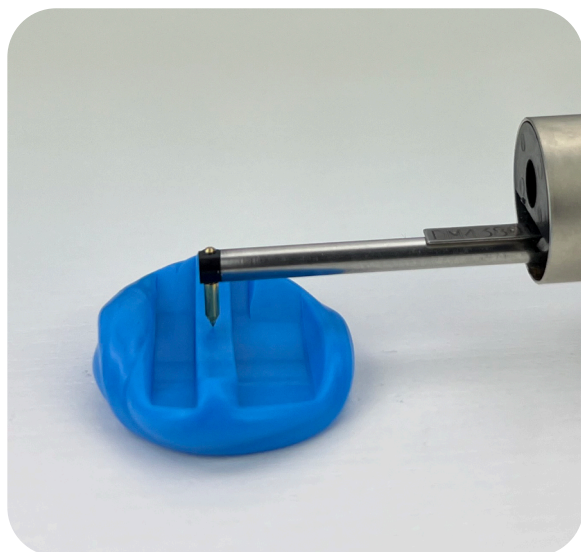




### ● P80 Ra



#### Key information

- ✓ **Shape Memory** Impression.
- ✓ No **dimensional shrinkage**.
- ✓ **Recommended** for **contact measurement**.
- ! **Incompatible** with the **Double Blade Cutter**.

#### Description

Plastiform is a high-precision silicone-based impression material used primarily for quality control and non-destructive dimensional testing in industry.

It is a two-component, addition-curing, 1:1 (one to one) mixture, polymerizing without heating or odor.

#### Technical data

Initial Consistency	Final Consistency	Final Hardness	Max. Removal Constraint (definition page 6)	Elongation at break *	Impression resolution **
Pasty	Semi-Rigid	80 Shore A	0 %	10 %	1 µm
Density at 20°C	Temperature of decomposition	Flash point	Boiling point	Ignition temperature	
1,46 g/cm <sup>3</sup>	ND	>130 °C	>300 °C	470°C	

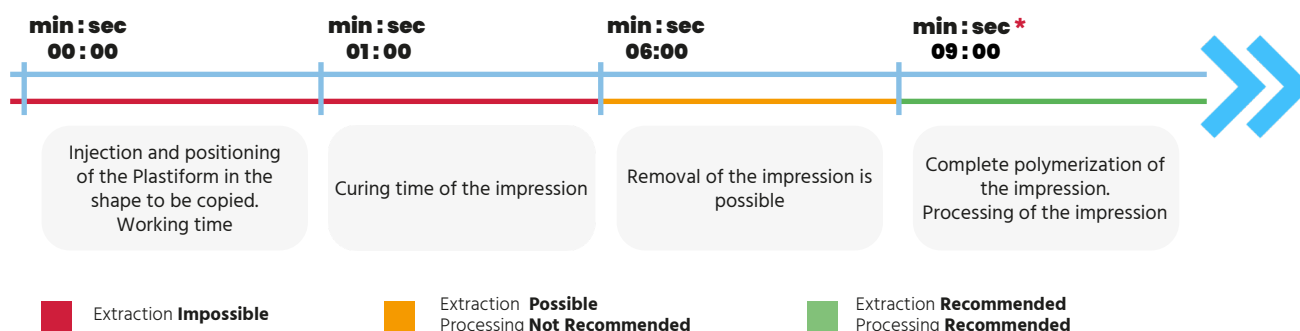
\* Elongation at break defines the ability of a material to elongate before breaking when loaded in tension.

\*\* The impression resolution is the smallest variation of the measured quantity that produces a perceptible variation of the indication delivered by the measuring instrument.

ND - Not Determined

#### Recommended application times (Data at 23°C / 50% HR)

It is recommended to wait for complete polymerization before extracting and processing the impressions.



\* If you are using the P80 Ra to **perform a roughness control**, it is recommended that you **wait 30 minutes** before taking your measurements.

