POKETONE™
HYOSUNG POLYKETONE

Flame retarded (0.8mm V-0), high-flow injection moulding grade

POKETONE Polymer M33AF2Y

POKETONE Thermoplastic Polymers are aliphatic polyketones, a revolutionary new class of semi-crystalline thermoplastics. Hyosung developed new catalyst to produce this unique polymer at in 2013 and constructed commercial plant in 2015, in Ulsan, Korea.

POKETONE Polymer M33AF2Y is a flame-retarded high-flow injection moulding grade with mechanical properties which classify it as an engineerring thermoplastic. This grade offers UL94 V-0 rating, high comparative tracking and glow-wire indices, all without the use of halogenated or red phosphorus flame retardants. The benign flame-retardant system used for POKETONE Polymer M33AF2Y ensures that the smoke density and toxicity are both low. Yet this grade retains the exceptional blend of properties of the base polymer, such as low moisture absorption, good toughness and high resistance to a wide range of chemicals.

POKETONE Polymer M33AF2Y is an advanced high-flow, low-viscosity polymer that should be considered for mouldings with long flow paths or thin walls. This grade is very easy to process on standrad injection moulding equipment. Cycle times are generally short. Parts show good mould definition with glossy mar-resistant surfaces. POKETONE Polymer's low moisuture sensitivity means that no conditioning of parts before assembly or use is necessary.

Applications of POKETONE Polymer M33AF2Y may be found in the automotive, electrical, electronics, industrial and consumer applicance markets.

TABLE 1 : TYPICAL MECHANICAL PROPERTIES OF POKETONE POLYMER M33AF2Y – Measured at 23℃

	Test Method & Conditions		ASTM Values	ISO Values
	ASTM	ISO	SI	SI
Tensile strength at yield	D638	527-1	50 MPa	50MPa
Tensile modulus	D638	527-1	1,850 MPa	1,700 MPa
Tensile elongation at break	D638	527-1	40 %	40 %
Flexural strength	D790	178	58 MPa	56 MPa
Flexural modulus	D790	178	1,700 MPa	1,550 MPa
Notched Izod impact strength	D256	180/A	70 J /m	6 kJ/m^2
Notched Charpy impact strength	-	179/1eA	-	8 kJ/m^2

TABLE 2: TYPICAL PHYSICAL PROPERTIES OF POKETONE POLYMER M33AF2Y – Measured at 23℃

	Test Method & Conditions		ASTM Values	ISO Values
	ASTM	ISO	SI	SI
Specific gravity	D792	1183	1.26g/cm^3	1.26g/cm^3
Water absorption equilibrium at 50% RH	D570	62	0.5 %	0.5 %
Water absorption at saturation	D570	62	1.9 %	1.9 %

TABLE 3: TYPICAL THERMAL PROPERTIES OF POKETONE POLYMER M33AF2Y

	Test Method & Conditions		ASTM Values	ISO Values
	ASTM	ISO	SI	SI
Melting temperature	D3418	11357	222℃	222℃
Vicat softening point	D1525 5kg	306/B50 50N	185℃	185℃
Heat deflection temperature	D648 66psi 264psi	75 0.45MPa 1.8 MPa	190℃ 110℃	185℃ 90℃

TABLE 4: TYPICAL PROCESS RELATED PROPERTIES OF POKETONE POLYMER M33AF2Y				
	Test Method & Conditions		ASTM Values	ISO Values
	ASTM	ISO	SI	SI
Melt flox index 240℃/2.16kg	D1238	1133	34 g/10 min	32㎖/10min
Mould shrinkage	D955 MD, 3mm TD, 3mm	-	1.3 % 1.4 %	-

TABLE 6: TYPICAL FLAMMABILITY PROPERTIES OF POKETONE POLYMER M33AF2Y		
	Test Method & Conditions	Values
Flame resistance	UL94	V-0 (0.8mm)
Glow wire flammability index	IEC 60695-2-12	960℃ (2mm)
Glow wire ignition temperture	IEC 60695-2-13	800℃ (2mm)

TABLE 5: TYPICAL ELECTRICAL PROPERTIES OF POKETONE POLYMER M33AF2Y		
	Test Method & Conditions	ASTM Values
	ASTM	SI
Dielectric sterngth, Short term	D149 3 mm 2 mm	 16 kV/mm 22 kV/mm
Volume resistivity	D257	10^{13} ohm cm
Surface resistivity	D257	10^{17} ohm/sq.
Dielectric constant at 60Hz	D150	5.7
Dissipation factor at 60Hz	D150	0.015

