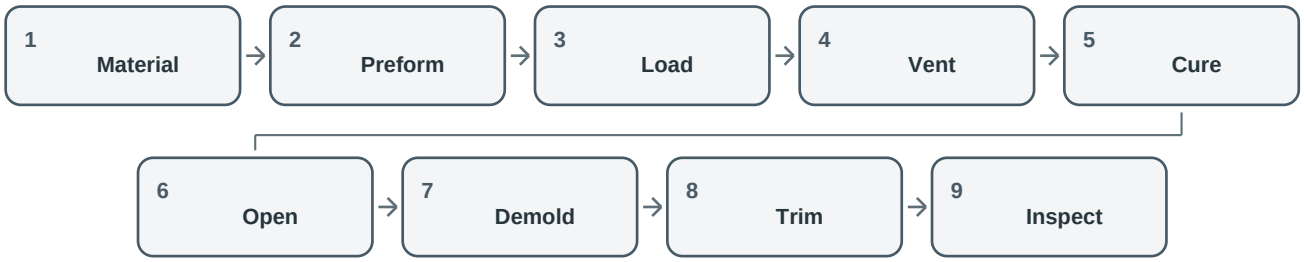
Silicone Compression Molding Cycle Control Guide

Process stages, control points, defect review, and RFQ information for custom molded silicone parts



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Purpose. This document explains the principal stages of a solid silicone compression molding cycle and the project information needed to review tooling, sampling, and repeat production. It is intended for engineering, sourcing, quality, and product development discussions.

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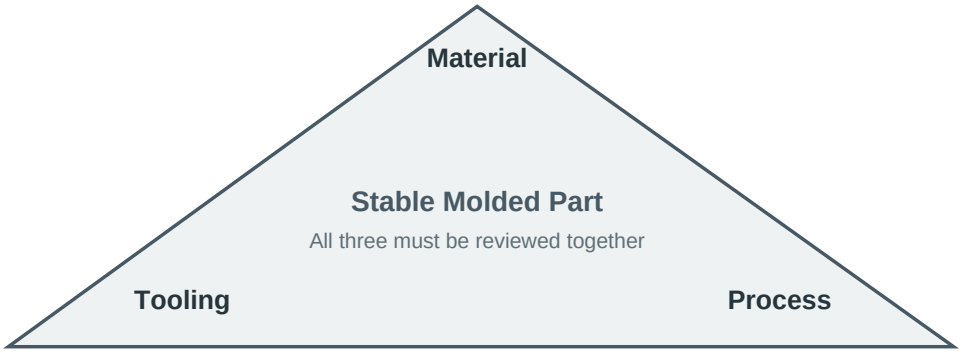
1. Cycle Scope and Process Logic

A compression molding cycle begins before the press closes and ends after the finished part has been removed, trimmed, inspected, and prepared for the next operation. The cure timer is only one part of the total production cycle.



Material controls flow, hardness, cure response, release behavior, color, and required secondary processing.
Tooling controls cavity filling, venting, parting line, flash location, surface reproduction, and demolding direction.
Process controls preform weight and placement, closing and venting sequence, cure condition, handling, trimming, and inspection.

A stable part requires the three areas to work together. Increasing pressure, adding material, or extending cure time cannot compensate for every design or tooling problem.

2. Standard Cycle Sequence

1. Material and batch confirmation

Confirm silicone type, hardness, color, cure direction, documentation needs, and batch identity.

2. Preform preparation

Cut or shape a controlled uncured charge with a planned weight and loading geometry.

3. Mold preparation

Confirm cavity cleanliness, vent condition, inserts, cores, parting surfaces, and temperature stability.

4. Preform loading

Place each charge consistently so the material can fill the cavity without avoidable imbalance.

5. Closing and air release

Close the mold under controlled conditions and allow trapped air to escape through the designed venting path.

6. Heat-and-pressure curing

Maintain the required cure condition for the selected compound and relevant cross-section.

7. Mold opening and demolding

Open at the validated stage and remove the part without tearing, stretching, marking, or distortion.

8. Trimming and secondary work

Remove flash and complete any cleaning, post-curing, marking, assembly, or special packaging.

9. Inspection and release

Check agreed dimensions, appearance, material, function, quantity, labeling, and packaging.

3. Preform and Loading Control

The preform is the measured uncured silicone charge placed into the heated mold. Its weight, shape, position, and loading consistency strongly influence filling, flash, trapped air, and cycle repeatability.

Preform Weight

Too little material may cause short fill, missing edges, or incomplete detail. Too much material may create excessive flash, longer trimming time, difficult closing, and unnecessary waste.

Preform Shape and Position

The charge should support the expected flow path. Long sleeves, deep caps, thin membranes, flat gaskets, and multi-cavity layouts may need different preform geometry and placement even when the finished part weights are similar.

Loading Time and Consistency

Each cavity should be loaded in a repeatable sequence. Long mold-open time can create temperature differences between the first and last loaded cavities. Shifted preforms can create uneven flow or air traps.

