

# **METABLEN P-551J**

Processing add for PVC resin

**Mitsubishi Chemical Corporation**

METABLEN Department

Acrylic Polymers, Otake R&D Center

# *Technical information*

- METABLEN P-551J is a new developed processing aid for rigid PVC building materials extrusion application.
- METABLEN P-551J has good metal release ability and same processability as conventional processing aid.

# Characteristic of Metablen P-551J

Weight-average  
molecular weight

(\*10<sup>4</sup>)

50

100

150

250

300

450

Solution viscosity

1.0

2.9

3.6

4.0

7.0

9.0

13.0

P-570A

P-501A

P-560J

**P-551J**

P-540J

P-533J

P-531A

Rigid Calendering (Prevent Flow mark)

Flexible Calendering (High filler ratio)

Extrusion molding (Improve surface appearance)

Foam application (Uniformed cell size)

Injection molding (Prevent jetting)

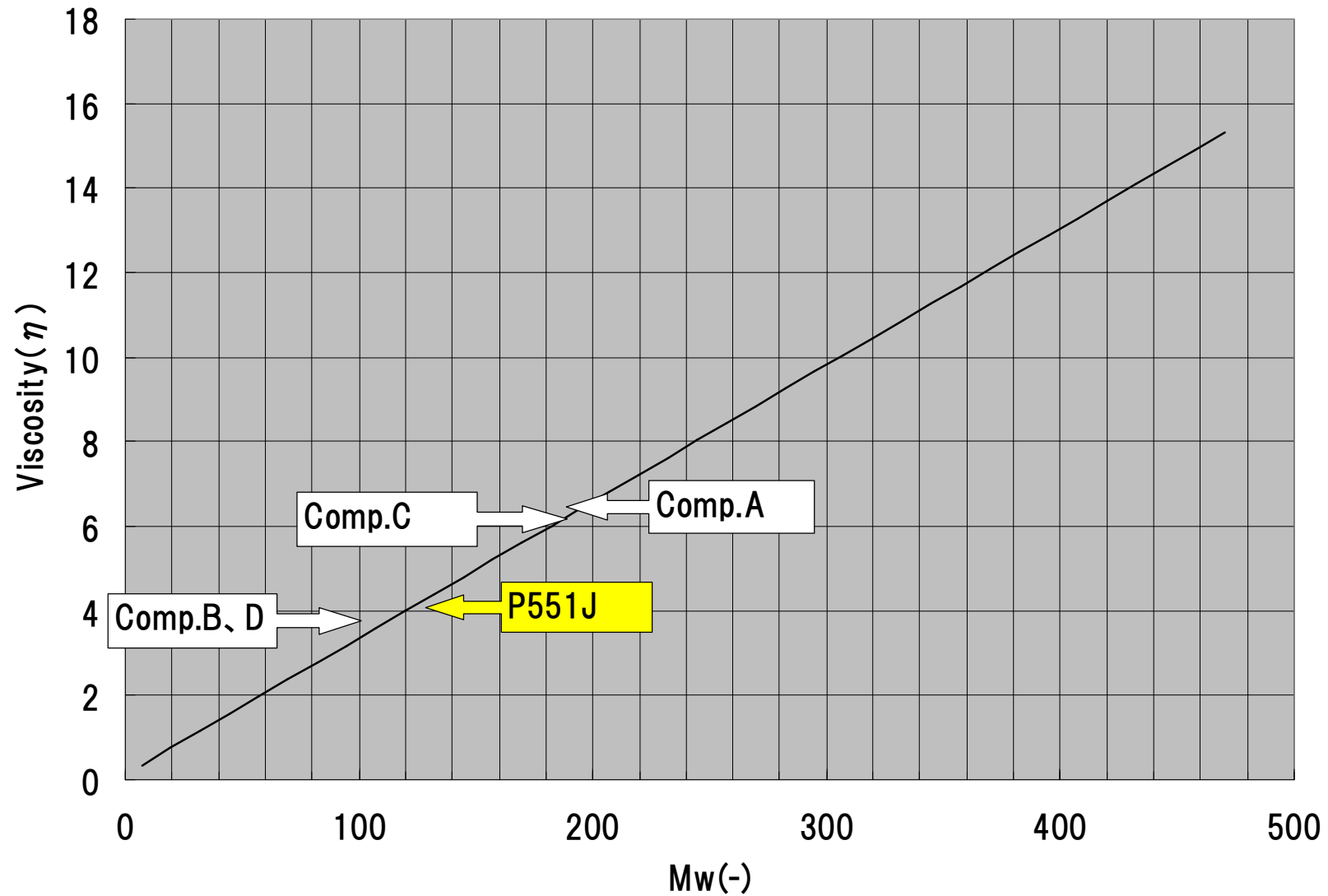
Secondary molding (Vacuum moldability)

