Arnitel®

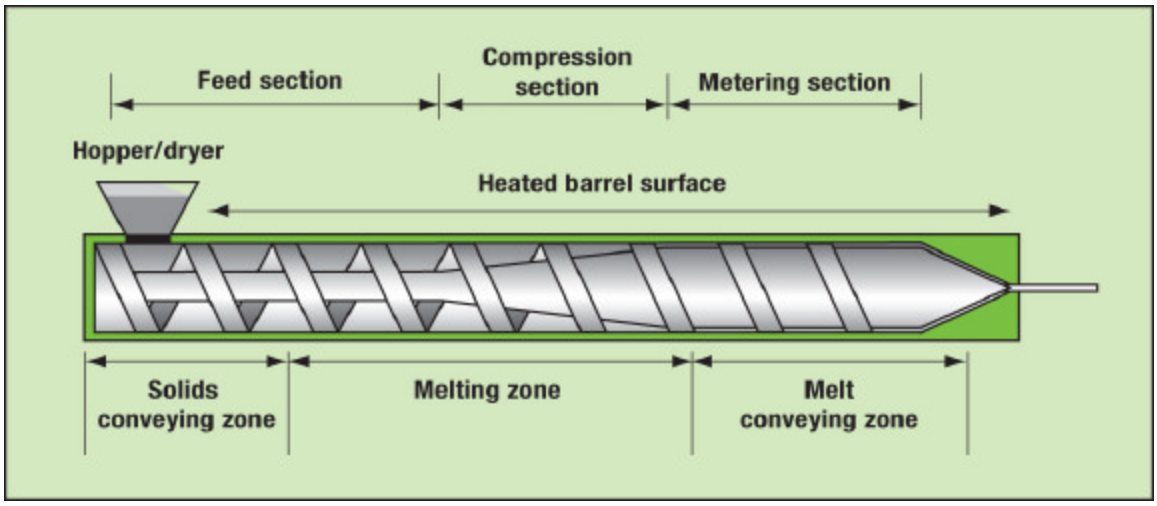
Recommendations for Extrusion

Machinery

Conventional single screw extruders can be used for the extrusion processing of Arnitel.

Extruder barrel: Extruder barrels for polyamide, polyester and polyolefins are usually suitable for Arnitel. Barrels with axial grooves and intense cooling of the intake zone require special attention during startup and cooling should be avoided.

Screw design: Good melt quality can be obtained with conventional single screw extruders equipped with a 3-zone screw as shown in the figure below. However well designed barrier screw achieves the best results in terms of melt quality without any possibility of any part of unmolten polymer. Also a mixing device at the end of the metering section enforces a homogenous melt temperature.



Length to diameter ratios of 25 or higher provides the best melt quality. The clearance between screw flights and barrel should be small:

- 0.08-0.10 mm for extruders up to 45 mm in screw diameter
- 0.1-0.15 mm for larger extruders

The compression ratios should be between 2.4 and 3.2, determined by the depth of the feed section divided by the depth of the metering section. For continuous extrusion a ratio of 3 is preferred.

The channel depth of both the feed and metering section is important; if the feed channel is too deep and not long enough, particularly with large diameter screws, poor feeding and loss of output can result.

If the metering channel is too deep, insufficient pressure will be built up resulting in irregular output, particularly with low viscosity grades. A metering channel, which is too shallow can result in overheating of the melt due to high shear, particularly with high-viscosity types.

On the two heating zones situated directly downstream from the hopper, the heater bands should have a power of 4-5 W/cm^2. For the remaining zones, a power of 1.5 W/cm^2 is sufficient. Extruder startup needs a motor power of approximately 0.3 kWh/kg output, after which an motor power of 0.15-0.2 kWh/kg output is sufficient. Heating bands and thermocouples should be installed at strategic positions to avoid overheating of the melt. All positions that are not directly heated should be avoided.

Characteristic design parameters 3-zone screw					
Screw length	25-30				
Pitch	1D				
Extruder diameter	**mm**	**30**	**45**	**60**	**90**
Length of section					
Feed section	D	7-10	7-10	7-10	7-10
Compression section	D	4-6	4-6	4-6	4-6
Metering section	D	8-11	8-11	8-11	8-11
Channel depth					
Feed section	mm	6	7	11	17
Metering section	mm	2	2.5	4	5

Extrusion temperatures for some Arnitel grades

Arnitel® Grade	Melting point (°C)	Melt Volume Rate (230°C/2.16 kg) (dg/min)	Melt* temp. mininum (°C)	Melt* temp. maximum (°C)
EL250	180	35	195	240
EM400	195	30	205	240
EM402-L	195	30	205	240
EM460	185	50	195	240
EM550	207	8	215	260
EM630	212	4	225	260
EM740	221	4.8	230	260
EL740	221	15	230	260
PM381	212	4	225	260
PM460	216	7	225	260
PM581	218	11	225	260
PM650	221	4	230	260
UM551	195	16	210	260
UM551-V	200	15	210	260
UM552	195	7	210	260

* *Measured via hand-held pyrometer*

Links to:

Material Handling

DSM Sales Offices

Technical query form