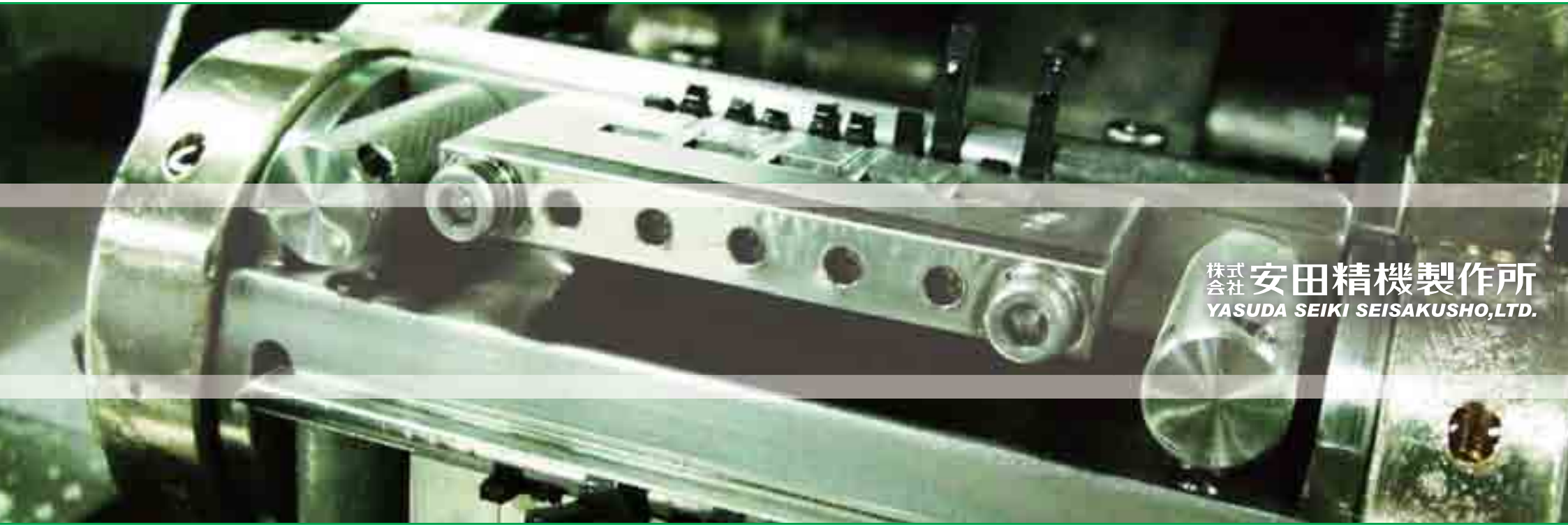
No.121-RA

BRITTLENESS TEMPERATURE TESTER



株式会社 安田精機製作所
YASUDA SEIKI SEISAKUSHO,LTD.

121 Series Catalogue

Yasuda
www.yasuda-seiki.co.jp

121-RA BRITTLENESS TEMPERATURE TESTER

This tester is used to measure the 50% impact brittleness temperature of plastic, rubber, and electric insulated wire at low temperature. By attaching one end of the test specimen to the holder and adding impact to the other end, the operator is to check for any breaks to the test specimen. The refrigerating method for 121 is dry ice and the 121-R is equipped with a refrigerator.

This Tester is Manufactured Based on the Following Standards;

JIS C3005
Test methods for rubber or plastic insulated wires and cables

JIS K6261
(Rubber, vulcanized or thermoplastic-Determination of low temperature properties)

JIS K6261
Testing Method for Brittleness Temperature of Plastics

ASTM-D746
Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

ISO 812
Rubber, vulcanized or thermoplastic -- Determination of low-temperature brittleness

