MENISCO ST88 NEO

Our Solderability Test Systems are designed to provide fast, accurate and objective measurement of solderability for components, including SMD and printed circuit boards The system's output results are expressed in quantitative units – capillary wetting forces (nM) and wetting meniscus angle (degrees). The results directly correspond to the solder wettability of the specimen. The Metronelec solderability systems advance the state of the art of solderability testing by eliminating the need to use indirect comparisons or subjective operator interpretations.

Meets requirement of all international standards:
IPC/EIA J-STD 002 1 003
JEDEC MIL 883 L
IEC 68-2-69
IEC 68-2-58
NFC 89-400
User's standard definition

Specifications

Dimensions:	w310 x l500 x h720
Immersion depth:	0.01-15mm by step of 0.01mm
Globule size:	1, 2, 3.2, 4 mm
Languages:	English, French, German, Chinese
Force measurement range:	0.1 – 40 mN
Force measurement accuracy:	0.001mN

Versions :

User guide ST88 Neo	Version 2.0	01/10/2021

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INTRODUCTION

Physical approach

When a solid is partially immersed into a molten alloy bath, it is subject to a set of forces due to the buoyancy and to the surface tensions which are particularly high at the alloy - flux interface.

The measurement of the force resultant is representative of the meniscus and, consequently, of the **wetting angle** 8 and function of the **solderability quality**.

We distinguish the three following phases:

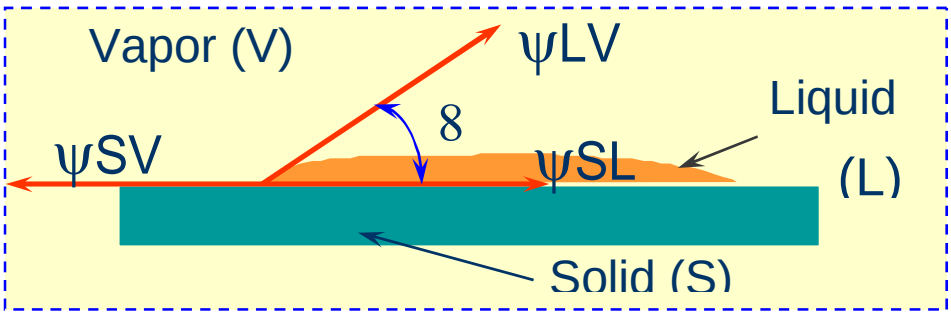
- **The solid phase (component or coupon),**
- **The liquid phase (molten alloy),**
- **The vapor phase (atmospheric air in most cases).**

Surface tensions

The molecular interactions of these three phases taken in pairs are surface tensions called:

- ψSL solid-liquid phases,
- ψSV solid-vapour phases,
- LV liquid-vapour phases.

Θ the wetting angle is the angle defined by the angle between · SL and · LV



Laplace & Young's equations

The balance of those three forces is attained when the liquid which wets the solid forms a stable meniscus represented by the Young's relation:

$$\psi\mathbf{SV} + \psi\mathbf{SL} + \psi\mathbf{LV} = 0$$

The angle 8 formed by the surface of the solid, gaseous (vapour) and the liquid at their extreme point of contact is the wetting angle.

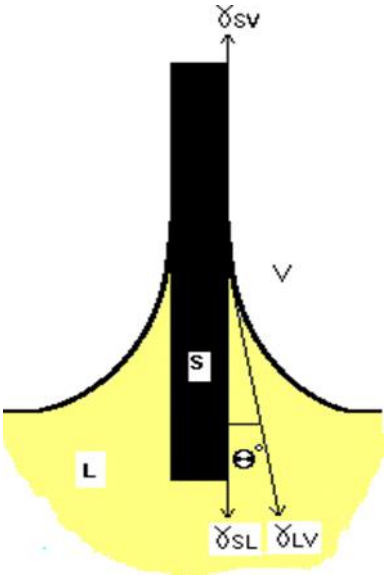


Figure 1: meniscus

The projection of the forces upon the "z" axis is written:

$$\psi SV - \psi SL - \psi LV * \cos 8 = 0 \qquad \Rightarrow \qquad \cos 8 = \frac{\psi SV - \psi SL}{\psi LV}$$

The angle 8 directly linked to surface tensions is thus representative of the wetting quality.

The angle 8 becomes smaller when the wetting quality increases.

Note: The wetting angle 8 is conceivable only for alloys in the liquid state.

Balance measurement

As we dip the sample in molten alloy, we create an Archimedean push and a wetting force then the sensor built in the balance sees these two different forces in the same time, hence the following equation of the force measured by the balance :

Fr = Fw - Fa

Fr ➔ resultant force measured by the balance
Fw ➔ wetting force
Fa ➔ buoyancy (Archimedean push)

IMPORTANT:
You have to consider the force and the meniscus angle only when the meniscus (the curve of the force) is stable.
Before, when the meniscus is moving (climbing) the values of the force are uncertain.

Wetting force

Knowing Fr we can extract the wetting force Fw from the measurement by adding the Archimedean push.

$$\mathbf{Fw = Fr + Fa}$$

From LAPLACE's law,

$$\mathbf{Fw = \psi_{LV} * l * \cos\theta}$$

And $$\mathbf{Fa = \pi * V * g}$$

Hence $$\mathbf{Fr = \psi_{LV} * l * \cos\theta - \pi * V * g}$$

Fr	➔	resultant force measured (mN)
Fw	➔	wetting force (mN)
8	➔	wetting angle
ψ_{LV}	➔	liquid-vapour surface tension alloy/flux (mN/mm)
l	➔	sample perimeter in the meniscus area (mm)
π	➔	Specific volume of the molten alloy (g/mm3
v	➔	immersed sample volume (mm)
g	➔	gravitational field (9.81 m/s2)

The other parameters are data fixed in accordance with the testing conditions.

If the value of the surface tension ψ_{LV}, is unknown, operator shall start by determining it as this value is mandatory for wetting angle and standard limit calculations, for more details see section "Video recording".

Wetting angle

The wetting angle gives a direct and absolute answer by a simple reading of the value. It is difficult in case of complex shape to extract the wetting angle.

The software uses dedicated formulas following the shape and the entry angle to extract the correct wetting angle.

In the general case (component fully wettable, regular shape on "z" axis),

we extract 8 from $Fr = \psi LV * l * \cos 8 - \pi * y * g$

Hence,

$$\cos 8 = \frac{Fr + \pi * y * g}{\psi LV * l}$$

Wetting force divided by perimeter

An alternative way between angle and force is to divide the wetting force by the perimeter so we obtain a result independent from the perimeter.

Using the same notation, we have :

$$\frac{Fw}{l} = \frac{\psi LV * l * \cos 8}{l} = \psi LV * \cos 8$$

As ψLV is constant, this unit is just function of the wetting angle and limited by $+\psi LV$ as cos8 can't be greater than one.

Solderability

Soldering

Soldering is the assembly of metallic surfaces with the help of a metal or an alloy in the liquid state.

The liquidus temperature is below these of the metals to joint by wetting. These surfaces are not reflowed during this process (by opposition to brazing) but are dissolved in the alloy.

Soldering is the main solution used in electronic assembly to provide a good electrical, mechanical and thermal link with the following advantages:

- Good knowledge of the technology
- Wetting effect
- Very long feed back
- Low cost
- Mass production is easy
- Low temperature

All soldering methods use an alloy and a flux associated in different ways following the application type:

- Cored solder wire with solid flux
- Wave soldering with liquid flux
- Solder cream reflow with pasty flux

Solderability testing

The goal is to evaluate the quality of components / soldering ingredients before to use it on production lines.

We can use solderability test to check components, pcb, alloys, chemicals for soldering or components productions, etc…

We can't check all components, so we operate by sampling to measure the « average level » of solderability. Size of the sampling depends on the amount of components and the degree of confidence you want to use, all this is just statistic and is defined in quality standards. Usually, we use batches of ten or twelve components to have a good idea of the quality.

Ageing

To know the solderability of a "fresh component" is not enough…As solderability can evolve quickly, it is also very important to know, to predict the wettability versus time to warrant the quality for months.

The ageing of fusible coating creates intermetallic growth; organic deposits have also a limited shelf life, ageing in general is not good for wettability as the general state of the surface is degraded.

Solderability shelf life is an important figure to know.

Different standards define conditions of ageing, it is generally an immersion of few hours in "dry steam", see standards for more details.

Why ?

The main reason is to avoid over cost due to repair and production destabilization and also to lead the process.

Predict production results with off line trials.

Components, process approval, pcb or component manufacture (No clean, lead free, etc)

This equipment, defined in standards and meeting all standard requirements is also mandatory to justify the level of solderability in case of doubt / conflict.

Who ?

Every company involved in soldering from:

- Raw materials suppliers (copper tapes or wires, rosins)
- Lead frames suppliers / formers
- Chemicals suppliers for pcb or component fabrication and assembly.
- Pcb and component manufacturers.
- Assembly companies
- Laboratories and schools

Dip & look test method

This test, achievable with the ST88 NEO, is only a visual test with no physical measure.

The sample is dipped in defined conditions followed by a manual control visual. Methodology is binary, just pass or fail no more discrimination. A comparison is not easy… Influence of the operator in evaluation of the result, subjectivity, repeatability, reproducibility function of the operator…

Efficient only with larges surfaces or need to use a microscope. See standards for more information.

Solder bath wetting balance test method

We do a complete soldering with a specimen mounted on a balance and dipped in a bath; we weight the amount of alloy wetting the specimen. The conditions of test are known and well standardized.

There is a direct relation between solderability and the mass measured.

The process is computerized so the comparison, historic, and traceability are easy offering a very good discrimination.

This method is well known worldwide by all standards and companies involved in electronic. Solder bath method is preferred for conventional components soldered on wave application, repeated tests (no need to align), gross thermal mass, large components.

Solder globule wetting balance test method

We do a complete soldering with a specimen mounted on a balance and dipped in a globule, we weight the amount of alloy wetting the specimen. The conditions of test are known and standardized.

There is no direct relation between solderability and the mass measured but we can proceed by comparison.

The process is computerized so the comparison, historic, and traceability are easy offering a very good discrimination.

This method is well known worldwide by some standards and companies involved in electronic.

Solder globule test method is preferred for local test (on pcb or component) for partially wettable sample, to limit the Archimedean push.

Components

All types of components can be tested with this machine excepted components already soldered with balls or columns (BGA, etc). We can check the solderability of BGA before balling but there is no sense to check the wettability of an alloy.

If the shape is simple, regular in the "z" axis or known in the library, we can apply a model to define the quality of wetting following the force measured.

If this is not the case we can test the component by comparison by building our own reference.

Substrates

Substrates are the base where we solder the component leads and pads.

We have a lot of different base materials and finitions (metallic or organic) on the market. Preparation is essential for substrate testing, see annex A.

Alloys

Metal or alloy with a melting point below 500 °C (soft soldering) generally based on tin with addition of lead, silver, antimony, copper, etc.

The alloy is present like a bath or like a preform called globule. Alloys are defined in many national or international standards.

Lead free

As the ST88 NEO is fully compatible with all type of alloys with melting temperature from room temperature to 450 °C as standard (600°C by request), there is no limitation for lead free alloys. No prematured ageing of the pot with any lead free alloy.

Don't forget to input the right temperature and density to stay in the validity domain of the formulas !

Fluxes

The flux is a chemical compound applied on metallic surface to help the soldering. The fluxes used in electronics are defined in many standards like synthetic, no clean, organic non rosin based, organic…

The fluxes used as standard in solderability are colophony based collected from trees. We define different type of activities by addition of an activator halided Ex type R Rosin non activated, RMA Rosin middly activated and RA Rosin activated).

Standards

This chapter describes quickly the spirit of the different standards in use, for further information, as these texts are protected by copyright; please refer to original text available on the web (www.ipc.org, www.iec.ch, etc)

The operator can apply all these standards to any curve or batch of curves by a simple right click on the graph area

NF 89400

This standard defines only the bath method.

The sanction is the value of the wetting angle obtained with the following test conditions :
Ageing : not mandatory

Flux : type R or RMA (CMA from the NF French standard NF C 90550) Alloy Sn60Pb40 at 235 °C
Immersion speed 20 to 30 mm/s
Immersion depth 4 or 2 mm
Immersion time : time as a function of the component size being admitted that the reference time is 3 s for small components (including the CMS).
Pre heat : no
Pass / Fail criteria(s) : the solderability quality is classified into four categories according to the following table

SOLDERABILITY CLASS	QUALITY	ANGLE VALUE (°)
1	EXCELLENT	8 : 30
2	GOOD	8 : 40
3	ADMISSIBLE	8 : 55
4	UNCERTAIN	8 : 55

The experience gained in production and assembly workshops enables the following table to be drawn up:
Note: if a sample in ten does not fall in the category chosen, one should measure five new samples which must all be satisfactory.

NF 89400 P

This standard defines only the bath method.

This is a variant of the previous one, we use in this case the force divided by the wettable perimeter as presented before. The "P" means perimeter.

We can use the wetting force (Fw/mm) extracted from the balance or the resultant force (Fr/mm) directly from the sensor.

The test conditions are :

Ageing : not mandatory
Flux : type R
Alloy : Sn60Pb40 at 245 °C Immersion speed : 20 to 30 mm/s Immersion depth : 4 or 2 mm.
Immersion time : 5 to 10 s.
Pre heat : no
Pass / Fail criteria(s) : zero crossing time less than 0.59 s (time to across the "x" axis

Time to obtain 2/3 of the maximum force less than 1.0 s

Mil – Std – 883C method 2022

This standard defines only the bath method.
This standard is a US military specification, designed for traditional components like DIL cases.

The conditions are :

Ageing : yes
Flux : type R or RMA Alloy Sn60Pb40 at 245 °C
Immersion speed 20 to 30 mm/s
Immersion depth 4 or 2 mm
Pre heat : no
Pass / Fail criteria(s) : zero crossing time less than 0.59 s (time to across the "x" axis)

Time to obtain 2/3 of the maximum force less than 1.0 s

IEC 68-2-69

This standard defines both methods bath and globule.

Ageing : defined
Flux : type R, RMA, RA
Alloy : Sn60Pb40 at 235 °C or lead free
Immersion speed : function of the component Immersion depth : function of the component
Immersion time : 5 to 10 s.
Pre heat : no
Pass / Fail criteria(s) : Buoyancy crossing time.

Time to obtain 2/3 of the maximum force less than 1.0 s
Minimum of force to reach at 2 and 5 s

IPC/ANSI/J-STD-002/3

This standard defines both methods bath and globule. Solderability test procedures for components and pcb.

Ageing : 3 classes defined
Flux : type R, RMA, RA

Alloy : Sn60Pb40 at 245 °C or lead free at 255°C Immersion speed : function of the component
Immersion depth : function of the component.
Immersion time : 5 to 10 s.
Immersion angle : 45 to 70 ° Pre heat : no
Pass / Fail criteria(s) : Buoyancy crossing time in less than 1.0 s.

Time to obtain 2/3 of the maximum force less than 1.0 s
Minimum of force to reach at 2 and 5 s

User's specification

The user can define is own specification pass / fail criteria in time, level of force, time to buoyancy, etc all criteria defined in standards. See section Utilization.

UTILIZATION

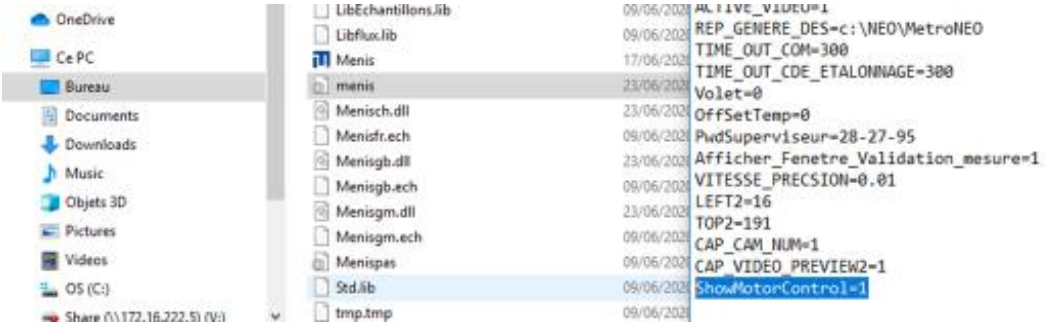
Start up

Connection

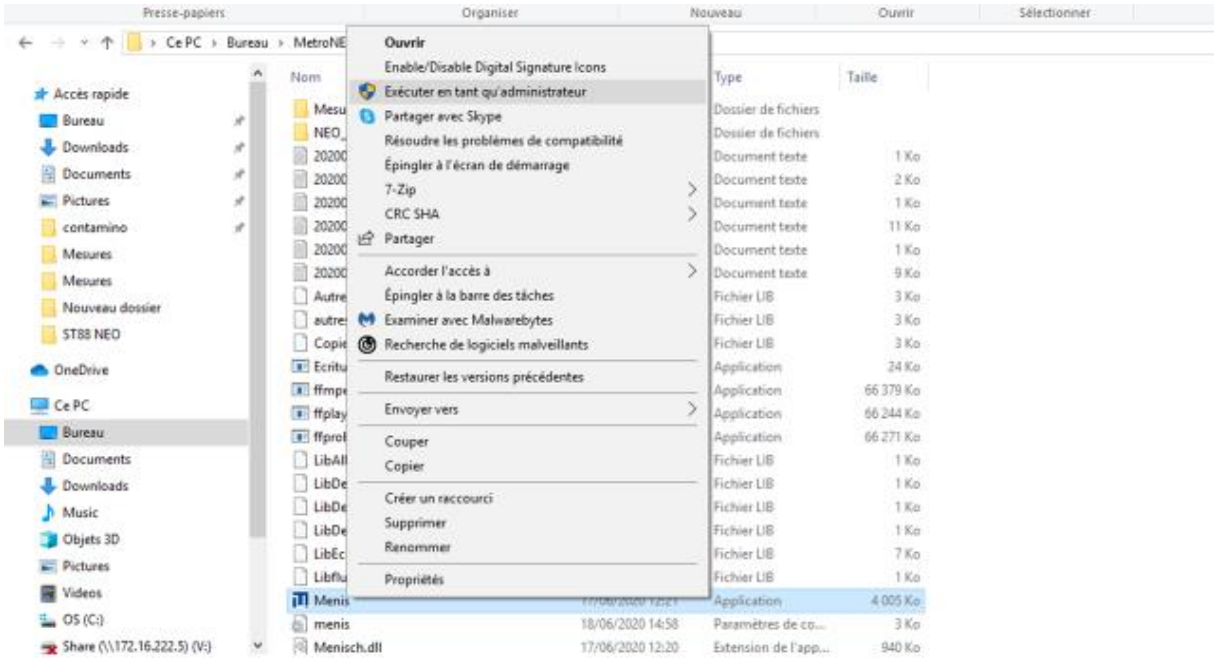
Introduction

The Menisco icon should be on the desktop or you can find it by Start Menis or Menisco.

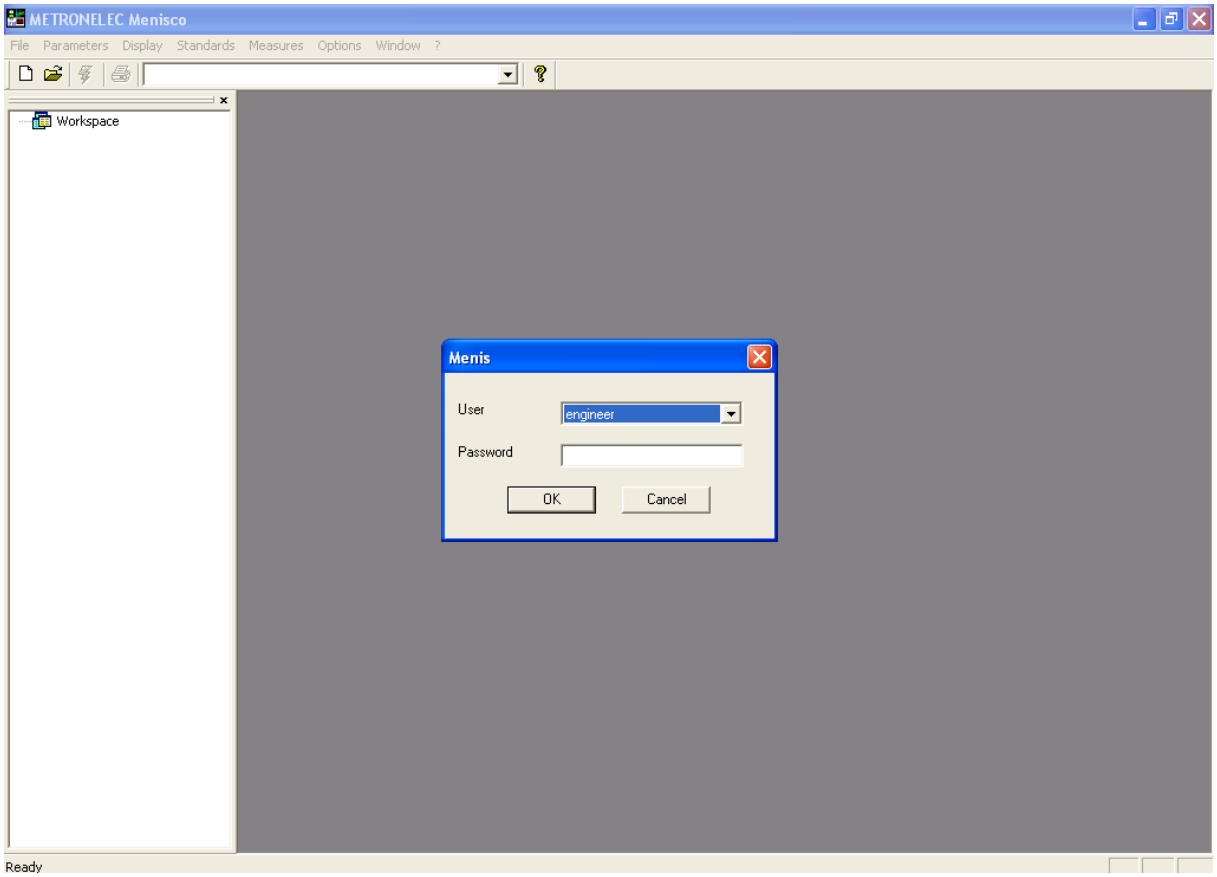
On first installation (you will have a direct icon to do it), it is interesting to have the presentation of Motor Control window appearing. For this just select in the file where it is installed the Menis.exe file and change the last line from 0 to 1 as shown on the image below



Then launch the software by right clicking on the Menis.exe and selecting "Launch under administrator mode".