### ● P80 Ra

#### Evolution of curing time / product temperature

Temperature is a factor with a direct influence on the curing time of Plastiform products. It is recommended to use the products at room temperature (~23°C).

#### Applications

The Plastiform P80 Ra has been specially designed for indirect roughness controls

The surface roughness is perfectly reproduced and can be measured directly on the impression with a **skidless roughometer** or an optical inspection device.

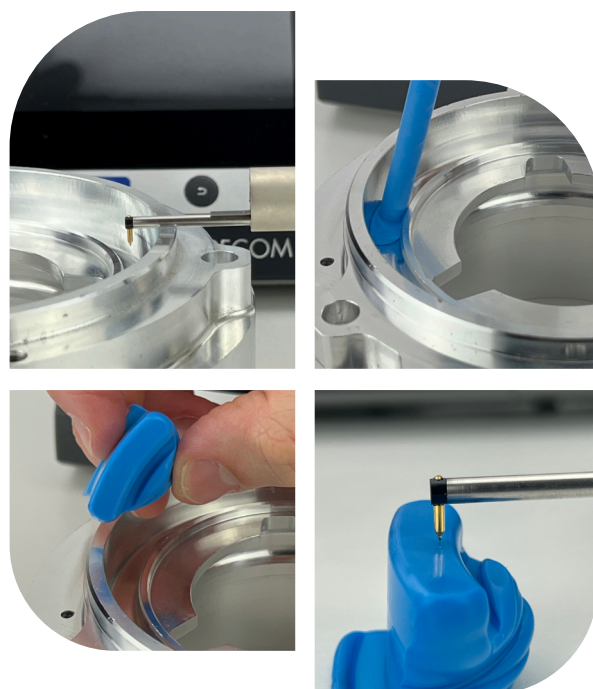
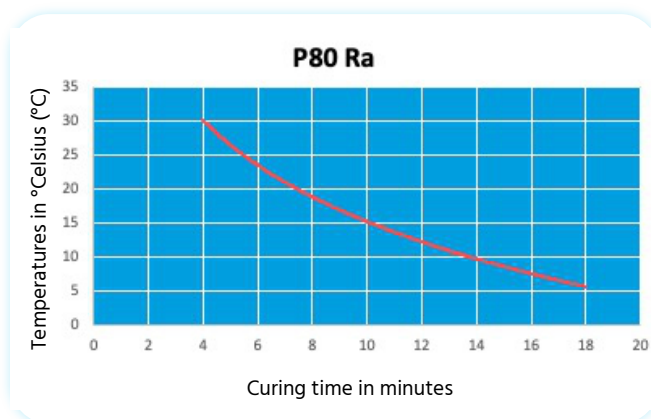
This plastiform is specially designed to reproduce the roughness of a surface and is a good indicator of the Ra.

If you are looking for Rt or Rz values, use a non-contact measuring device instead.

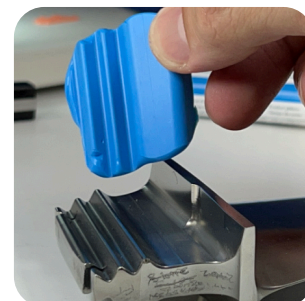
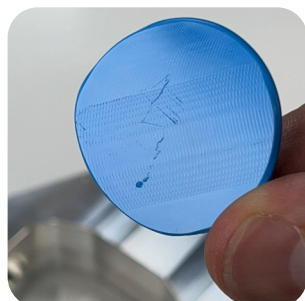
#### Secondary applications

The P80 Ra can also be used to create partial impressions on simple external shapes. The impression is very accurate but cannot be subjected to a removal constraint.

We do not recommend cutting the impression of this plastiform with the Double Blade Cutter as it is too rigid.



Example of use of the P80 Ra for roughness control



#### Material compatibility

Plastiform can be used on all types of materials. However, an alteration of the chemical reaction of polymerization can occur in contact with latex, sulfur compounds, graphite, oils and greases, as well as certain titanium alloys (non-exhaustive list). In general, the user is advised to conduct comprehensive tests to determine the suitability, effectiveness and safety of Plastiform for the intended application.