ISO 974
Plastics -- Determination of the brittleness temperature by impact

Introduction of BRITTLENESS TEMPERATURE TESTER・・・p.3~p.6

Lineup of 121 Series・・・p.7~p.8

Comparison of 121 Series・・・p.9~p.14

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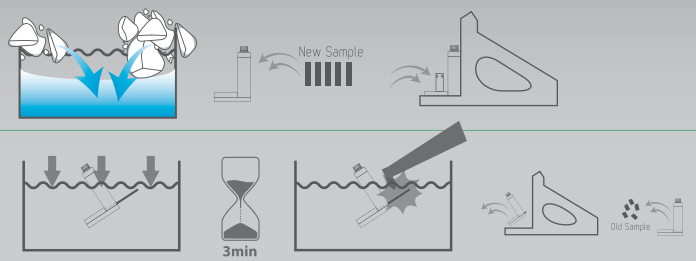
What is Calendar Timer ?・・・p.17

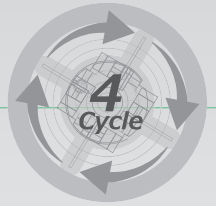
Comparison of 121 Series Specification・・・p.18

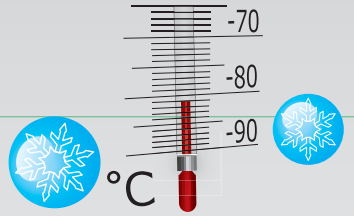
121

121-R

121-RA







Prepare Test Samples

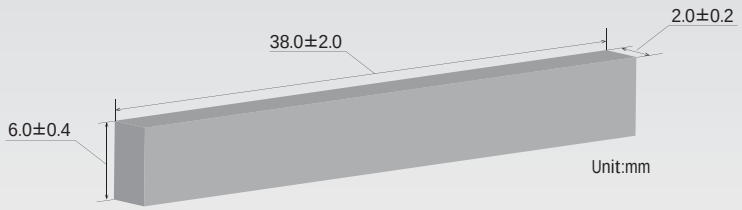
Knocking the Sample Sheet with a Hammer and Specimen Cutter

Cutted Test Samples

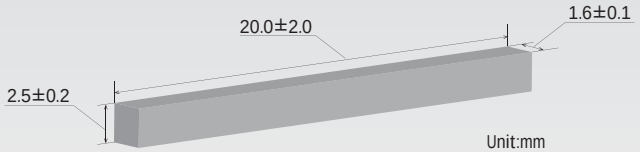
Sample Cut to the Test Size

The Sample of JIS-K7216(Rubber)

A type specimen — Figure and Size

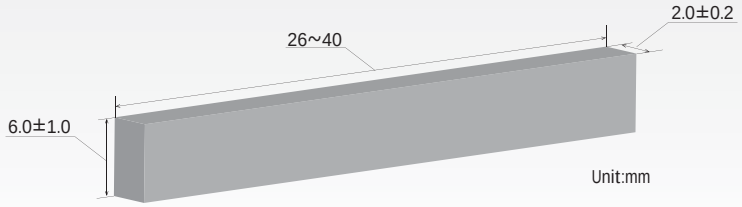


B type specimen — Figure and Size

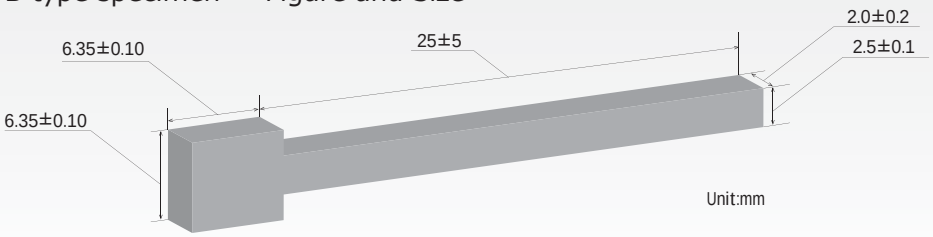


The Sample of JIS-K6261(Plastic)