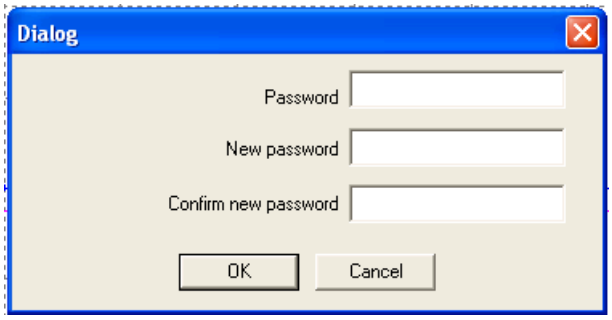


With the mouse click on the Menisco icon and you must obtain the following screen :



User level

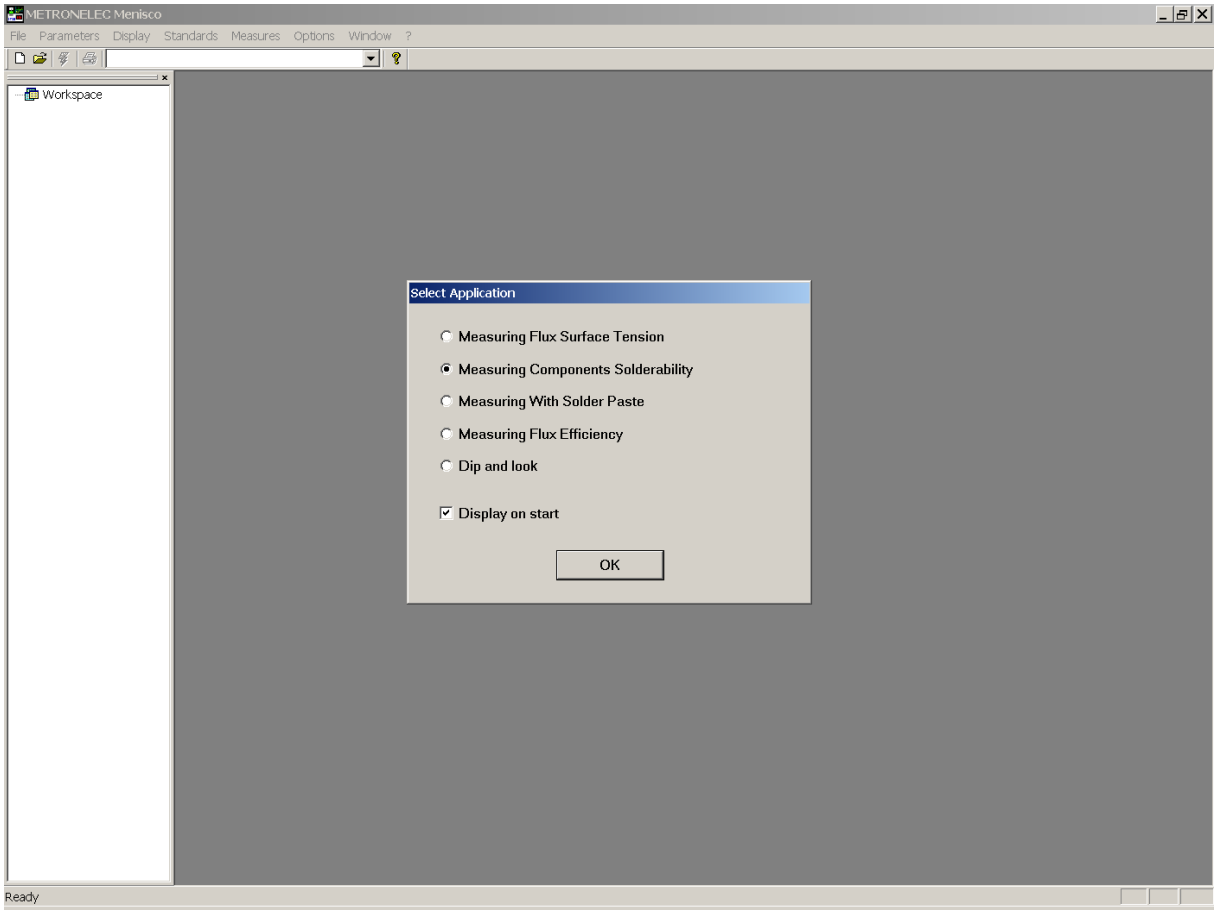
You must choose your user level Engineer or Operator, only the Engineer has a full access to the software; the Operator has a limited access. The first password is "secret" you can change it only is Engineer mode, the password is used only for the Engineer mode.



You don't need to use a password for the Operator mode.

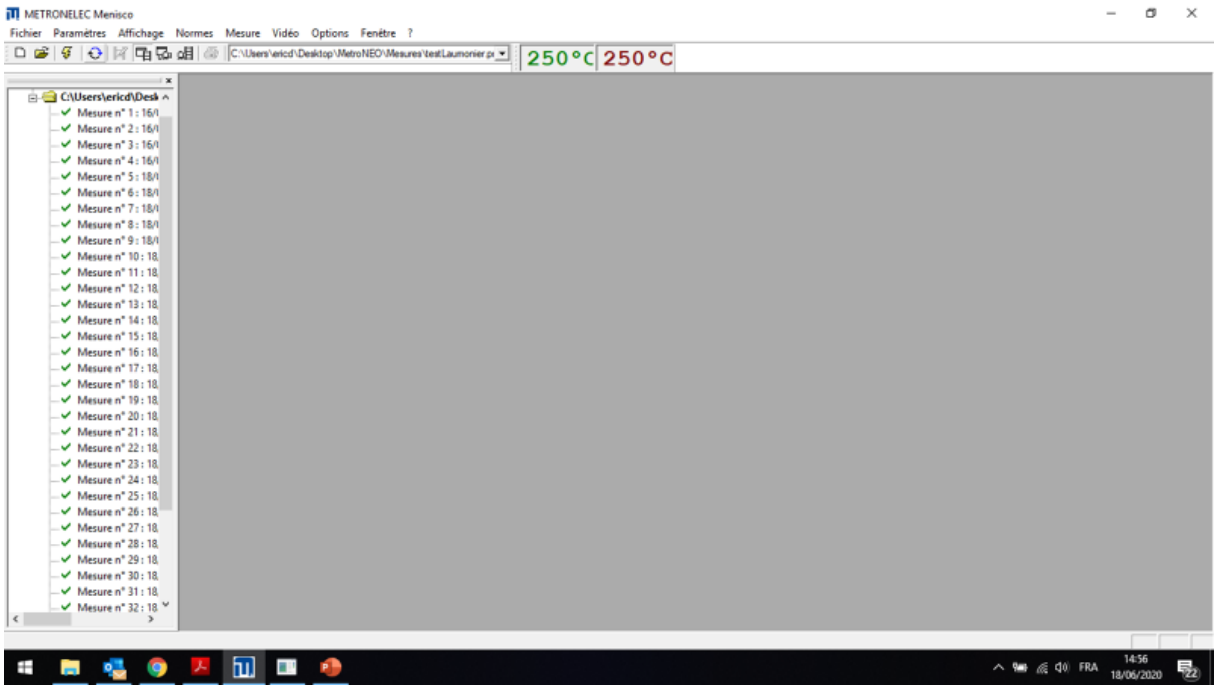
Main menu

After confirmation of the password, the following window appears



Use the arrow keys or the mouse to select the items wanted corresponding to the type of test to do.

Startup user interface:



MEASURING FLUX SURFACE TENSION

Select this line in order to measure the surface tension of a couple FLUX / ALLOY, see section 2.3.

MEASURING COMPONENTS SOLDERABILITY

Select this line in order to measure the component or pcb solderability, see next section for more details.

MEASURING FLUX EFFICIENCY

Select this line in order to measure flux efficiency using sample of polluted copper with determined grades, see section Video Recording.

MEASURING WITH SOLDER PASTE

Select this line in order to measure the efficiency of solder paste, using samples of polluted copper with determined grades, and solderability of SMD components. Option not yet available with ST88 NEO.

DIP AND LOOK

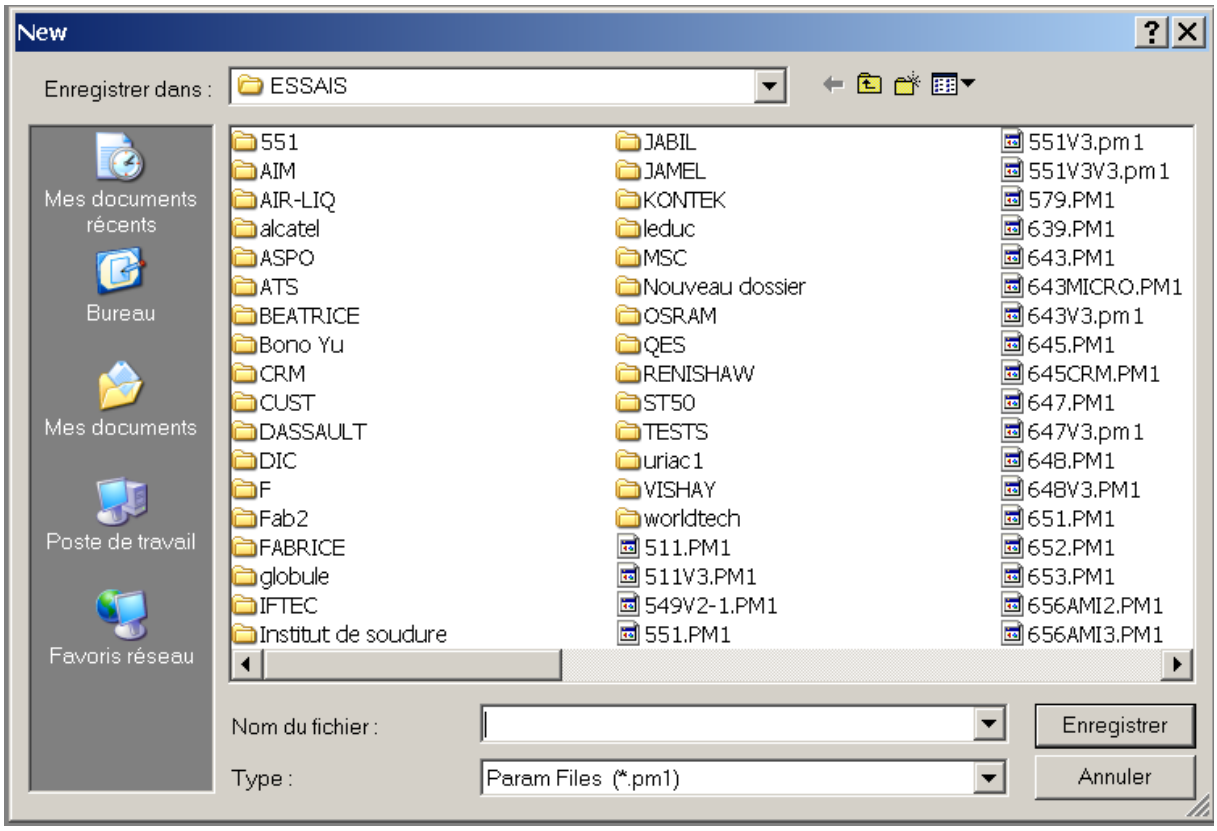
Select this line in order to check visually the solderability (visual inspection, no weight measurement)

Definition of parameters

Prior to make any measurement, the operator must define the file where the data will be stored, for that we can create a new file or open an existing file.

New File

Open the menu File and choose New, or click on the white page icon, then you obtain the following window

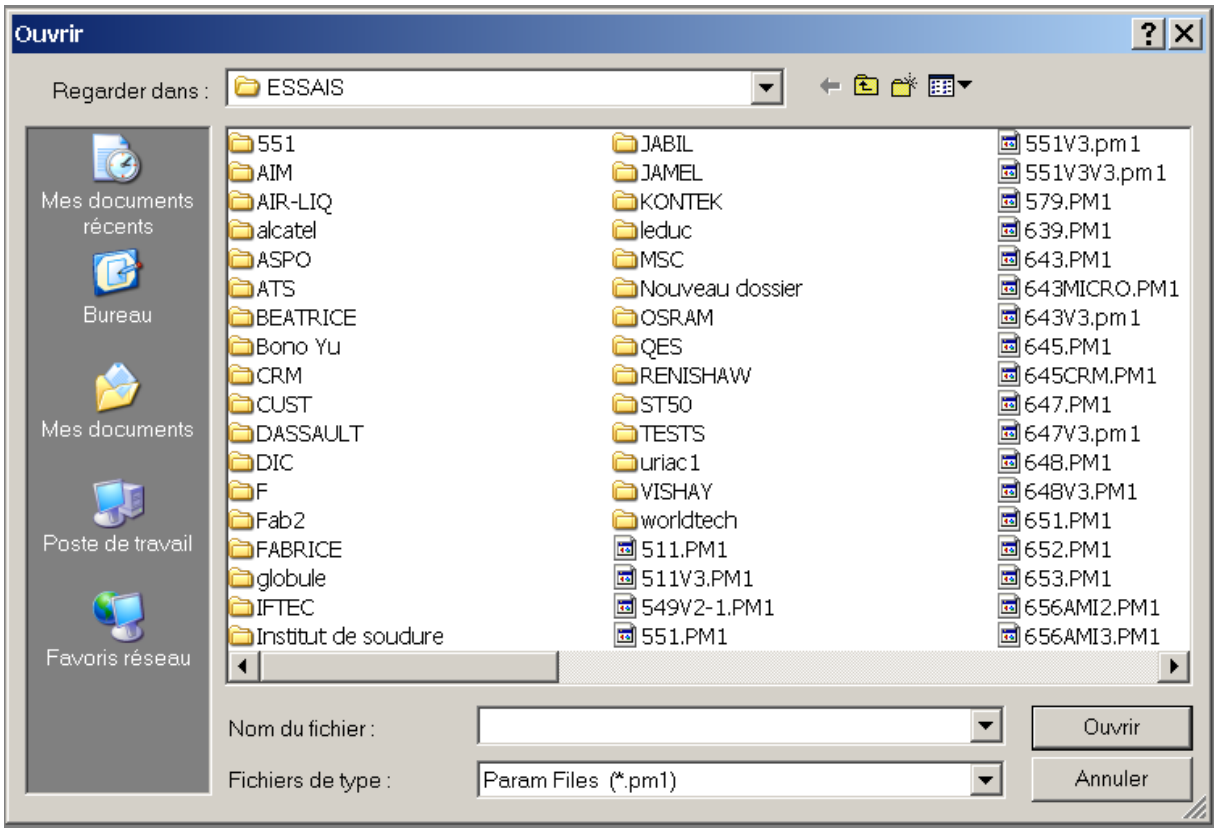


Select a directory or make a directory on your hard disk or on a accessible network drive. Give a new name and confirm by enter or Save button.

Open file

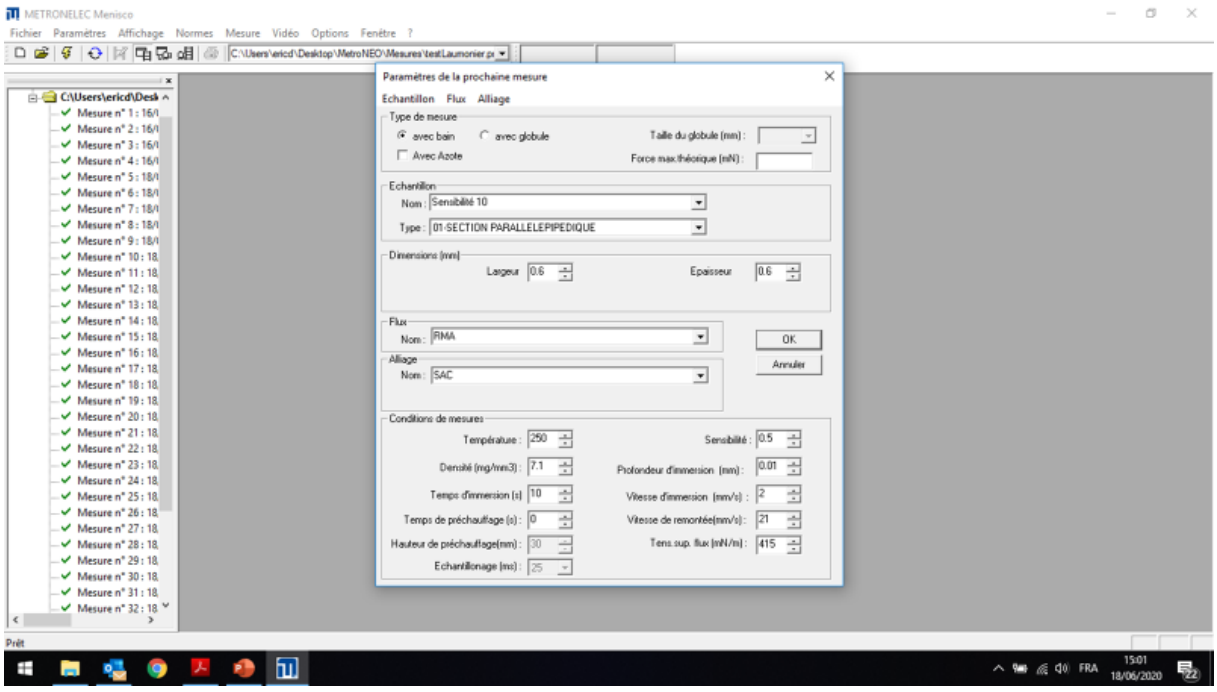
Open the menu File and choose Open, or click on the open icon, then you obtain the following window.

Select the directory and file to open on your hard disk or on a accessible network drive. Confirm by enter or Open button.



Parameters

Before to start test, check the parameters definition by opening the Parameters Menu and Next Measure Parameters.



The menu Parameters Measure in progress will give you the conditions of a previous test Keep in mind that dimensions, density and Gamma LV values are used to calculate the pass fail limits, any error in it will create false limits. (See equations in section 1.1)

TYPE OF MEASURMENT

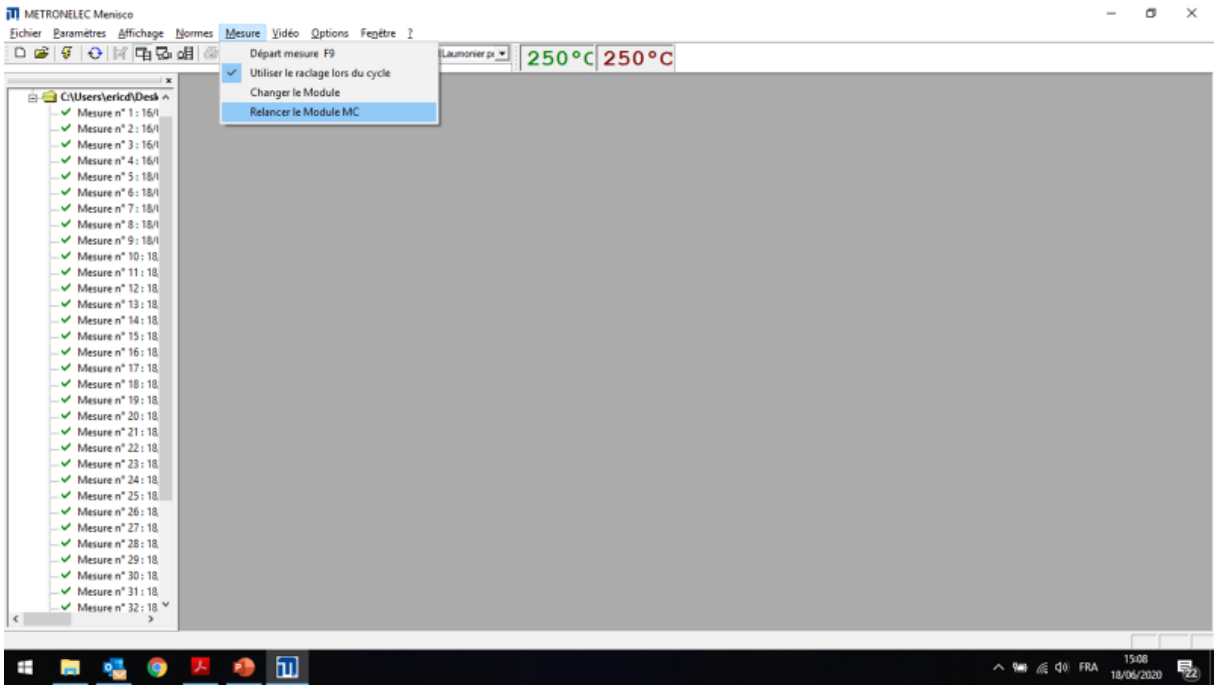
Choose the bath or one globule, some options are available / limited or not following this choice. Check the receptacle chosen is well installed on the ST88 NEO !

To change the receptacle, pull up the manual jig on the right front side to free it, lift up gently until you can move it outside the machine. Put the new receptacle by the same way, be careful to avoid any chock with the height gauge.

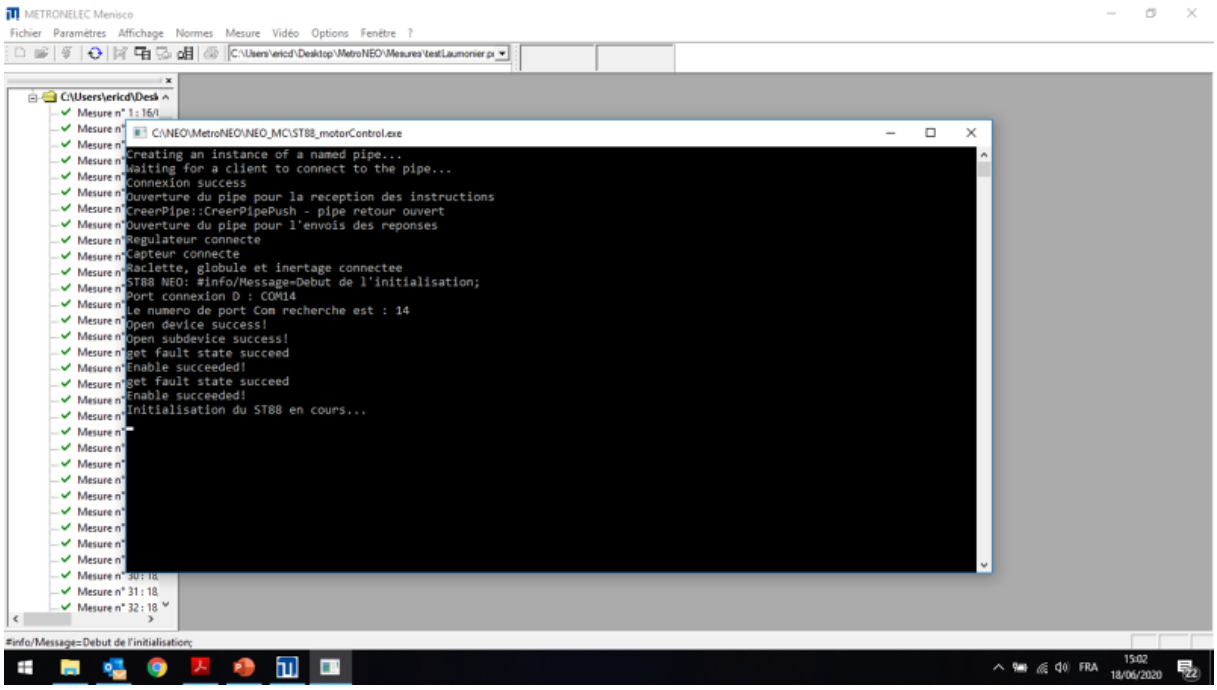
The globule receptacle has three globules of 4, 2 and 1 mm diameter, the operator choose by alignment of the desired globule with the component.

This receptacle has also a green button to confirm the alignment with one globule, mandatory to allow the system to continue the test. This is the moment when the Motor Control software will start. if you have putted 1 in the last lane of the menis.ini you should have this black window with several lines, (more than 2, coming), if only two lines it means that you have another small window behind this black one saying that pipe was not possible.

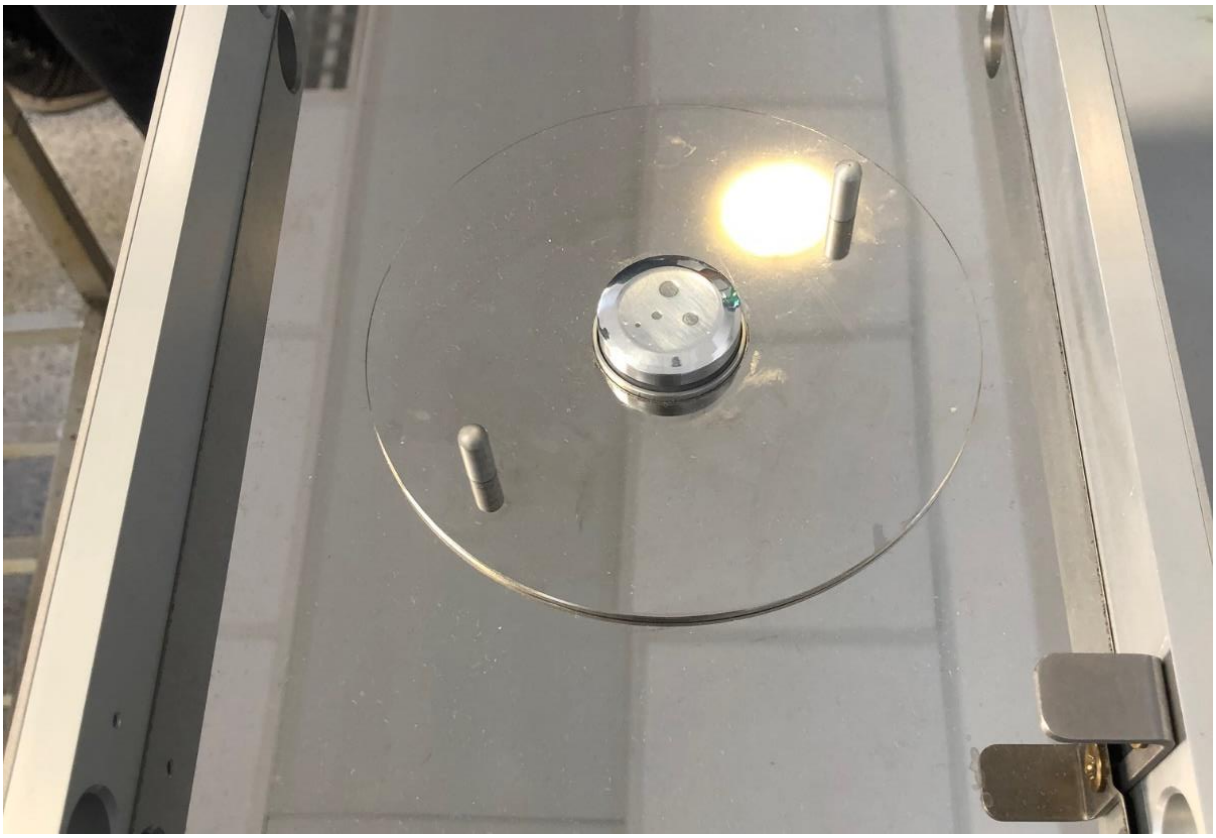
In this case you have to select in the main software the action : Measure / relancer le module MC. Please see the two following windows :



Then the following window should appear:



If you still have the problem of starting MC, try to shut down the machine and turn it back on after a while.