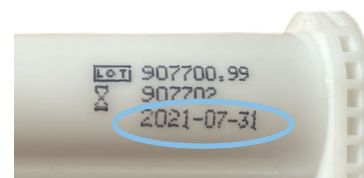
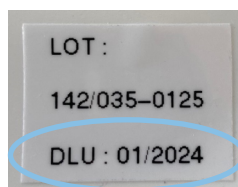
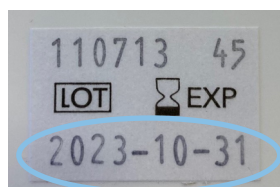


### ● P80 Ra

#### Shelf life / Storage / Conservation

The expiry date of Plastiforms is indicated on the products. It varies between 24 and 36 months (depending on the product) after the manufacturing of the product, if it is kept in its original packaging, well closed, and stored in a dry and temperate environment (between 15 and 25°C).

The expiry Date is indicated on the cartridge or under the jar as follows:



Once the product's validity date has been exceeded, Rivelec no longer guarantees the performance shown on this technical data sheet. It is then up to the user to proceed with tests, in order to determine the adequacy, the efficiency and the safety of Plastiform products with the application he is considering. Nevertheless, Rivelec has been able to confirm the conformity of Plastiform on products manufactured more than 5 years ago, untouched and stored in nominal conditions.

As long as that the materials have been stored at room temperature and that the original packaging has not been opened, Rivelec considers that it is safe to use the product up to one year after its expiration date. Rivelec recommends that tests be carried out by the customer before using expired products.

A change of aspect, of consistency or an abnormally long polymerization time allow to detect the alteration of the product.

Plastiform's performance can be potentially impaired if the products have been exposed to wide temperature variations or extreme temperatures (< 0 °C or > 55 °C).

In order not to pollute the components and thus alter the homogeneous mixture of Plastiform and the 1/1 ratio of the base and the catalyst, take care not to interchange the caps and to close the cartridges well after use.

#### Health & Environment

- ✓ Plastiforms are **non-toxic** and can be handled without PPE.
- ✓ None of the raw materials used in the manufacture of Plastiform products are classified as **CMR** (carcinogenic, mutagenic or toxic for reproduction).
- ✓ No Volatile Organic Compounds (**VOCs**) are used as raw materials in the manufacture of Plastiform.
- ✓ No substances / raw materials containing substances mentioned in the **REACH SVHC** list in a concentration > 0.1 % are present in the composition of Plastiform products.
- ✓ The polydimethylsiloxanes used in the manufacture of Plastiform products contain a maximum of 0.1% of **volatile cyclic siloxanes** D4, D5 and D6.
- ✓ No **nanoparticles** are used in the manufacturing of Plastiform products.
- ✓ No substance / raw material containing **substances of animal origin** is present in the composition of Plastiform products.
- ✓ No **halogenated hydrocarbons** (chlorinated, fluorinated, brominated) are present in elemental form in Plastiform.
- ✓ No substance / raw material containing **latex** is present in the composition of Plastiform products.
- ✓ Plastiform containers and impressions are classified as **non-hazardous non-inert waste** and more precisely as waste from organic chemical processes under code 07 02 17 "waste containing silicones" (according to annex I of article R 541-8 of the Environmental Code).