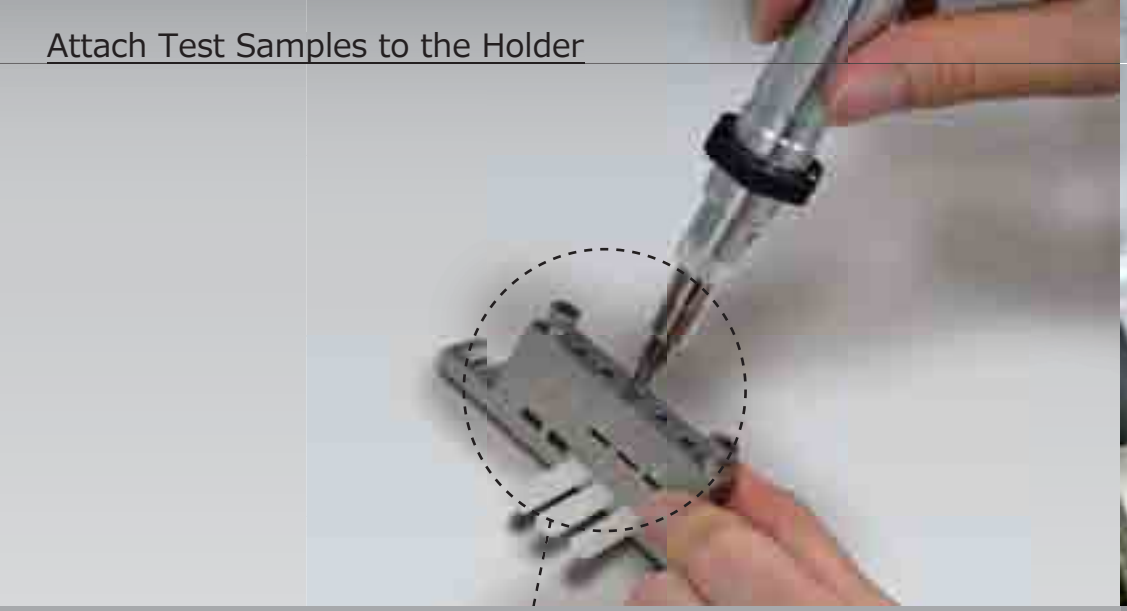
A type specimen — Figure and Size



B type specimen — Figure and Size



Attach Test Samples to the Holder



Attaching the Test Samples to the Holder using the Torque Wrench

Attach the Sample Holder

Attaching the Holders to the Rotary. Maximum 4 Holders can be attached to the Rotary.

Sample Holder

Attach

Rotary Type Holder

Maximum 4 Holders can be attached to the Rotary.

Single Type Holder

One Sample Holder can be attached.

Dip the Holder in a Cool Bath which is Filled with Ethanol

The Hammer Impacts the Samples after Holding Time

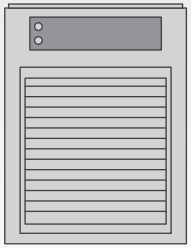
Dry Ice Cooling

Operator is to Cool Down the Bath which is Filled with Ethanol by Pouring Crashed Dry Ice into the Bath. Operator has to Adjust the Temperature Manually with the Dry Ice depending on the Present Temperature in the Bath.

