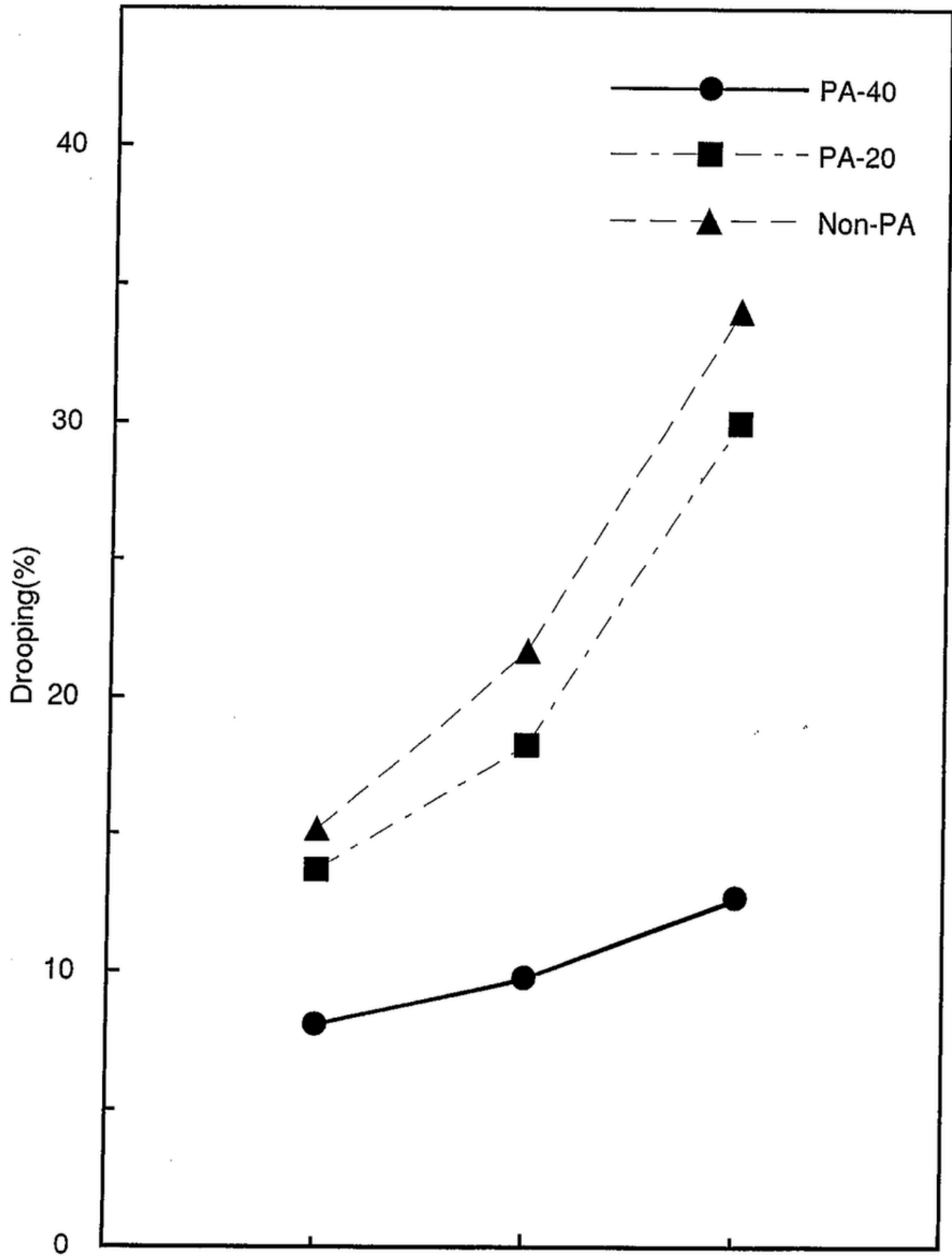
Test temperature : 180°C

Loading time : 5, 15, 25 min.

Test piece : 220mm×25mm×1mm

Load : 10g

Annealing : 180°C×5 min.



3—6. Volume Resistivity

Item	Dosage of DOP (PHR)	Grade	
		PA-40	PA-20
Volume Resistivity (Ω cm)	40	2×10^{13}	2×10^{13}
	80	3×10^{11}	2×10^{11}

Formulation

PVC (KV=71 KANE VINYL S-1003)	: 100	PHR
Ba-Zn stabilizer (AC-186)	: 3	〃
DOP	: 40, 80	〃
Processing aid	: 2	〃

Processing conditions

Roll	: 170°C × 5 min.
Pressing	: 180°C × 10 min.

Test conditions

Test piece	: 120mm × 120mm × 1mm
Voltage	: 1000V

3—7. Elongation

(Unit : %)

Dosage of DOP (PHR)	Dosage of PA (PHR)	Grade	PA-40	PA-20	Non-PA
		Measured temperature			
40	2	23℃	348	316	296
		120℃	384	345	305
	10	23℃	345	323	—
		120℃	389	361	—
80	2	23℃	598	579	543
		120℃	428	402	462

Formulation

PVC (KV=71 KANE VINYL S-1003)	: 100	PHR
Ba-Zn stabilizer (AC-186)	: 3	◇
DOP	: 40, 80	◇
Processing aid	: 0, 2, 10	◇

Processing conditions

Roll	: 170℃× 5 min.
Pressing	: 180℃× 10 min.

Test conditions

Dumbell type	: JIS—III
Test speed	: 200mm/min.

3—8. Modulus

(kg/cm²)

Measured temperature (°C)	Grade	PA-40	PA-20	Non-PA
	Elongation			
23°C	10%	73	68	52
	50%	121	107	95
	100%	155	136	113
120°C	10%	3.2	2.4	2.7
	50%	5.2	4.9	4.6
	100%	7.7	6.5	5.8

Formulation

PVC (KV=71 KANE VINYL S-1003) : 100 PHR
 Ba-Zn stabilizer (AC-186) : 3 //
 DOP : 40 //
 Processing aid : 0,10 //

Processing conditions

Same as 3—7.

Test conditions

Same as 3—7.

3—9. Transparency

Item \ Grade	PA-40	PA-20	Non-PA
Transparency (%)	86.8	89.3	89.6
Haze (%)	6.3	4.4	6.8

Formulation

PVC (KV=71 KANE VINYL S-1003)	:	100	PHR
Ba-Zn Stabilizer (AC-186)	:	3	〃
DOP	:	40	〃
Processing aid	:	0, 2	〃

Processing conditions

Roll	:	170°C× 5min.
Pressing	:	180°C× 15min.



Important Notice

All technical statements, information and recommendation in this TECHNICAL DATA are based on tests and data which are believed to be reliable.

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