

About Us

THERNA is the new brand of Kanat Boya, one of the leading manufacturers in Turkey in Protective and Industrial Paints and Coatings. Therna aims at bringing a new excitement and perspective to the industry with Kanat Boya's experience of more than 30 years and quality registered by the professionals of the industry.

Therna is offering solutions in diverse areas with its extensive product range covering coatings for Cookware, Bakeware, Small House Appliances, White Goods and Glass. Therna has documented its quality through international certificates. Backed by the power of Kanat Boya's tens of specialized field personnel, R&D staff of 50+ members, annual production capacity of 23.000 tons at its factories at İzmir and Osmaniye, Therna aims at being a significant competitor of global brands not only in Turkey but in the international area as well.

We aimed to make our products that favoured by leading manufacturers pure as water and registered our quality with international certificates.



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Test Methods For PTFE Based Surfaces

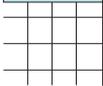
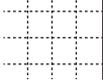
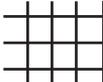
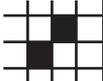
Boiling Water Adhesion

- Water is boiled for 30 minutes.
- After 30 minutes, coated surface is drawn with the help of scalpel/curved knife according to quadrature method.
- Adhesive tape is placed on the squares and it is pressed firmly to prevent air gap underneath.
- Adhesive tape is pulled rapidly at once with upward force.
- This process is performed for 5 times in different directions (vertical, horizontal, diagonal) to determine the degree of adhesion. Adhesion degree is evaluated according to ASTM D-3359 (5B - Best | 0b - Worst) or DIN 53151 (GT - Best | GT5 - Worst).



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to watch the test video.



Surface	Classification	Description
	GT0 / 5B	The edges of the cuts are completely smooth, none of the squares are detached.
	GT1 / 4B	Small flakes of coating are detached at the intersections, less than 5% area is affected
	GT2 / 3B	Coating fragments are detached alongside the cut and intersections. 5% to 15% area is affected.
	GT3 / 2B	The coating fragments detached from the cuts and from the squares. 15% to 35% area is affected.
	GT4 / 1B	The coating detached along the edges, intersections and squares as large ribbons. 35% to 65% area is affected.
	GT5 / 0B	All of coating is almost detached. More than %65 of area is affected.





Abrasion

- 10% detergent solution is poured onto the surface to be tested.
- The scouring sponge (3M 7447 - 7x3 cm) is placed under the equipment and 3 kg weight is loaded on the top.
- The temperature is set to 60°C and machine is started.
- The scouring sponge is reversed every 250 cycles and the scouring sponge is changed in every 500 cycles.
- When the aluminium surface is visible at 10% of the scanned surface, the test is terminated and total number of cycle is recorded.



IMPORTANT: The result of abrasion test must be compared only if the parameters are the same.



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Salt Water

- 10% salt-water solution is prepared.
- Half of the cookware is filled with salt-water solution and started to heat.
- When water is boiled, it is kept at the constant temperature for 8 hours.
- Water level is checked hourly. If level decreases, water is added.
- After 8 hours, hot plate is turned off and stayed at room temperature for 16 hours.
- Then cookware surface is washed with water and dried.
- Cycle is repeated to observe at which stage the surface is blistered and deformed.



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Egg Release

- Cookware temperature is set to 160C.



ATTENTION: Temperature control must be provided with an infrared thermometer during the whole test.

- When the temperature reaches 160 - 170°C, the egg which is kept at room temperature is broken into the cookware slowly.



IMPORTANT: Temperature values must not exceed 200 - 210C.

- Cook the egg for three minutes and check if it is easily taken out with spatula from the surface and evaluate the results.
- Repeat the test five times and observe how many times the surface passes the test.



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Milk Release

- Cookware is filled with milk that will cover the surface.
- The temperature of the cookware is kept between 180-200°C until the milk is burned and its color is returned dark brown.
- Then the cookware surface is washed with water and it is observed if the milk layer can be easily removed or not.



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Ketchup

- First, 1 measure of tomato ketchup and 1 measure of water are mixed together then salt is added to the mixture according to %2 in total mass.
- The test pan is filled 2/3 of volume with above mixture and level is marked in pan by marking pen.
- Heat the pan, the process of heating continues until the mixture in pan starts boiling. After that the heater or flame level is reduced.
- Let the mixture in pan simmer for 8 hours at very low flame.
- The examination procedures are generated in every 1 hour to observe the water level of the mixture. If the water level goes below the %20 in total mass, the mixture will burn.
- The heating process stops after 8 hours, next the mixture cools down for 16 hours.
- The pan is cleaned with warm water by a soft cleaning tool.
- All surfaces are observed for defects, blisters and etc.
- All the steps must be repeated 3 times.