The Slot of Dry Ice

OR

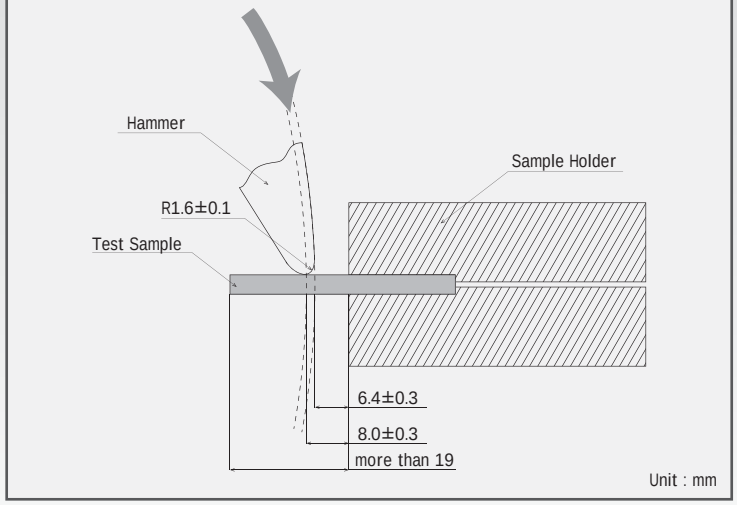
Automatic Cooling by Refrigerator

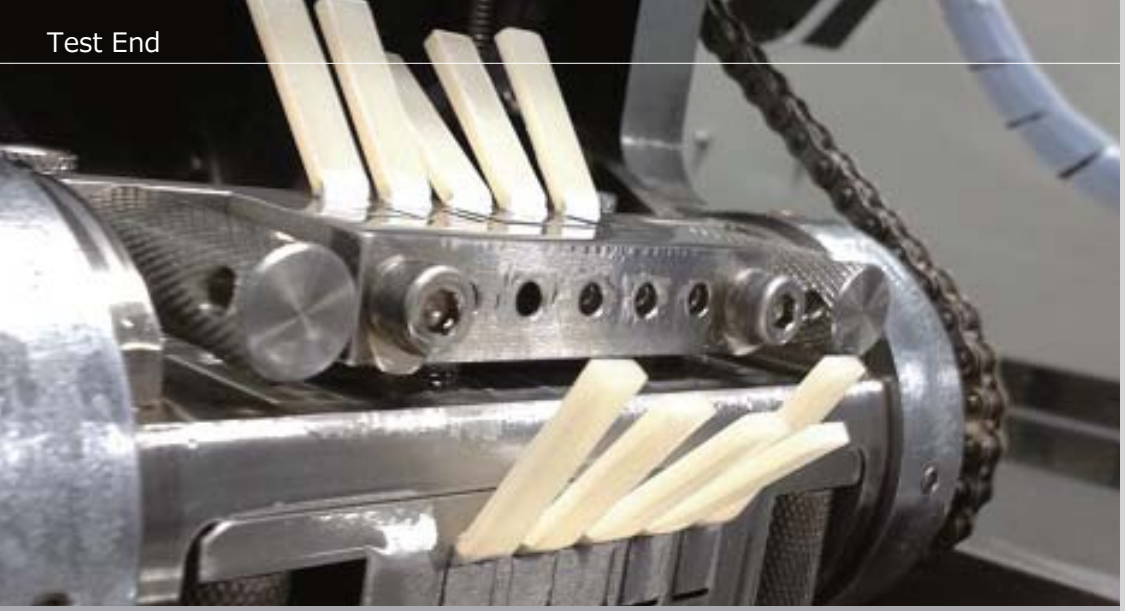


Enables to Set 4 Test Temperatures from the Touch Panel. Temperatures are Automatically Adjusted During the Test Cycle.

Setting Screen of Touch Panel

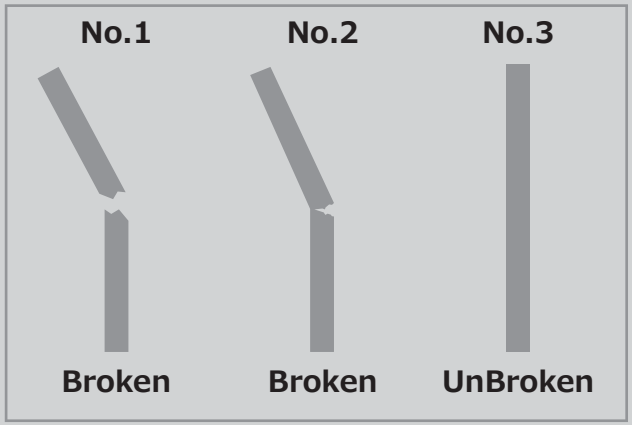
BRITTLENESS TEMPERATURE TESTING





After the Test Ends, Examine each Test Sample to Determine whether or not it has Broken

"Broken" is defined as the division of a test sample into two or more completely separated pieces or as any crack in the specimen which is visible to the unaided eye.