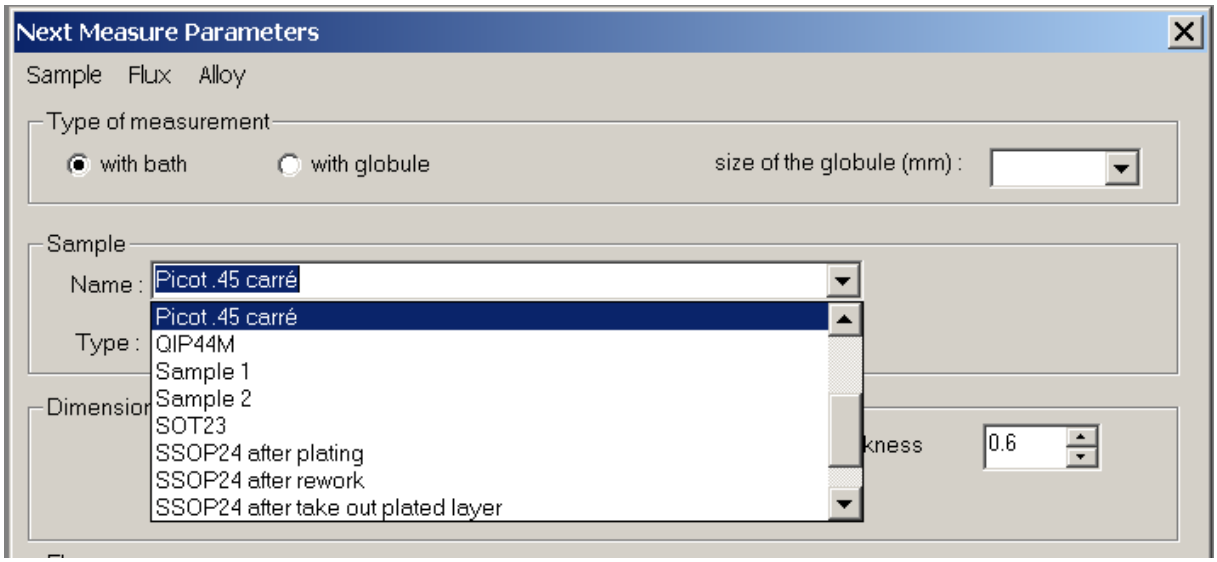
Solder globule receptacle

NAME

If the component is new, enter the NAME and if you wish the MANUFACTURER and BATCH number, these information will be listed in the browser of tests to help you to find any test.

If the component has already been placed in the LIBRARY, Click on the  button of the "Sample Name"

All of the parameters that have been entered are displayed. They can be modified for this new series of measurements.



2.2.3.4 DIMENSIONS

Type the dimensions needed in mm following the type selected (see the technical data)

2.2.3.5 FLUX

Type the name of the flux or select it in the list by clicking on the lift button.

The surface tension (Gamma LV) of the flux is linked to the flux selection but you can modify the surface tension if required.

Use preferably a reference flux well known everywhere by all standards like colophony fluxes; they are more robust with thermal conditions than no clean fluxes.

The flux shall be changed frequently to keep a constant level of solderability.

It is important to know well the GammaLV value for any couple of Alloy / flux as it is used to define the maximum force and the wetting angle

The value of the flux surface tension is depending of the flux type here are some values for common fluxes.

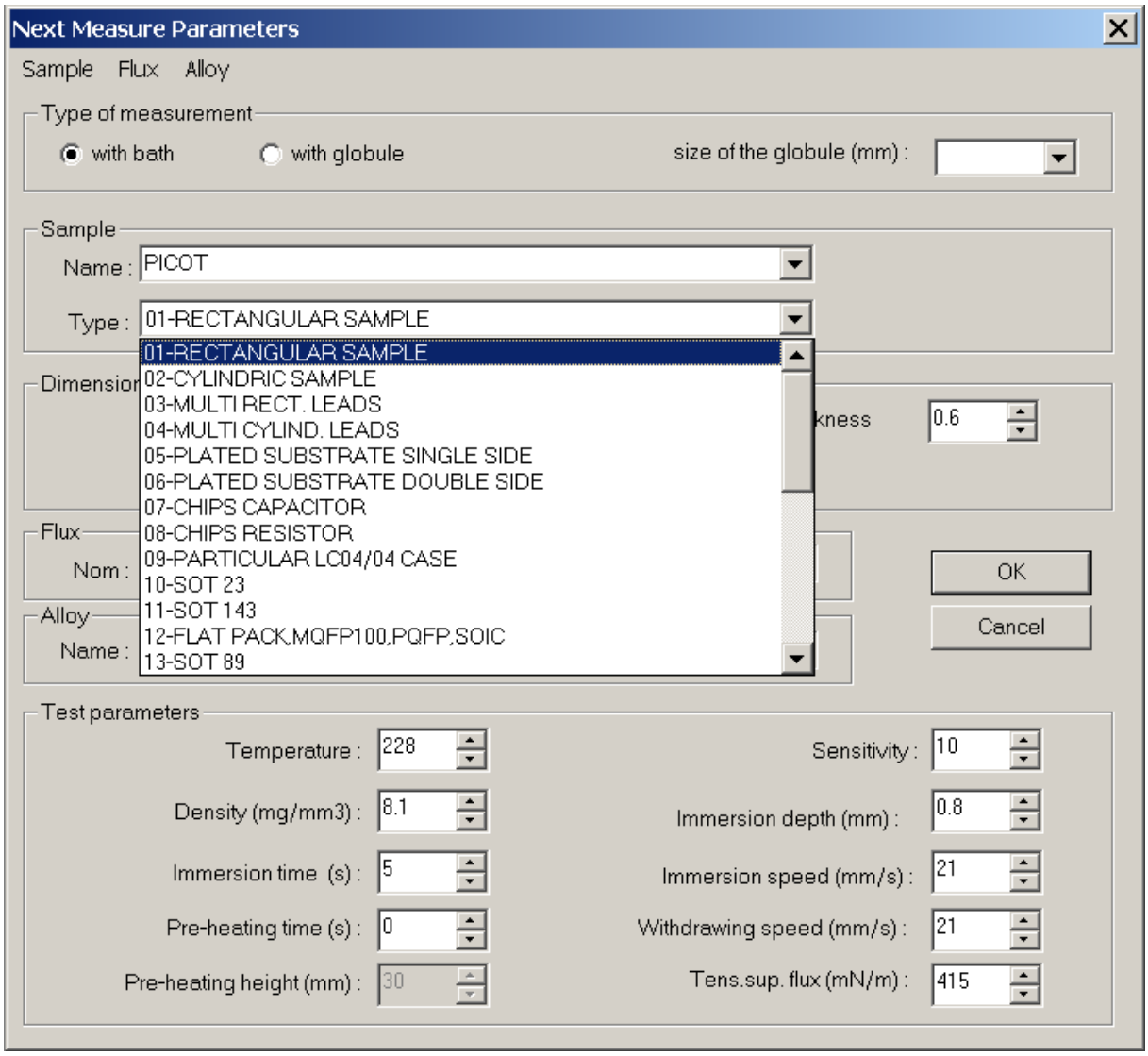
Non activated (R type)	445 mN/m
Midle activated (RMA type	415 mN/m
Activated (RA type)	370 mN/m
No clean	425 mN/m

TYPE

Choose the type of component as defined in Section 4.

This choice will set the formulas and the pass fail criteria to use following the shape / type of component.

Click on the  button to have the list of type to select as below :



ALLOY

Type the name of the alloy or select it in the list by clicking on the lift button.

Alloy choice must be done in a standard list or the closest to the alloy used in production.

It is important to know well the GammaLV value for any couple of Alloy / flux and the alloy density at the test temperature as it is used to define the maximum force and the wetting angle

TEMPERATURE

Input the temperature test in °C directly or click on the arrows to change the value degree by degree (0 to 500).

Respect a certain margin above the liquidus alloy to avoid delay in wetting. (50 to 35 °C).

DENSITY

Input the density in mg/mm3, be sure of the alloy density at the temperature set or click on the arrow (0 to 10.00)

IMMERSION TIME

Input the immersion time in second or use the mouse to select value (3 to 90).

The wetting takes time, few seconds to let the equilibrium to occur. If there is no equilibrium in this time, there is probably a mistake…

3 to 5 second for a component wetting, 5 to 10 for a pcb test and much more for a dewetting.

PRE HEATING TIME

In case of pre heating requirement, input here the duration of the pre heating in second (0 to 90)

The pre heating is done few millimeters above the bath level.

Nota : if you select "Time = 0" the solderability measurement is made without Pre-heat process.

PRE HEATING HEIGHT

As for pre heating time, we input here the height above the level of the bath in mm (3 to 30).

SENSITIVITY

The sensitivity is automatically set by the software according to the dimensions of the measured part of the component but the operator can force it if wanted.

IMMERSION DEPTH

Input the immersion depth in tenth of mm (0.1 to 10) or use the mouse on the arrows to change the value.

This depth is a compromise between good thermal exchange (function of the surface in contact), shape / height of the sample and wettable area.

We use generally 1 to 3 mm for traditional components or 0.1 to 0.5 mm for SMD components.

IMMERSION SPEED

Input the immersion speed in mm or use the mouse on the arrows to change the value(1 to 50). Immersion speed is a compromise between assembly process (wave, iron, reflow,..), the component type and the immersion depth to have a minimum immersion time.

We use generally 1 or 2 mm/s for reflow (static) and 20 to 25 mm/s for wave (dynamic).

WITHDRAWING SPEED

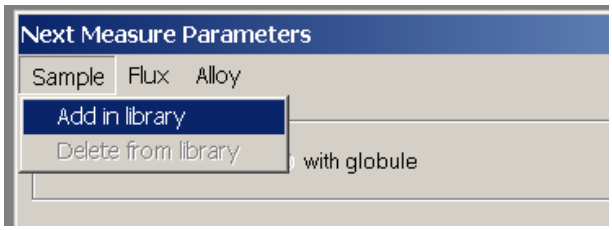
This value is only useful for dip and look test as there is no influence during the measurement. Input the withdrawing speed in mm (1 to 50) or use the mouse on the arrows to change the value.

SURFACE TENSION (GammaLV)

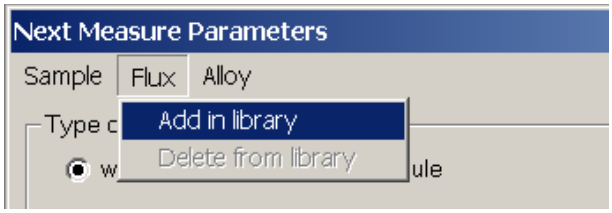
Input the GammaLV in mN/m or use the mouse on the arrows to change the value(1 to 1000).

LIBRARIES

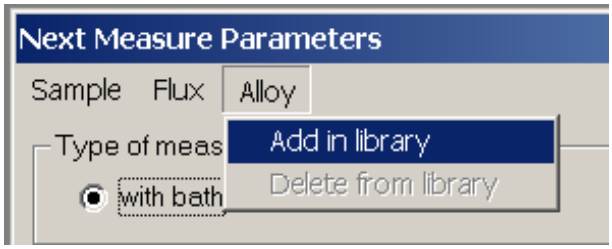
It is possible to save all parameters selected in the "Sample library" by clicking on Sample + Add in library. Operator can also delete from library.



The flux surface tension is saved or deleted in the "Flux library.



The temperature and the density are saved or deleted in the "Alloy library"



Measuring solderability of component / PCB

Components model choice

For "classical" components, use the list of type in section 4 and 5, operator will find an answer to the majority of needs.

Specific components

For component non listed, operator should use "generic" type 1, 2, 3, 4 or 19. If the component is fully wettable on the immersed section, we use type :

1. For rectangular section
2. For cylindrical section
3. For multi rectangular section
4. For multi cylindrical section

Type 19 is for partially wettable part, see Section 4 for more details.

If the component requests an immersion with angle, the software is not able to define itself the pass fail limit (and also the wetting angle), operator must define a proper pass fail limit from experience and literature and use "user's specification"

The dipping orientation is normally 90° as we weight in that direction but some component lead are parallel to the board or complex (J leads), so in this case we use a compromise between the normal orientation of the component during soldering and the "z" axis. (20 to 45°).

Coupons

For coupon, it is important to have the greater wettable area by cutting non wettable area . The metallization should start at the edge of the immersed side. If there is no contact between the metallization and the alloy, there is no wetting.

Use type 19 and define total perimeter and wettable perimeter, the immersion depth should be 3 mm if possible.

The best is to use pre cut coupon designed for wettability testing, with metallization on both side and eventually on edges. If the coupon is fully wettable on all sections, use type 1.

Video recording

The video recording is accessible from the tool bar or from the video menu and the hot key F11 to start a video recording.

Video capture

Operator can make a video recording manually or automatic during a measurement (following option chosen in Capture Parameters by using the tool bar icon or the video menu + video capture or directly by pressing F11

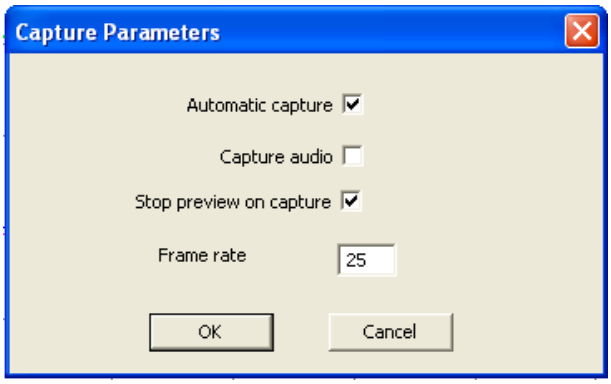
Image capture

Operator can prefer to make only a picture by choosing the video menu + image capture or by clicking on the icon

Capture parameters

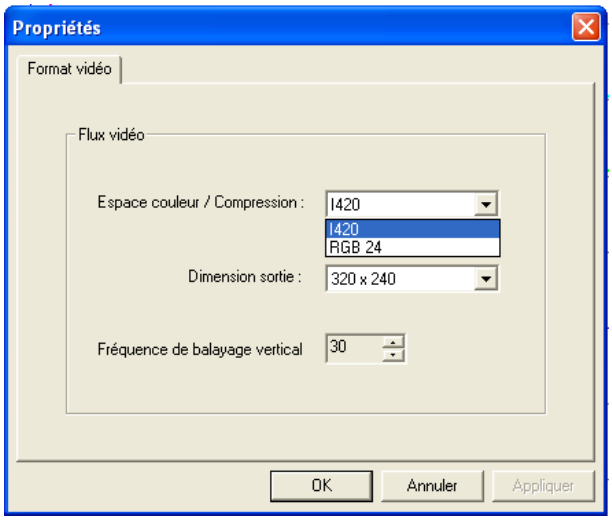
Operator can choose to capture automatically all measurement or prefer the manual mode.
The audio capture is also optional (no great interest for the test itself !).
It is also possible to stop the preview during the capture.

The frame rate can be changed following the cam recorder capability.



Video Format

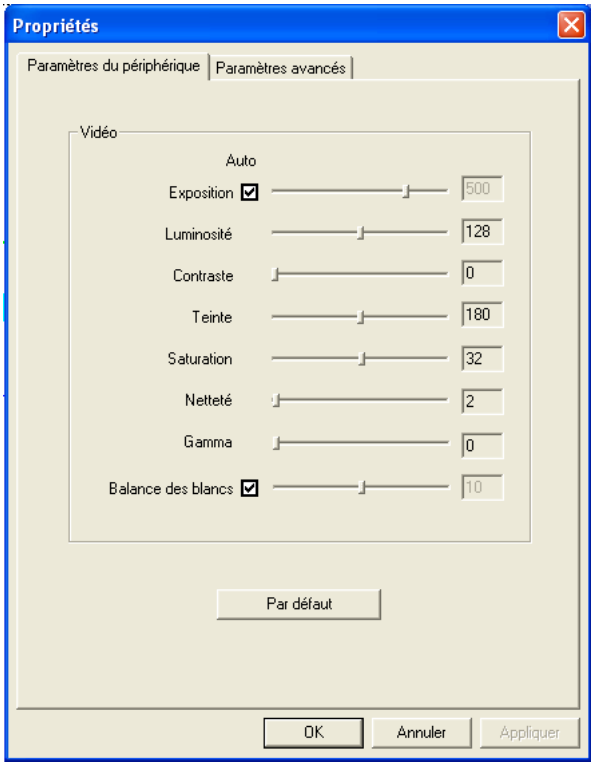
The video format can be tuned to operator's preferences: compression, format size from 320 x 240 the default value up to 640 x 480, and vertical frequency.

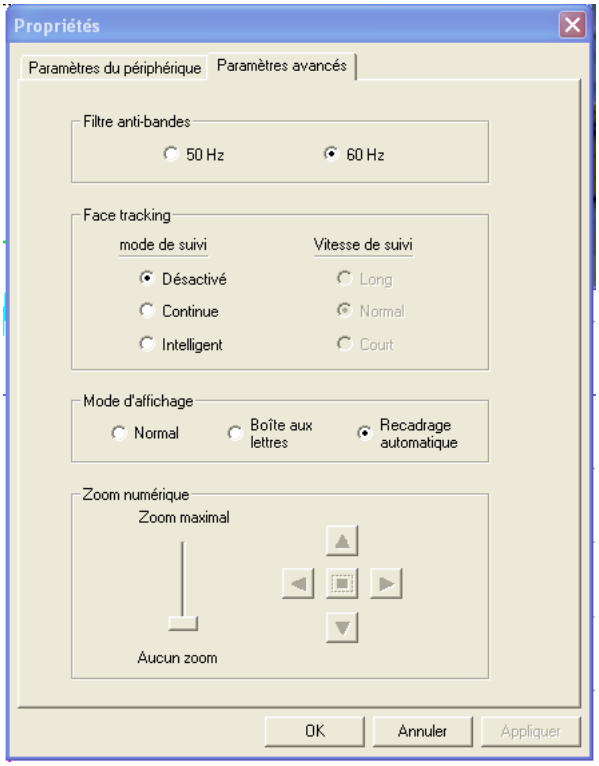


Play video

Play the current video, you can select the video in the measurement browser. Access by the video menu + play video or by clicking on the icon (Can be grey if there is no video in memory)

Video source



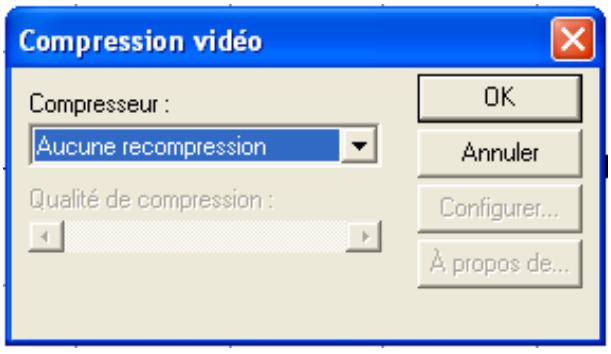


Cam setting can be changed in contrast, saturation, Gamma, white balance, etc, the default setting button come back to factory setting.

In advanced parameters, we can apply a filter for the power supply at 50 or 60 Hz, numerical zoom and some other options following the cam used.

Video compression

The software can use the different compression tools available on your system, operator can adjust some settings following the compression chosen.

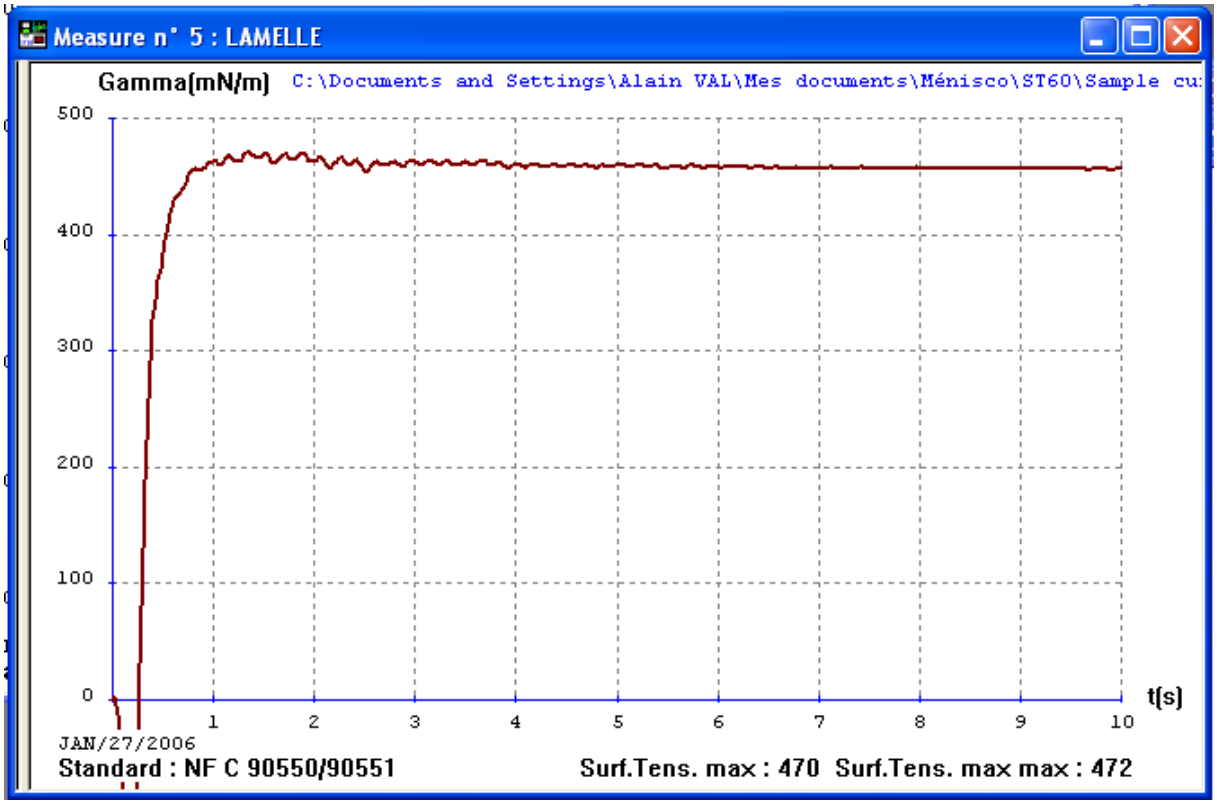


Measuring the Gamma LV

The parameters definition is similar to other applications, except for the types of sample, only type 1 is available, as this requires the use of very thin copper foils of 10 mm width.

The data files are different than other test files.

This application is really useful to determine unknown GammaLV values.



The result is expressed in mN/m, giving the max value for the current curve (surf.tens. max) and the max value of all values (Surf.Tens. max max).

