Thermal Treatment
for
Parts Made of Objet RGD5160-DM
ABS-like Material

1. Purpose

Objet RGD5160-DM is an ABS-like digital material fabricated using RGD515 and RGD535 materials on Connex 3-D printers. Parts made of Objet RGD5160-DM have an initial heat deflection temperature (HDT) of 58–68°C (136–154°F). This document describes thermal treatments that result in greater heat resistance for RGD5160-DM parts.

HDT test method: ASTM D 648-06, HDT at 0.45 MPa

Note: The actual thermal resistance results depend on the part geometry.

2. Special Instructions

To avoid distortion during thermal treatment:

1. Consider the best orientation for the printed part in the programmable oven.
2. Parts with thin walls and overhangs must be properly supported before placing them in the oven.
3. Place the part on a flat surface in the oven and not directly on the oven rack.

Oven rack

Figure 1 Oven chamber

3. Thermal Treatment Procedures

Procedures A and B are suitable for all part geometries. They differ in the desired HDT and the duration of the procedure.

3.1 Procedure A

- Desired HDT: 90°C (194°F)
- Time in oven: approximately seven hours (including cooling time)

1. Clean the part and remove the support material.
2. Place the part in a programmable oven (see specifications on page 4) at room temperature.
3. Set the ramp-up rate to 1°C (1.8°F) per minute.
4. Set the temperature to 60°C (140°F).
5. Turn on the oven.
   The oven temperature reaches 60°C (140°F) after approximately 35 minutes.
6. Maintain the temperature at 60°C (140°F) for two hours.
7. Increase the temperature to 70°C (158°F) and maintain for two hours.
   The oven temperature reaches 70°C (158°F) after approximately 10 minutes.
8. Increase temperature to 80°C (176°F) and maintain for one hour.
9. Cool in oven.
10. When oven temperature is lower than 35°C (95°F), remove the part from the oven.

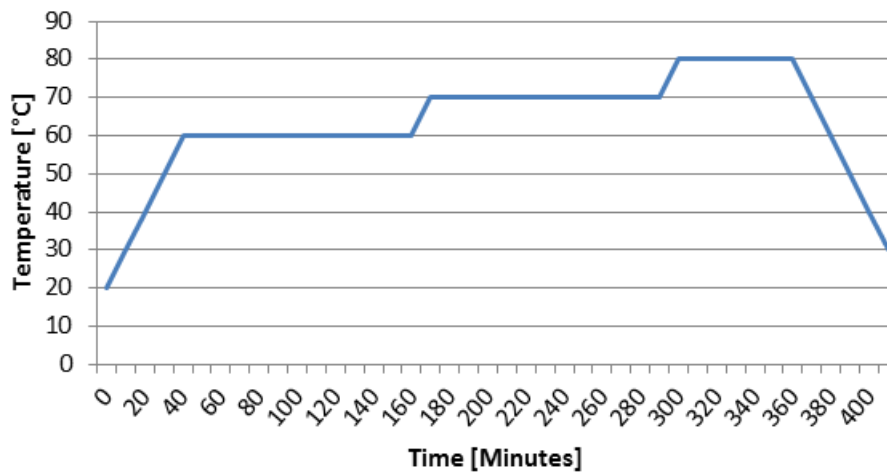> ⚠️ **Caution:** Always wear oven gloves when handlings hot parts.

Figure 2 Oven temperature over time (Procedure A)

3.2 Procedure B

- Desired HDT: 100°C (212°F)
- Time in oven: approximately nine hours (including cooling time)

Note: This procedure may cause greater distortion to unsupported thin walls and overhangs. If this is a concern, use procedure A.

1. Clean the part and remove the support material.
2. Place the part in a programmable oven (see specifications below) at room temperature.
3. Set the ramp-up rate to 1°C (1.8°F) per minute.
4. Set the temperature to 60°C (140°F).
5. Turn on the oven.
   The oven temperature reaches 60°C (140°F) after approximately 35 minutes.
6. Maintain the temperature at 60°C (140°F) for two hours.
7. Increase the temperature to 70°C (158°F) and maintain for two hours.
   The oven temperature reaches 70°C (158°F) after approximately 10 minutes.
8. Increase the temperature to 80°C (176°F) and maintain for one hour.
9. Increase temperature to 100°C (212°F) and maintain for one hour.
10. Cool in oven.
11. When the oven temperature is below 35°C (95°F), you can remove the parts from the oven.

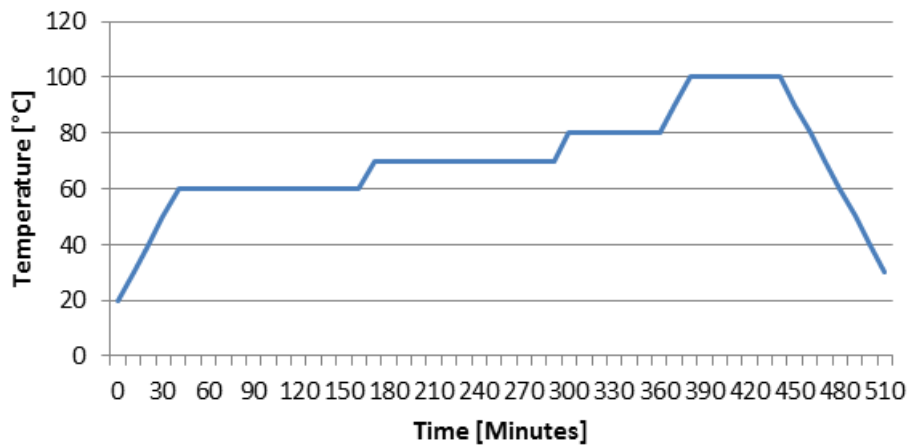> ⚠ **Caution:** Always wear oven gloves when handlings hot parts.

Figure 3 Oven temperature over time (Procedure B)

4. Programmable Oven

4.1 Recommended Specifications

Feature	Specification
Maximum operating temperature	250-300°C (480-570°F)
Temperature stability (PID controller On/Off)	±0.1/±0.2 degrees
Temperature uniformity	at 300°C ±5° (at 570°F ±10°)
Heat-up time to maximum temperature	25 minutes
Recovery time to maximum temperature	4 minutes
Dimensions	as required
Volume (liters)	as required
Air changes per hour	10-50 (depends on oven size)
Maximum power	depends on oven size: 750 W for 28-liter oven 9000 W for 900-liter oven
Holding power	depends on oven size: 300 W for 28-liter oven 3500 W for 900-liter oven
Programmer	stores 4 programs and up to 16 segments (Eurotherm programmer, or similar)

4.2. Recommended Oven Manufacturers and Models

The following oven manufacturers and models are recommend by Objet and are available worldwide.

Note: Other manufacturers and oven models may be suitable. Make sure they meet the specifications listed in section 4.1.

Manufacturer	Oven model	Chamber size	Comments
Despatch Industries www.despatch.com	LBB oven series	as required	May require an additional controller
Nabertherm www.nabertherm.com	TR oven series		