Acquire 50% Brittleness Temperature on the Number of Broken Test Samples

■Calculation Method

Under the Calculation Method, the Brittleness Temperature of the test will be as below;

$$Tb = Th + \triangle T \left(\frac{S}{100} - \frac{1}{2} \right)$$

Where the figures indicate
Tb: Brittleness Temperature
Th: The highest temperature at which all of the test samples on the Holder are "broken"
ΔT: The increasing rate of temperature
S : The sum of percentage of the test samples that was "broken" from the lowest test temperature that none of the test samples broke.

<EXAMPLE>
Using 10 samples at the below temperature
-30℃ 0 broken
-32℃ 2 broken
-34℃ 3 broken
-36℃ 6 broken
-38℃ 8 broken
-40℃ 10 broken

So the figures above will be,
$Th = -40℃$
$\triangle T = 2℃$
$S = 20 + 30 + 60 + 80 + 100 = 290$

$$\therefore Tb = -40 + 2 \left(\frac{290}{100} - \frac{1}{2} \right)$$

$= -35.2℃$
∴Brittleness Temperature $-35.2℃$

How to Acquire 50% Brittleness Temperature

According to the standard, the operator is to count how much of the test samples have "broken" due to the impact under low temperature. The definition of "broken" is when the test sample is broken up into 2 or more pieces or as any crack in the specimen which is visible to the unaided eye. So, in the above figure, test samples No.1 and No.2 are "broken" . No.3 is "unbroken" . The evaluation of the Brittleness Test is to use these "broken" under either the Calculation Method or the Graphic Method.

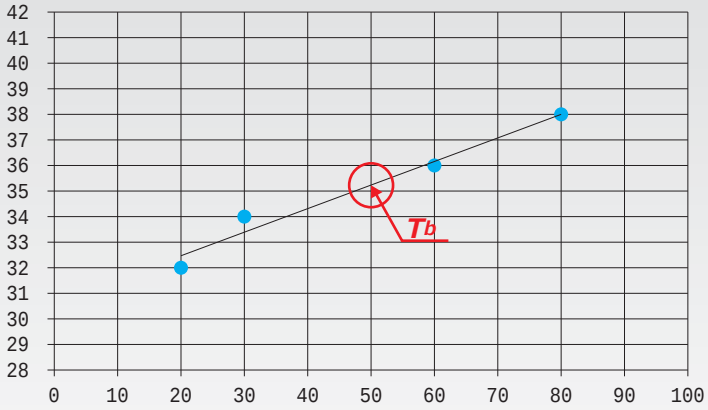
Calculation Method

OR

Graphic Method

■Graphic Method

Using the example in the Calculation Method to the the Graphic Method, the below will be how to acquire the Brittleness Temperature.



First eliminate the test data at which all the test samples are broken and none of the test samples are broken (here, test data at -30℃ and -40℃). Draw a line that best fits the plotted dots and the Brittleness Temperature will be at where 50% of the samples are thought to be broken. In this case, it will also be -35℃.

121 Series Line Up

YASUDA Offers 3 Lineup of 121 Series to Meet the Various Needs of the Testing Scenes. Select the Most Appropriate Machine for your Needs.

- 121
- 121-R
- 121-RA

No.121

Single Type Holder or Rotary Type Holder [Option]
Dry Ice Cooling

- Cooling and Temperature Adjusting is Manual
- Rotary Type Holder is Selectable by the Option
- Manual Testing

Single Type Holder

Rotary Type Holder [Option]

Dry Ice Cooling

No.121-R

[Option]
Single Type Holder or Rotary Type Holder
Auto-Refrigerator Cooling

- Auto-Refrigerator Cooling
  Temperature Adjusting
- Manual Testing

Single Type Holder

Rotary Type Holder [Option]

Auto-Refrigerator Cooling

No.121-RA

Compare the Details of 121 Series

Rotary Type Holder
Auto-Refrigerator Cooling
Auto Testing & Temperature Management

