



Silicone keypads

How to create shapes that
improve user experience?

Applications and design options

Silicone rubber keypads are used across industrial, medical, automotive and consumer electronics – wherever durability, flexibility and tactile control matter. The material is a soft elastomer with high resistance to temperature extremes, chemicals and mechanical wear.

Keypads are made using compression moulding, which allows for complex shapes such as curved surfaces, undercuts and integrated sealing gaskets.

Silicone is naturally translucent, and its light diffusion can be tuned by adjusting pigmentation and wall thickness – making it well suited for backlit designs.



Design parameter model

Designing a keypad starts with understanding available space, product geometry and requirements. We assess the following **key design parameters**:

- keypad size and support
- button shape & size
- tactile feedback
- light placement & design
- artwork
- integration & sealing

Each parameter influences the others. Designing the right keypad is about balancing these factors and making the right compromises. In most cases, this involves a few design iterations to get the best overall result.

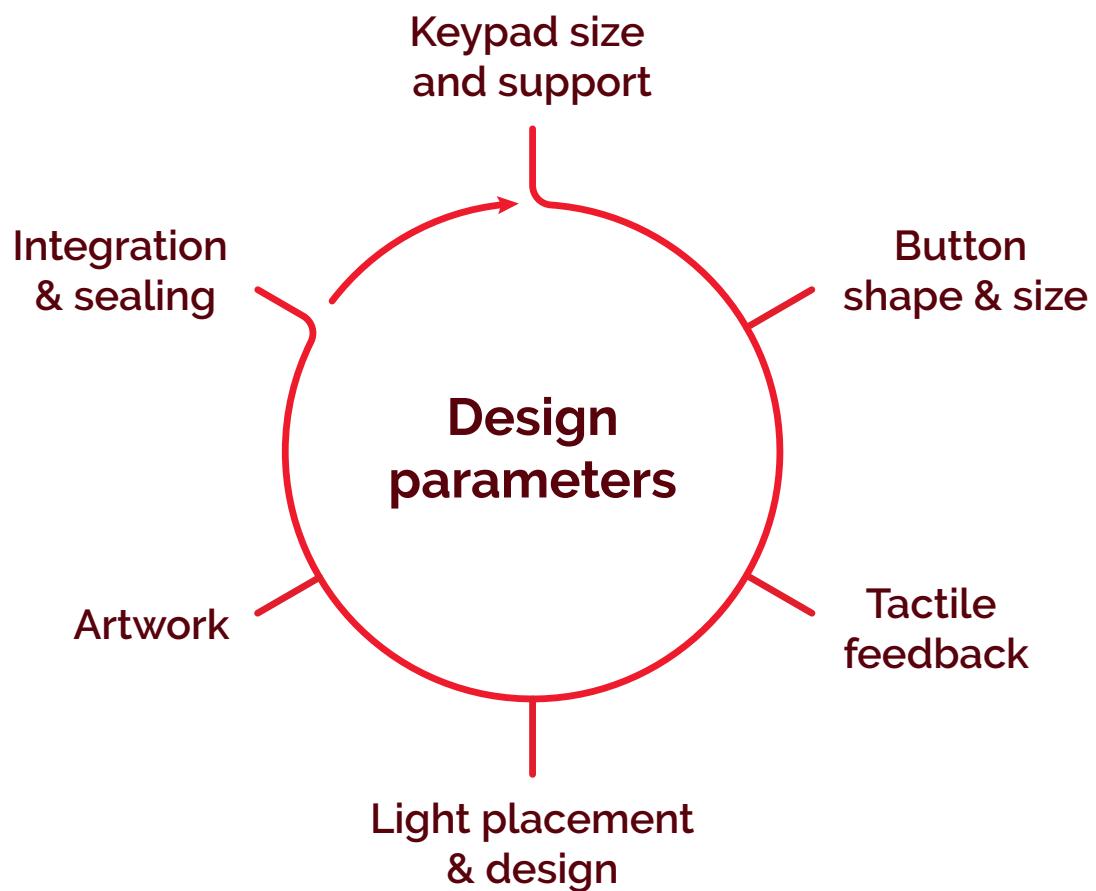


Image: Design parameter model, used for mapping the different criteria and their importance when designing a keypad

Design guidelines

These are the most essential design guidelines for silicone rubber keypads. They are based on real project experience and summarise what matters most early in the process. Each point is explained in more detail on the following pages.

