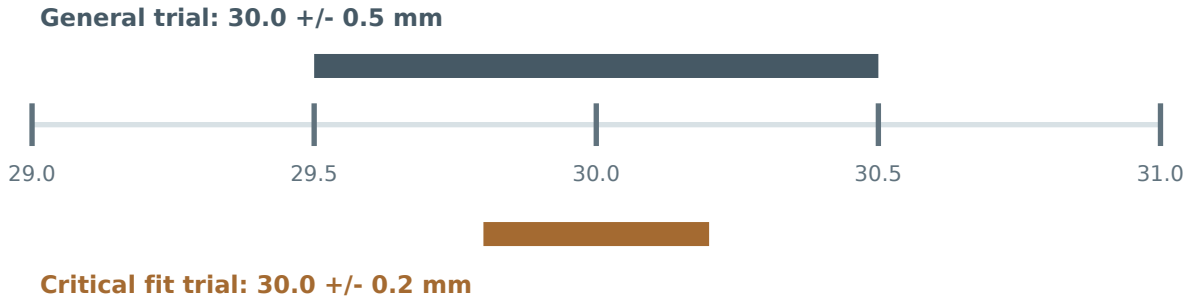
ENGINEERING + SOURCING GUIDE

How Tight Tolerances Increase the Cost of Custom Silicone Parts

Tooling, shrinkage, inspection, yield and design choices that affect the true cost of molded silicone components

ILLUSTRATIVE LIMITS FOR A 30.0 mm FIT DIMENSION



These are fictional drawing examples, not ISO table values.

> **The central decision:** Specify tight limits where they protect sealing, assembly or another measurable function. Give non-critical dimensions practical molding tolerances. A blanket precision note can increase tooling and inspection work without improving the product.

Reference: RM-RFQ-299 **Edition:** October 2026 **Audience:** OEM buyers, product engineers and quality teams

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01 What Actually Gets More Expensive?

A narrow dimensional window can require work at multiple stages. The cost impact is driven by the specific feature and the required production capability, not by the number of decimal places on the drawing.

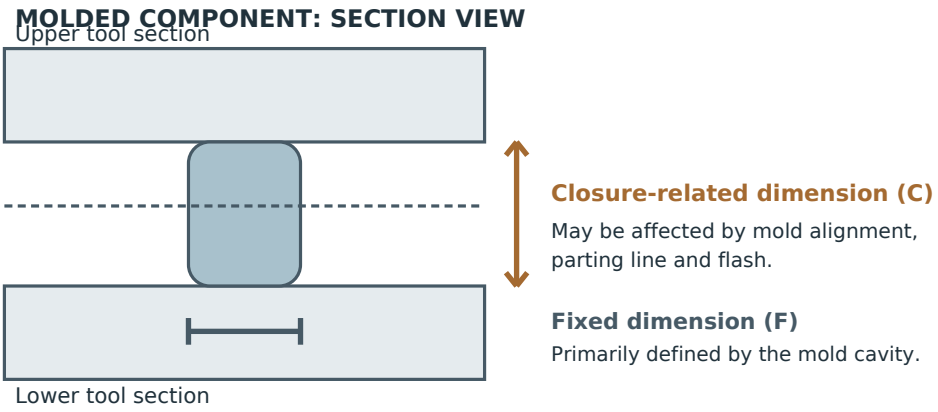
Cost driver	Potential consequence	Buyer action
Mold precision & alignment	More detailed tool construction, inserts, fitting or sampling iterations	Identify which dimensions truly control fit
Material shrinkage control	Compound/cure consistency and possible tool compensation	Freeze material, cure state and approved revision
Production yield	More accepted parts may be lost to a narrower limit	Discuss measurable acceptance risk
Metrology & fixtures	Soft parts can deform under measuring force; gauges/fixtures take time	Define the inspection fixture and part condition
Cavity and batch control	Per-cavity checks, separation or extra sampling may be needed	Share annual volume and cavity strategy
Sorting & documentation	More inspection, traceability, deviation management	Specify sampling and reporting expectations

What "tight" means depends on geometry

For a sealing lip, its installed compression height may be essential. For an external decorative radius on the same part, a larger tolerance may be acceptable. A molded cover can require a controlled mating ID while allowing a looser overall outside dimension.

> **ISO reference:** ISO 3302-1:2014 covers dimensional tolerances for molded, extruded and calendered solid rubber products and defines multiple tolerance classes. Its applicability must be checked: precision toroidal sealing rings are outside its scope. Confirm the governing standard for each product type.