Measuring fluxes & alloys efficiency

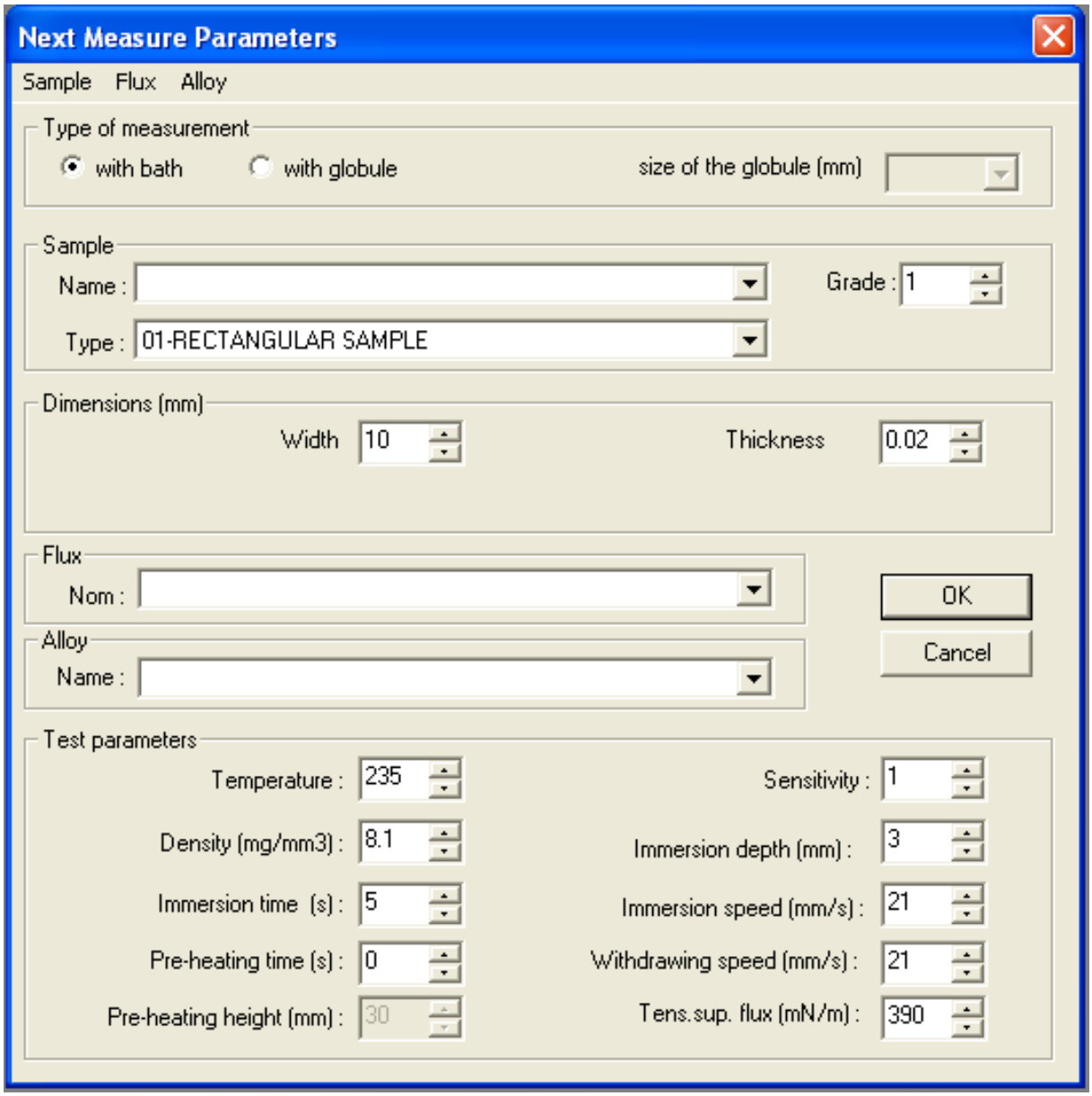
The parameters definition is similar to other applications, except for the types of sample only type 1 is available, as this requires the use of very thin copper foils of 10 mm width.

The data files are different than other test files.

For this application, we have one more field "grade" where we defined the grade / ageing of the copper foil used. The ageing is defined in standard NFC 90 550 and NFC 90 551.

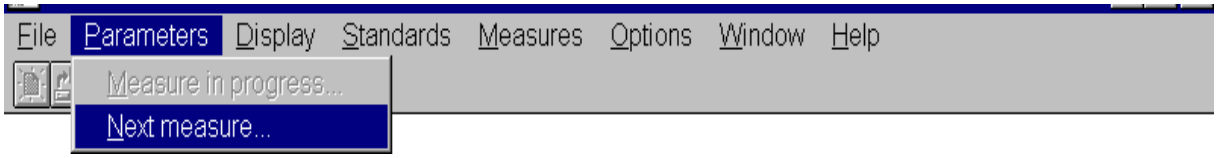
We can measure the flux spectrum of activity vs aged copper grade.

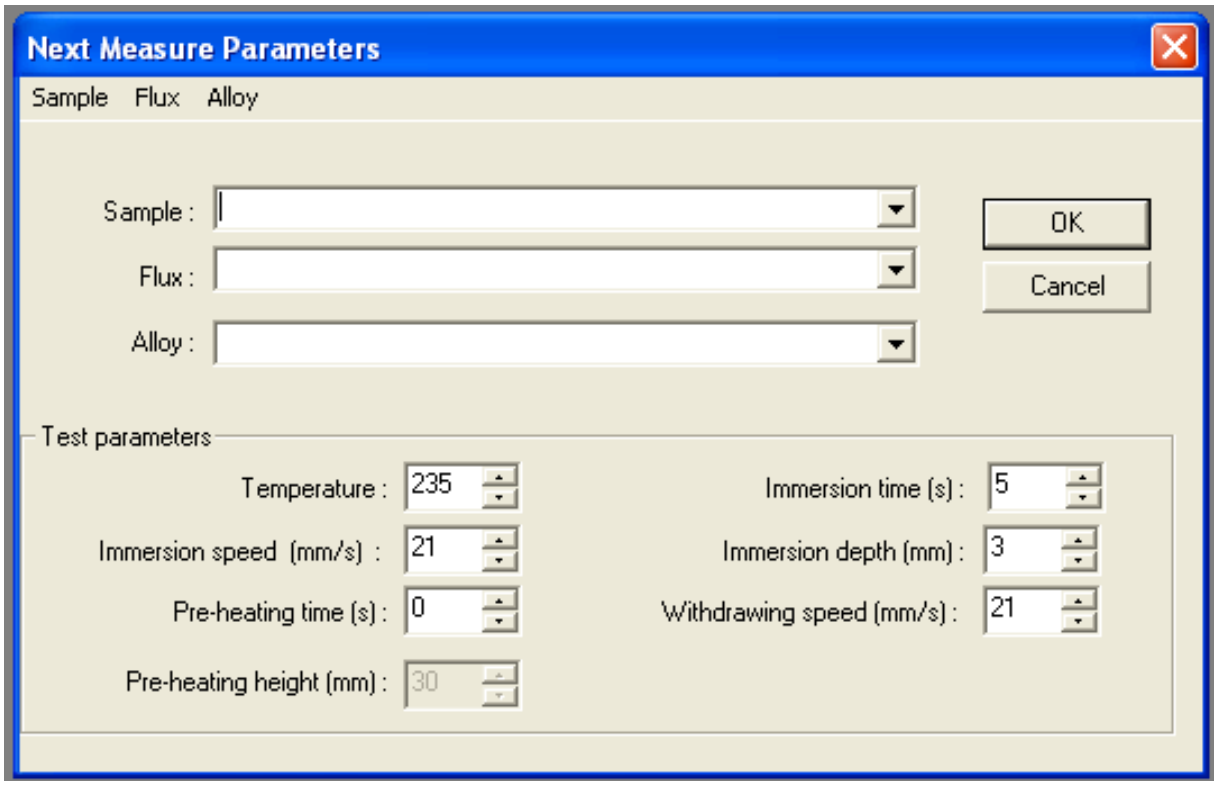
The results are expressed in mN; Mil, IEC and IPC standard are not available.



Dip & look test

You can choose this option at the start of the software, in that case there is no measurement of force and of course no data saved, but we can define the parameters by the same way through the Parameters menu :





The immersion speed is defined only in inches, here is the corresponding values in mm.

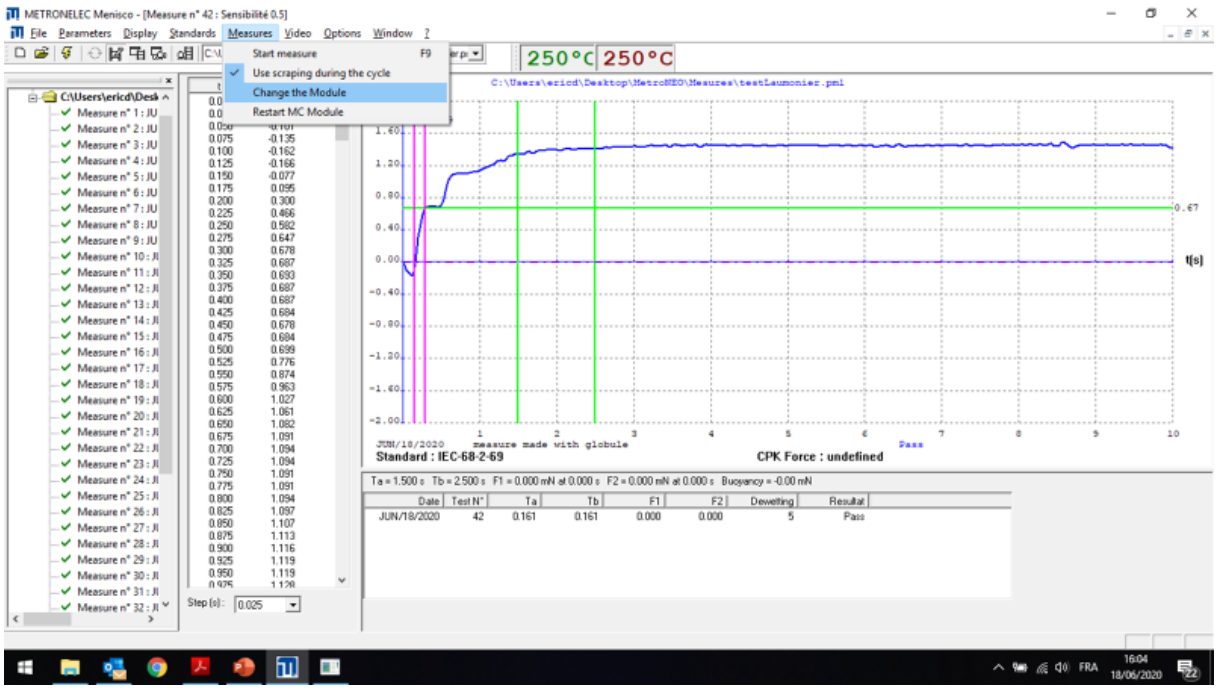
Immersion speed (mm/s)
2
12.7
19.05
21
25.4
31.75
38.1
44.45
50.8

The immersion time is from 1 to 30 s (step 1 s)

Start Measure

Please notice that you can ask for a change of module (bath or globule)

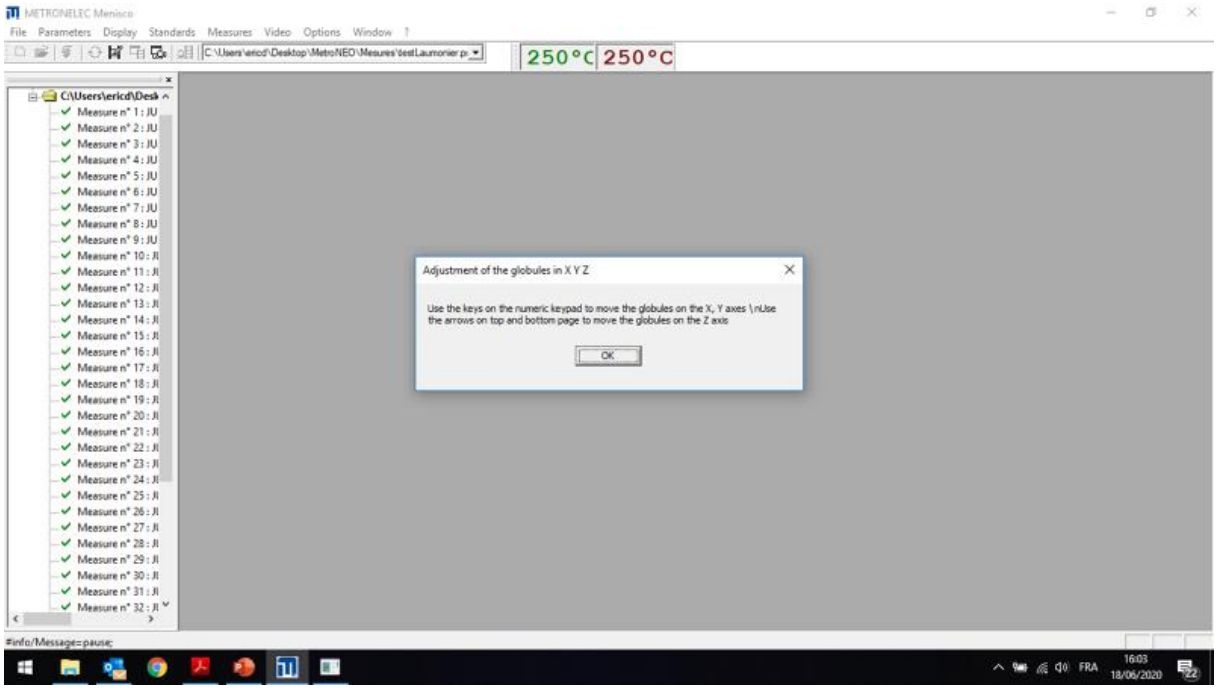
Noticed changer le module in the screen here under



Measure cycle

The cycle described below is automatic:

1. Resetting of the measuring chain to zero,
2. Scraping of the bath surface, if the bath is used, and scrapping selected or not in the main menu
3. Module goes up
4. The height gauge goes down until it detects the module (bath or globule)
5. The height gauge rotate below the component
6. The height gauge goes up until it touches the component.
7. The receptacle moves up until detection by the height gauge.
8. The height gauge rotates and goes home (up)
9. Only when using globule module:
   Tthe system waits for the alignment with the globule chosen (4, 2 or 1 mm) and confirm alignment by pressing the four or eight arrows on the key pad or key board before clicking ok in this window :



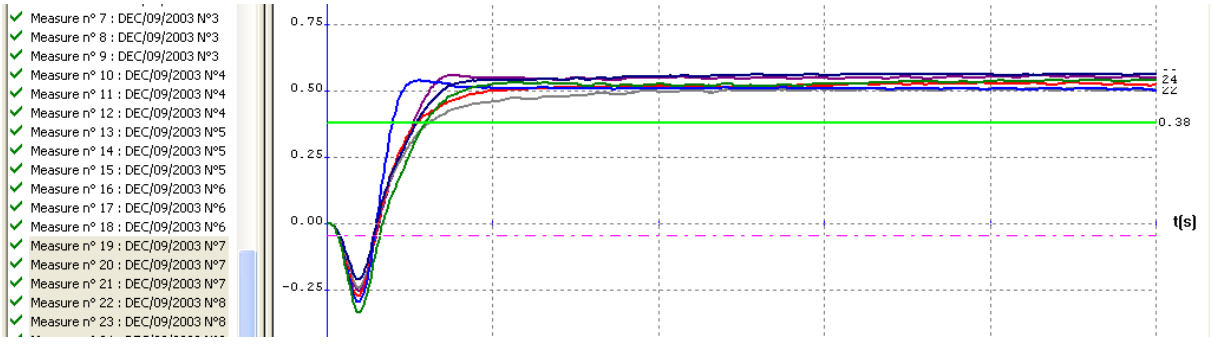
You can approach vertically the globule from the sample with the fast up arrow, when aligned, just press enter in the previous window.

10. The inert chamber system goes down (if requested).
11. The receptacle goes up until the desired immersion depth
12. Measurement
13. Receptacle, inert chamber come back to home position
14. Remove the tool holder and the component from the sensor
15. Clean the tool holder using solvent
16. Software asks for data saving and for next measurement with same parameters.

Analysis of results

Display the curve

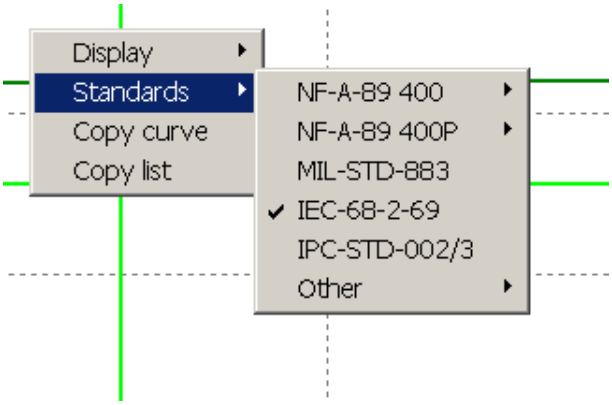
Once the measurements have been taken, the results are displayed in a graph.



Each measurement has a number (increasing order), regardless of whether it is validated or not, this appears at the top of the graph and on the browser in the right windows (if opened!).

Apply standard

It is possible to apply different standards, for that click on the right button in the graph area or go to the Standard Menu and select the standard wanted.

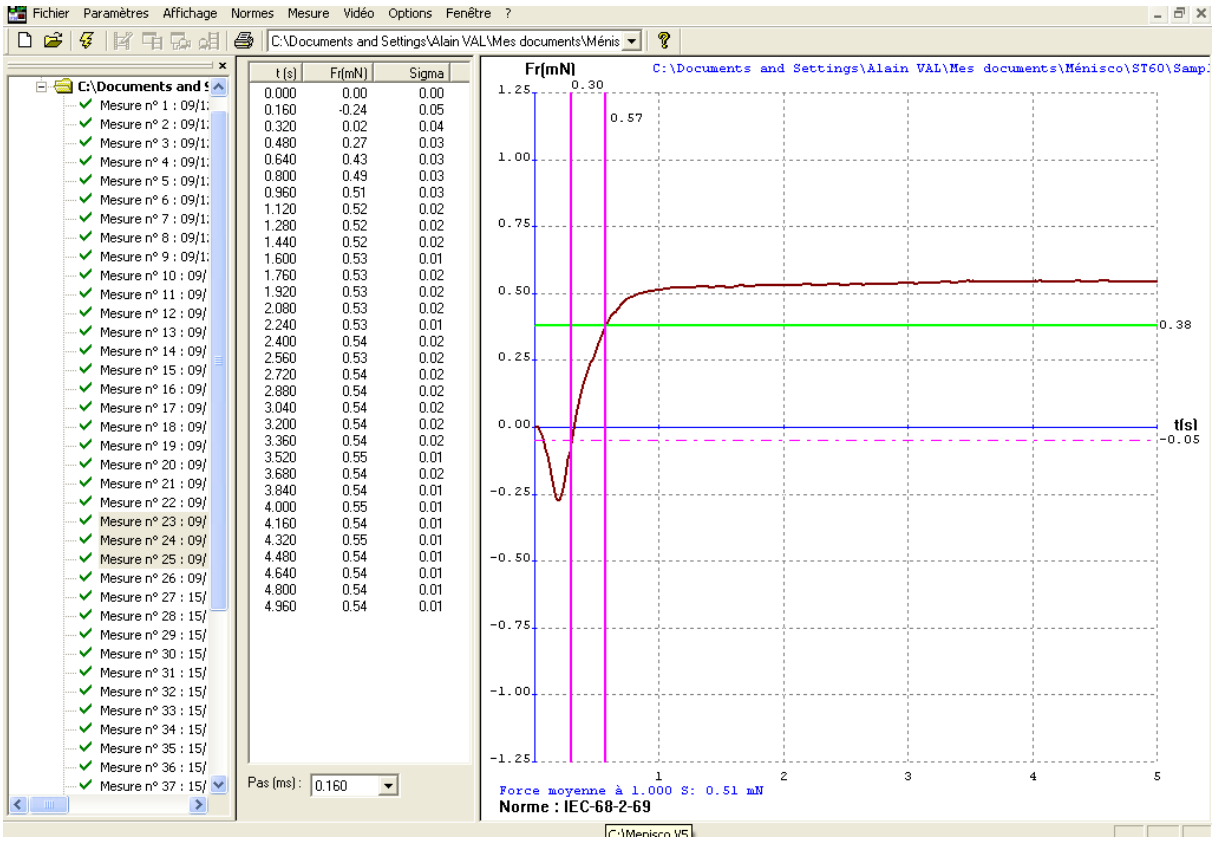


Standard are presented in section Standards.

Table of values

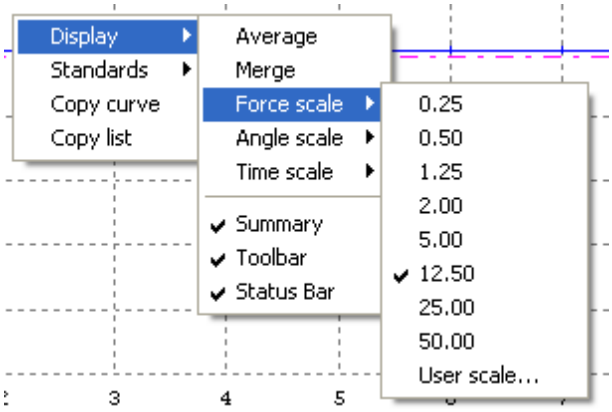
If the table of value is not visible, click on the double bar between the browser and the graph windows.

In case of average of curves, the table of values include also the "standard deviation".

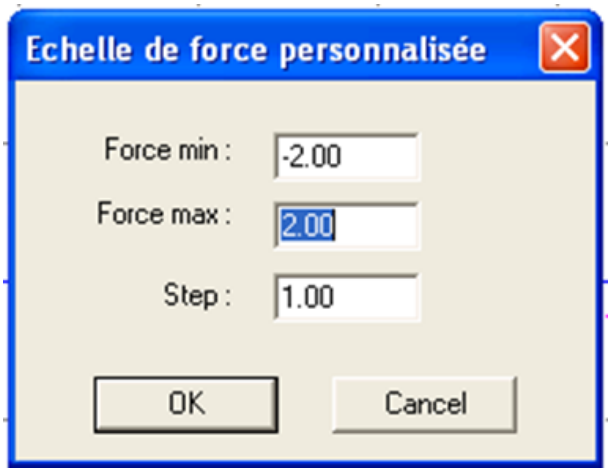


Zoom / scale (force, angle, time)

By a left click on the graph or from the menu Display you can switch from different standards or scale, mix result or ask for an average.



You can personalize the scale in force or wetting angle, for this ask for the force or angle scale and then User Scale, here is below the windows for the force, just fill the fields.



Validate / Invalidate / Open / Print / Delete / Average / Merge

Select the measurement with the mouse (left button), and click with the right button to display the window here above.

Valid / Invalid : Only valid curve will be displayed but invalid curves are still store on data. Invalid curves are marked with a red cross, valid curve have a green mark.

Open : open and display the graph if more than one curve are selected, the software open one window by curve. (If you want just one graph, use the merge option).

Print : Print the current graph and or the table of values following the printing option.

Delete : Erase from file data selected, be careful as there is no way to undelete.

Average : Make an average curve of selected curves, calculate the average value and the standard deviation in the table of values.