Define the keypad size, spacing, and available geometry first, as this sets the limits for button layout, sealing, and tactile performance. [Page 5](#)

In tight layouts, combine top and bottom webs to create smooth button movement. [Page 5](#)

Add silicone support walls (typically 1 mm) to improve button stability and prevent wobble. [Page 5](#)

Respect minimum button spacing to avoid mis-presses and allow clean separation. [Page 6](#)

Use concave, convex, raised or grouped button shapes for intuitive, orientation-friendly design. [Page 6](#)

Keep button thickness around 3–5 mm whenever possible for consistent tactile feel. [Page 7](#)

Avoid hotspots by adjusting pigments and LED positions, and place LEDs to the side if possible. [Page 8](#)

Use silicone light blocks to focus light and avoid bleed, with enough space (1 mm each side) for stability. [Page 8](#)

Limit screen-printing to flat button surfaces for crisp, durable symbols. [Page 9](#)

Consider dead-front laser-etching if you want hidden icons that only light up when active. [Page 9](#)

Choose moulded gaskets for robust waterproofing, sealing lips for compression seals, or glue where space is tight, depending on the IP target – up to IP67 is achievable. [Page 10](#)

DESIGN PARAMETER

Keypad size and support

When defining the size and layout of a silicone keypad, three factors are especially important: spacing between the buttons, space around the edge of the keypad, and the overall thickness. These all influence how stable the keypad is – and how it feels when used.

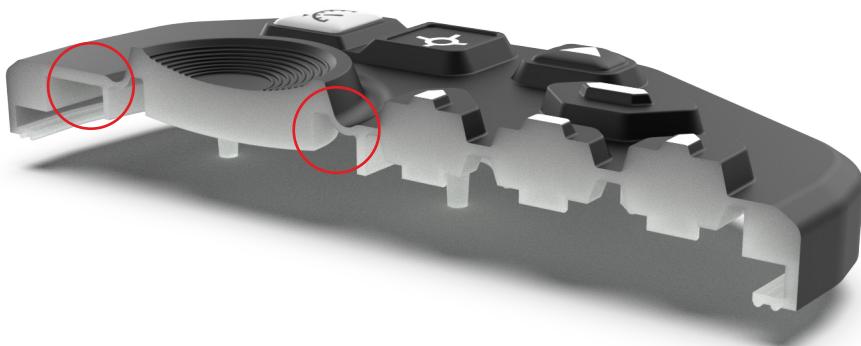


Image: Supporting walls around a key

Supporting walls

When the key pad area is small, consider adding silicone support walls between and around the buttons. A general rule is to use 1 mm thick walls to improve stiffness and avoid wobbling. These walls should be placed where buttons are otherwise unsupported by the housing or PCB.

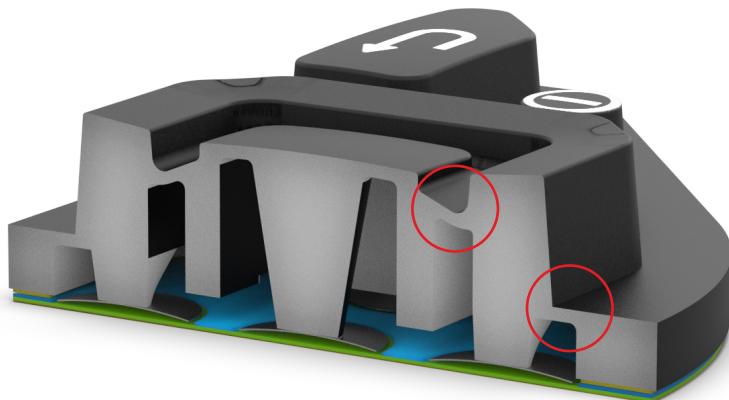


Image: Top and bottom web around a navigation key

Top and bottom web design

In compact layouts, button flexibility can be optimised by shaping the silicone's web – the thin area that allows movement. A top web sits inside the button, while a bottom web is shaped outside. Using both can improve tactile response when space is tight.