02 Why Silicone Dimensions Are Not Like Machined Metal



A silicone part is formed against tooling but changes dimension with cure, cooling, release and handling. Its flexibility also makes measurement method important. Compression molds may contain dimensions principally defined by a tool feature and dimensions influenced by closing tool sections.

Fixed vs. closure-related dimensions

ISO 3302-1 distinguishes fixed (F) and closure (C) dimensions in molded rubber. Closure dimensions can be more sensitive to parting-line flash, alignment and mold closing variation. This is one reason a nominally equal numerical tolerance may have different difficulty on different features.

Design review before tooling

Question	Why it matters
Which mating feature controls assembly?	A critical locating diameter or sealing height can deserve individual control.
Is the dimension F or C?	Closure effects can limit practical process stability.
Where is the parting line?	Flash, mismatch or trimming can interfere with a tight requirement.
Is a soft wall being measured?	The gauge may compress the part and distort the reading.
Are dimensions taken free-state or assembled?	Installed fit and free-state measurement are different acceptance concepts.

03 Turn Blanket Tolerances into Functional Specs

The following illustration compares two ways to write an RFQ. It is hypothetical and deliberately not a quotation or claimed production capability.

Blanket instruction	Functional instruction
"All dimensions +/-0.2 mm"	"Locating ID: 30.0 +/-0.2 mm after conditioning; external OD: 45.0 +/-1.0 mm"
"Inspect every dimension"	"Inspect the locating ID with agreed support and method; sample non-critical dimensions"
"High precision silicone"	"Fit must pass assembly gauge and retention/functional test at mating-part tolerance limits"

Specify how inspection happens

Include measuring state (after demolding / post-cure / conditioning), temperature, instrument, location, soft-part support, feature datum, sample size and acceptance rules. Do not compare numbers from different measurement setups as though they were equivalent.

Do not tighten the entire drawing

Mark critical-to-function (CTF) features individually. Apply an agreed general tolerance scheme to the remaining dimensions, and document exceptions. When available, use mating-part CAD or samples to verify both worst-case loose fit and worst-case tight fit.

> **Watch for overconstraint:** Requesting a strict tolerance on several linked features can create contradictory requirements when deformation or mold closure makes them dependent. Review dimensions, datums and their functional relationships together.

04 A Cost Model, Not a Universal Price List

The effect of rejects is easy to miss: the factory must make more molded parts to ship the same number of accepted pieces. Yield is only one cost driver; inspection, mold investment and downstream work can change independently.

Illustrative formula: conversion cost per accepted part = conversion cost per molded attempt / accepted yield. This isolates yield impact only; it does not calculate total quotation price.

Scenario (hypothetical)	Yield	Cost per attempt	Conversion cost per accepted part
Practical requirement	98%	$0.50	$0.510
More selective limit	90%	$0.50	$0.556
Very selective limit	75%	$0.50	$0.667

How buyers should compare quotations

Request separate visibility into	Ask the supplier
Tooling and revision cost	Will tighter features require a new insert or tool revision?
Inspection and test method	What measurements, fixtures and lot records are included?
Quality and acceptance	How will rejects, deviations and sorting be handled?
Repeat unit price	What batch size, annual usage and cavity count were assumed?
Change control	What happens if the part or mating component is revised?

These examples are invented for explanation and are not Reemane costs, market averages, guaranteed yields or indicative commercial rates.

05 Send a Tolerance-Ready RFQ

Before requesting a tighter cost estimate, provide enough information to identify true functional needs and the practical measurement route.

RFQ field	What to include
Drawing / STEP / sample	Part revision, units, important datums and actual mating part
Critical dimensions	Nominal limits, fit/sealing function and worst-case assemblies
Material	Compound, hardness, color, post-cure and environmental conditions
Tolerance approach	Named standard/class if appropriate; individually toleranced exceptions
Measurement plan	Free-state vs. installed, gauge, conditioning, inspection location
Quantities	Prototype, first order, annual usage and colors/SKUs
Functional acceptance	Fit checks, compression, leakage, retention or other test
Documentation	First article, sampling, cavity traceability, reports if required

Recommended sourcing conversation

Ask the manufacturer to mark each critical tolerance as **achievable as drawn**, **achievable with a cost or process change**, or **requires design review**. Request a quote for the current requirement and a second practical-tolerance alternative if there is a meaningful cost driver.

> **Working rule:** Tighten only where measurable product function requires it. Agree on the test method and tolerance before mold steel is cut.

Reemane OEM / ODM support

Custom silicone rubber parts, mold review, prototypes and repeat molding. Send drawings, mating-part details, material and quantity to **www.siliconefactories.com/get-a-quote/**.

This guide supports early engineering and sourcing discussion. Final dimensions, applicable standard, costs and capability require project-specific review and sample validation.