USER'S MANUAL

I – Overview of the application

This application is designed for measurement of vertical glazing in windows.

The measure uses the backlight of the display of the iPhone. You must insure your iPhone is set to the highest brightness (settings and brightness) for optimum results.

The measures "in sunlight" may thus be difficult or impossible. It is therefore advisable to make his first steps indoors or in the evening.

The user must stand with the strongest light behind him.

If the glass to be measured is directly exposed to sunlight, open a movable part of the window to make the measure "sunlight protected" on the movable part wide open or folded against the wall.

You can measure the glass thickness from inside the glass (with sunlight outside in front of you), but you must place a dark material on the outer surface of the glass (a dark agenda or conference folder as a background behind the glass) to protect the screen of the iPhone from direct light.

II – Main screen of the Apps

The main screen presents to you three choices :

- glass thickness measurement ;
- Air gap thickness measurement;
- Low Emissivity layer detection.

And a scroll millimeter - inches converter

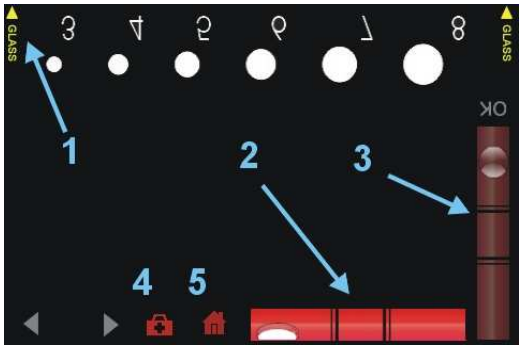
Select one of these tasks. A start screen comes.

III – Start screen of the task

The start screen gives you the following informations :

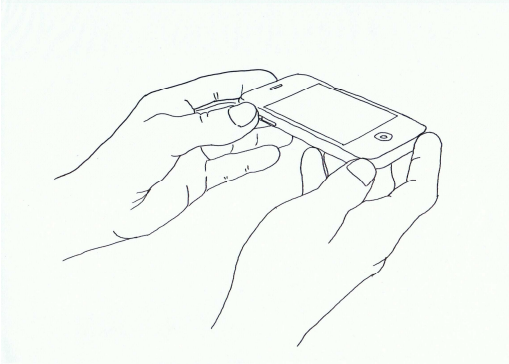
1. two indicators show you the edge of the iPhone to put against the glass unit.
2. a spirit level to get horizontality ;
3. a spirit level to get the good d'inclination ;
4. a path to a shorted user's manual ;
5. back to the main screen.

White figures are inversed.



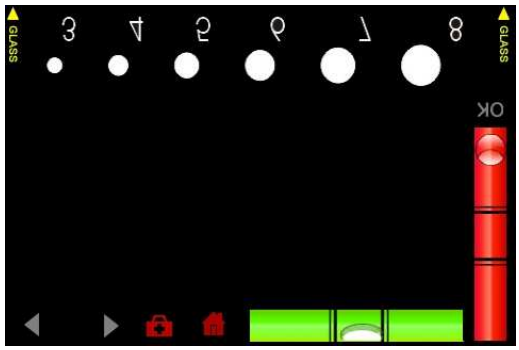
IV – Placement of the tool for measurement

To make a measurement, near the glass, hold the iPhone flat in front of you similar to shown someone watching the screen in landscape mode. The button should be positioned on your right side. The iPhone is then flat and the screen faces the ceiling.



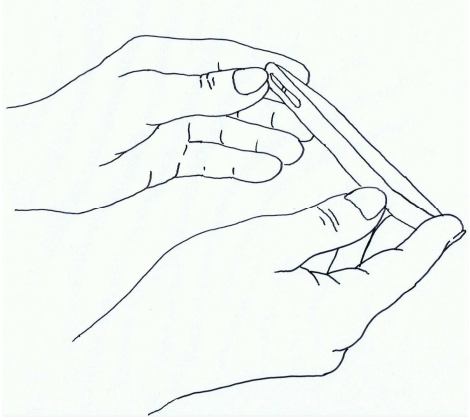
A spirit level simulation appears on the screen and helps you to stand in a good position.

Adjust the horizontality of the long edge (spirit level in green with bubble centered) raising or lowering one hand relative to the opposite.



Put the long edge of the l'iPhone, (like shown by yellow arrows GLASS⇨) against the glass surface at chest lever.

Rotate the iPhone gradually as if you intend to flatten the screen against the surface of the glazing, but stop the rotation when the spirit level indicates you are at the correct inclination (red becomes green with bubble centered).