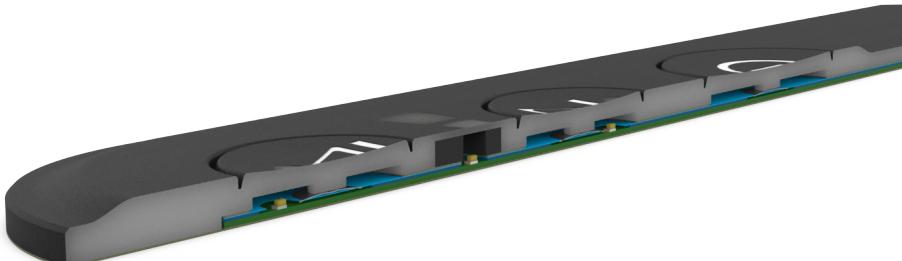


Image: Cross section of a 4mm thin keypad construction

Small thickness

Even in slim designs, it's possible to achieve a clear click and good light diffusion. But it requires careful control of web thickness, actuator geometry and dome characteristics. The web is typically 0.5 mm thick, but this depends on the silicone hardness and overall keypad layout.

DESIGN PARAMETER

Button shape and size

The shape and size of the buttons influence both user experience and mechanical performance. With silicone keypads, moulded shapes allow for endless design variations – from soft, concave surfaces to raised navigation clusters.



Button spacing and grouping

Button spacing and grouping help reduce accidental presses and support intuitive use. Clear separation between buttons – whether through spacing, raised areas or recessed zones – improves orientation and makes it easier to identify functions by touch alone.



Recessed or flush design

Recessed or raised buttons, concave or convex shapes help users feel the orientation without looking. This improves the tactile clarity of the keypad. Flush buttons offer a sleek look and good wipe-clean properties but require well-defined web shapes to deliver satisfying feedback.



Raised button area

A flush button design can be combined with a raised button area to ensure both a sleek look and good tactile feel. This approach adds height to the button itself while keeping the surrounding surface smooth, which supports easier cleaning and makes it simpler to apply artwork.

DESIGN PARAMETER

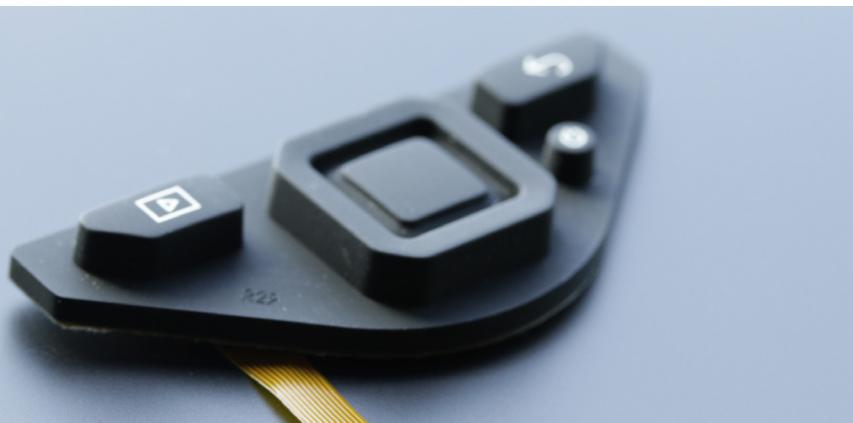
Click & tactile feedback

How a button feels is critical for a keypad's usability. Tactile feedback ensures the user can confidently operate the device, even without looking. Several parameters influence this:



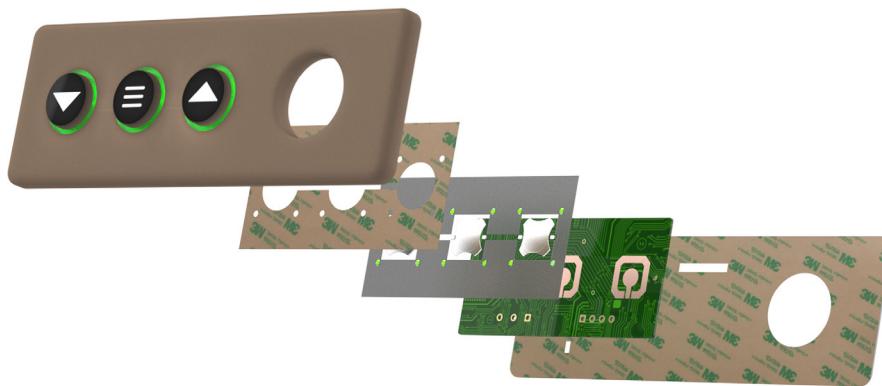
Thickness of the buttons

As a rule of thumb, aim for a button thickness of around 3–5 mm to maintain a good tactile feel without feeling the metal dome underneath. Thicker buttons may be harder to clean, so smooth surfaces and angled button sides can help.



Button height and supporting walls

Button height and silicone structure affect how the click feels – even before choosing dome or switch. Taller buttons with support walls give better tactile feedback and stability. Thin, unsupported buttons may feel soft or imprecise.



