

## Maximum allowable short-term strain

The maximum allowable short-term strain in plastics must be known to calculate the maximum permissible deformation, for instance of

- snap fits during assembly and disassembly,
- threads during stripping from the mould,
- parts with undercuts during ejection from the mold etc.

The maximum allowable short-term strain is:

70% of the yield strain for materials with a clear yield point\*. 50% of the strain at break for materials that break without yielding, as is the case for most glass filled materials.

The table below gives some typical values at a temperature of 23°C. Because values are temperature dependent and different temperatures can be encountered during the various manufacturing steps, real values at those temperatures should be used.

The yield strain and the strain at break can be found in the DSM [material database](#).

# DSM Engineering Plastics – Technical Guide

Typical values for the maximum allowable short-term strain at 23°C			
DSM Products	Polymer description	$\epsilon$ (%) Dry / conditioned	
Semi-crystalline materials	Akulon	PA6 and PA66	2.5 / 10 <sup>(*)</sup>
		PA6 and PA66 + 15-35% GF	1.8 / 2.8
		PA6 and PA66 + 40-50% GF	1.5 / 2.0
		PA6 and PA6.6 + GF + IM	2.3 / 4.0
	Stanyl	PA46	7.0 / 10 <sup>(*)</sup>
		PA46 + FR	3.5 / 10 <sup>(*)</sup>
		PA46 + IM	10 / 10 <sup>(*)</sup>
		PA46 + 15% GF	2.0 / 4.0
		PA46 + 15% GF + FR	1.5 / 3.0
		PA46 + 30% GF	2.0 / 3.5
		PA46 + 30% GF + FR	1.3 / 1.8
		PA46 + 40% GF	1.5 / 3.0
		PA46 + 40-45% GF + FR	1.0 / 1.5
		PA46 + 50% GF	1.4 / 2.5
		PA46 + 60% GF	1.0 / 1.5
		Arnite	PBT
	PBT + FR		3.2 <sup>(*)</sup>
	PBT + IM		2.8 <sup>(*)</sup>
	PBT + 15-30% GF		1.5
	PBT + 15-30% GF + FR		1.3
PBT + 20% GF + IM	2.0		
PBT + 35% GF	1.3		
PET	2.8 <sup>(*)</sup>		
PET + 20-35% GF	1.3		
PET + 30-33% GF	1.0		
PET + 50% GF	1.0		
Amorphous materials	Xantar		PC
		PC + 10% GF	3.5
		PC + 20% GF	2.0
		PC + 30% GF	1.0
		PC + 40% GF	0.8
	Xantar C	PC + ABS	3.0
	Stapron E	PC + PET	4.2

FR = flame retardant  
GF = glass fibre  
IM = impact modifier

For applications where repeated loading and unloading is experienced, 60% of the mentioned values is recommended.

(\*) Note, even higher strains, close to the yield strain, could be accepted for unfilled semi-crystalline thermoplastics with a clear yield point. Although no breakage will occur, this can result into unacceptable plastic deformation.