Coefficient of friction

The coefficient of friction must be known for the calculation of constructions such as bearings, snap fits and threads. The coefficient of friction depends on several factors:
- the material,
- the hardness of the counter surface,
- the surface roughness,
- the service temperature,
- the surface pressure,
- the sliding velocity,
- running-in phenomena, elapsed time and
- additives.

Frictional properties of plastics differ markedly from those of metals. The rigidity of even the highly reinforced resins is low compared to that of metals; therefore, plastics do not behave according to the classic laws of friction. Metal to plastic friction is characterized by adhesion and deformation of the plastic, resulting in frictional forces that are proportional to velocity rather than load. In thermoplastics, friction actually decreases as load increases.

It is a characteristic of most thermoplastics that the static coefficient of friction is less than the dynamic coefficient of friction.

Running-in phenomena normally do not play a role in applications such as snap fits and threads, and the temperature will generally be close to room temperature. The coefficients of friction in the table below can be used for these applications. The table gives values for various plastics when tested either against itself or against steel.

Coefficients of friction at 23ºC, without running-in			
DSM Products	**Polymer description**	**On itself**	**On steel**
Akulon	PA6 & PA6.6	0.15 – 0.45	0.20 – 0.50
Stanyl	PA4.6	0.15 – 0.45	0.20 – 0.50
Arnite	PBT	0.20 – 0.40	0.20 – 0.45
	PET	0.20 – 0.30	0.15 – 0.25
Xantar	PC	0.30 – 0.50	0.25 – 0.50
Xantar C	PC + ABS	0.30 – 0.50	0.25 – 0.50

The equilibrium dynamic coefficient of friction at elevated temperatures, after several hours running, is of importance for bearings. The temperature increase is the result of the heat generated by the friction.