I. Sheet Extrusion Dies

The job of the sheet die is to shape the hot, putty-like plastic melt from the extruder, into a flat rectangular web of uniform thickness to feed into the roll stack.

NOTE: Sheet die designs vary depending on the required sheet thickness, the characteristics of the sheet being produced, the type of plastic used, and the allowable cost.

A. Sheet die sizes

1. Typically, sheet dies are two to six feet wide, but they can as wide as ten feet.
Notes

II. Sheet Die Construction

A. Typical sheet die operating temperatures: 360° F to 600° F (182° C to 316° C).

B. Sheet die inlet pressures: Up to 5000 psi (345 bar).

C. Dies are usually made of chrome or nickel plated tool steel.
   1. For some applications, for example PVC, dies can be made from stainless steel.

III. Parts of the Sheet Die

Sheet dies have an upper and a lower half. In each half, channels are machined to create a flow passage inside when the halves are put together. This flow passage consists of a primary manifold, a preland, a secondary manifold, and the lip land. The entire manifold is polished, and usually chrome plated, for a smooth, wear resistant surface.
During assembly, the die halves are aligned with dowel pins and are held together with body bolts.

High temperature gaskets seal the two ends of the die to prevent plastic leakage.
A. Mounting flange and adapter

1. The mounting flange connects the die to the extruder. If the die inlet does not exactly match the outlet of the extruder, an adapter may be needed to allow smooth plastic flow into the die.

B. Sheet die temperature control

1. Die body temperatures are measured by:
   a. Thermocouples
   b. RTD’s
   c. Other temperature sensing instruments

2. Types of die body heaters
   a. Electric cartridge heaters
      1. Placed into cored out areas of the die body
   b. Surface heaters
   c. Heat transfer tubes

3. Placement of die heaters
   a. Dies are normally zoned with heaters across the top and bottom widths of the die.
   b. Dies can also be zoned independently top to bottom.
   c. Sometimes die bodies have cooling zones using air or liquid.

*NOTE: Any temperature variations across the die can produce thickness variations in the sheet, with hotter areas becoming thicker from increased melt flow; and colder areas becoming thinner from decreased flow. Too high a temperature can cause burning of the plastic, or cause it to degrade.*

C. Restrictor bar

1. Restrictor bar adjustment bolts
   a. Restrictor bolts are usually spaced 3” (7.6cm) apart.
   b. Adjusting the bolts will bend a bar, called a restrictor or choke bar, which changes the plastic flow within the die.

2. Restrictor bars use a push-pull adjustment system.
   a. A closing adjustment will push the bar and make the flow passage more restrictive.