Blow molding (Prevent drawdown)

# Typical powder property

			P-551J
Powder property	Viscosity (MCC method)	-	4.0
	Moisture	%	<1.5
	Bulk density	g/cm <sup>3</sup>	0.5 0.2
	Average particle size	μm	90

# Relations of viscosity and the molecular weight by the MCC method



# Rigid PVC Formulation (Pb Stabilizer)

	Shear Viscosity			Fusion behavior			Charpy impact strength			Flexural property	
	180°C	190°C	200°C	Fusion time	Max. torque	Equil. torque	23°C	0°C	-10°C	23°C	
	(Pa.s)			(sec.)	(N·m)	(N·m)	(KJ/m <sup>2</sup> )			(MPa)	(MPa)
Blank	4904	4146	3146	174	45.8	37.0	-	-	-	-	-
P-551J	4954	4175	3153	74	52.2	39.7	106.3	15.4	10.6	2900	68.1
Comp.A	-	4253	3177	94	52.2	40.9	106.3	17.1	11.6	2830	69.6
Comp.B	-	4138	3096	86	51.2	39.5	111.8	16.0	11.1	2966	68.9
Comp.C	-	4160	3200	90	50.8	40.8	98.4	15.9	10.7	2869	69.3
Comp.D	4837	4079	3159	68	53.2	39.3	110.7	16.2	11.6	2903	68.9

## Formulation(Pb stabilizer)

PVC(Pn=1000)	100
Pb type stabilizer	4.1
Calcium stearate	1.8
Filler(CaCO <sub>3</sub> )	20.0
METABLEN C-223A	4.0
Processing aid	2.0

## [molding condition of Charpy impact test piece and flexural property test piece]

8 inch test roll  
 Temperature; 190deg.C-3min  
 Press:190deg.C-5min  
 4mmt

## [Test condition]

Shear viscosity  
 Capillary rheometer  
 L/D=10/1  
 Shear rate (/s): 148  
 Fusion behavior  
 Plastmill  
 Temperature; 170 deg.C  
 Screw rotation speed; 30rpm  
 Charge amount; 55g  
 Flexural property/  
 Size:80mm × 10mm × 4mmt  
 Speed:2mm/min.

# Rigid PVC Formulation (Tin Stabilizer)

	Fusion behavior (140deg. c)			fusion behavior (170deg. c)		Metal release	Color		Transparency	
	Fusion time (sec.)	Max. torque (N·m)	Equil. torque (N·m)	Fusion time (sec.)	Equil. torque (N·m)	Sticking time (min.)	Trans parent (-)	Reflection (-)	Total Transmission (%)	Haze
P-551J	84	67	46	45	44	20.0	-32	-40	59.8	11.1
Comp.A	96	65	45	46	44	11.0	-30	-34	58.7	11.8
Comp.B	126	64	45	-	-	9.0	-33	-40	59.6	11.3
Comp.C	100	65	45	52	44	10.0	-33	-35	58.8	11.5

## Formulation(Tin stabilizer)

PVC(Pn=700)	100
Tin type stabilizer	1.3
Internal lubricant	0.5
External lubricant	0.5
Wax-OP	0.2
METABLEN C-215A	6.0
Processing aid	2.0

## Formulation(roll release ability)

PVC(Pn=700)	100
Tin type stabilizer	1.2
Internal lubricant	0.8
External lubricant	0.5
METABLEN C-201A	6.0
Processing aid	2.0

## [molding condition of transparency and YI test piece]

8 inch test roll  
 Temperature; 190deg.C-3min  
 Press:180deg.C-6.5min  
 3mmt

## [Test condition]

Fusion behavior  
 Plastmill  
 Temperature; 140 or 170deg.C  
 Screw rotation speed; 30rpm  
 Charge amount; 60g

