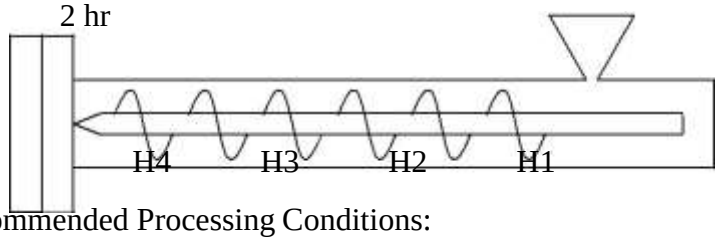
PS RESIN PROCESSING CONDITIONS

1. Drying: Polystyrene can be directly processed under normal conditions except for the following:

   A: contains recycling material.

   B: slightly higher humidity of the environment.

   C: abnormal storage conditions, pre-drying is recommended at 75℃ for 1-2 hr



2. Recommended Processing Conditions:

Grade	Processing Temperature Range(℃)	Mold Temp.(℃)	Barrel Temperature(℃)				Funnel Material Temp.(℃)
			H4	H3	H2	H1	
GP5000	160～210	20～70	195	200	185	170	40
GP5250 GP525N	170～215	20～70	200	205	195	180	40
GP5350 GP535A GP535N GP535P GP535H	180～225	20～70	205	215	205	185	40
GP5500 GP550N GP560N	190～230	20～70	215	220	210	195	40
MP6500	170～215	20～70	200	205	195	180	40
HP825E	180～220	20～70	205	210	200	190	40
HP825F HP825T	180～220	20～70	205	210	200	190	40
HP8250 HP825N HP825G HP825S	180～220	20～70	205	210	200	190	40
HP9450	190～230	20～70	215	220	210	200	40

Notes: Modifications of the processing conditions based on the variations of the product thickness and dimension and the design of sprue, gate, and runner are recommended.

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3. Set-up of the Equipment Operation Conditions

3.1 Barrel Temperature The barrel temperature during the injection molding of polystyrene should be as low as possible provided that polystyrene is running without any problem. However, the temperature is usually set slightly higher due to the difficulty of precise temperature control during the operation.

3.2 Measurement and Injection Pressure

The optimal condition is achieved when the screw injects the material into the mold cavity and the screw also moves to the highest point. However, due to the deviation of the measurement of the material, the actual measurement is usually 5% more than the theoretical volume. The holding pressure is usually 90% of the injection pressure.

3.3 Injection Speed

The higher the injection speed, the better it is. However, flashing occurs when the speed is too high and the weld line becomes obvious when the speed is too low. Therefore, the injection speed shall start from the medium speed.

3.4 Cooling Time

The cooling time depends on the cooling ability of the mold. However, the screw rotation speed can be increased to shorten the molding cycle if the screw backing time is longer than the cooling time.

3.5 Screw Rotation

In the absence of back pressure, polystyrene will introduce air to affect the measurement. Therefore, 10% back pressure is usually added.

3.6 Mold Temperature

The mold should be cooled by the circulation of a large quantity of water by a cold (warm) water machine. The outlet temperature of the warm water machine should be set 5℃ lower than the mold temperature.

4. Molding Precautions

4.1 Use of the Release Agent

The release agent should not be used unless necessary. When it is necessary, please use the release agent exclusively for plastic molding such as the polysilane release agent. Avoid the use of the ordinary release agent. A small amount of the agent will be applied during the use and the excess amount should be removed. Problems are usually encountered during the second processing (painting and hot stamping) or the weld line becomes more obvious during molding when the release agent is used for the molding product.

4.2 Stress Cracking

Cracking usually happens some time after the assembly of the molding product

with remaining stress such as embedded objects or lock screws. As a result of the reduction of the force supporting the stress from the long term exposure of polystyrene to solvents and oils, cracking still occurs due to excessive tension regardless of the absence of the action of the oils.

The test results show that the long term exposure to lubricants, rust proof oils, cutting oils, lamp oils, edible oils, fruit oils, detergents, polish agents, pesticides, and hair oils will lead to stress cracking. The cracking phenomenon is rather obvious in general purpose polystyrene.

Cracking of polystyrene occurs from the long term exposure to soft PVC due to the shift of the plasticizer from soft PVC to PS. The cracking can be prevented with a layer of PE between soft PVC and PS.

Molding Conditions for Stress Cracking Reduction

Reduction of injection pressure, increase of resin temperature and mold temperature, shortening of holding pressure time

Prevention of Stress Cracking - Annealing

After molding, product is slowly cooled for 2 hr at a temperature of 5-10℃ near the heat deflection temperature. However, the actual annealing process is rather difficult to operate and most companies fail.

4.3 Molding Dimension Stability

If the dimension is still unstable even when the molding conditions are not changed and the same batch of material is used the following factors should be taken into consideration:

4.3.1 Different Dimensions during daytime and nighttime

4.3.2 Same mold but different machines

4.3.3 Deviation of cavities during molding with multiple molds

4.4 Changes of Physical Properties from Repetitive Processing

FCFC impact resistant polystyrene possesses excellent mechanical properties that allow the conservation of impact resistance strength to some extent after repetitive recycling and processing. However, if the recycling material is used 100% for processing, the color will gradually turn yellow with increasing amounts of processing. As a result, the characteristics and the quality of the product should be taken into consideration prior to the use of the recycling material. The optimal mixing ratio of the recycling material and the fresh material and the number of recycling uses should be determined after the adequate assessment to avoid the variation of the product quality. In general, the best mixing ratio is within 25%. In addition, because the FR-HIPS grades contain the frame retardant, the best mixing ratio is within 10%.