Control Questions

• Is the finished part weight sufficient to define the charge, or is a special preform shape needed?

• Where should the charge be placed to reduce long or unbalanced flow paths?

• Can every cavity be loaded without delaying the mold-open time excessively?

• Does the part include inserts, tall cores, thin edges, or deep cavities that affect loading?

• Which preform variation would create the most serious functional defect?

4. Closing, Venting, and Cure Control

As the mold closes, the silicone deforms and begins filling the cavity. Air must leave before the flowing compound blocks the escape path. The suitable closing and venting sequence depends on the mold layout, compound, wall thickness, and air-trap locations.

Potential air-related symptoms: surface bubbles, voids, gas marks, incomplete details, weak flow-front areas, and short fill in remote features.

Cure time should be validated for the selected compound and the thickest relevant section. A thin outer surface may appear cured before a thick internal section has reached the required condition. A universal cure time should not be applied to every part.

5. Mold Opening and Demolding Control

The press should open after the validated cure stage. Opening too early can cause soft, unstable, or easily damaged parts. Leaving the part in the mold longer than necessary reduces output and does not automatically improve quality.

Demolding Risk Factors

Undercuts and negative geometry

May require significant stretching or a different mold structure.

Deep cavities and long cores

Increase friction and the distance the part must travel during release.

Thin lips and local weak sections

Can tear when the part is pulled from the mold.

Low hardness or high surface friction

Can increase deformation, sticking, and handling variation.

Surface texture

May improve product grip but also increase mold-release resistance.

Poor handling access

Forces operators to pull from critical functional or cosmetic areas.

DFM principle: A part is not fully manufacturable merely because the cavity can be filled. It must also be removed repeatedly without unacceptable tearing, distortion, marking, or cycle delay.

6. Trimming, Secondary Work, and Inspection

Compression-molded parts normally require flash removal or edge finishing. Secondary operations can become a major cost driver when the part has a long parting line, delicate edges, multiple holes, marking, assembly, cleaning, or special packaging requirements.

Inspection should follow the approved drawing, sample, and project-specific acceptance criteria. Critical-to-function dimensions, fit, sealing, grip, retention, appearance, material, and packaging should be defined before mass production.

Typical Release Checks

• Critical dimensions and fit-related features

• Short fill, excessive flash, tears, bubbles, contamination, and surface marks

• Color and appearance against the approved standard

• Material or hardness confirmation according to the agreed plan

• Functional fit, sealing, grip, retention, or assembly test

• Quantity, label, packaging, and deformation protection

7. Defect-to-Process Review

Short fill or missing detail

Review charge weight and position, flow path, venting, mold temperature, cavity balance, thin sections, and closing sequence.

Excessive flash

Review charge weight, parting-surface condition, mold fit, clamping condition, material flow, venting, and the approved flash limit.

Air bubbles or gas marks

Review preform placement, trapped-air locations, vent path, closing sequence, contamination, cavity geometry, and cure behavior.

Tearing during demolding

Review undercuts, wall thickness, core depth, release direction, surface texture, cure completeness, material direction, and handling method.

Dimensional variation

Review material batch, preform control, mold temperature, cure condition, demolding deformation, post-cure effect, measurement timing, and gauge method.

Color or surface variation

Review pigment mixing, contamination, cavity cleanliness, release practice, cure condition, texture, and the visual approval standard.

8. Project Information Required for Review

To evaluate tooling, cycle risks, sampling, and quotation, provide as much of the following information as available:

- STEP, STP, IGS, or other available 3D file
- 2D drawing with dimensions and critical tolerances
- Physical sample or clear product and assembly photographs
- Target silicone material, hardness, color, and surface direction
- Operating temperature, contact media, cleaning, or outdoor exposure
- Functional requirement: sealing, fit, grip, protection, cushioning, or insulation
- Prototype quantity, first production quantity, and estimated annual usage
- Testing, documentation, packaging, label, or traceability requirements
- Current defect, supplier problem, or redesign objective

9. Reemane Project Support

Reemane supports custom silicone compression molding projects from requirement review and mold development to prototype sampling, sample confirmation, and repeat production. Projects may begin with complete CAD files or with a sample, photographs, dimensions, and an application description.

Project support may include:

• Molding feasibility and DFM discussion

• Material and Shore hardness direction

• Parting line, venting, preform, and demolding review

• Compression mold development

• Prototype and production sample planning

• Sample feedback and mold adjustment discussion

• Mass production, inspection, packaging, and repeat-order support

Send Your Drawing for Process Review

Send Reemane your drawing, sample, dimensions, application conditions, expected quantity, and current production concern. We will review the project information and identify the next details required for tooling, sampling, and quotation.

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Compression Molding: www.siliconefactories.com/silicone-compression-molding/
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Technical boundary. This guide is intended for preliminary project and manufacturing discussion. Final material, tooling, cycle settings, dimensions, inspection method, and functional acceptance criteria must be confirmed for the actual part and application.