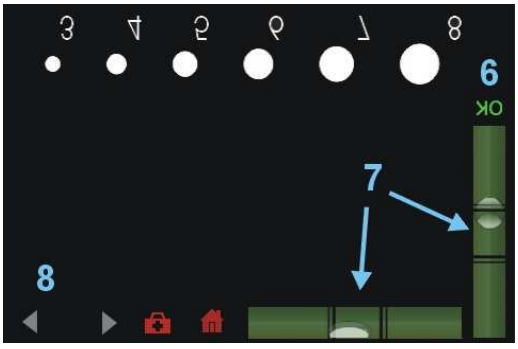


When the position is good enough, the levels disappear and a "**OK" appears in green**.

Higher inclination makes it disappear and switch on again the spirit levels. So lean back.

The measurement can begin when screen shown opposite appears :

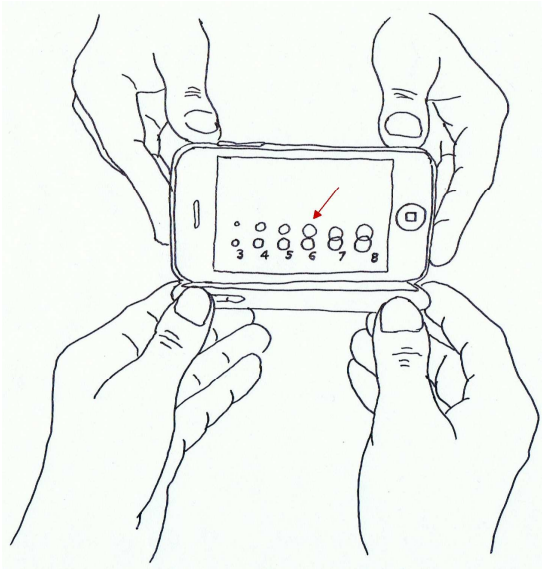
6. Yellow arrows "GLASS⇨" disappear and "OK" appears in green ;
7. spirit levels become gloomy ;
8. Two arrows allow you to slide to next screens for the higher thicknesses by touch of left forefinger.



In case of lost of these signals (6 and 7) make a new adjustment.

Remaining in this position, sight with your eyes at 20 cm distant from the iPhone to the precise height where you can no longer read the display directly on the screen but only its reflection in the glass as shown bellow.

V – Measurement of a single glass unit



You are now reading the display of the iPhone screen only through its reflection in the glass.

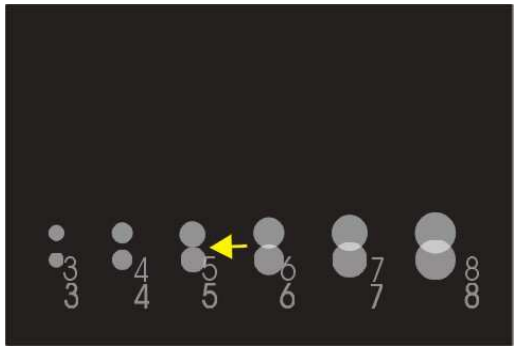
The "reading" of the glass thickness is obtained from this position by comparing the images reflected by the glazing measured.

You can slide your eyes horizontally to adjust your sight, but neither up nor down because this would change the incident angles for which pictures that appear on the screen have been designed.

Notice that white discs of increasing size (millimeter steps) are displayed on the screen of the iPhone. Each one is associated with a number corresponding to a glass thickness in millimeters.

On a single glazing, 2 images are reflected by the glass (one by each surface).

Then you can observe one pair of discs which are precisely joined together without overlaps.



Picture corresponds in a thickness of 5mm

When the measured glass is thicker than the corresponding discs, the discs do not touch.

When the measured glass is thinner than the corresponding discs, the discs overlap.

If no disc tangents for the values from 3 to 8mm, slide to next screen for the thicknesses from 8 to 12mm and so on (left forefinger touch on the screen).

The thickness of the glass will correspond to the discs with reflections perfectly tangent.

VI – Measurement of thicknesses on the two glass sheets of an insulating glass unit

This can quite always be made from one of the two sides of an insulating glass unit.

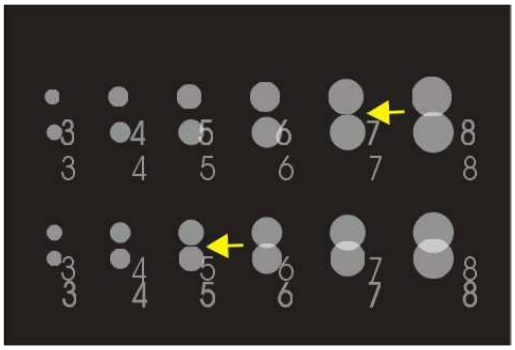
The method of positioning the iPhone is the same than above.

