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Hot plate welding of mouldings made from amorphous thermoplastics in volume production
Welding parameters for amorphous thermoplastics and blends

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This accompanying sheet gives guidelines for the hot plate welding of amorphous thermoplastics (Table 1) and blends (Table 2). The values shown take account only of the weld strength. Because of the different material types and manufacturing conditions of the joining components, weld strength values were not shown. Deviating guidelines may be advantageous for the purposes of optimizing economy, melt adhesion, stringing, appearance and internal stresses.

The following illustrations 1 to 11 show the effect of the hot plate surface temperature T_H on the heating time t_E for achieving the required melt layer thickness L_0 for each of the materials listed in Tables 1 and 2. The influences were determined on rectangular plates with a wall thickness of 3 mm. The adjustment displacement was 0.5 mm and the adjustment pressure 0.8 N/mm^2.

If the adjustment conditions change, values deviating from the melt layer thicknesses shown in the diagrams can be expected. In general, it is the case that the adjustment time increases as the adjustment displacement increases and/or the adjustment pressure decreases, so that a greater melt layer thickness is achieved with a constant heating time.

There may also be deviations for other wall thicknesses of the joining component. With constant adjustment and heating conditions, a greater wall thickness results in a lower melt layer thickness.

A PTFE anti-adhesion coating was used for hot plate temperatures up to 270 °C.

Table 1. Amorphous thermoplastics.

Material	Hot plate temperature T_H [°C]	Melt layer thickness L_0 [mm]	Joining pressure p_F [N/mm^2]	Ratio of joining displacement to melt layer thickness s_F/L_0 [–]
PC	250 ... 410	> 1.5	0.1 ... 0.9	> 0.3
ABS	230 ... 410	> 2.0	0.1 ... 0.6	0.4 ... 0.8
PMMA	230 ... 280	> 1.8	0.2 ... 0.6	0.5 ... 0.7
PS	220 ... 410	> 2.2	0.2 ... 0.7	0.6 ... 0.9
PES	350 ... 500	> 1.0	0.4 ... 0.8	0.5 ... 0.9

Table 2. Amorphous blends.

Material	Composition [%]	Hot plate temperature T_H [°C]	Melt layer thickness L_0 [mm]	Joining pressure p_F [N/mm^2]	Ratio of joining displacement to melt layer thickness s_F/L_0 [–]
PC + ABS	45/55	230 ... 410	> 1.8	0.3 ... 0.9	0.8 ... 0.9
PC + ABS	75/25	250 ... 410	> 2.2	0.2 ... 0.9	0.8 ... 0.85
PC + ASA	35/65	230 ... 300	> 2.0	0.4 ... 0.7	0.65 ... 0.85
PC + ASA	70/30	230 ... 310	> 2.0	0.2 ... 0.4	0.5 ... 0.75
PPE + SB	30/70	230 ... 300	> 2.0	0.2 ... 0.4	0.4 ... 0.5
PPE + SB	50/50	230 ... 300	> 1.8	0.4 ... 0.7	0.6 ... 0.7

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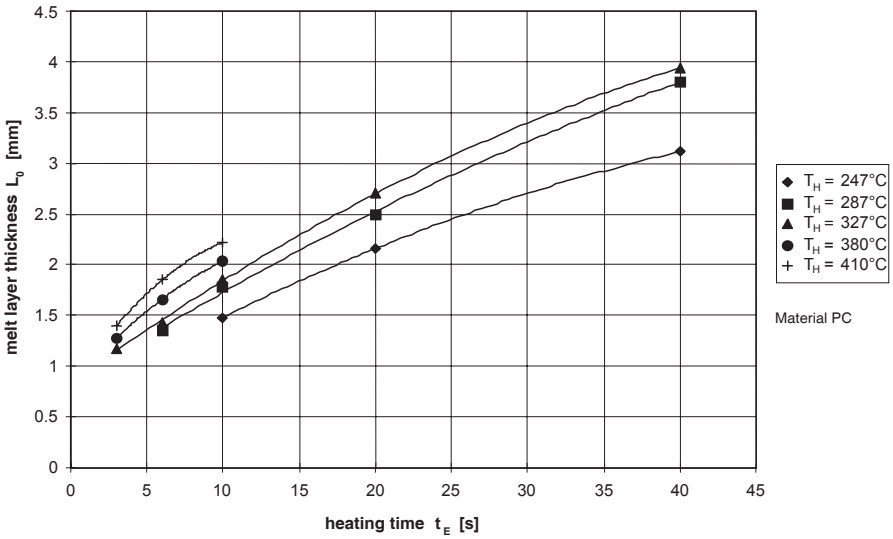

Figure 1. Melt layer thickness as a function of the unpressurized heating time and the surface temperature on the hot plate.

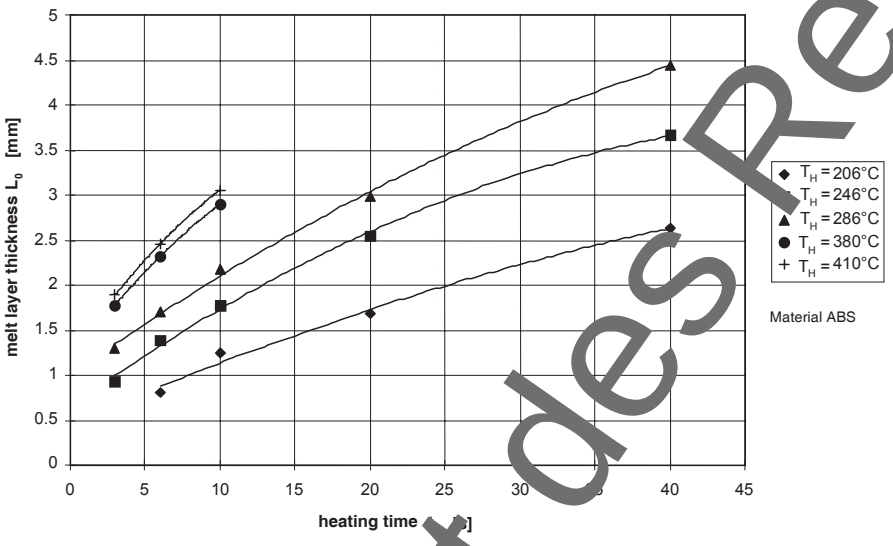

Figure 2. Melt layer thickness as a function of the unpressurized heating time and the surface temperature on the hot plate.