TABLE 7: UL-746A SHORT TERM PERFORMANCE CATEGORIES FOR POKETONE POLYMER M33AF2Y			
	Minimum Thickness (mm)		
	0.8	1.6	3.0
HWI	1	1	1
HAI	0	0	0
HVTR	-	-	2
CTI	-	-	0

TABLE 8 : TYPICAL INJECTION GUIDE OF POKETONE POLYMER M33AF2Y		
	Nominal Value	Unit
Drying Temperature	80	℃
Drying Time	3.0 to 4.0	hr
Suggested Max Moisture	0.20	%
Rear Temperature	210	℃
Middle Temperature	215 to 220	℃
Front Temperature	230	℃
Nozzle Temperature	240	℃
Processing (Melt) Temp	225 to 240	℃
Mold Temperature	60 to 80	℃
Back Pressure	0.294 to 0.686	MPa
Screw Speed	50 to 100	rpm

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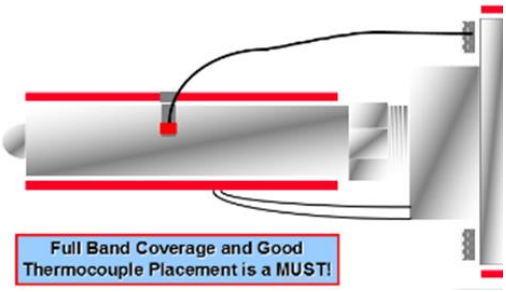
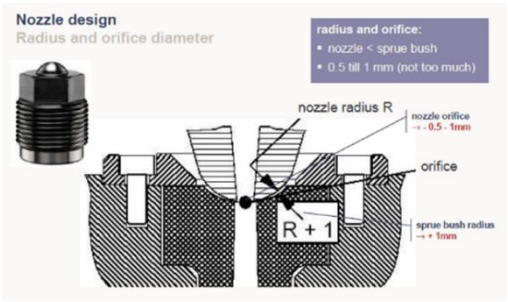
Advanced Injection process guide for POKETONE

Nozzle design of Injection machine



Well-controlled heated nozzles as using enough capacity heater and Separated thermo-couple are strongly recommended to prevent freeze-off issue at nozzle due to small sized nozzle orifice or rapid solidification of POKETONE.

Recommended nozzle orifice size
Small sized m/c (200T less): min. Ø 3.5mm
Mid sized m/c (200~450T): min. Ø 4.0mm
Mid~Large m/c (500T over): min. Ø 5.0mm



Purging

Strongly recommend immediate thoroughly purged before or after injection of POKETONE Polymers at processing temperature with purging material such as PCTG, HDPE, GPPS or other commercially available purging compounds.

Shut-down Procedure

At the completion of the molding run at normal barrel temperature (about 230~240℃), all traces of POKETONE should be thoroughly purged at processing temperature from the barrel with purging material such as PCTG, high viscosity-PP, HDPE, GPPS or other commercially available purging compound. (Should be immediately purged after POKETONE molding)
After the purge appears clean, the screw is left in the forward position. Barrel and nozzle heats can then be turned off.
(Can be purged several times at higher barrel temperature of 270~300℃ for better cleaning of POKETONE, then purge again at the normal barrel temperature (about 240 ℃) till purging clears.)

Color master-batch, pigment Blending

Color additives dry blending, we recommend check the color guide leaflet in POKETONE homepage contacting us and discussing about it

Hot runner

While most of crystalline engineering thermoplastics polymer including POKETONE Polymer is more heat-sensitive than amorphous polymer, careful treatment in hot runner system is needed.
- The manifold should be well-balanced without dead spot (hold-up) on flow path, and externally heated manifolds are preferred versus internally heated ones, as they allow better streamlining at intersections and generate less shear for the polymer.
- Direct gating on the part surface is not recommended to avoid aesthetic issue on surface such as flow mark, cold slug and other quality issues.
- The hot runner manifold channels should be unrestricted without sharp corners or flow obstructions. Flow restrictions will increase the shear on the material and may result in discoloration or degradation of the melt resin.
- Any hold-up spot in flow path, which will tend to thermally degrade due to excessive residence time, should be avoided, and also needed to be polished in flow path. Excessive residence time in the hot runner manifold should be avoided as it can result in material degradation which can make poor surface issue and easily part broken.
- Separate temperature controllers for each drop and each location on the manifold is essential. The controlling thermocouple for each heat source in the manifold should be close to the melting resin.
- More precisely heat controlling at nozzle tip both in hot runner and cold runner is strongly recommended due to fast solidification at Tc for POKETONE Polymers, as using separated thermocouple and full covered heater (enough capacity of heater) on hot drop or nozzle tip.)

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