The screen looks the same way : A series of white discs of increasing size gradually giving the thickness of the most common glass.

The 4 white discs reflected by the glass must be considered in pairs. Lower discs represent the thickness of the nearest glass. The top two represent the farthest glass.

If the 2 glass components (inside and outside) are of different thickness the thickness of the glass nearest is given by the 2 discs tangent at the bottom (5mm in this example).

The thickness of the farthest glass is given by the 2 discs tangent at the top (7mm in this example).



VII - Thickness measurement of an air gap (gas space between the two sheets of glass)

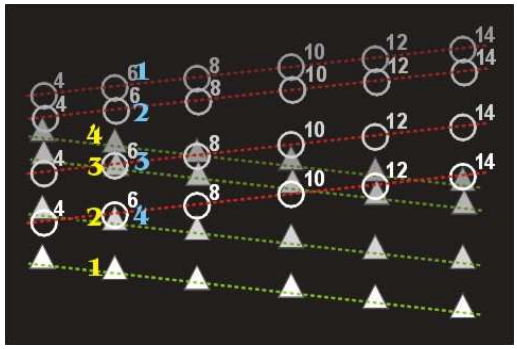
The method for positioning the iPhone against the glass is the same as above.

The reflected image in the glass shows four successive descending lines (green) on which are placed triangles and four successive rising lines (red) on which are placed circles.

The numbers next to the circles represent the thickness of the corresponding air gap.

The principle of the measurement is always to find a coincidence on the reflected image as follows :

The thickness of the air gap is determined by the reflected image where the 3rd triangle from the bottom is located into the 3rd circle from the top.



The air gap thickness is 6mm.

Notice that for the value 8, that is the 4th triangle which is located into the 3rd circle, and for the value 14, that is the 4th triangle which is located into the 4th circle so don't mix them up.

Notice the farther the echo comes (from the bottom to the top) the darker it is.

When the measured air gap is thicker than the corresponding reflected image, the 3rd triangle from the bottom is located above the 3rd circle from the top (First proposed value is 4 in the example above. The thickness of the measured air gap is 6mm. It is thicker than 4mm. the 3rd triangle from the bottom *of the first vertical left line group* is located above the 3rd circle from the top).

When the measured air gap is thinner than the corresponding reflected image, the 3rd triangle from the bottom is located below the 3rd circle from the top.(proposed values 8, 10, 12 and 14 in the example above)

If none of the proposed thicknesses correspond, go to the next screen for thicknesses from 16 to 26 mm and so on.

VIII - Detect and locate a low emissivity layer (Low E coating)

To detect and to determine on which surface of which sheet of glass a low emissivity layer is, the method for positioning the iPhone against the glass unit is quite the same as above.

Select the corresponding item on the main screen and follow the instructions.

Notice that the angle of inclination is different than the other items (near 30 degrees from horizontal). The incident angle is 30 degrees instead of 45 degrees but the spirit level simulated helps you.

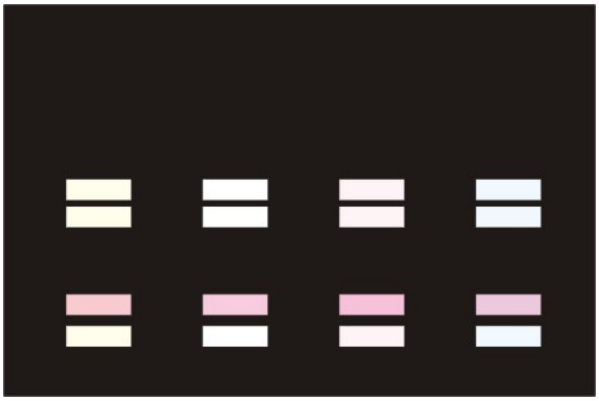
Each rectangle reflects itself four times on the screen. One for each surface (two sheets of glass x 2 surfaces).

If there is one low emissivity layer (or more) in the observed glass unit, it will be sign by a change of colour into the reflected image.

The colour of the echo which corresponds to the surface with E layer is different than colour of uncoated surface echos.

On the first example shown opposite, the second surface (second rectangles from the bottom) is covered by a low emissivity layer and reflects a more violet colour than the three others.

The layer is located on the second surface of the first sheet of glass whereon is the iPhone (the layer is against the air gap).



In the second example shown opposite, the third surface (third rectangles from the bottom) is covered by a low emissivity layer and reflects a more violet colour than the three others.

The layer is located on the first surface of the second sheet of glass (the layer is always against the air gap but on the other side) furthest from the iPhone.