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Tiger Paw

- Cookware is placed on Tiger Paw machine and ball-point pens are fixed on the rotating part of device. Machine temperature is set at 200°C.



IMPORTANT: Dry film thickness of surface must be measured. The bottom of the cookware must be flat to be placed completely on device.

- Timer of cycle is set to 15 minutes for each in clockwise direction and in counter clockwise direction.
- Machine is started and the deformation on the surface is observed after every 30 minute-cycle.
- Cycle time is recorded until the aluminium surface to be appear which shows the coating performance. This test simulates the surface damage caused by using of metal equipment in the kitchen.



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to watch the test video.



LGA Abrasion

- Inner surface of the cookware is divided into 4 equal parts. 3 parts should be covered with strong tape, the remaining part will be exposed to test.
- Cookware is fixed on the test machine and the mixture of water, quartz and steel ball are poured into cookware.



IMPORTANT: Dry film thickness of surface must be measured. The bottom of the cookware must be flat to be placed completely on device.

- The machine is started by setting timer to 15 minutes and speed to 300 RPM. After first period is completed, tape is removed from one of the three parts that covered at the beginning.
- When the second period is completed, tape is removed from one of the two remaining covered parts. Then the machine is started again.
- All parts which are exposed to abrasion during 45, 30, 15 minutes and the one which is stayed covered and not exposed to abrasion during test are cleaned with water and detergent.
- Then milk test is performed on the whole cookware surface. As a result of the test, cookware surface is evaluated according to release, stain and deformation.
- This test which requires circular mixture device simulates the performance of the coated surface in daily kitchen usage.



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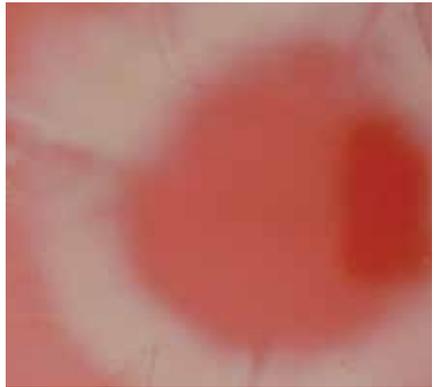
Silicone Outer Surface Tests

Direct Flame Boiling Water Test _____

- Fill the pan or pot with water until 2 cm empty space left to top and put on the stove at high flame for one hour.
- While evaporation happens, add water if the water level decrease. (3-5 times in an hour)
- After one hour take the pan/pot from stove and turn upside down and check for any flame marks, paint softening or any coating area remove from the surface.



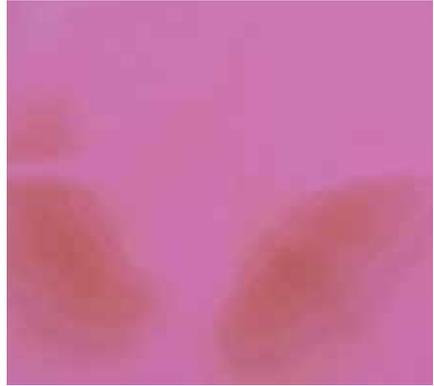
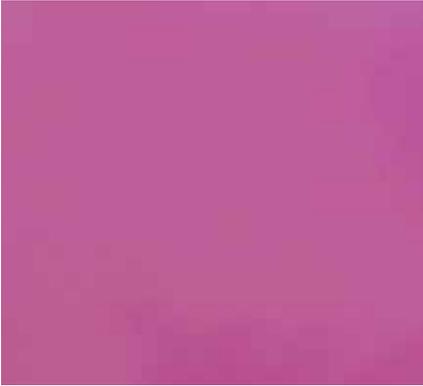
Silicone Outer Surface Tests



Boiling Oil Test On Direct Flame

- Add 3 cm oil inside of the pan or pot and put it to the stove at high degree.
- When the liquid oil starts boiling (approx. 300°C) put peeled potatoes to pan/pot. When the potatoes fry and at next stage when it turns color to the black turn off the stove.
- After cooling take out oil inside of the pan/pot and check for any flame marks, softened paint or any coating area that removed from the surface.