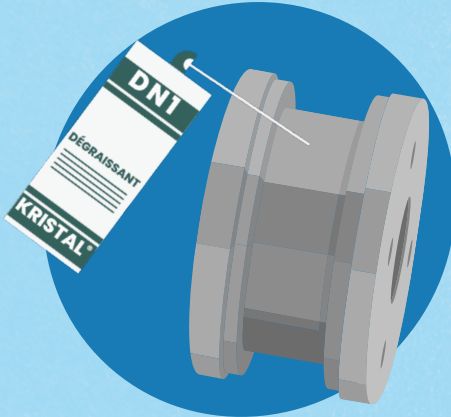


### Implementation

### ● P80 Ra

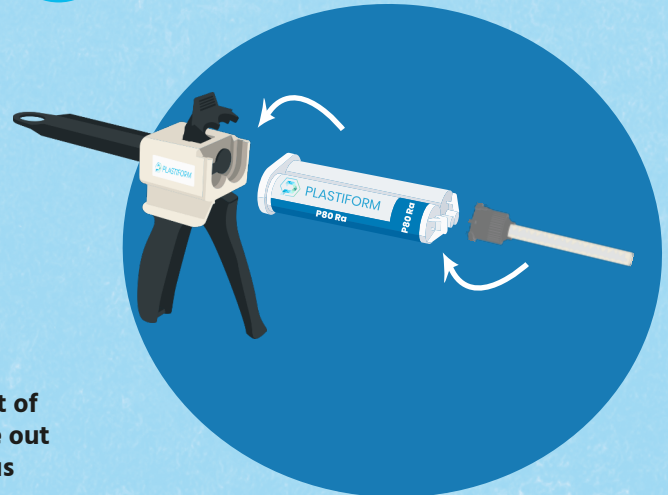
1

Degrease the part thoroughly.



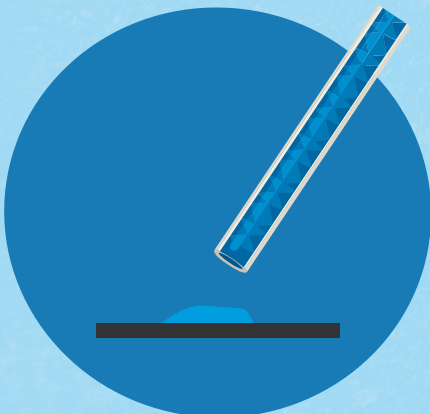
2

Assemble the cartridge with the injector then mount them on the gun.



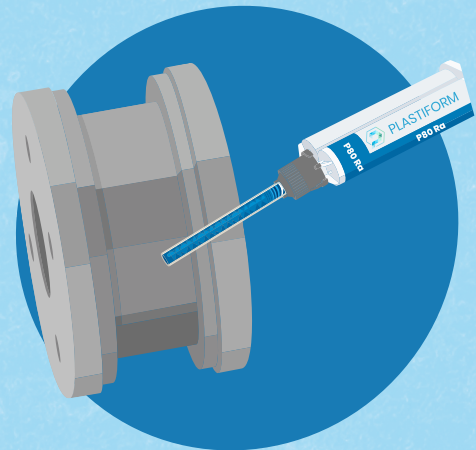
3

Expel the first sample of product that comes out of the injector. Check that the 2 components come out of the injector in equal quantities (homogeneous color).



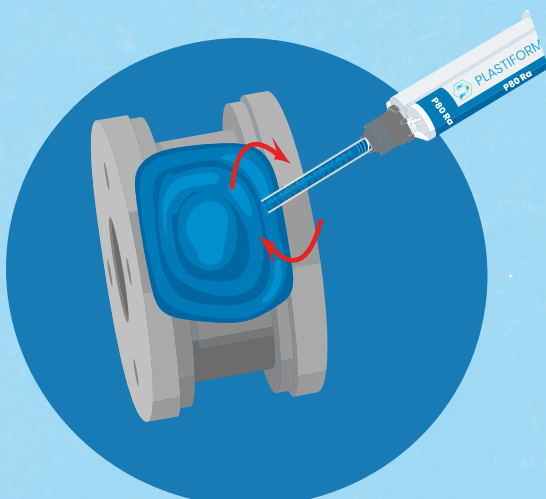
4

Insert the injector by putting it in direct contact with the surface of the part in order to avoid creating bubbles.