- Operate with Touch Panel
- After Attach the Sample to the Rotary Type Holder,
  Testing and Temperature Management is Automatic

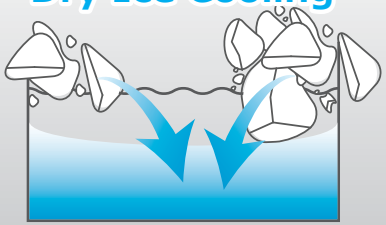
Rotary Type Holder

Auto-Refrigerator Cooling

Operate with Touch Panel

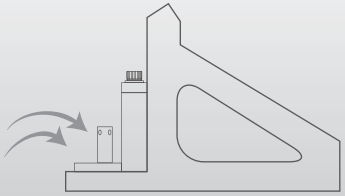
No.121
Single Holder
Dry Ice Type

Dry Ice Cooling

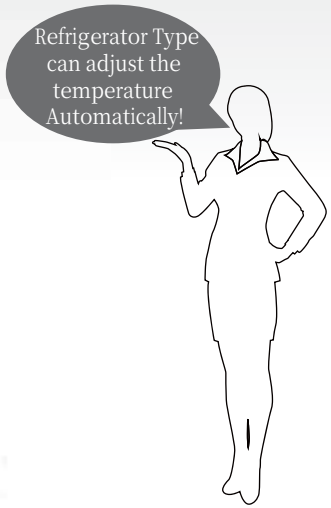


Attach Test Sample

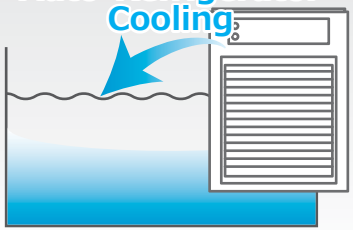
Attach Holder



No.121-R
Single Holder
Refrigerator Type - Automatic Cooling System

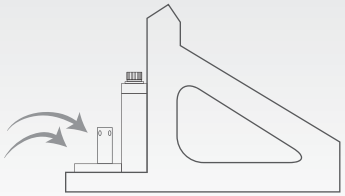


Auto-Refrigerator Cooling

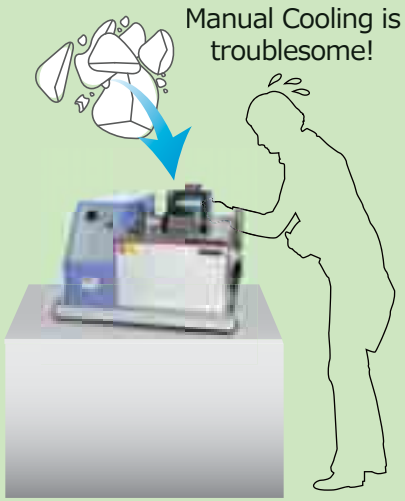


Attach Test Sample

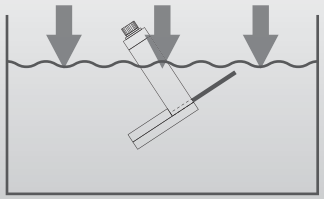
Attach Holder



Adjusting with Dry Ice

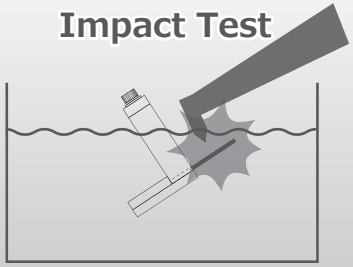


Dip the Holder into the Bath



Holding Time

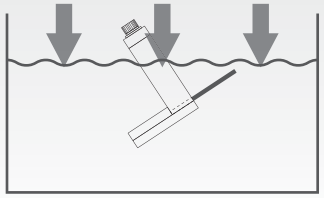
Impact Test



Remove Holder & Remain Sample

Point !