Resistance To Detergent

- Put one tablet of Finish Quantum Detergent into 1 liter of water and boil it on hot plate.
- Put coated test piece into boiling water for one hour.
- After one hour take the piece out of water and rinse it with cold tap water. Check test piece for adhesion manually, film softening, color change, blistering etc. And rate the performance.

Pencil Hardness

- To determine the surface hardness, pencils with standard hardness are used. (SOFT) 6B-5B-4B-3B-2B-B-HB-F-H-2H-3H-4H-5H-6H (HARD).

(SOFT) 6B - 5B - 4B - 3B - 2B - B - HB - F - H - 2H - 3H - 4H - 5H - 6H (HARD)

- The hardness level one before the one that leaves a permanent mark on the surface is defined as pencil hardness. (ASTM D 3363)

Resistance To Solvents

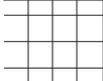
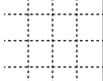
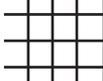
- Take a white cotton piece and soak in to Methyl Ethyl Ketone (MEK).
- Rub the cotton piece using two fingers on the test piece surface back and forth one cycle. Continue till cycles till the surface for any deformation, gloss reduction, softening or color change.
- Note down number of cycles as final result.



Adhesion Test

- After curing, take out the cured materials to cool down.
- Cut the coated surface with a sharp cutting tool by squares.
- Take adhesion tape and cut it in size so it can cover the whole test area.
- Press the adhesion tape to test area and apply pressure using round edged cutter, pencil or eraser. After that rapidly pull the tape without any jerk.
- Repeat this test 5 times in different directions (vertical, horizontal, diagonal). Make evaluation according to ASTM D3359 or DIN 53151 and rating it as per below table Gt-0 is best and Gt-5 is worst.



Surface	Classification	Description
	GT0 / 5B	The edges of the cuts are completely smooth, none of the squares are detached.
	GT1 / 4B	Small flakes of coating are detached at the intersections, less than 5% area is affected
	GT2 / 3B	Coating fragments are detached alongside the cut and intersections. 5% to 15% area is affected.
	GT3 / 2B	The coating fragments detached from the cuts and from the squares. 15% to 35% area is affected.
	GT4 / 1B	The coating detached along the edges, intersections and squares as large ribbons. 35% to 65% area is affected.
	GT5 / 0B	All of coating is almost detached. More than %65 of area is affected.

Recoatibility Test

- After curing, take out the material to be tested and let it cool down to room temperature.
- Apply the coating one more time to the cooled down surface.
- After curing, let the material cool down to room temperature.
- Check the adhesion on cooled surface. Also control the surface visually and evaluate the results.

Bakelite Tests

Bakelite Tests



ATTENTION: Use only standard vibration process for surface preparation. Use standard cleaning chemicals to remove any oil or any other surface contamination. Dents as well unevenness on the bakelite surface must be removed and surface should be smooth.



ATTENTION: It is very important to prepare the paint as instructed at technical information recipe. Also it is important to consider the pot lives of products so products doesn't stand still for a long time period.



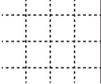
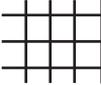
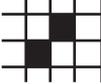
IMPORTANT: Check and control coated parts for below defects,

- Flow-out
- Cratering
- Orange peel
- Color difference (Controlled with standard color)
- Pinholes



Adhesion

- Cut the coated surface with a sharp cutting tool by squares.
- Take adhesion tape and cut it in size so it can cover the whole test area.
- Press the adhesion tape of test area and apply more pressure using round edged cutter, pencil or eraser.
- After that rapidly pull the tape without any jerk.
- Make evaluation according to ASTM D3359 or DIN 53151 and rating it as per below table
Gt-0 is best and Gt-5 is worst.

Surface	Classification	Description
	GT0 / 5B	The edges of the cuts are completely smooth, none of the squares are detached.
	GT1 / 4B	Small flakes of coating are detached at the intersections, less than 5% area is affected
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	GT4 / 1B	The coating detached along the edges, intersections and squares as large ribbons. 35% to 65% area is affected.
	GT5 / 0B	All of coating is almost detached. More than %65 of area is affected.

Boiling Test

- Put one tablet of Finish Quantum Detergent into 1 liter of water and boil it on hot plate.
- Put coated bakelite piece into boiling water for 1 hour.
- After one hour take a piece out of water and let it cool down to room temperature.
- Check adhesion with nail manually when the test piece cools down.
- Check the test piece for any discoloration or color difference against control piece.



Dishwasher Test

- Put coated bakelite handles into dishwashing machine and perform 65 standard washing cycles as per program.
- Check the test piece for any defect, discoloration or colour difference against standard piece.