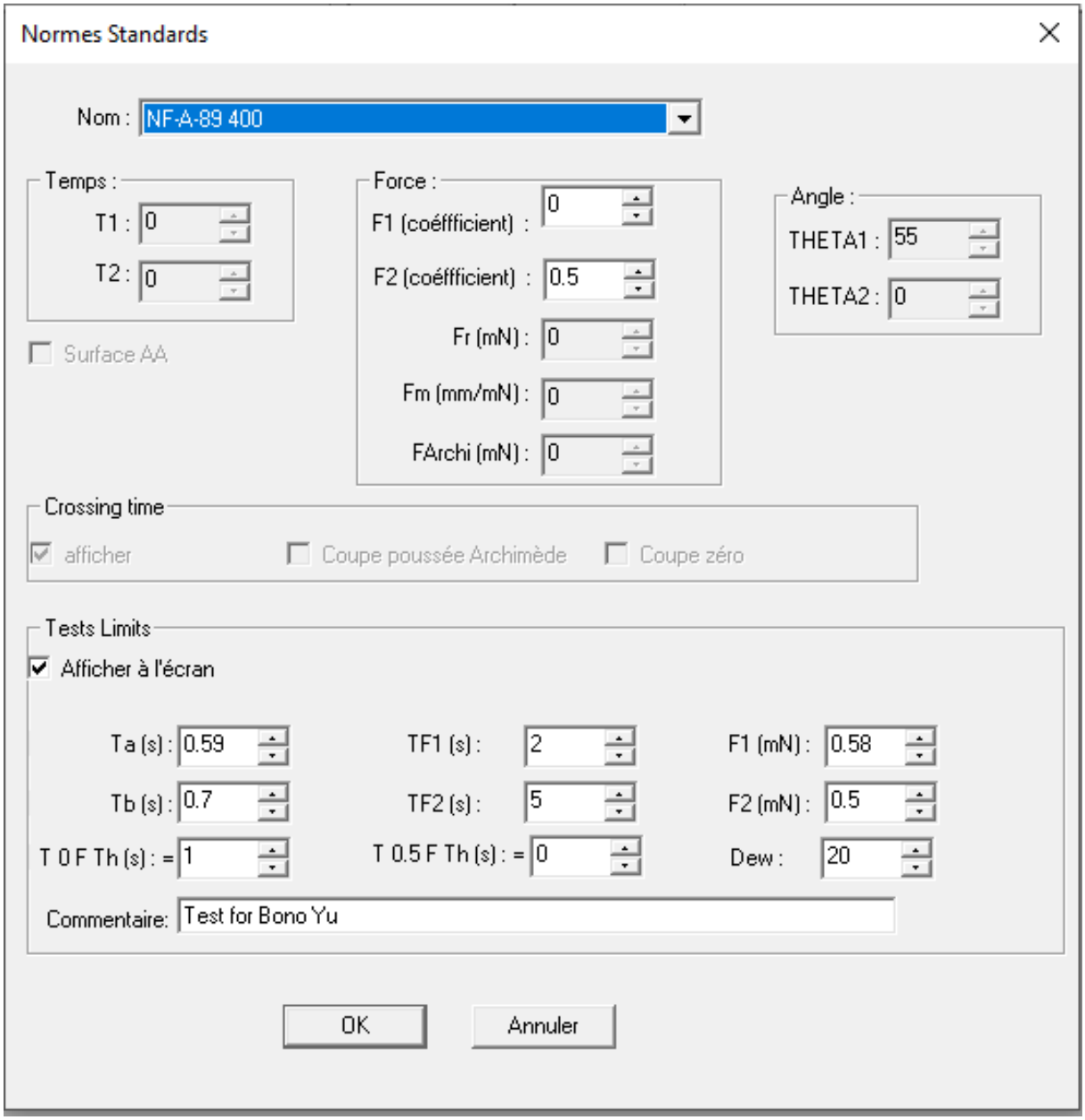
Merge : Display selected curves in one single graph for comparison.

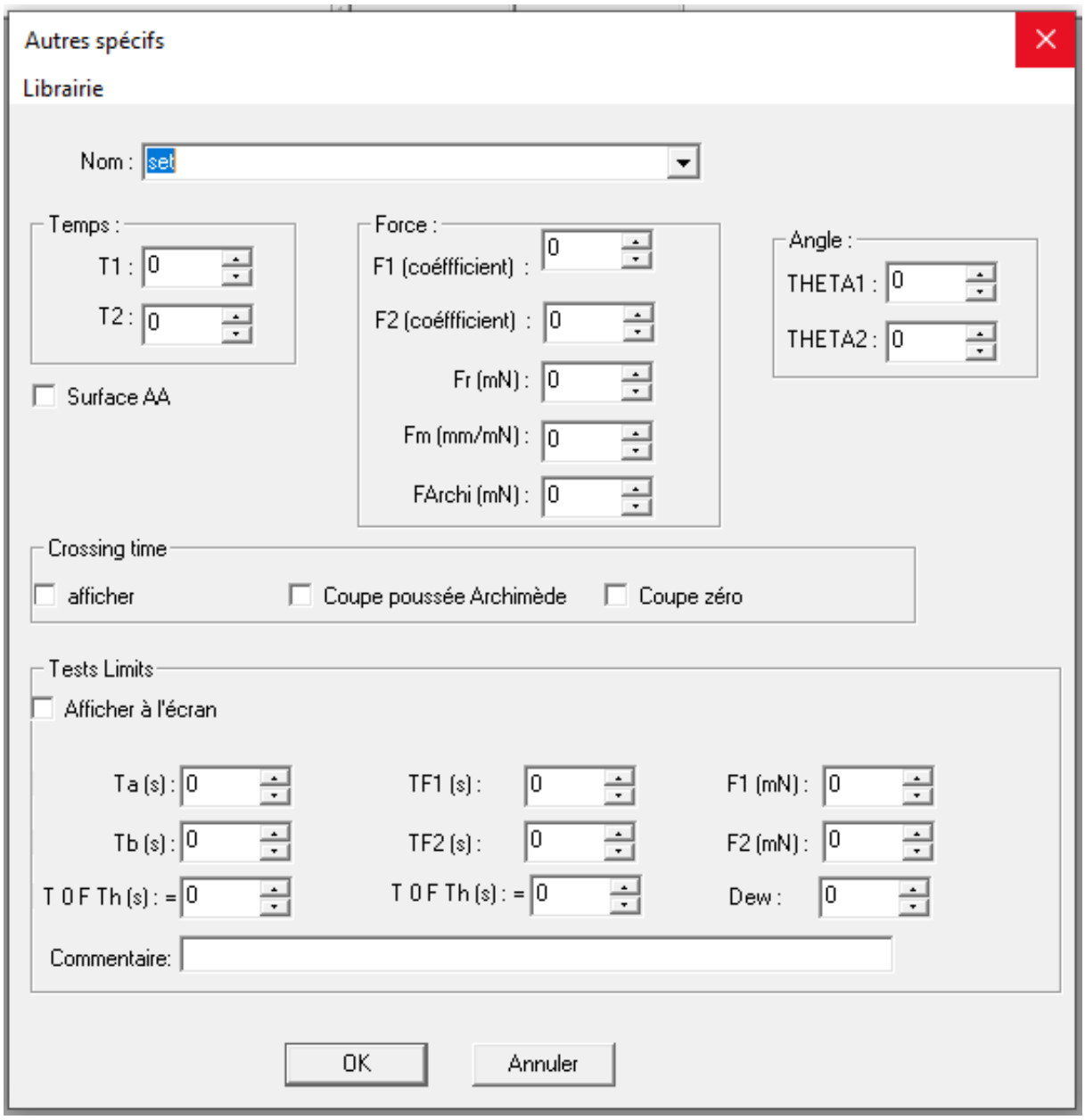
Options

Configuration

Click on the Configuration Menu, to access the configuration window where it is possible to modify the serial port (COM1 or COMM,….)

Also if the printer is color printer, select "Print on color" in the window. If the printer is black and white don't select the "Print on color" in the window.





Directory : which is the "working directory" of the software, where we save the configuration files, software, calibration file, etc.

Serial port : We declare here the serial port where the machine is connected, if an unvalid port is selected, you will obtain an error message when you ask for a measure.

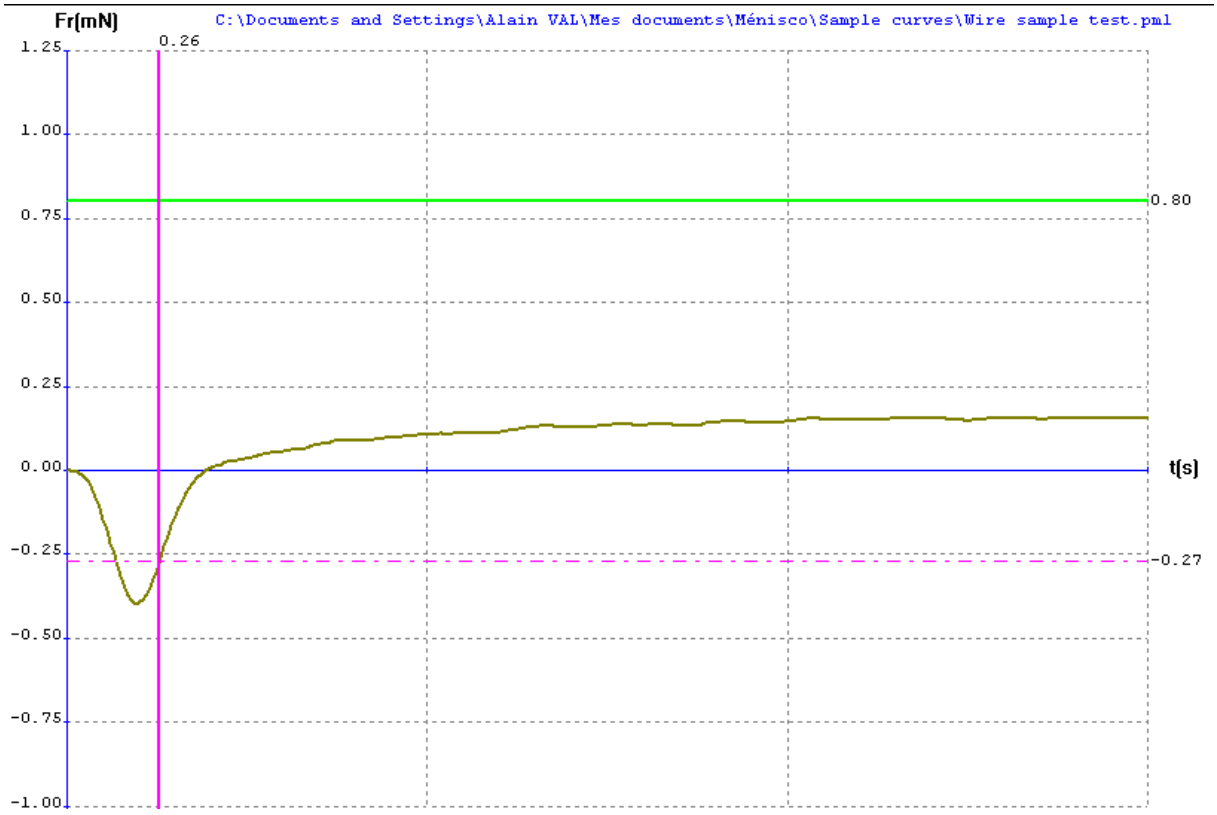
Step (ms) : Step between two measurements, you can choose 10, 25 or 125 ms, this will affect the smoothness of the curve. 10 ms is dedicated to "light" liquid like resin or water based, more mobile than tin alloy hence a quicker phenomenon.

Preset measurement time (ms) : to display in the graphic curve, the "Maxi, Mini" , Average values, at the "Preset Time"

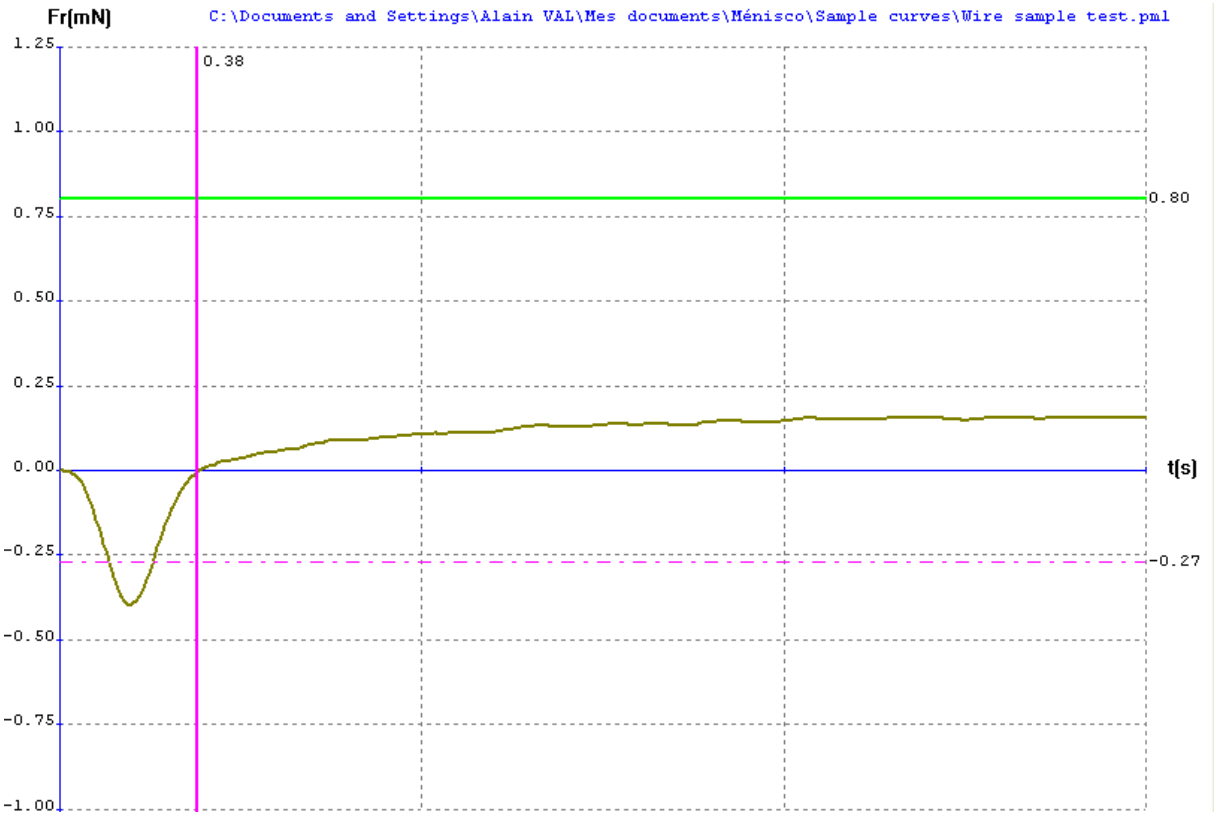
Print on color : Appear to be "has been" today but still necessary for old systems non compatible !

Display Start Windows : Display or not the application selection windows , where we choose between, GammaLV, flux efficiency, component solderability, etc

Crossing time : Crossing time is the time when the curve cut the buoyancy level (Ta) or the "X" axis level (Tb). Both are used in different standards but on the graph only one is calculated so you can select buoyancy or "zero" crossing time.



Example curve of "buoyancy crossing time"
Crossing time is 0.26 s between the curve and the buoyancy level (discontinuous pink line)



Example curve of "zero crossing time"
Crossing time is 0.38 s between the curve and the X axis level (continuous blue line)

Print Pass Fail Data : You can print, only if you select different curves in merge, a table of values with the different curves result and obtain a pass/fail result following the criteria :

Ta(s) : Crossing time with the buoyancy line, often fixed to 0,7 s or 0,59s for Mil spec.

Tb(s) : Crossing time with the zero line, often fixed to 1,0 s.

TF1(s) / F1(mN) : You can define a pass fail limit point with a minimum level F1 expressed in mN (could be negative for partial wetting, ex pcb) at a certain time TF1(s). The curve should pass over this level F1 at the time TF1. (Use in IEC 60-2-69)

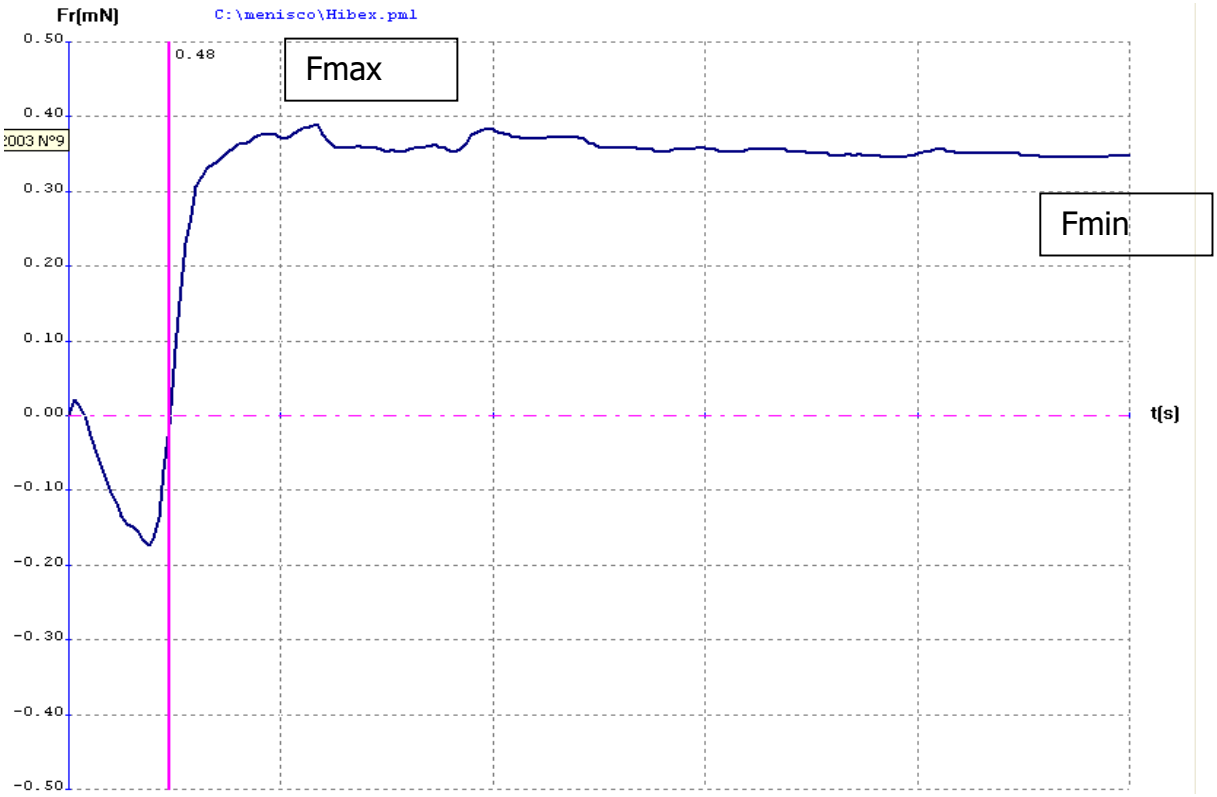
TF2(s) / F2(mN) : same than above to define a second point (TF2, F2), we tolerate often a dewetting between F1 and F2 of 20%.

T2/3Fmax : Crossing time with the calculated value of the 2/3 of the maximum force, should be usually less than 1.0 s. The maximum force is extracted from the geometry of the component and the hypothesis of a "full wetting" with a wetting angle supposed to be at zero.

Dew : Dewetting is expressed as a limit percentage between the maximum force and the minimum force (minimum known after this maximum), so the dewetting is equal to (Fmax –

Fmin) / Fmax. Standard accept generally a value of 20 %. Don't let a value of 0 as we have often a dewetting of few percent…if not the test will be failed.

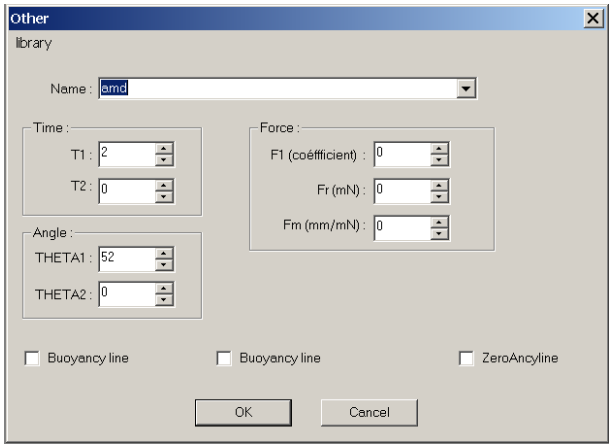
Comment : space for operator to describe the conditions of test, batch number, etc



Example of dewetting curve Fmax Fmin.

Other Spec (specification)

In order to create personal specification



Name : Select the user standard wanted to apply on graph. Or type a new one to save a new standard.

Time : T1 and T2 times for wetting angle Theta1 and theta 2 and for force.

Force :

F1 coefficient : percentage of maximum force as pass fail limit, for 2/3 of the maximum force input : 0.67.

Fr(mN) : define a nominal pass fail limit, an horizontal green line will be displayed at this level.

Fw(mm/mN) : Level of force divided by the perimeter , common vaules are 0.25 – 0.27.

Display buoyancy line : display the buoyancy line on graph.

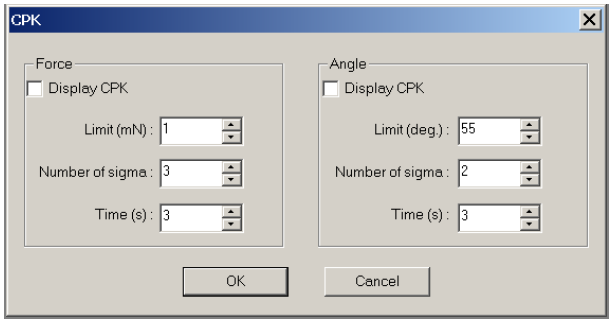
Buoyancy line : calculate the time to buoyancy line and put a purple vertical line at this point.

Zero ancyline: calculate the time to zero ancyline and put a purple vertical line at this point.

CPK

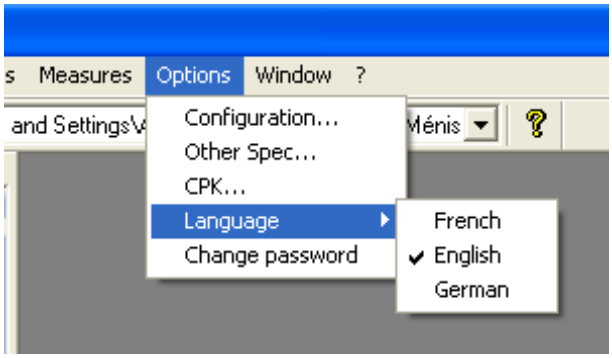
You can modify the CPK setting in the menu Options, CPK.

The CPK value can be displayed for force and or angle, the calculation is made with a certain limit, number of sigma at a certain time.



Languages

This software supports different languages, we can switch easily by the menu Options Language.

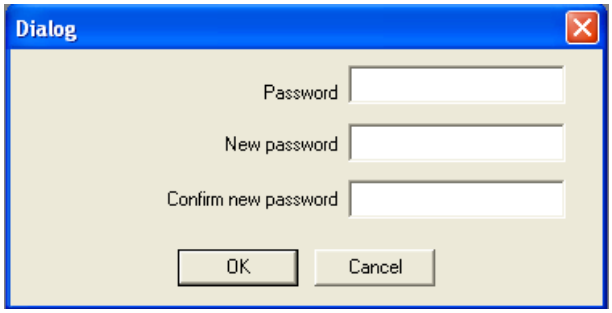


Change password

To change the password, or to remove it, go to Menu Options Change password.

Enter the previous password and then the new one and confirm.

