360° PROJECTS BY INOVAN
SNAP DOMES
THINK. THINKING IT THROUGH. THINKING IT THROUGH RIGHT FROM THE START.
There really are differences.

During implementation at the latest. When things take longer, become more expensive or turn out to be much more difficult than expected. So, by all means it is a kind of art: the art of thinking it through right from the start. It has a lot to do with years of experience, deeper understanding and overall implementation expertise.

These are success factors that are expressed in each one of our snap domes. It doesn’t matter whether you choose a model from our standard range or we develop a specified snap dome for you.
SNAP DOMES

INOVAN GmbH & Co KG has been gaining experience in the production of metal snap domes for more than thirty years. INOVAN’s initial activity in this field has been the development of a snap dome for keyboard application in 1975. A snap dome with a diameter of 12.2 mm has been developed, that even today is still widely used in many applications.

Snap domes are used in keyboards, micro switches, push button switches, touch panels in terminals, flexible keyboards and many other applications.

Along with the increasing miniaturisation of components, the demand for snap domes with a diameter of less than 6 mm is also rising. Furthermore the snap domes are used more and more in applications of the automotive industry including all considerable OEMs.

Generally, snap domes can be produced with all available spring materials, but high-grade steel X10CrNi 18 8 (1.4310) proved to be the most suitable in regard to stress and electrical characteristics combined with an electroplated surface.

A constant force-deflection-diagram during the total lifetime of the snap dome, also under the condition of varying temperatures, is considered to be one of the significant advantages of such snap domes. Therefore a constant tactile switching characteristic is guaranteed, creating a defined tactile surface for the user.

Upon request we will develop in cooperation with you an individual customer specific solution for your application.

Please feel free to contact us – we will be glad to help you.

DEFINITIONS // - - -

F = maximum actuation force
The force necessary to actuate the snap dome.

Fᵣ = return force (contact force)
The force applied to the counter contact by the snap dome. As a rule the return force should always be > 0.3 N, because otherwise there is a risk of a two state switching characteristic.

Sk = spring travel
The distance the snap dome travels from the beginning of the actuation to contacting the counter contact.

Af (Delta F)
∆F is mainly responsible for a good tactile feeling. This value is the difference between F and Fᵣ. The target for a typical Delta F is 0.3 to 0.5 * F.

As an alternative to ∆F the Snap is a well-known term for the tactile feeling. Usually the unit for the Snap also known as Click Ratio is percent (%).

Formula to calculate the Snap:
\[
\text{Snap} = \left( \frac{F(g) - Fᵣ(g)}{F(g)} \right) \times 100
\]

MATERIAL // - - -

Maximum material performance is the basic requirement for a constantly high level of quality for the snap domes. INOVAN uses high grade steel X10 Cr Ni 18 8 (Material – No. 1.4310) for the production of its snap domes.

The raw material deliveries from our selected suppliers are continuously checked by strict quality controls.

The raw material is precisely specified by INOVAN regarding the alloy composition, grain size, surface quality, tensile strength and strip dimensions.

ELECTROPLATING // - - -

In our in-house electroplating department the required surfaces are deposited to the raw material with state-of-the-art electroplating lines, which are working in a reel-to-reel process.

Our snap domes can be purchased with the following contact surfaces:

» 0.2 µm Au
» 0.2 µm Ni
» 1 µm Ag
» no plating
» Sn alloys on terminals and solder contacts for customer specific products.

TOOLINGS // - - -

All toolings are designed at INOVAN’s engineering department and manufactured in our in-house tool shop.

The toolings are designed in a modular technology to achieve a higher flexibility in producing different variants of snap domes as well as being more efficient in tool maintenance.

In principle all cutting-, bending- and stamping elements are built from carbide metal. The inclusion of sensors for tooling protection goes without saying. All stamping and bending operations in our toolings are adjustable.

Last, but not least, adjustable stamping elements are absolutely vital in order to be able to produce samples with different actuation force, spring travel and tactility. The follow-on toolings are being operated on high performance Bruderer punching machines of the newest generation in the range of 250 to 500 kN.
GENERAL PRODUCT
SPECIFICATIONS

Material: 1.4310
Operating temperature: -40°C to 85°C
Storage temperature: -40°C to 105°C
Contact resistance (no plating): < 100 Ω *
Contact resistance (Ni): < 1 Ω *
Contact resistance (Au): < 100 mΩ *
Mechanical life time (LD): depending on product (see table)

* The above mentioned values are standard values, which are depending very much on the actual assembly situation in the final product.
The values mentioned in the tables are valid for the normal applications for snap domes. Requirements for product testing need to be clarified in advance. Technical changes reserved.

PRODUCT CODE

PART NUMBER

VERSION

00

contact surface 0.2ym Au, piece parts
-01

contact surface 0.2ym Ni, piece parts
-02

contact surface 0.2ym Au, on reel
-03

contact surface 0.2ym Ni, on reel

REMARK: Parts without plating, with Ag and with non adhesive domes upon request.

PACKAGING

INOVAN is certified according to TS 16949, ISO 14001 and ISO 50001.

During the production of snap domes the force-deflection-diagrams are cyclically recorded and documented in our CAQ-system.

A complete traceability of every production lot back to the incoming inspection of the raw material can be guaranteed.

Every production lot of snap domes has to pass a life time inspection according to DIN 42115 before its delivery to the customer. The testing frequency is usually 3 to 5 Hz.

Depending on the actual final purpose and the assembly situation of the snap dome, agreements regarding customer specific test methods can be met.

With each delivery we provide the force-deflection diagram, the inspection report and the report of the plating thickness in case of electroplated snap domes.

Our certified management systems express our intransigence concerning quality and environment.

INOVAN is RoHS compliant.

3D-SIMULATION

This enables us to define the geometry of new snap domes and to calculate their corresponding life time. This data is transferred directly to the CAD-software, which is used in the engineering department to design the tooling components.

To compute snap domes INOVAN is working with a specially developed software program, which is frequently updated with empirically determined data of newly produced parts.

Furthermore we are able to generate FEM simulations in our 3D CAD system to visually illustrate tension within the dome when actuated. This helps us to identify and improve possible weak points already at the developing stages of a dome.
SNAP DOMES WITH 4 LEGS WITH Dimple // - -

<table>
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<tr>
<th>PART NO.</th>
<th>D (mm)</th>
<th>F (N)</th>
<th>F2 (N)</th>
<th>Sa (mm)</th>
<th>D2 (mm)</th>
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SNAP DOMES WITH 4 LEGS WITHOUT Dimple // - -

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SNAP DOMES WITH LED HOLE // - -

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SNAP DOMES SMD // - -

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SNAP DOMES SMD WITH LED HOLE // - -

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SNAP DOMES WITH OPEN-CLOSE FUNCTION // - -

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Part number 402036: The contact point is specified -0.06mm below the plain.
SNAP DOMES / PRODUCTS

Snap dome with contact rivet for power application 30 A in car window switch.

Snap dome for SMD-assembly.

Square snap dome for LED lighting.

Snap dome with contact rivet for doorbell switch.

Snap dome with additional frame to increase spring travel.

Snap dome with multiple contact positions for joystick applications.

Snap dome array for car window switch.

Self-adhesive dome arrays on carrier foil with and without spacer to stick on PCBs for panels, flexible keypads etc.

CUSTOMER SPECIFIC SPECIAL DESIGNS // --

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schnappischeiben@inovan.de
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LET US THINK YOUR PROJECT THROUGH RIGHT FROM THE START. PLEASE CONTACT US.