IMPORTANT: Since dishwasher test takes quite a time, boiling water test can be used as reference.



Scratch / Impact Resistance:

- During the production and transportation processes, coated bakelites can chafe with each other or they can have a friction with packages etc.
- It is very difficult to stimulate this kind of situations in laboratory.
- But we can use our thumbnail to scratch the surface or we can hit two bakelite pieces to each other.
- Check for any deformation or deterioration of the coating from surface after every two tests.

Plastic Surface Tests



ATTENTION: As plastics have their own characteristics, suitable coating system should be chosen according to technical information sheet for the most fundamental feature; adhesion.



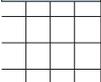
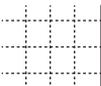
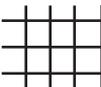
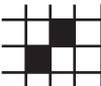
IMPORTANT: All test surfaces must be cleaned with IPA (Isopropyl alcohol) before tests. After curing paint defects must be checked. Defects are as follows:

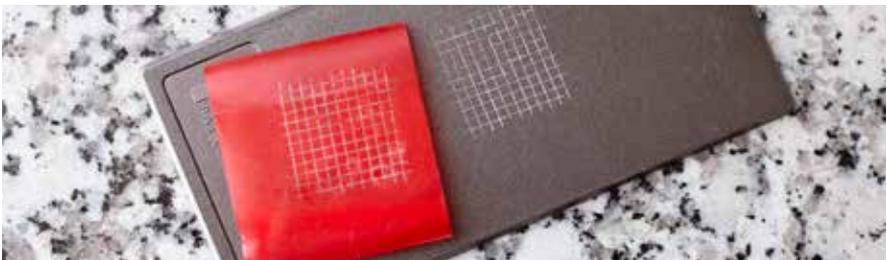
- Flow out
- Cratering
- Orange peel
- Color difference (Controlled with standard color)
- Pinholes



Adhesion

- Cut the coated surface with a sharp cutting tool by squares.
- Take adhesion tape and cut it in size so it can cover the whole test area.
- Press the adhesion tape of test area and apply pressure using round edged cutter, pencil or eraser.
- After that rapidly pull the tape without any jerk.
- Make evaluation according to ASTM D3359 or DIN 53151 and rating it as per below table Gt-0 is best and Gt-5 is worst.

Surface	Classification	Description
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	GT5 / 0B	All of coating is almost detached. More than %65 of area is affected.



Scratch Resistance

- Scratch resistance of the coating is checked by using standard scratch testing equipment - ERICHSEN HARDNESS TEST PENCIL (MODEL 318).
- The test piece must be checked for scratch with standard tip using variable pressure range from 1N to 10 N (newton).
- If there is a scratch through the coating till substrate at x value, then reading will be considered one less than this x value, and if it doesn't scratch through the coating, higher pressure than x will be tested.
- Value in Newton is defined as scratch resistance level of coating. E.g. 1 Newton, 5 Newton etc...



Dishwasher Test

- Put coated bakelite handles into dishwashing machine and perform 65 standard washing cycles as per program.
- Check the test piece for any defect, discoloration or color difference against standard piece.



IMPORTANT: Since dishwasher test takes quite a time, boiling water test can be used as reference.

Pencil Hardness

- To determine the hardness of the surface from soft to hard as shown below, pencils with standard hardness must be used.

(SOFT) 6B - 5B - 4B - 3B - 2B - B - HB - F - H - 2H - 3H - 4H - 5H - 6H (HARD)

- The hardness level one before the one that leaves a permanent mark on the surface is defined as pencil hardness. (ASTM D 3363)

Thermal Quenching Test

This test is to evaluate the plastic coating resistance against any rapid or sudden change in temperature:

- Thermal Quenching test is evaluated with five cycles like shown below;
 - √ 2 hours 80°C (oven/air condition cabin)
 - √ 30 minutes environment (23±2)
 - √ 2 hours -30°C (oven/air condition cabin)
 - √ 30 minutes environment (23±2)
- After this test, test panels should be evaluated like shown below;
 - √ No corruption on surface,
 - √ No corrugation on surface,
 - √ No cracks on surface,
 - √ No adhesion loss on surface.

Detergent Resistance Test

- Prepare a tap water solution includes 1% detergent.
- Submerge the parts into that solution and keep them inside for 7 days at 70°C.
- After this process evaluate the panels for any deformation on coating, adhesion (5B/GT0), gloss (max<10) and color loss ($\Delta E < 2$).