If you want to remove the password, just enter an empty chain (no character) The first password is : secret

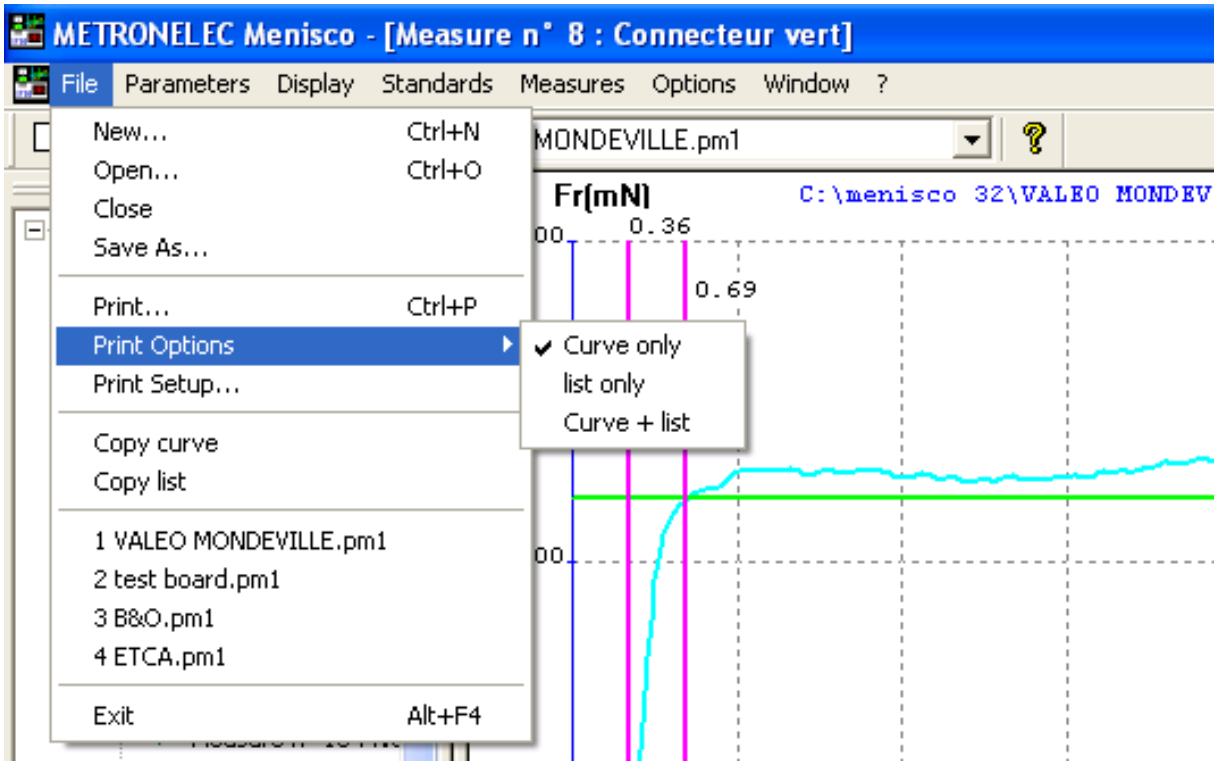


Printing the measurement

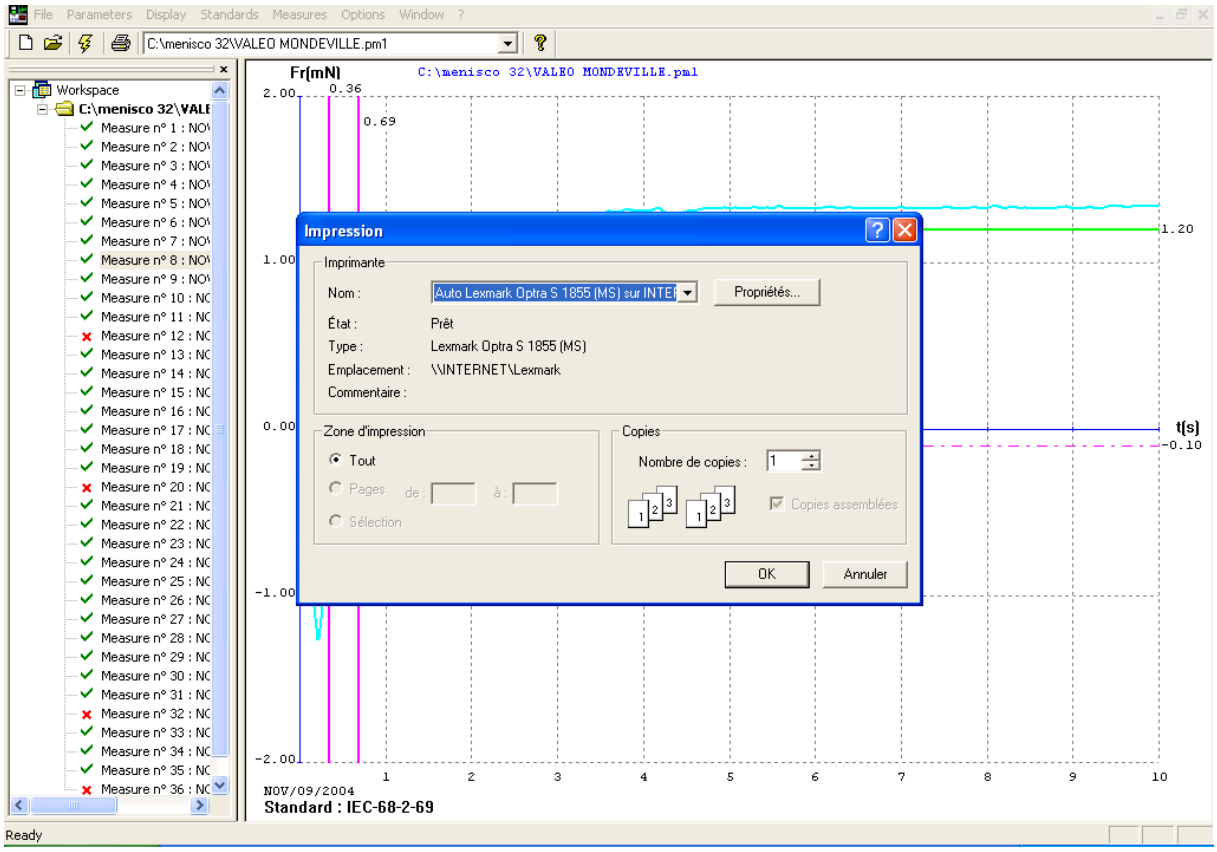
If the printer is color printer, select "Print on color" in the window "Options/Configuration". If the printer is monochrome dont select the "Print on color".

Print Options Menu

The print out could be Curve or List (table of value) or both, access from main menu file and Print Options



Print Menu: Definition of the printer to use, must be defined under the operating system.



Printing result in table

This is in order to compare more easily the measurements (Curves and Values) made by METRONELEC and other brands.

Open one measurement file and select several curve. Click on « Merge ». Click on « Options / Configuration ».

Select « Print Pass Fail Data » in the windows here above, and type the values : Ta, Tb, T2/3 Fr max, TF1, TF2, F1, F2, Dew, and Comment. Click on « OK ».

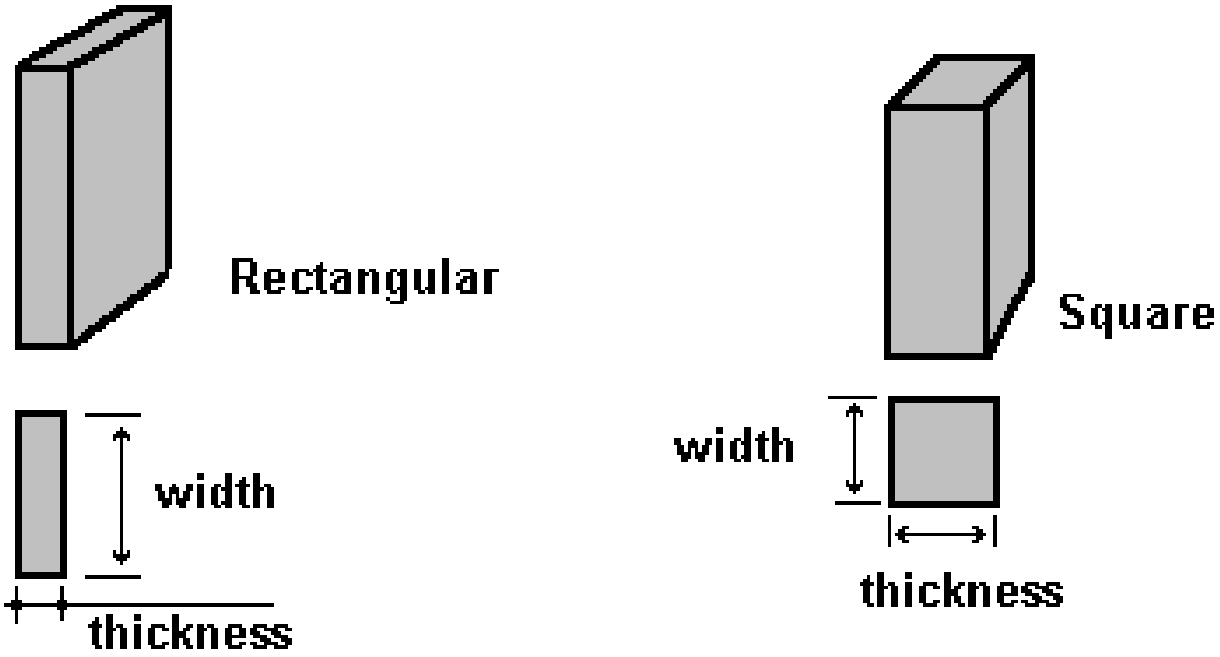
Then click on « File/Print ».

COMPONENT TYPES FOR BATH MODULE

Type (Sample)	TECHNICAL DATA
01 - rectangular sample	N° 01
02 - cylindrical sample	N° 02
03 - multi rectangular leads	N° 03
04 - multi cylindrical leads	N° 04
05 - plated substrate single side	N° 05
06 - plated substrate double side	N° 06
07 - chips capacitor	N° 07
08 - chips resistor	N° 08
09 - particular LC04/04 case	N° 09
10 - SOT 23	N° 10
11 - SOT 143	N° 11
12 - flat pack, MQFP100, PQFP, SO	N° 12
13 - SOT 89	N° 13
14 - DPACK package	N° 14
15 - cylindrical resistor	N° 15
16 - JLCC, PLCC, CQPJ, SOJ	N° 16
17 - 4 sides output chips 22.20	N° 17
18 - DUPONT connector solder resist	N° 18
19 - pc board stripe	N° 19
20 - diode DO4	N° 20
21 - diode DO5	N° 21
22 - chips solid tantalum A	N° 22
23 - chips solid tantalum B	N° 23
24 - chips solid tantalum C	N° 24
25 - test solder paste	N° 25
26 - CQPL, MQFP>100	N° 26
27 - PCB (TEST STRIPE & PLATED HOLE)	N° 27
28 - SAMPLE (PBRC/AVX - 4 M)	N° 28
29 - CHIPS FILM (LCC)	N° 29

TYPE 1 : - RECTANGULAR SAMPLE

APPLICATION FIELD: Copper strip, flat contacts, components leads (rectangular or square cross section).



DIMENSIONS in mm

TOOL ref. : D19-D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

Usually, the immersion depth must be the maximum possible. If sample extend the tool by less than 10 mm, select 1 mm.

SENSITIVITY:

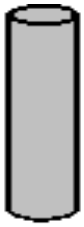
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

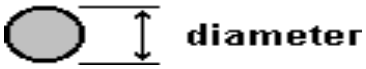
FLUX:

Dip the extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 2 : - CYLINDRIC SAMPLE

APPLICATION FIELD: copper wires, or usually metal wires (cylindrical section)





DIMENSIONS in mm

TOOL ref. : D19-D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

Usually, the immersion depth must be the maximum possible. If sample extend the tool by less than 10 mm, select 1 mm.

SENSITIVITY:

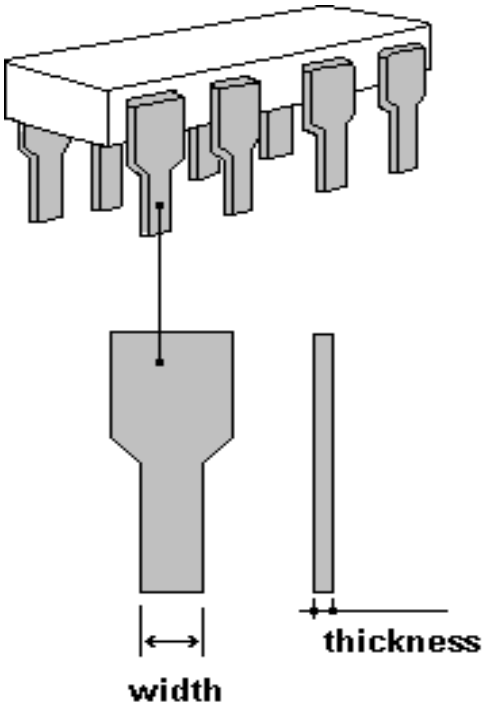
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

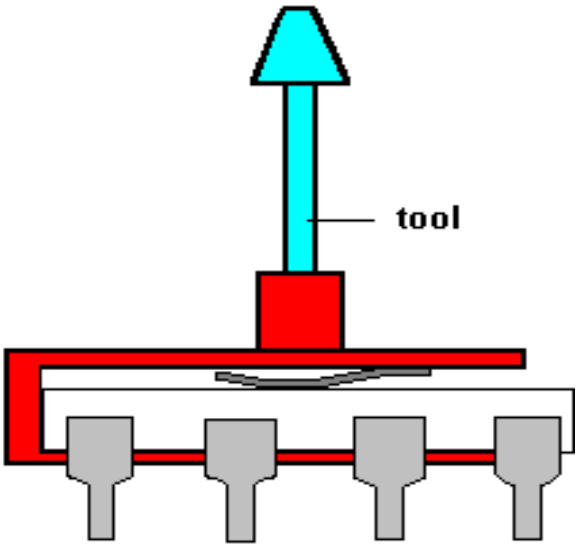
FLUX:

Dip the extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 3 : - MULTI RECT. (angular) LEADS

APPLICATION FIELD : DIL package.





number of leads : 8

TOOL ref. : C05

DIMENSIONS in mm

Take care to clean also sensor tip .

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH: 1 mm

SENSITIVITY:

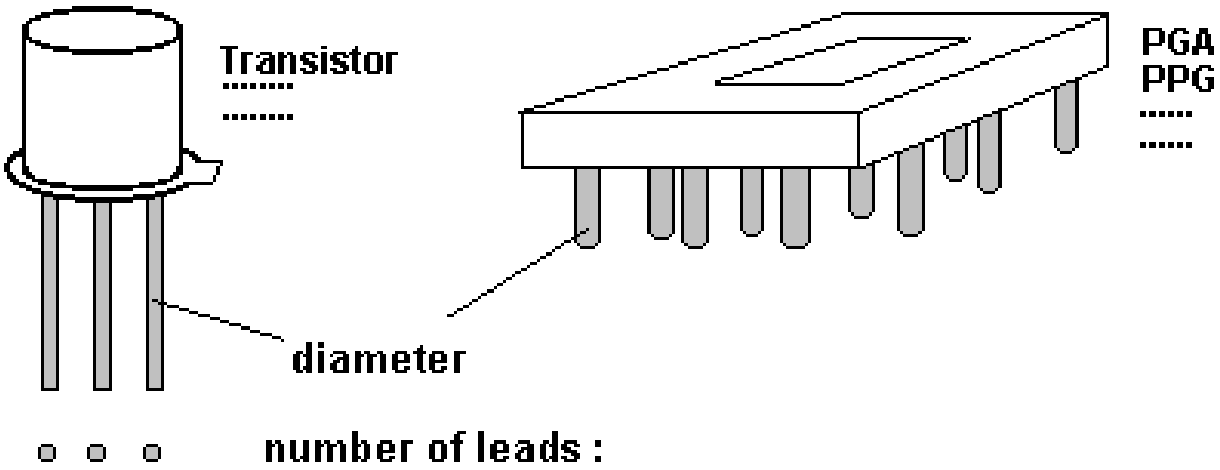
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of leads in the flux, and remove the drop on the absorbent paper.

TYPE 4 : - MULTI CYLINDRICAL LEADS

APPLICATION FIELD: sample with several identical leads (section cylindrical). Exemple : PGA, PPG, Diodes, Transistors, Connectors, ...



DIMENSIONS in mm

TOOL ref. : C05-D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

1 mm (or 3 mm if the length of the leads > 10 mm)

SENSITIVITY:

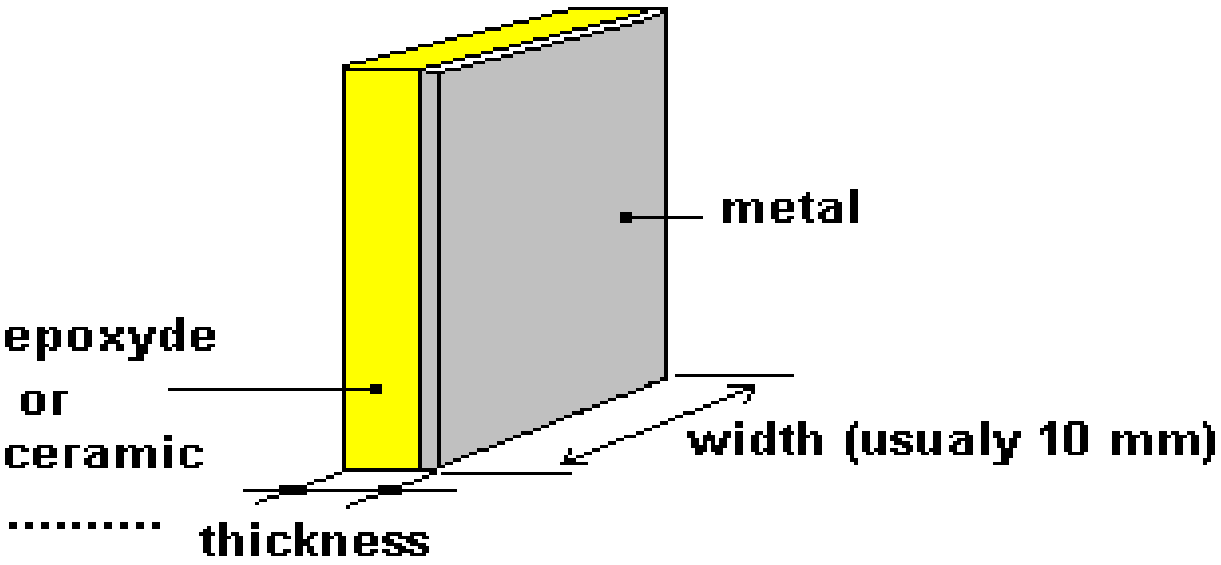
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of leads in the flux, and remove the drop on the absorbent paper.

TYPE 5 : - PLATED SUBSTRATE SINGLE SIDE

APPLICATION FIELD: PCB plated full metal single side



DIMENSIONS in mm

TOOL ref. : D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

Usually, the immersion depth must be the maximum possible (3 mm). If the sample is small, choose 1 mm or 0, 5 mm.

SENSITIVITY:

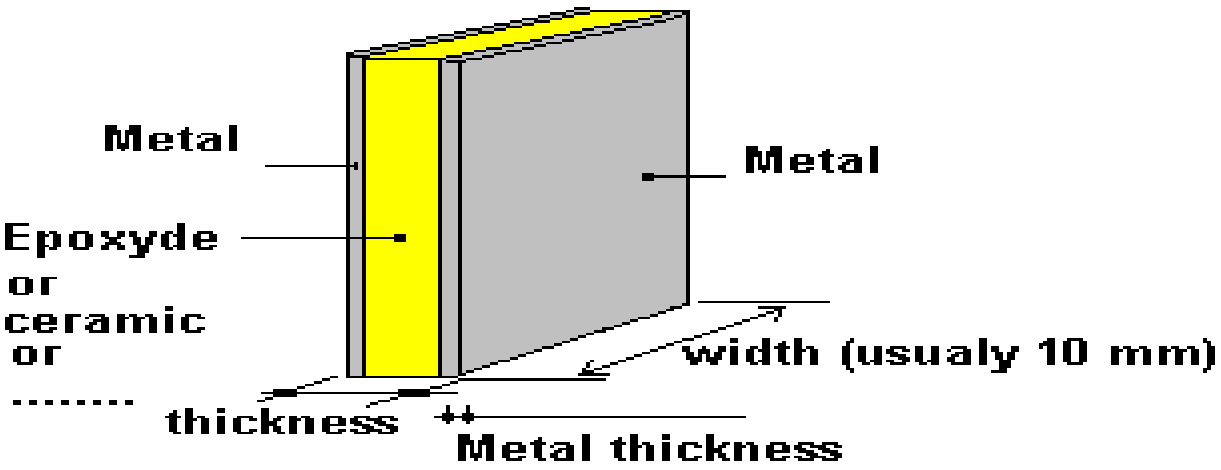
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity (epoxy and metal) of sample in the flux, and remove the drop on the absorbent paper.

TYPE 6 : - PLATED SUBSTRATE DOUBLE SIDE

APPLICATION FIELD: PCB plated full metal double side



DIMENSIONS in mm

TOOL ref. : D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

Usually, the immersion depth must be the maximum possible (3 mm). If the sample is small, choose 1 mm or 0, 5 mm.

SENSITIVITY:

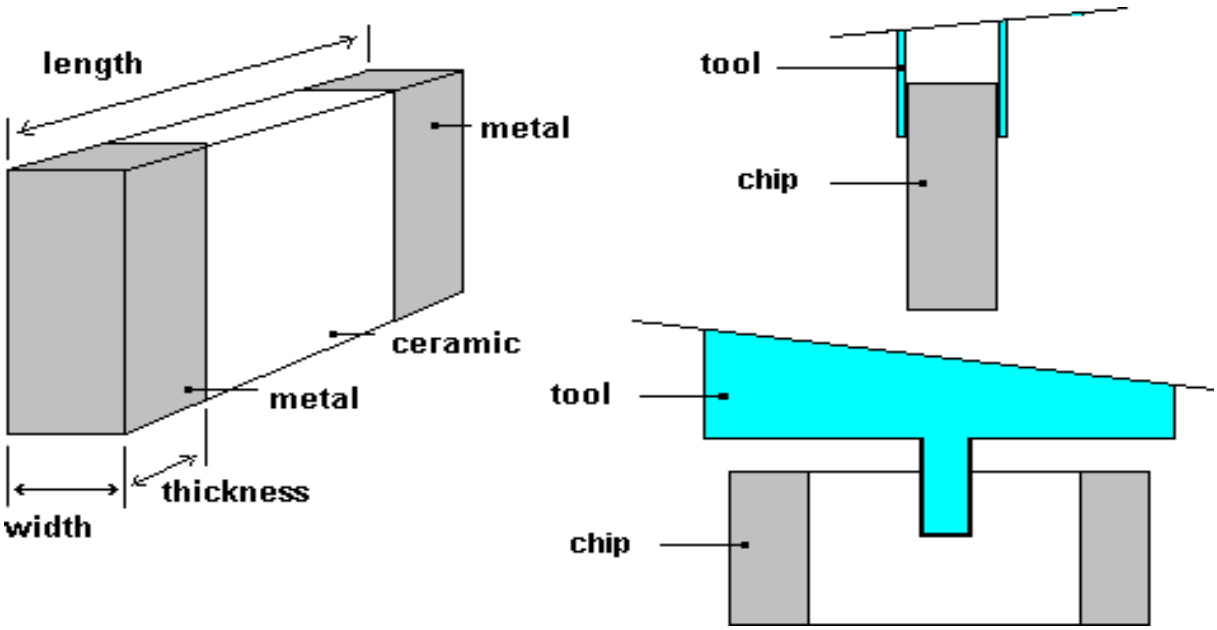
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity (epoxy and metal) of sample in the flux, and remove the drop on the absorbent paper.

TYPE 7 : - CHIPS CAPACITOR

APPLICATION FIELD: all the chips capacitor like displayed below



DIMENSIONS in mm

TOOL ref. : D10 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 2 mm

SENSITIVITY:

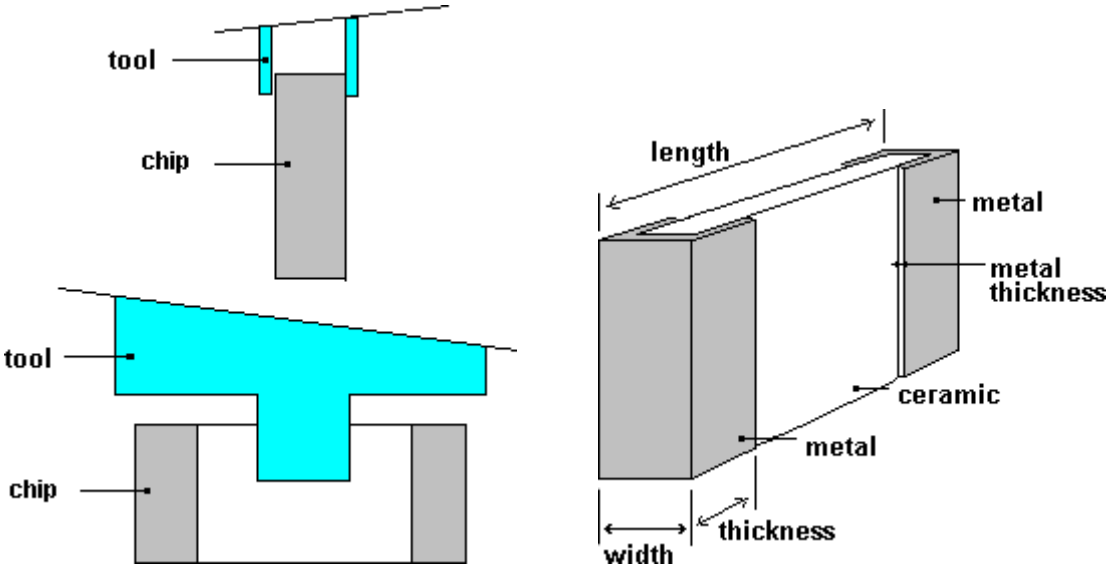
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of chip in the flux, and remove the drop on the absorbent paper.