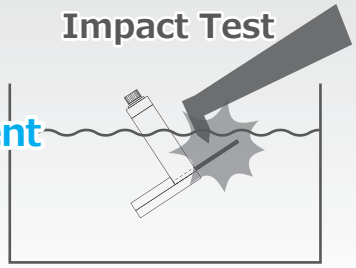
Dip the Holder into the Bath



Holding Time

Stable Temperature Management by Refrigerator

Impact Test



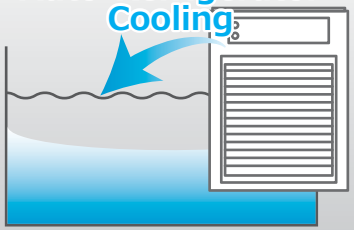
Remove Holder & Remain Sample

Move to Impact test Smoothly

No.121-R
Single Holder

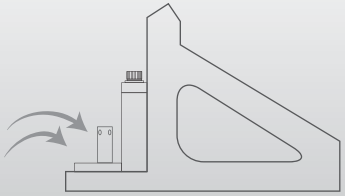
Refrigerator Type - Automatic Cooling System

Auto-Refrigerator Cooling



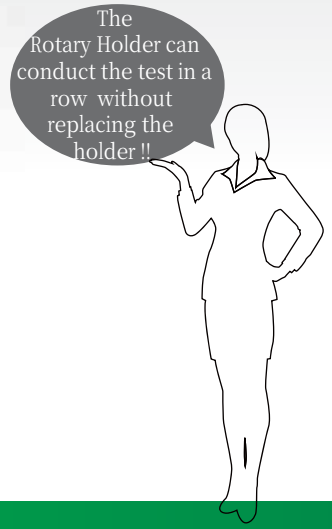
Attach Test Sample

Attach Holder

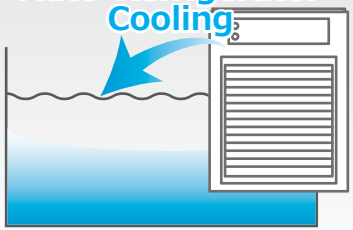


No.121-R
Rotary Type Holder

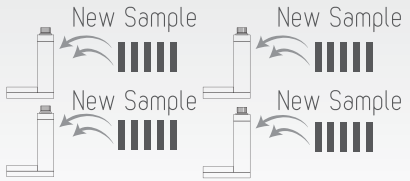
Refrigerator Type - Automatic Cooling System



