Catamold® 316L A

Product Description

Ready to mold granules for the production of sintered components in stainless steel 316L using the BASF system.

Manufacturer

BASF Aktiengesellschaft
D-67056 Ludwigshafen
Phone +49 (0) 621-60-46124
Fax +49 (0) 621-60-22198

Tool Design

The tool must be designed with flow paths as short and as thick as possible. The shrinkage which arises during processing must be considered by oversizing the mold dimensions. Every dimension must be multiplied by this oversizing factor which is defined in the pertinent specification.

Injection Molding

Processing on standard injection molding machines for thermoplastic polymers. The starting values for optimization, based on an Engel ES80/50 are:

<table>
<thead>
<tr>
<th>Barrel temperature</th>
<th>Zone 1 160 °C</th>
<th>Zone 2 170 °C</th>
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</thead>
<tbody>
<tr>
<td>Mold temperature</td>
<td>128 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screw speed</td>
<td>50 min⁻¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injection speed</td>
<td>10 cm³/s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cushion</td>
<td>5 mm</td>
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<tr>
<td>Molding pressure</td>
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<td></td>
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<tr>
<td>Holding time</td>
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<td></td>
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<tr>
<td>Back pressure</td>
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Temperatures higher than 200 °C, screw speeds higher than 50 min⁻¹ and mold temperatures higher than 140 °C must be avoided. Screws which develop only low shear are preferred; compression ratios of 1.6:1 are recommended, the maximum compression ratio is 2:1.

Debinding

Debinding according to the BASF process at 110 °C using HNO₃ > 98%. The formaldehyde evolving from the parts during debinding can react with any oxidizing agent. Explosion limit of formaldehyde with oxygen is 4.5 % by volume. There is some indication that a slow reaction between formaldehyde and nitric acid exists. Therefore any unintended high dose of nitric acid must be avoided.

In order to avoid entry of air through a leakage we refer to the manual of the oven suppliers. We highly recommend to keep the maintenance intervals for the door seals and the bearings of the circulation fan.
Based on a 50 litre debinding furnace (e.g. Heraeus VT 6060 MU 2) a nitric acid feed of typically 30 ml/h and a purging gas (nitrogen) throughput of 500 l/h proved to lead to safe processing. At this gas throughput the acid feed may not be increased to more than 38 ml/h. The debinding process is finished when a minimal debinding loss of 7.0% is reached.

Under certain circumstances, a deposit can be formed in the sintering furnace containing MnO, Manganosite. This compound may also exhibit a fiber-like morphology which may pose a health hazard requiring special care during cleaning of the furnace: It is highly recommended to avoid dust formation and to use disposable masks with particle filters type FFP3 (DIN EN 149).

**Sintering**

Sintering must be done in an atmosphere with 100% clean and dry hydrogen (dewpoint <-40 °C). As sintering support Al₂O₃ with a purity of 99.6% is recommended, e.g. Frialit® Al₂O₃ (Friatec AG).

A typical sintering cycle is:
room temperature – 5 K/min – 600 °C, hold 1 h,
600 °C – 5 K/min – 1380 °C, hold 3 h
furnace cooling

In the early stage of the sintering process remaining binder constituents are burnt off and the pyrolysis products should be removed by a suction fan. Removal of condensed pyrolysis products from the wall of the sintering furnace should be done wearing laboratory gloves or, in extreme cases gloves made of nitrile rubber.

**Note**

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July 2006
Catamold® 316L G

Product

Catamold 316L G

Product Description

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Manufacturer

BASF Aktiengesellschaft
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### Sintering

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July 2006
**Catamold® 316L W**

**Product**
Catamold 316L W

**Product Description**
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**Manufacturer**
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D-67056 Ludwigshafen  
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Fax +49 (0) 621-60-22198

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March 2009

BASF SE
GBU Inorganic Specialties
Powder Injection Molding, G-CAS/BP – J 513
67056 Ludwigshafen, Germany
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