Resistance To Different Chemicals

Plastic substrates are used in different sectors, and thereby it comes in contact with various chemicals depending on area of use. To stimulate these kind of situations, different kinds of chemicals can be applied on surfaces and these surfaces are closed by an hourglass. After the tests, surfaces should be cleaned with tap water and soap and note the following observations;

- √ No corruption on surface,
- √ No changes on pencil hardness,
- √ No adhesion loss,
- √ Max gloss difference %10,
- √ Max color difference 2(ΔE)

The chemicals used on this tests can be following; Nescafe, vinegar, ketchup, olive oil, sunflower oil, butter, mustard, margarine, lemon juice, red lipstick, moisture cream, shoe paint, citric acid solution (%1), liquid detergent, disinfection water, wood cleaner, egg white etc..



Resistance To Alcohol

- Make a solution of 90% IPA+10% Water.
- Take a piece of cotton and dip into solution and take out extra solvent by squeezing it.
- Rub the cotton piece using two fingers on the test piece surface back and forth for one cycle. Continue till 30 cycles and evaluate the surface for any deformation, gloss reduction, softening or color change.

Humidity (Qct) Resistance

- Test panels is coated with required thickness of coating and cured. Place the test panel into humidity test chamber so that the test surface is facing inside of the test chamber.



IMPORTANT:

- Ambient temperature is set $40 \pm 2^{\circ}\text{C}$ inside chamber and outside ambient temperature keep at $24 \pm 3^{\circ}\text{C}$
- There should be no air gap between the panels to be tested.
- Maintain the pH of water (that used for test) between 6.5-7.2 and conductivity below $10 \mu\text{S}$.
- QCT chamber must run 24 x7.

- Take out Panel after 10 days and clean it with a soft paper towel and evaluate.
- As panels taken out, blistering check must be done according to ASTM D 714-02 and TS 9260 EN ISO 4628-2
- Check the surface for blistering, surface defects, discoloration, gloss reduction etc... and rate coating performance accordingly.
- Performance values for these parameters must be; for adhesion GT0 / 5B for color ($\Delta E < 2$), and for gloss (max loss %10).

UV (QUV) Resistance

• Test panels is coated with required thickness of coating and cured. Place test panel into Humidity Test Chamber so that the test surface is facing inside of the test chamber.



IMPORTANT:

- There should be no gap between panels.
- Maintain the pH of water (that used for test) between 6.5-7.2 and conductivity below 10 μ S.
- QCT chamber must run 24 x7.
- Set the cycles so the test panel expose to QUV (4 hours at 60°C) and then QCT (4 hours at 50°C) cyclically.

- Take out the test panels after 10 days and clean with soft paper towel.
- As panels taken out, blistering check must be done according to ASTM D 714-02 and TS 9260 EN ISO 4628-2
- Performance values for these parameters must be; for adhesion GT0 / 5B, for color ($\Delta E < 2$), and for gloss (max loss %10).

Thermal Aging Test

There are various test for aging from customer to customer, but in common thermal aging test is define as below;

- Test piece is kept in oven for 7 days at 70°C.
- After 7 days, cool down the substrate to room temperature and then check for any defect on surface like gloss reduction (max<10%), adhesion GT0/ 5B and discoloration ($\Delta E < 2$).

Salt Water (Corrosion) Resistance

- Coated test panel should be cut from the center for almost 5 cm, parallel to the long side of the panel. To cut the panel, a special pen with hard tip must be used and cut must be deep enough to see the surface. The cut must expand from bottom to top of the panel from 0.3 mm to 1 mm.
- The panel should be placed to panel arrangement tool at 15-25 degree angle and the surface to be tested must be on top.



IMPORTANT:

- Cabin temperature must be $35\pm 2^{\circ}\text{C}$,
- pH of %5 NaCl solution which will be used for test must be between 6,5-7,2
- Cabin must function 7x24.

- After 10 days panels should be taken out and cleaned with a clean paper towel.
- Blister evaluation must be done according to ASTM D 714-02 and TS 9260 EN ISO 4628-2.
- If there are no blisters on surface, performance values for these parameters must be; for adhesion GT0 / 5B, for color ($\Delta E < 2$), and for gloss (max loss %10).



ATTENTION: If customer doesn't give a specification about process times at tests such as; humidity (QCT), UV (QUV) and salt water (corrosion), Kanat Paints and Coatings' test standards will be used.

Kanat Boyacılık Tic. ve San. AŖ

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