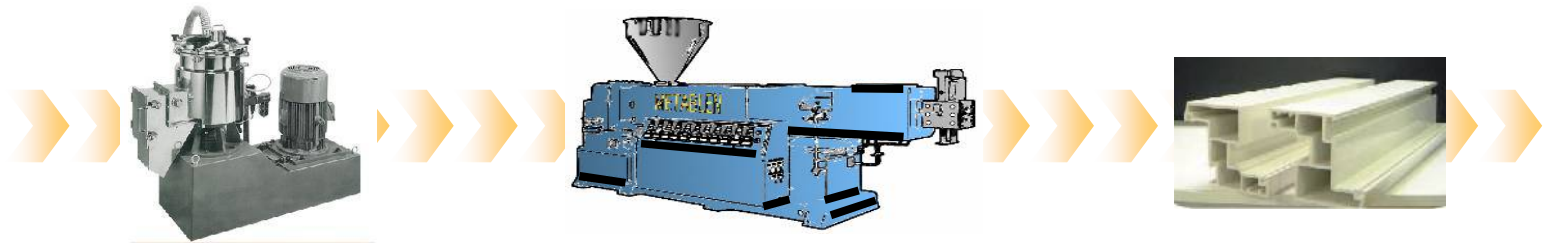
## [Test condition]

Roll release ability  
 8 inch test roll  
 Temperature; 195deg.C  
 Roll rotation speed;  
 Front/17rpm, Back/14rpm

In the case of low processing temperature, fusion time is faster than competitor on tin stabilizer.

# Processing aid summery

★Each processing aid has its own timing to work effectively★



Avoid clumping  
(Thermal stability,  
plasticizer absorption)

Acceleration  
of fusion

Lubricity  
(Torque, exotherm)

Melt tension

Lubricity  
(Die deposit,  
productivity)

P-570A	○	➔➔➔➔	➔	➔	➔
P-551J	—	➔➔➔	—	➔➔	—
P-533J	—	➔➔	—	➔➔➔	—
P-700	○	➔➔	➔	➔	➔
P-710	○	—	➔➔	—	➔➔
L-1000	○	➔	➔➔	—	➔➔



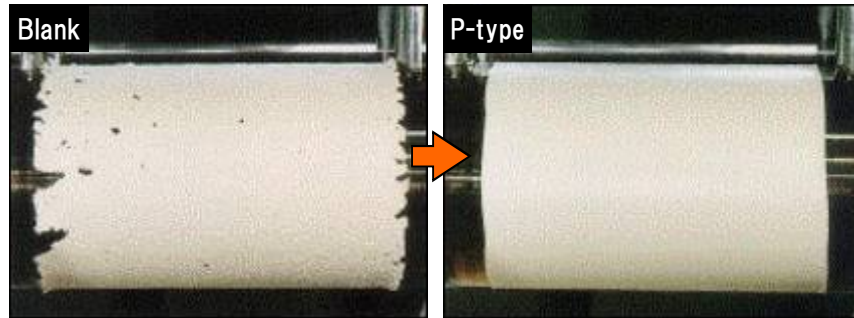
# Characteristic of Metablen P-551J

		P-570A	P-560J	P-551J	P-533J	P-531A
<b>Molecular weight</b>		Low	<-	-	->	High
<b>Performance</b>	Accelerated fusion of PVC	+++++	+++	++++	++++	+++
	Improving calendering processability	+++	+++++	++++	++	+
	Improving dispersion of additives	+	++++	++++	++++	+++
	Preventing jetting on injection molding	+	+++	++++	++++	+++
	Processability on foam extrusion	+	++	+++	+++++	+++
	Preventing draw down	+	+++	+++	+++++	+++++
<b>Application</b>	Calendering (rigid)	O	O	O		
	Calendering (flexible)		O	O	O	O
	Injection molding			O	O	
	Extrusion (film, sheet, pipe, profile etc.)	O	O	O	O	
	Extrusion (foam)				O	O
	Blow molding			O		
	Thermoforming (vacuum and pressure)			O	O	

# Effect of Metablen

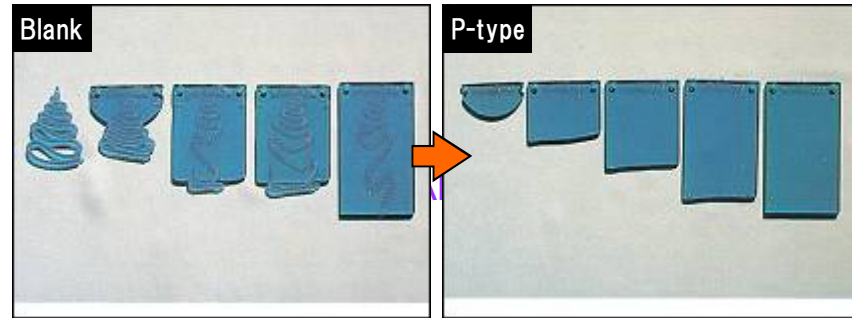
## Roll molding

Acceleration of fusion, state of bank (PVC, PO)