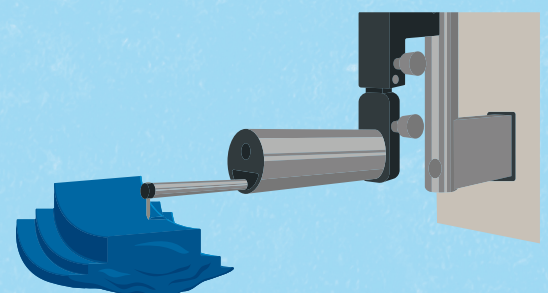
5

Inject the product with a circular motion as you go up. Keep the injector immersed and in contact with the surface of the part.



6

Wait until the curing time of the Plastiform is reached, then remove the impression. Wait 30 minutes before measuring it with a roughness meter





### **P80 Ra**





#### Factors that may influence the measurement results

There is always some unavoidable margin of error between the measured value and the "true value".

The causes of uncertainty can be due to several factors, either during the making of the impression or during its measurement, and can therefore have an impact on the measurement result. The following is a non-exhaustive list of causes of uncertainty:






#### Measuring device

The measuring device can have an impact on the measured value of the replica. The following should be taken into account:





-  **Compatibility between Device/Plastiform:** Some instruments are perfectly compatible with Plastiform impressions, others will have more difficulties. This is why a preliminary test is always recommended, especially for machines with optical detection (laser, scan, light...)
-  **Calibration of the device**
-  **Uncertainty associated with the instrument**
-  **Contact pressure of the instrument:** too much contact pressure can deform the impression and distort the measurement result.

#### Method





The impression must be taken according to the procedure in the instructions for use and the recommendations in the data sheet.

-  **Surface pollution:** The original surface of the part must be perfectly clean. A poorly degreased surface can lead to poor curing of the impression, and a poorly cleaned surface will have dust and residues that will pollute the Plastiform impression.
-  **Plastiform product selection:** The choice of the Plastiform is essential. It must be adapted to the application (shape of the part, orientation of the part, extraction constraints, measuring system used, etc.).
-  **Implementation:** Incorrect application of the product could lead to bubbles or defects in the final impression.
-  **Removing the impression:** The impression must be sufficiently hard before it is removed (curing time). Premature removal of the impression will have an impact on its accuracy.
-  **Exploitation of the impression:** The replica must be measured or evaluated after it has fully cured, as indicated on the data sheet.

#### Operator

-  **Handling the impression:** The impression must be handled with care. The control surface must be preserved throughout the production, extraction and handling process.
-  **Cutting with Double Blade Cutter:** A bad cut with the Double Blade Cutter can induce a loss of measurement precision (parallelism, deformation...).
-  **Positioning the impression on the measuring device:** Since Plastiform is a rather soft material (even the most rigid ones), the impressions must be positioned so that they are not deformed during the measurement.
-  **Measurement size:** Beyond a certain measurement distance, the margin of error logically tends to increase. This factor must be taken into account in the measurement strategy.

#### Plastiform Impression

-  **Impression Volume:** If the impression is too large, there is a risk that it will deform under its own weight.
-  **Cleanliness:** Plastiform material is slightly electrostatic and therefore attracts dust. A cleaning of the impression (with the help of Plastin) may be necessary so that this does not disturb the measurement.
-  **Impression Condition:** The impression may be altered during handling (scratches, tears, deformations), resulting in geometrical defects. Although Plastiforms are resistant, they must be handled with the utmost care in order to obtain optimal results.
-  **Adhesion:** Soft impressions may adhere slightly to surfaces. Incorrect positioning on the measurement support can therefore deform them.