TYPE 8 : - CHIPS RESISTOR

APPLICATION FIELD: all chips resistor like displayed below



DIMENSIONS in mm

TOOL ref. : D10 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 2 mm

SENSITIVITY:

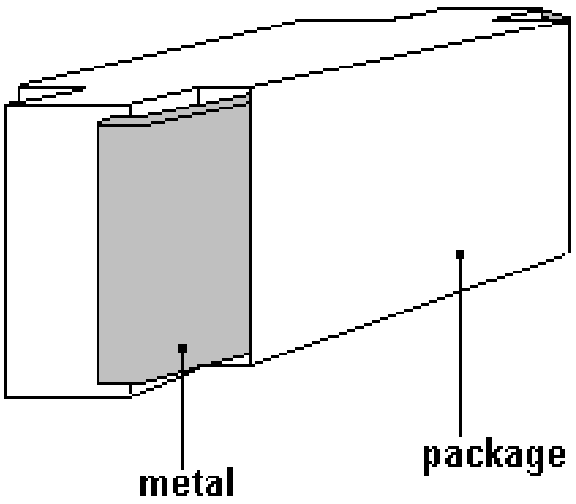
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of chip in the flux, and remove the drop on the absorbent paper.

TYPE 9 : - PARTICULAR LC04/04 CASE

APPLICATION FIELD: specific capacitor LCC



IMPORTANT:
This type of component doesn't exist since several years!

no select dimension

TOOL ref. : D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

0, 5 mm

SENSITIVITY:

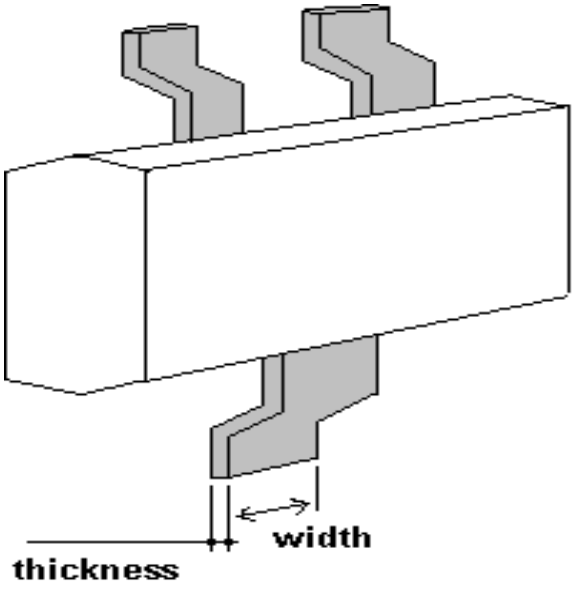
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

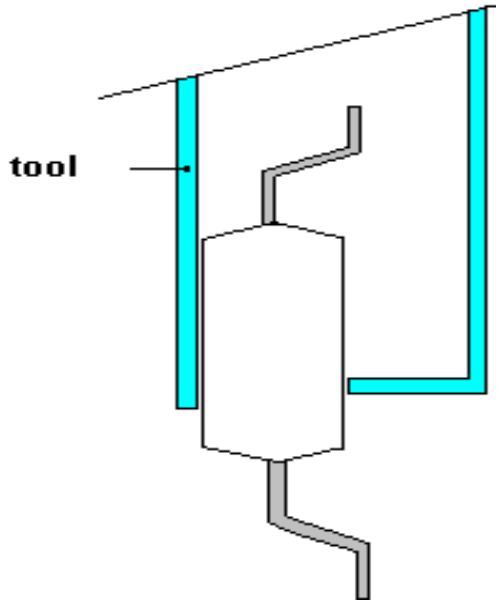
FLUX:

Dip the extremity (package and metal) of sample in the flux, and remove the drop on the absorbent paper.

TYPE 10 : - SOT 23

APPLICATION FIELD: all components like displayed below





DIMENSIONS in mm

TOOL ref. : D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 2 mm

SENSITIVITY:

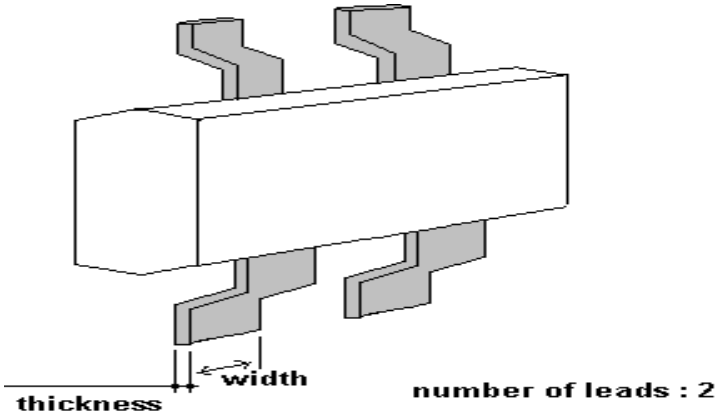
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

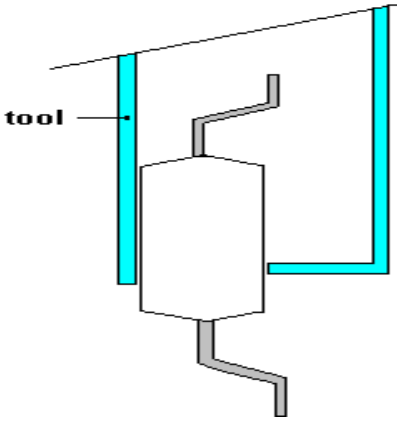
FLUX:

Dip the extremity of lead in the flux, and remove the drop on the absorbent paper.

TYPE 11 : - SOT 143

APPLICATION FIELD: all components like displayed below.





DIMENSIONS in mm

TOOL ref. : D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

Carefully check a perfect cleaning of the tool. Take care to clean also sensor tip .

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 2 mm

SENSITIVITY:

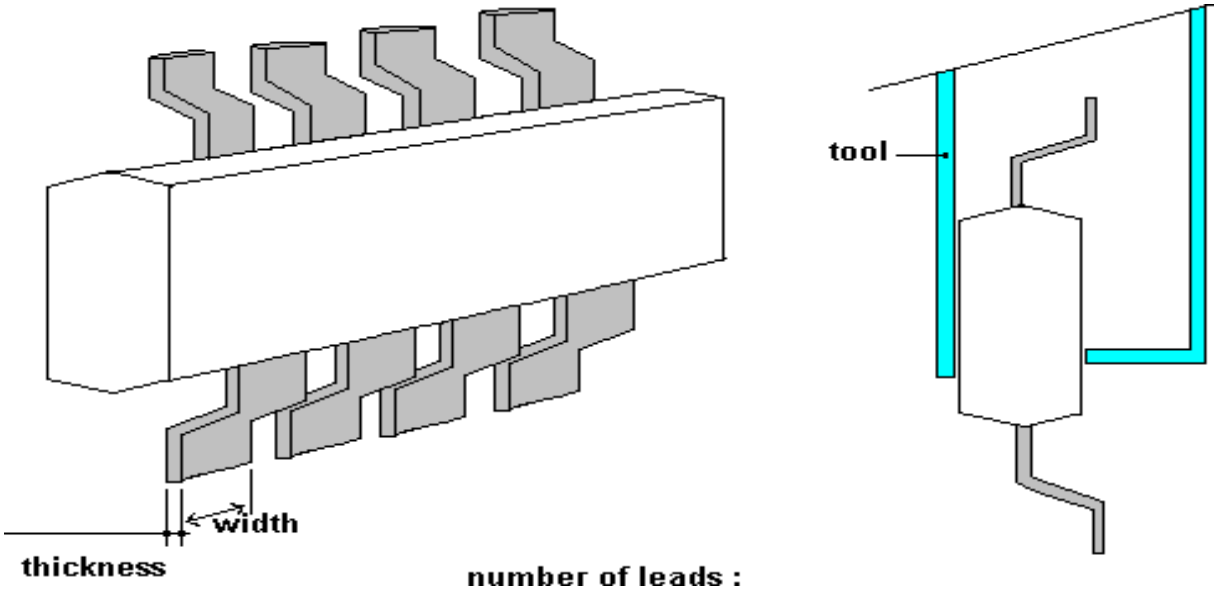
Adjustment depend of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of leads in the flux, and remove the drop on the absorbent paper.

TYPE 12 : - FLAT PACK, MQFP100, PQFP, SO

APPLICATION FIELD: all components like displayed below



DIMENSIONS inmm

Attention: the distance between two leads you measure, must be 1.5 mm minimum (IEC STD). Remove leads if necessary.

TOOL ref. : D19-D10-D23 (FLAT PAK ET MQFP 100, SO, PQFP) Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

0, 2 mm

SENSITIVITY:

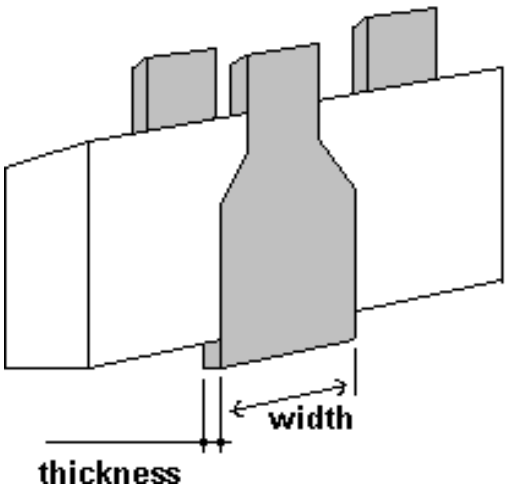
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

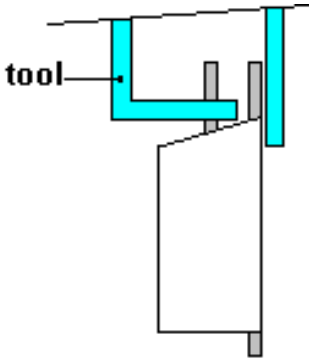
FLUX:

Dip the extremity of leads in the flux, and remove the drop on the absorbent paper.

TYPE 13 : - SOT 89

APPLICATION FIELD: all components like displayed below.





DIMENSIONS in mm

TOOL ref. : D 10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 2 mm

SENSITIVITY:

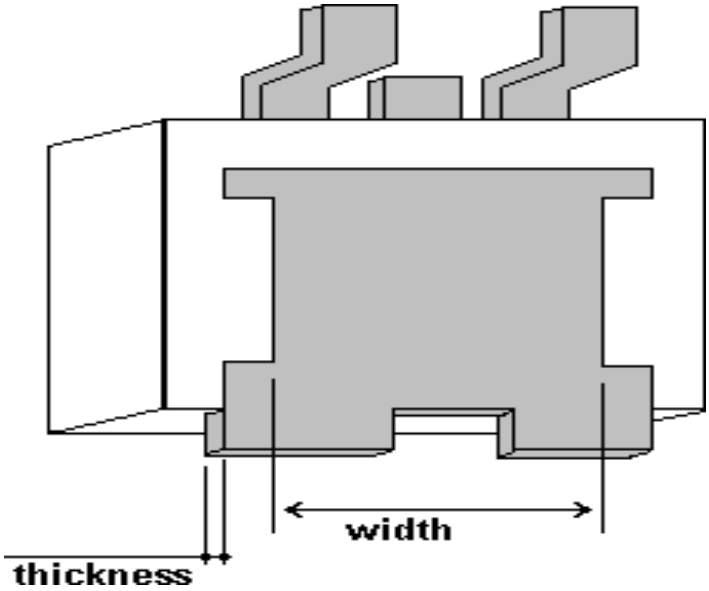
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of lead in the flux, and remove the drop on the absorbent paper.

TYPE 14 : - DPACK PACKAGE

APPLICATION FIELD: all components like displayed below



DIMENSIONS in mm

TOOL ref. : D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 5 mm

SENSITIVITY:

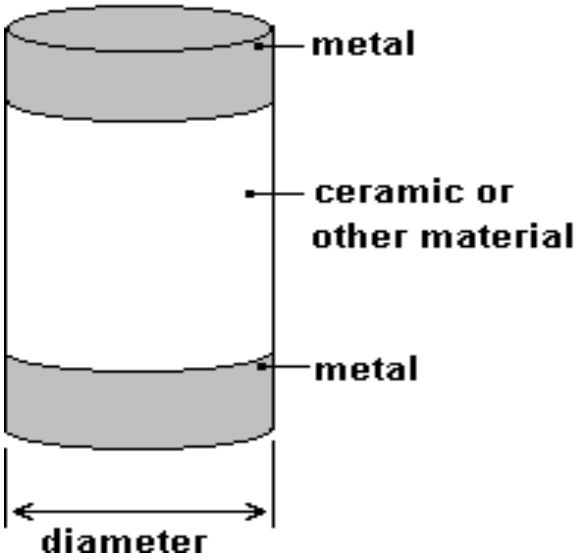
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

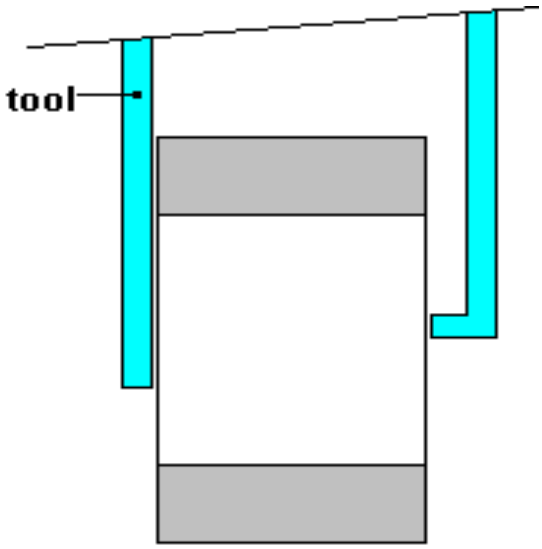
FLUX:

Dip the extremity of lead in the flux, and remove the drop on the absorbent paper.

3.15 TYPE 15 : - CYLINDRIC RESISTOR

APPLICATION FIELD: melf, mini melf, cylindrical resistor





DIMENSIONS in mm

TOOL ref. : D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 1 mm

SENSITIVITY:

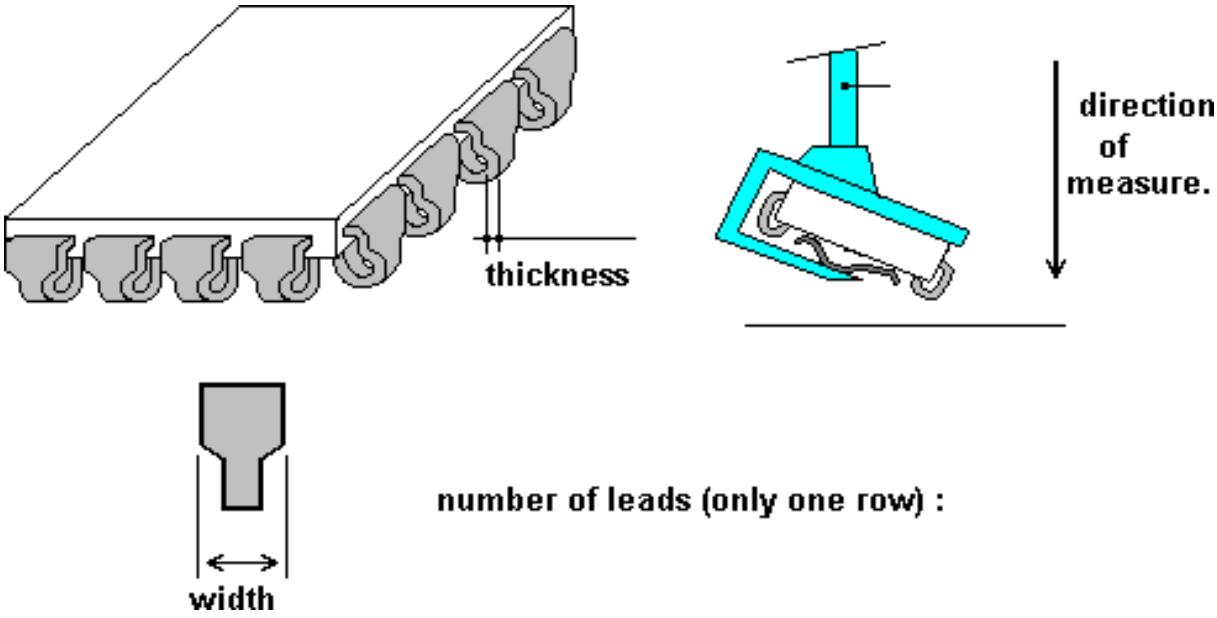
Adjustment depends of a component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 16 : - JLCC, PLCC, CQPJ, SOJ

APPLICATION FIELD: all components with leads like displayed below.



DIMENSIONS in mm

Attention: the best process (come from the experience) to measure this type of sample is to straighten some leads with non metallic tool (wood toothpick is perfect), to remove (cutting it) of the package, and to measure with the tool D10 (select

« Type n°1 / Rectangular sample »), immersion depth 1 mm.

TOOL ref. : D30 (universal) Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 2 mm

SENSITIVITY:

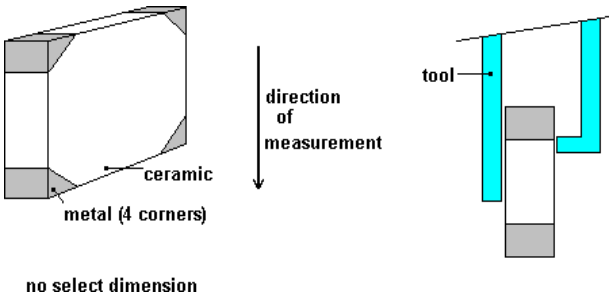
Adjustment depends of a component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of leads in the flux, and remove the drop on the absorbent paper.

TYPE 17 : - 4 SIDES OUTPUT CHIPS 22.20

APPLICATION FIELD: specific chip capacitor EUROFARAD



IMPORTANT:
This type of component doesn't exist since several years!

TOOL ref. : D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETRES:

TIME:

Select 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

0, 1 mm

SENSITIVITY:

Adjustment depends of a component size. The sensitivity is automatically selected by the software.

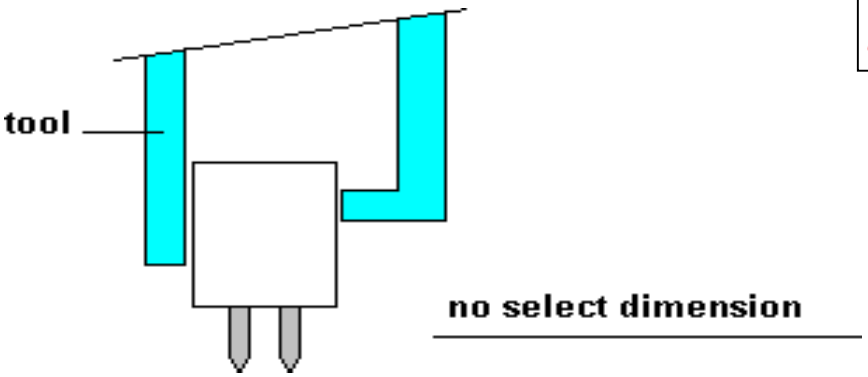
FLUX:

Dip the extremity of chip (ceramic and metal) in the flux, and remove the drop on the absorbent paper.

TYPE 18 : - DUPONT CONNECTOR SOLDER RESIST

APPLICATION FIELD: specific connector BERG ELECTRONIC

IMPORTANT:
This type of component doesn't exist since several years!



TOOL ref. : D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

1 mm

SENSITIVITY:

Adjustment depends of the component size. The sensitivity is automatically selected by the software.

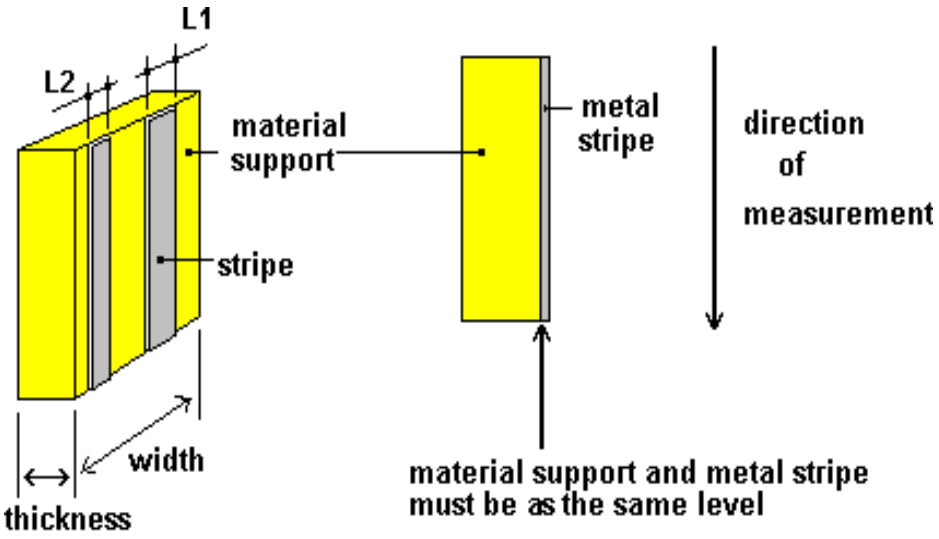
FLUX:

Dip the extremity of leads in the flux, and remove the drop on the absorbent paper.

TYPE 19 : - PC BOARD OR COMPONENT PARTIALLY WETTABLE

APPLICATION FIELD: PCB with stripes on one side or two sides. Complex or specific component.

Λ PCB stripe width or wettable perimeter ζ 40% sample perimeter.



∑ PCB stripe width = L1+L2+.....

DIMENSIONS in mm

TOOL ref. : D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

0.5 or 1 mm

SENSITIVITY:

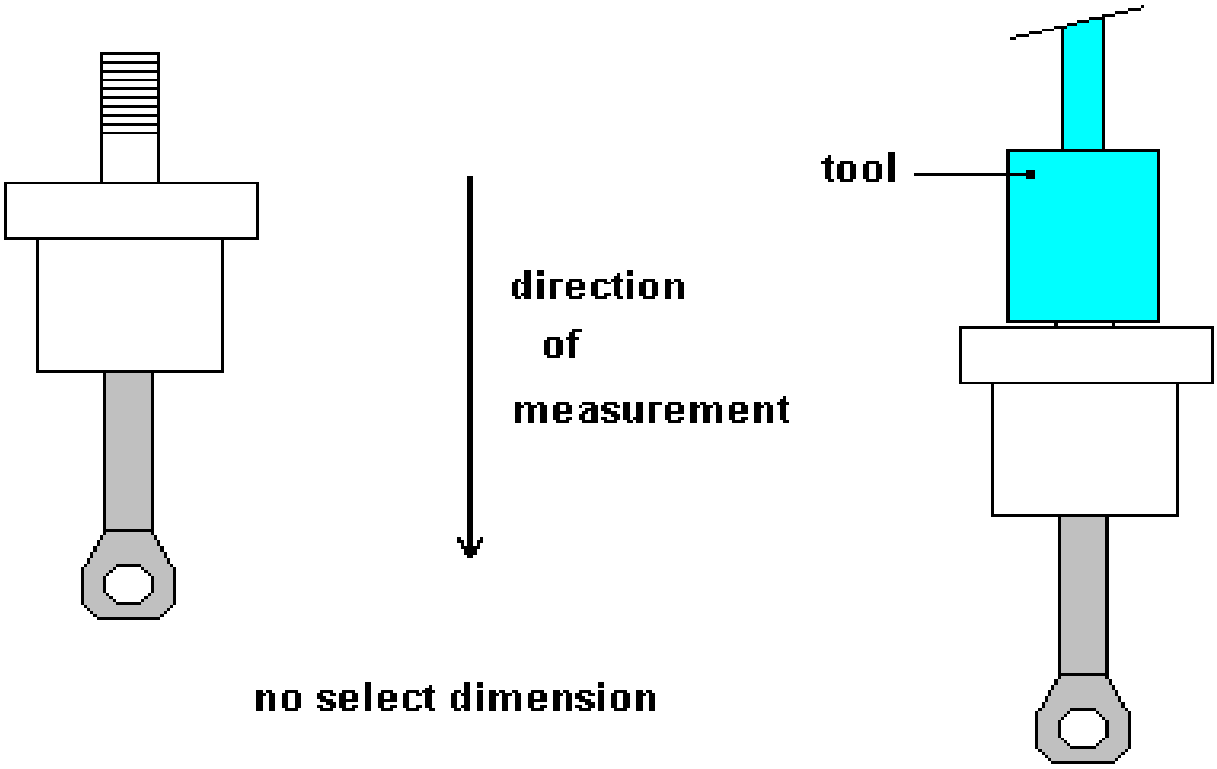
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of sample (epoxy and metal) in the flux, and remove the drop on the absorbent paper.