Anatomy of the click

To define the click in more detail, focus on four key tactile factors:

- Force – how hard to press
- Travel – how far the button moves
- Snap ratio – how sudden the click feels
- Audio feedback – the sound of activation

For a full overview, see our guide on tactile feedback.

DESIGN PARAMETER

Light placement

Integrating light in silicone keypads requires careful design. Light diffusion depends on material thickness, pigmentation, and LED positioning, and often benefits from several prototype iterations to fine-tune the result.



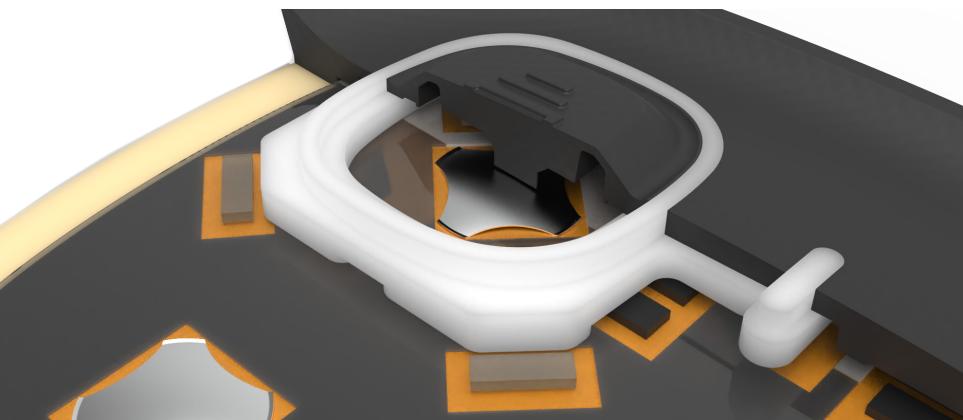
Pigmentation and light diffusion

Silicone's translucency can be adjusted by adding milky-white pigments. Higher pigmentation improves light diffusion and reduces visible hotspots from LEDs, but may also affect colour rendering and brightness. Test prototypes with different pigment levels to find the right balance.



Light blocks

Moulded light blocks (solid-colour silicone inserts) help prevent light bleeding between symbols or button areas. These require extra space: typically 1 mm for the block itself, plus 1 mm clearance on each side for silicone stability. This affects button spacing, so compromises on LED positioning may be needed.



LEDs away from window

Placing LEDs further from the window – to the side or vertically – helps reduce hotspots and improves light distribution. In tight layouts, combine careful positioning with milky-white silicone to enhance diffusion. Moving LEDs sideways is often more effective than increasing thickness.

DESIGN PARAMETER

Artwork

Artwork can be created with screen-printing, laser-etching, or with the dead-front effect, where symbols stay hidden until backlit. Plan early whether the icons should emit light or stay opaque.



Screen printed icons and symbols

Screen-printing is best suited for flat button tops. On raised or shaped buttons, only the top area can be screen-printed, as the printing process cannot reach curved or angled sides. Masking and spray-painting is possible but often leaves uneven edges.



Laser etched icons and symbols

Areas of the silicone can be laser-etched after painting to reveal a second paint layer in a different colour. This makes laser-etched icons precise, durable, and ideal for symbols that must stand out clearly.

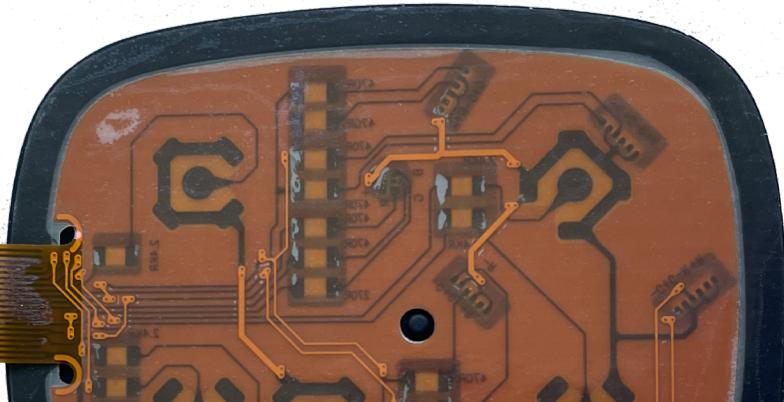


Dead-front effect

Artwork can also be created with light, only visible when illuminated. This is known as the dead-front effect, made by laser-etching through the surface paint down to the transparent silicone underneath. Icons remain hidden until backlit.