### ● P80 Ra

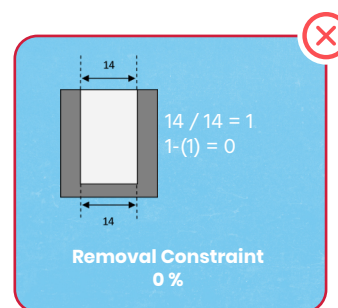
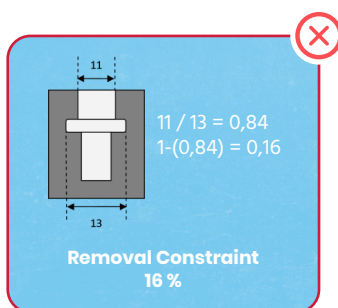
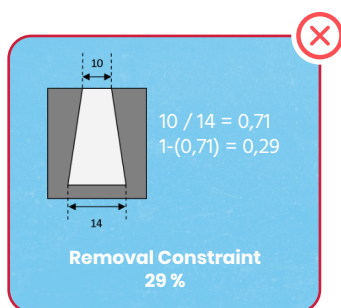
#### Removal Constraint

Determining the Removal Constraint of your part allows you to select the right Plastiform.

When taking an impression of a part, complex internal shapes can complicate the extraction: groove, internal angles, threading... We then say that there is a Removal Constraint (or undercut).

It is calculated using the following formula:

$$1 - \left[ \frac{\text{Minimum size of the extraction hole}}{\text{Maximum internal dimension}} \right] = \text{Removal Constraint (\%)}$$



The **P80 Ra** has a **0%** Removal Constraint

**The higher the percentage, the softer and more elastic the product will need to be to be removed.**

For a Removal Constraint = 29%, it is necessary to choose a product which accepts a constraint **higher than 29%**: F30 Max, F20 or F20 XL for example.

#### Available Packages

Each Plastiform cartridge box is equipped with injectors and tips.



**CA-P80Ra-2**

- ✓ 2 Cartridges of P80 Ra
- ✓ 12 Mixing nozzles
- ✓ 6 Nozzle tips



**CA-P80Ra-8**

- ✓ 8 Cartridges of P80 Ra
- ✓ 48 Mixing nozzles
- ✓ 6 Nozzle tips



**CA-P80Ra-16**

- ✓ 16 Cartridges of P80 Ra
- ✓ 48 Mixing nozzles
- ✓ 6 Nozzle tips

The information provided in our data sheets is based on our current knowledge and on the results of tests carried out under specific conditions. These data are in no way intended to establish a specification.

It is the user's responsibility to carry out complete tests under his own responsibility, in order to determine the suitability, efficiency and safety of Plastiform products for his intended application.

Rivelec cannot guarantee the compatibility of a Plastiform product with any application.

Rivelec rejects any responsibility in case of damage or incident resulting from the use of its products. The warranty conditions are governed by our general sales conditions.



## Ra measurement on a PLASTIFORM® impression with a contact roughness tester

### Description

The Plastiform P80 Ra, as its name suggests, is a molding product that can copy the Ra roughness of a surface and reproduce it identically. This capability allows it to be used in cases where the surface to be inspected is not accessible to the measuring instrument.

### Resolution of the impression

Resolution is the smallest absolute value that can be distinguished or identified by a measurement system on the impression.

Tests on optical systems with sub-nanometer resolution (laser interferometer and scan) have shown a 1 nanometer resolution on the impression.

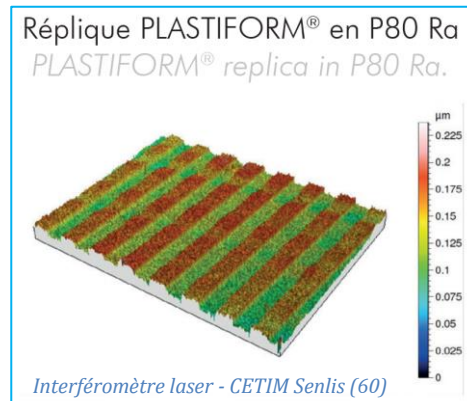
This demonstrates that Plastiforms, and in this case the P80 Ra, are capable of copying nanometer-level details on surfaces where they are applied.

### Definition

Roughness corresponds to the irregularities present on a surface, due to differences in level.

The Arithmetic Mean Roughness, **Ra**, is the arithmetic average of the absolute values of the profile deviations within the reference section. In other words, it is the average distance between the peaks and troughs of the profile, over a given measurement distance.