TYPE 20 : - DIODE DO4

APPLICATION FIELD: specific component SGS THOMSON



TOOL ref. : D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

3 mm

SENSITIVITY:

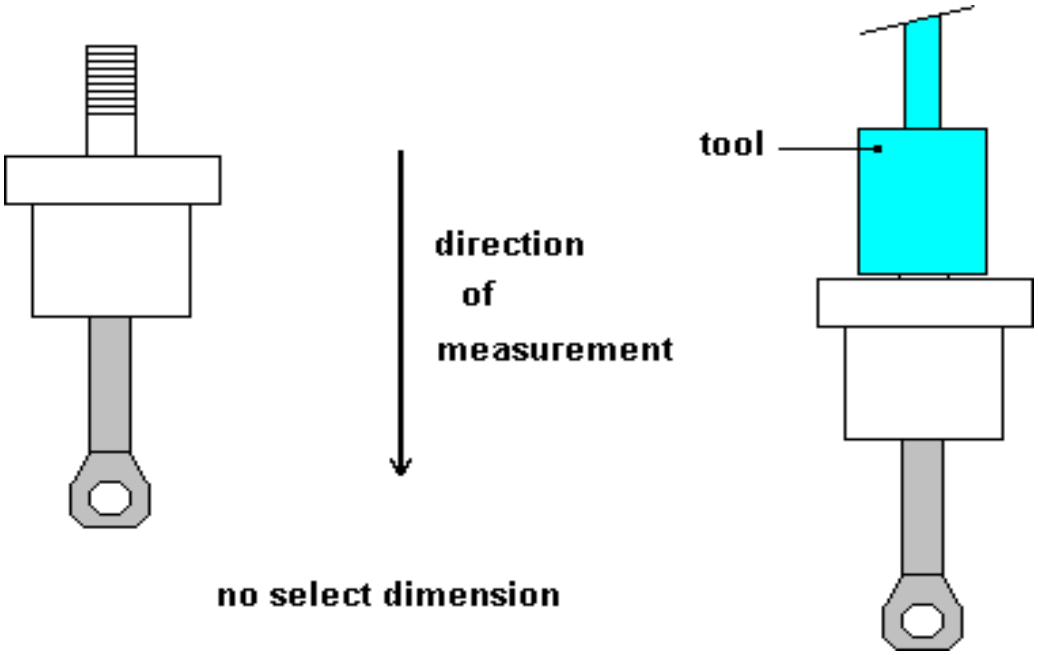
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the flat extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 21 : - DIODE DO5

APPLICATION FIELD: specific component SGS THOMSON



TOOL ref. : D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

3 mm

SENSITIVITY:

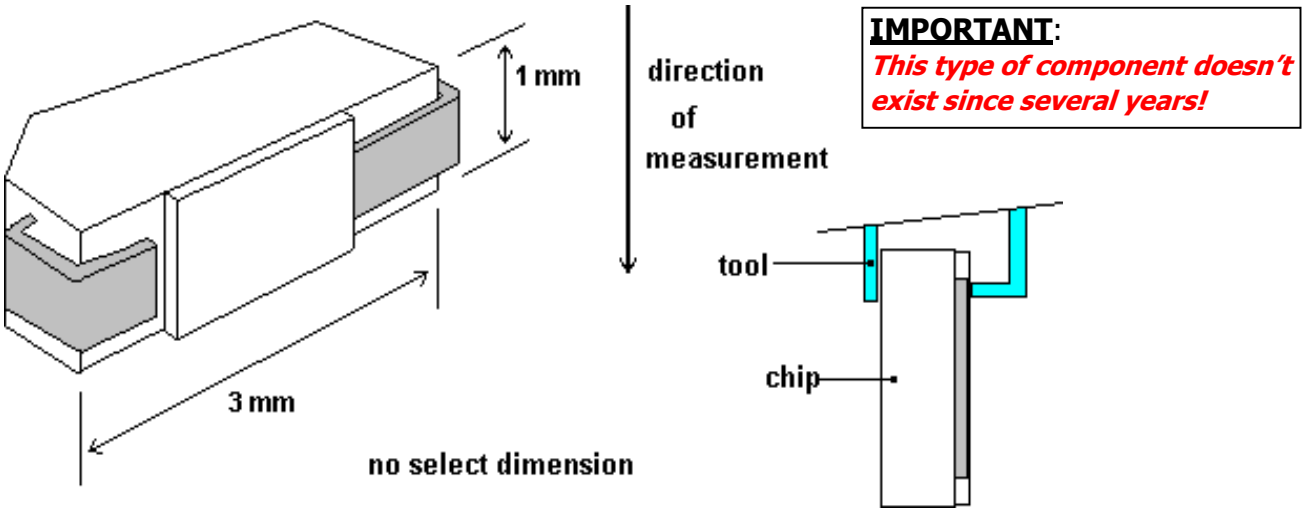
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the flat extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 22 : - CHIPS SOLID TANTALE A

APPLICATION FIELD: specific component LCC like displayed below. The connections are not leads. There are metal plated on the ceramic.



IMPORTANT:
This type of component doesn't exist since several years!

TOOL ref. : D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

0, 2 mm

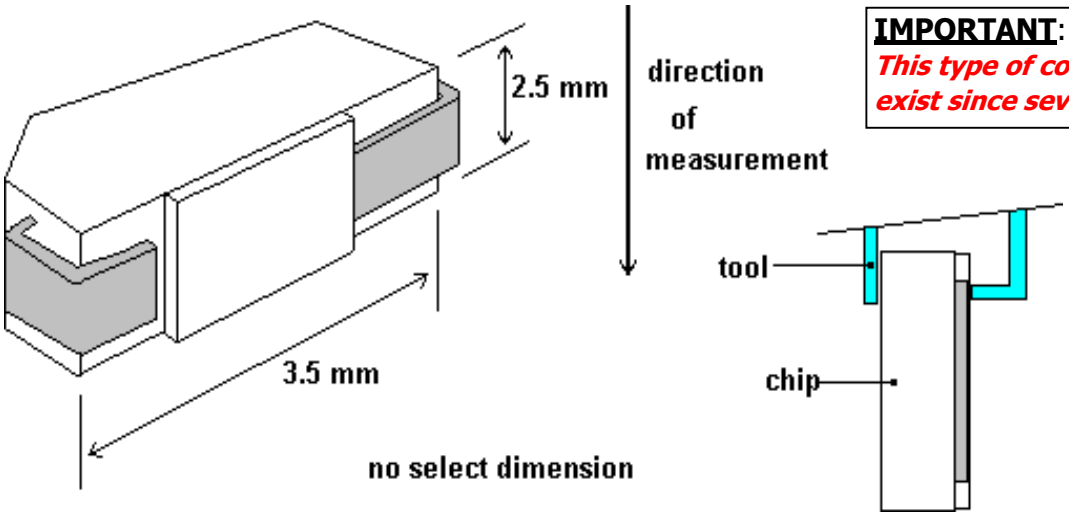
SENSITIVITY: 10

FLUX:

Dip the extremity (package and metal) of sample in the flux, and remove the drop on the absorbent paper.

TYPE 23 : - CHIPS SOLID TANTALE B (Obsolete)

APPLICATION FIELD: specific component LCC like displayed below. The connections are not leads. There are metal plated on the ceramic.



IMPORTANT:
This type of component doesn't exist since several years!

TOOL ref. : D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 2 mm

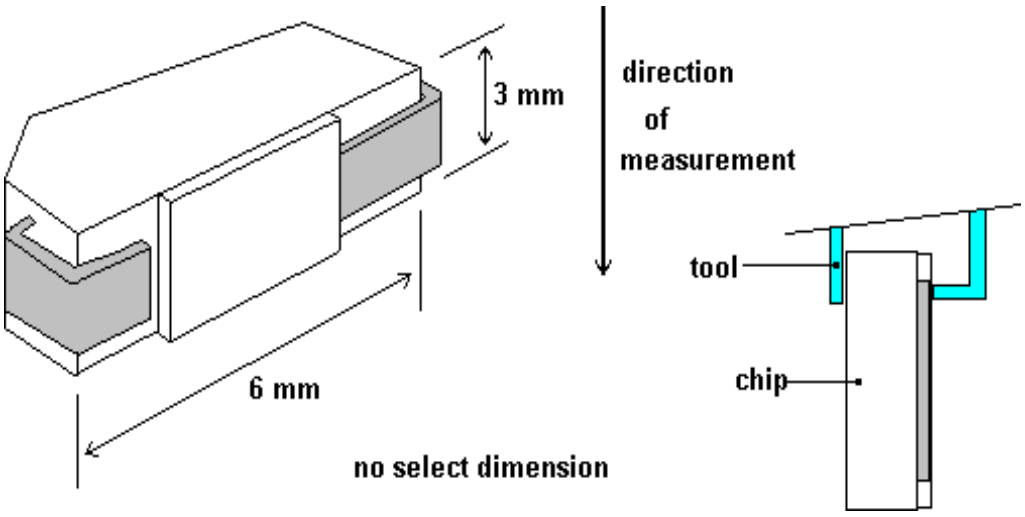
SENSITIVITY: 5

FLUX:

Dip the extremity (package and metal) of sample in the flux, and remove the drop on the absorbent paper.

TYPE 24 : - CHIPS SOLID TANTALE C

APPLICATION FIELD: specific component LCC like displayed below. The connections are not leads. There are metal plated on the ceramic.



TOOL ref. : D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTHN:

0, 2 mm

SENSITIVITY: 1

FLUX:

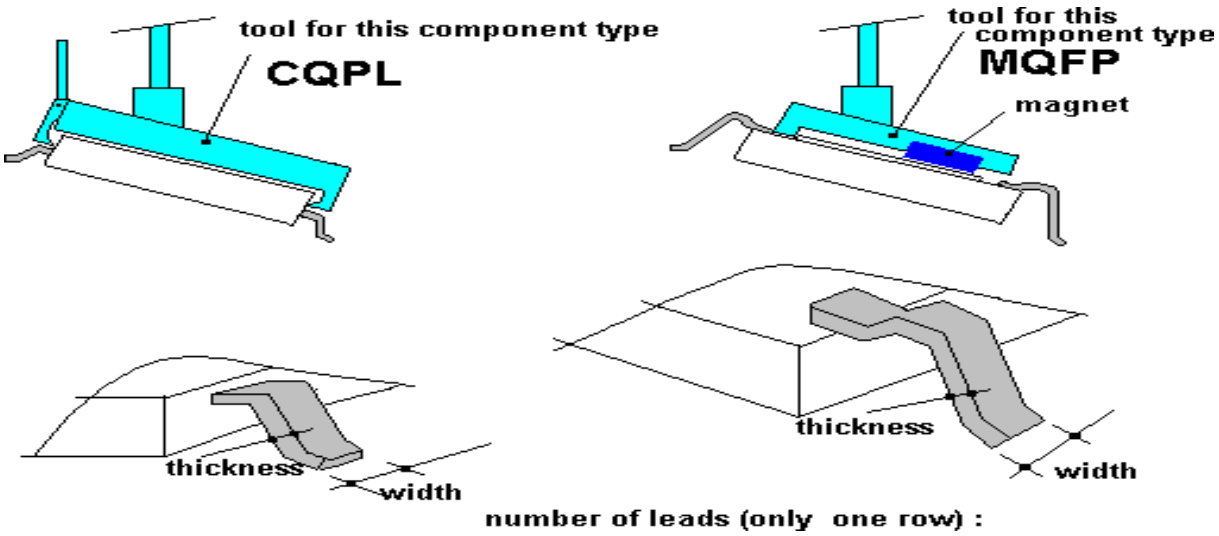
Dip the extremity (package and metal) of sample in the flux, and remove the drop on the absorbent paper.

TYPE 25 : -SOLDER PASTE

(Measure not available)

TYPE 26 : - CQPL, MQFP>100

APPLICATION FIELD: all components like displayed below



DIMENSIONS in mm

TOOL ref. : D30 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0, 5 mm

SENSITIVITY:

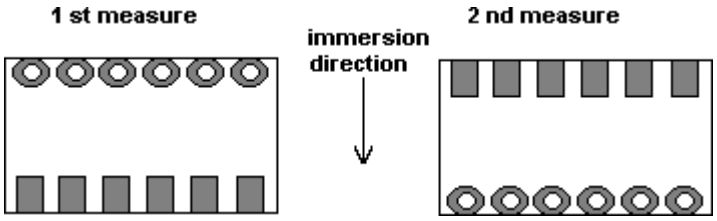
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of leads in the flux, and remove the drop on the absorbent paper, .

TYPE 27 : - PCB (TEST PAD & PLATED HOLE)

APPLICATION FIELD: special coupon PCB with plated hole



It is very important the stripe and the whole pads are at the same level with the support. If it is necessary adjust the level with sand paper or file.

The measurement must be made in two times:

- First stripe side
- Secondly whole side

The results displayed are concerning only the whole solderability.

TOOL ref. : D19 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH: 1 mm stripe side

0.5 mm whole side

SENSITIVITY:

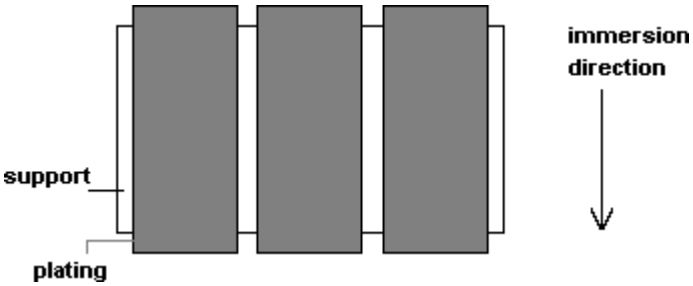
The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 28 : - SAMPLE (PBRC/AVX-4M)

APPLICATION FIELD: SAMPLE PBRC/AVX-4M



TOOL ref. : D10 with « GAUGE FOR POSITIONING THE COMPONENT »

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0.2 mm

SENSITIVITY:

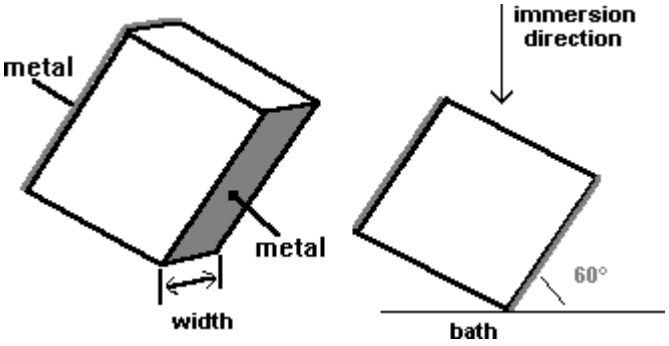
The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 29 : - CHIPS FILM (LCC)

APPLICATION FIELD: CHIPS FILM (LCC)



DIMENSIONS in mm

TOOL ref. : D19-D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

0.5 mm

IMMERSION SPEED:

2 mm/s

SENSITIVITY:

Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

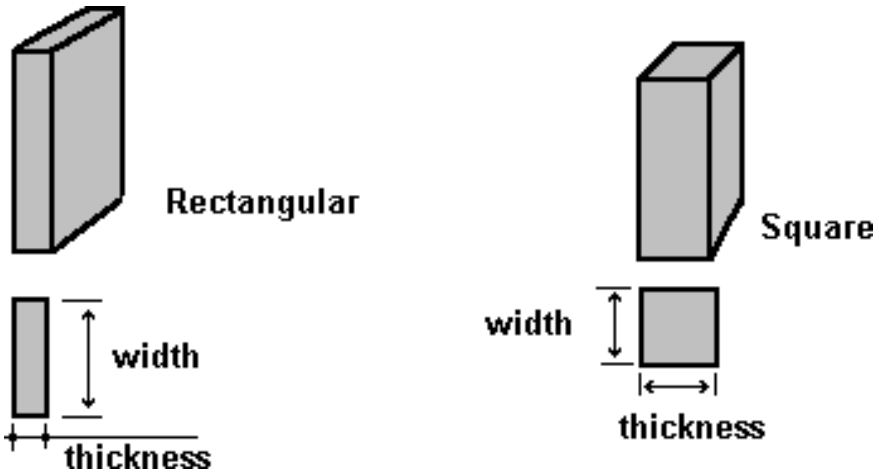
Dip the extremity of sample in the flux, and remove the drop on the absorbent paper.

COMPONENT TYPES FOR GLOBULE

Type (Sample)	**TECHNICAL DATA**
01 - rectangular sample	**N° 01**
02 - cylindrical sample	**N° 02**
03 – complex shape sample	**N° 03**

TYPE 1 : - RECTANGULAR SAMPLE

APPLICATION FIELD: Copper strip, flat contacts, components leads (rectangular or square cross section).



DIMENSIONS in mm

TOOL ref. : D19-D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH:

Usually, the immersion depth must be the maximum possible. If sample extend the tool by less than 10 mm, select 1 mm.

SENSITIVITY:

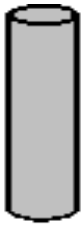
Adjustment depends of the component size. The sensitivity is automatically selected by the software.

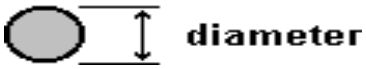
FLUX:

Dip the extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 2 : - CYLINDRIC SAMPLE

APPLICATION FIELD: copper wires, or usually metal wires (cylindrical section)





DIMENSIONS in mm

TOOL ref. : D19-D10-D23 Put the sample in the tool holder, let only few mm of component termination for a conventional component (solder wave) or less for a SMD component.

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilized force before end of measurement

IMMERSION DEPTH:

Usually, the immersion depth must be the maximum possible. If sample extend the tool by less than 10 mm, select 1 mm.

SENSITIVITY:

Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of sample in the flux, and remove the drop on the absorbent paper.

TYPE 3 : - COMPLEX SHAPE SAMPLE

APPLICATION FIELD : miscellaneous.

DIMENSIONS in mm²

TOOL ref. : All

For complex component, the system requires the immersed volume. Take care to clean also sensor tip .

PARAMETERS:

TIME:

Select between 5 - 10 - 15 - 20 seconds to obtain the stabilised force before end of measurement

IMMERSION DEPTH: function of the component.

SENSITIVITY:

Adjustment depends of the component size. The sensitivity is automatically selected by the software.

FLUX:

Dip the extremity of leads in the flux, and remove the drop on the absorbent paper

SERVICING

Unpacking

The complete unit content:

- ST88 NEO
- Bath and/or globule receptacle(s)
- Power cord
- Serial cord
- Pot + ring + alloy
- 4 tool holders (D19, D23, D10 and D10D)
- 45° tool angle.
- 4 allen keys
- One calliper
- One bubble level
- Tweezer
- This manual
- Calibration certificate
- Software on CD
- Video cam (optional)

Installation

The startup is done under the METRONELEC's responsibility or one of the authorized agent's.

Work station environment

To avoid the disturbing of the signal during the measurement, the apparatus shall be on a stable working bench top, free of vibrations, away from air draughts and noises.

The room must be free of acid or corrosive vapors.

Main supply

- 230 V 50 Hz (or 110 V 50-60 Hz optional), stabilized non trouble.
- Power 700 W
- Inert gas supply if requested.

Powering on the unit

In fact, you have to connect your USB cable to the left plug looking in this way.

Notice the 2 other plugs have been kept as spares if needed, but they will not be used.

The right plug is notified with a sticker.

1. Plug the power cord into rear panel plug (as below) and into a 230 V 50 hz socket (or 110 V in option)
2. Install a receptacle in place. They are located in the right side of the cabinet, push on it to open. They are secured with a locating on the left, you can unlock with a 4 mm allen key.
3. Switch on the power supply in front and rear of the unit.
4. Put the melting pot into its housing with its ring, release the thermocouple if you are using the bath.
5. Connect the serial cord to the rear plug and to the PC COM1 or COM 2 plug
6. Check the level of the machine.
7. Set apparatus « Power on » and check the thermocouple is fully dipped into the solder bath as son as the solder alloy is molten.
8. The temperature display indicates the temperature sensed by the thermocouple, and the temperature set.

The apparatus is ready for operation.

Hardware requirements

Pentium2 with Windows 2000 mini

VGA Screen mini

Serial port

256 Mb RAM memory

Installation of the software

The first installation is made by METRONELEC or by the official sales representatives. The updating of the software is made by the users, according to the following procedure :

1. Start WINDOWS software
2. Place the CD into the drive
3. Double click on INSTALL
4. Follow instruction on screen
5. Once the installation is finished, remove the CD from the drive and keep it as a backup.

Note : if we send you an update of the software by E-mail, the file will be zipped.

Copy the file into a temporary directory, and uncompress the zip file to obtain the software for the MENISCO ST88 NEO.

Daily Maintenance

Solder bath

Check the thermocouple is well dipped in the bath. Even if the bath is automatically scrapped, some drosses need to be removed by the operator during a long time without scrapping.

Check cleanliness of the height gauge unit where the component touches the paddle.

Solder globule

Change at every test the solder globule used, don't let the globule pads without alloy on it. Use cotton bud to remove the previous performs and to flux the new one.

Check cleanliness of the height gauge unit where the component touches the paddle.

ANNEX A

PCB wetting test

First, keep always in mind the basic equation :

$$F_{measured} = F_{wetting} - F_{buoyancy}$$

$$F_{measured} = \gamma_{LV} \cdot p \cdot Cos(\theta) - V \cdot \rho \cdot g$$

Where :

- γ, GammaLV is the interaction between the liquid and gaseous phases, function of the couple alloy / flux. Typically, GammaLV # 400 mN/m

- p is the "wettable "perimeter only, the distance where the wetting will occur, this perimeter is defined following the type used.
- Θ, theta is the wetting angle, the angle between the coupon and the meniscus at the point where the three phases are present. Only theta is changing during the test, the other terms are fixed and constant during the test.
- V is the Archimedean volume, known from the type used, this force could be great in comparison to the wetting force, we always try to have a low value of this force to have the better ratio Fwetting / Fbuoyancy.
- ρ rho is the alloy density at the test temperature.
- g is the acceleration field fixed at 9.81 m/s² in normal condition.

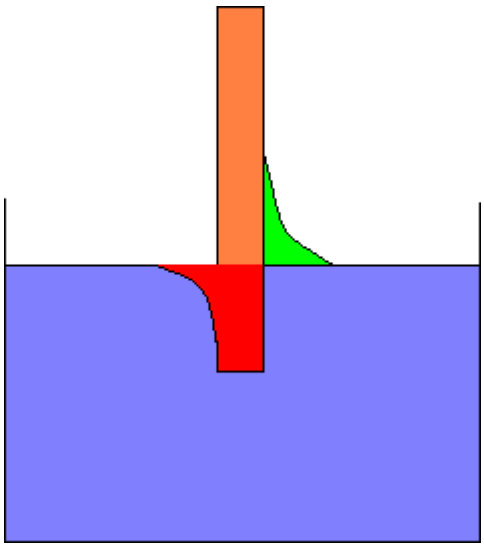
So the result expressed in mN is the balance between the wetting force and the buoyancy force, hence a result sign depending on the value of these forces. So no panic is the result is negative, this is fully possible if the wetting is partial (one side board) or if the buoyancy force is great.

When you define the standard to use, if you choose IEC or IPC or MIL specification, you will obtain a green horizontal line representing the 2/3 of the maximum force or another value if you define by yourself in Option Other Spec, another value for the "coefficient". 2/3 is the general value defined in the specification but you can use other values with this option.

This pass/fail green line can be negative due to the balance between the wetting force and the buoyancy force

Here is below an example : section of coupon wettable only on one side, so the wetting force is the green area and the buoyancy force is the red area (buoyancy from the coupon + inversed meniscus).

As the red area is greater than the green one, it is fully clear than in this case the result will be negative ! but the test result is Ok.



Following your coupon you have different cases :

If your coupon is :

- Fully wettable use type 1, define width, thickness and immersion depth to define the buoyancy volume and the perimeter fully wettable so the perimeter "p" used for the wetting force calculation will be the full perimeter).
- Single side board use type 5, define width, thickness and immersion depth to define the buoyancy volume and the perimeter is not fully wettable so the perimeter "p" used for the wetting force calculation will be just one width, without thickness, no wetting on edges).
- Double side board use type 6, define width, thickness and immersion depth to define the buoyancy volume and the perimeter is not fully wettable so the perimeter "p" used for the wetting force calculation will be just two widths, without thickness, no wetting on edges).
- Complex board partially wettable, use type 19, define width, thickness and immersion depth to define the buoyancy volume and as the perimeter is not fully wettable and "complex" you need to input by yourself the total perimeter wettable "p" called in this type "sigma pcb str width"