Integration and sealing

Depending on product demands, you can achieve up to IP67 sealing with silicone-based solutions, using gaskets, lips or adhesive. Silicone keypads allow for different sealing solutions depending on space, mechanical strength and cost.



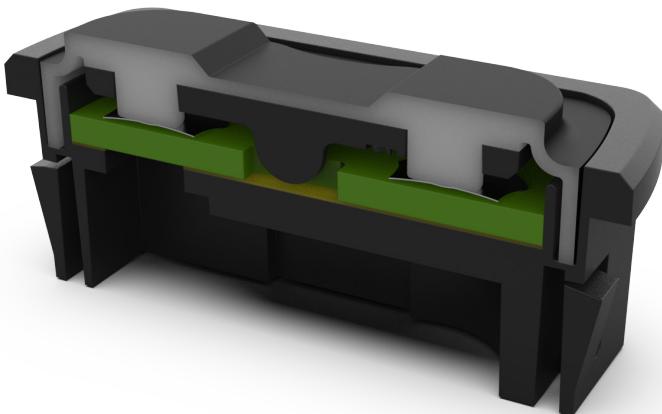
Sealing gasket

By using special silicone adhesive with enough surface area, an IP67 rating can be achieved. By rule of thumb, a 5mm adhesive gasket is required. The rear surface is then adhered to a flat surface, ensuring a strong and reliable fit.



Sealing lip

A sealing lip can be integrated into the outer edge of the keypad. This lip is compressed against the housing, creating a simple yet effective barrier against water and dust, while also allowing the buttons to remain flush-mounted.



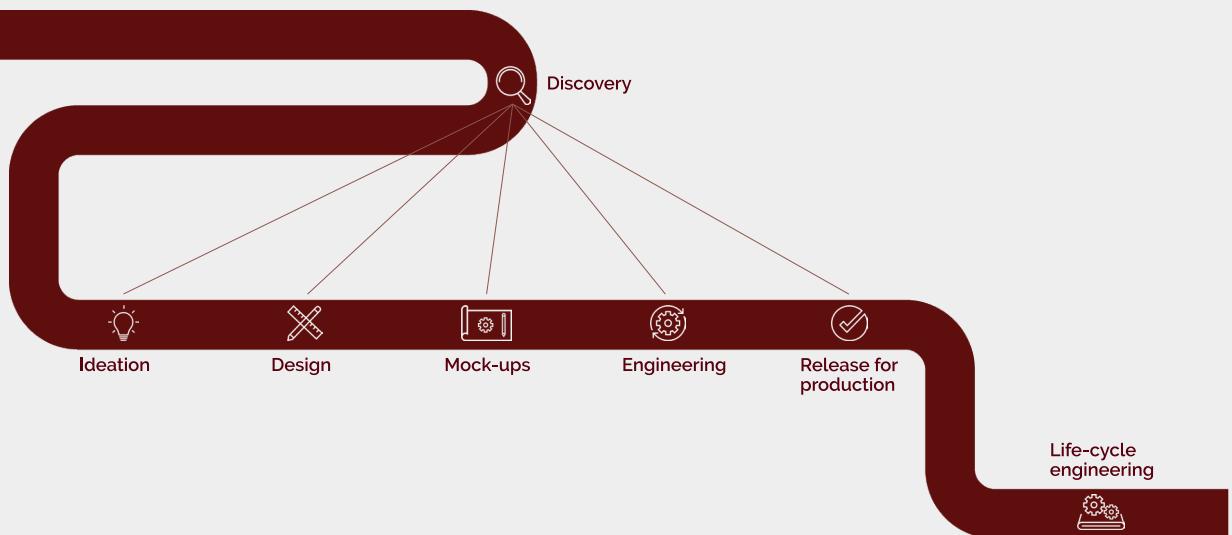
Sealing by glueing

Where space is limited, gluing can be a good option. By applying adhesive in a controlled section between the silicone and the plastic housing, you can achieve a waterproof bond even in tight designs.

HMI design services

We offer design and engineering services for your HMI solution. Whether you're facing time constraints, resource limitations, or simply need specialised HMI expertise, our specialists are ready to integrate into your development efforts seamlessly.

Our HMI services are structured into distinct development stages, allowing you to select and purchase service packages tailored to your current needs. This modular approach ensures you get exactly the support you require, when you need it.



Reach out to us

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