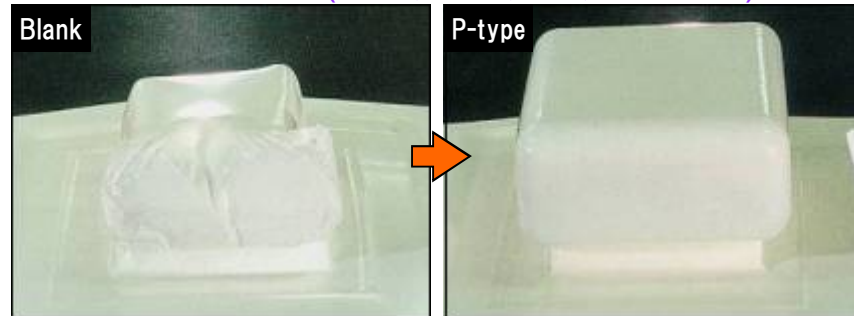
## Injection molding

Prevent jetting (PVC, ABS, TPO)



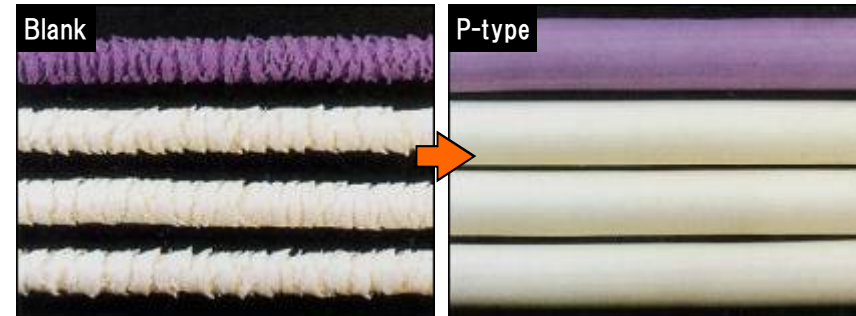
## Vacuum molding

Uniform thickness (PVC, ABS, PO, PBT etc.)



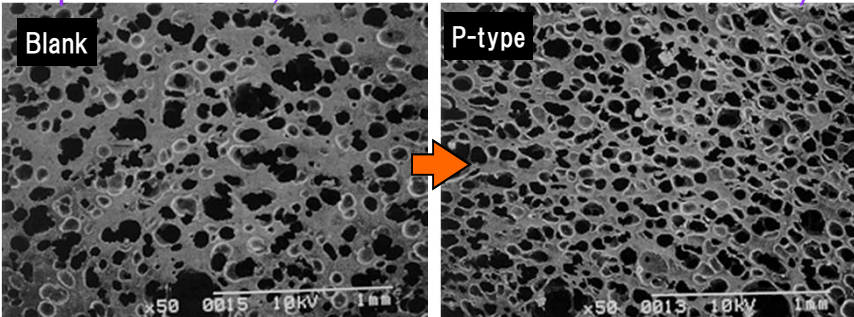
## High speed extruding

Prevent melt-fracture, Stable extruding (PVC, PO, TPO)



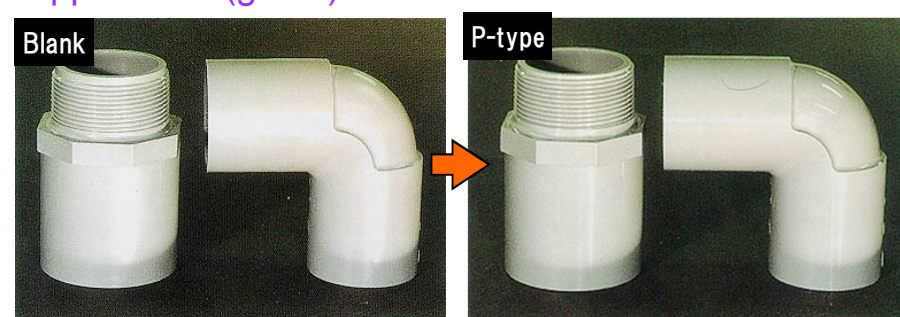
## Form molding

Expansion ratio, Cell uniform (PVC, PO, ABS)



## Fitting

Appearance(gross) (PVC, PO, TPO)



# *For further information,*

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