This is the Ra value that can be obtained on the **P80 Ra** with a contact roughness tester. The other characteristics (Rt, Rz...) can only be obtained with non-contact surface measurement systems.



### Measurement systems and results

There are two main types of contact roughness testers: skidded roughness testers and skidless roughness testers.

Although both can be used for measurements on P80 Ra impressions, the best results are generally obtained with the skidless roughness testers. These instruments allow tolerances of +/- 0.1µm.

For optimum accuracy, optical (non-contact) measuring systems are the most suitable. They can measure Ra of less than 0.020µm with very high accuracy.

### Methodology for a contact measurement

#### 1. Clean the surface well:

Before taking the impression, it is essential to clean the part thoroughly with DN1 degreaser in order not to distort the roughness test. The surface must be perfectly clean, without any grease or oil residue. The presence of dust will also affect the quality of the impression.

#### 2. Follow the instructions for taking the impression:

Measuring the roughness of a part requires careful application of the Plastiform to the test surface. Refer to the instructions for a good application.

P80 is a pasty product that will not flow, so you can apply it to any surface. Be careful not to create air bubbles.

We recommend pressing the impression against the surface with a flat object, in order to create a flat surface on top, but also to ensure good infiltration of the product into the micro-details of the surface.

This way, you will get a cured impression that is easy to position under the probe.

### 3. Wait 30 minutes after the product has cured:

Once the Plastiform has cured, allow approximately 30 minutes before starting the roughness measurement. This will allow the product to reach its final hardness of 80 Shore A. This hardness is essential for an accurate measurement.

### 4. The measuring system must be calibrated:

Before taking the measurement on the P80 Ra impression, it is imperative to calibrate your measuring system properly. We even recommend testing the roughness meter on a P80Ra replica of the roughness standard, in order to check conformity. To do this, take the impression of the roughness standard and compare the results obtained on the impression and on the standard.

### 5. Position the impression correctly:

Place the impression so that the grooves are perpendicular to the direction of measurement and ensure that it is stable and as flat as possible. For this reason, we recommend creating a "flat" on the back of the impression when making it (see point 2 above). The impression must also be held securely so that it does not move due to the friction of the probe. Do not hold the impression with your fingers, as this causes harmful micromovements.



### 6. Take the measurement:

According to the norm, the profile should be measured on 5 different sections, in order to have an average. And since the stylus can slightly damage the surface of the impression, the measurement should not be taken twice in the same place.

## Factors influencing the measurement results

When measuring the roughness of a surface, several factors can have an impact on the measurement result. And there are even more factors when it comes to cavity measurements. Here is a non-exhaustive list:

#### 1. Environment:

Temperature variations can affect the result of a roughness measurement. The humidity of the air can also affect the result of a measurement.

#### 2. Human factor and measurement strategy:

The experience of the measurement technicians also has an impact on the measurement result. The choice of measurement method, or the appropriate probe, are important elements in obtaining optimal results.

#### 4. Measuring device:

The choice of the most suitable measuring device determines whether the inspection will be easy or complex. Some instruments are perfectly compatible with Plastiform impressions, others will have more difficulties. Therefore, a preliminary test is always recommended to check the compatibility of the equipment.

#### 5. Object of measurement:

The original surface as well as the surface of the impression must be perfectly clean and the Plastiform impression must have reached its maximum final hardness (approx. 30 to 40 minutes after application). Care should also be taken to preserve the control surface of the impression as much as possible. As it is not made of metal, it should not be scratched, rubbed or bent too much. It should be handled and positioned with care.

#### 6. Limit value of Ra:

When the surface roughness Ra is less than 0.4µm, the contact test becomes unsuitable. Because of the low roughness, a deviation appears, leading to errors in the interpretation of the roughness tester. It is therefore necessary to switch to an optical (non-contact) measuring instrument when the target roughness is less than or equal to 0.4µm.