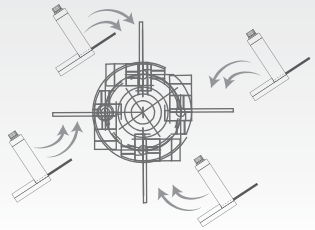
Auto-Refrigerator Cooling



Attach Test Sample

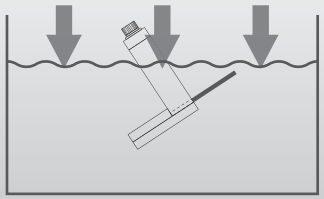


Attach Holder





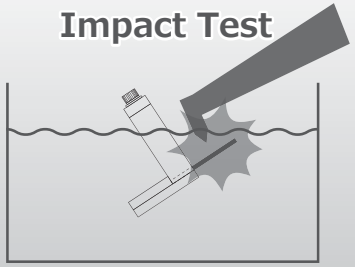
Dip the Holder into the Bath



Holding Time

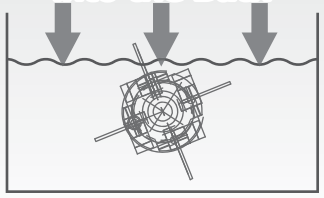
3min

Impact Test



Stable Temperature Management by Refrigerator

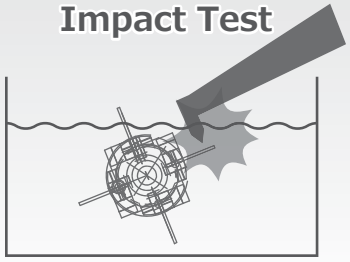
Dip the Holder into the Bath



Holding Time

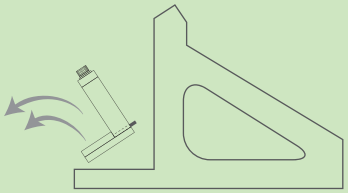
3min

Impact Test






Remove the Holder

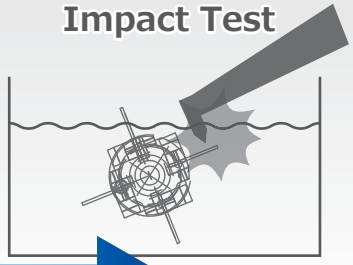


Remove the Remain Samples

Point !

Rotate the Holder
Feed the Samples

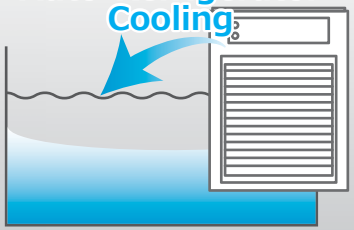
Impact Test



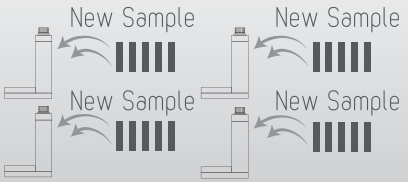
Conduct the Test in a Row


No.121-R
Rotary Type Holder
Refrigerator Type - Automatic Cooling System
Manual Testing

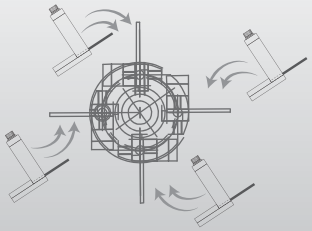
Auto-Refrigerator Cooling



Attach Test Sample

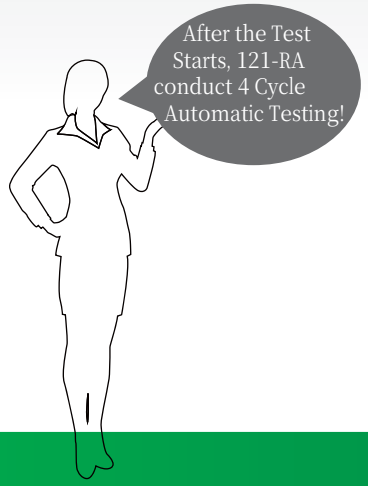


Attach Holder

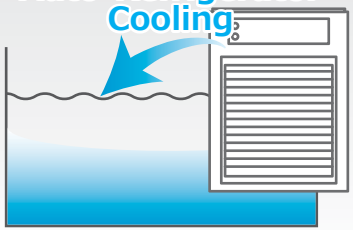


No.121-R
Rotary Type Holder
Refrigerator Type - Automatic Cooling System

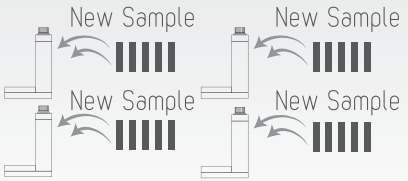
Automatic Testing & Cooling



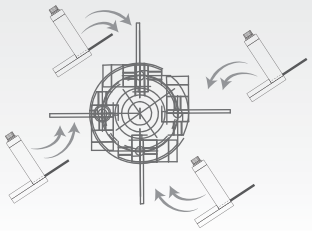
Auto-Refrigerator Cooling



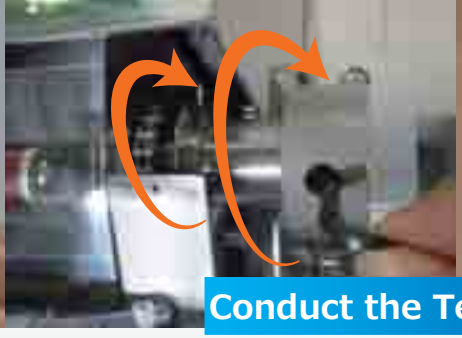
Attach Test Sample



Attach Holder

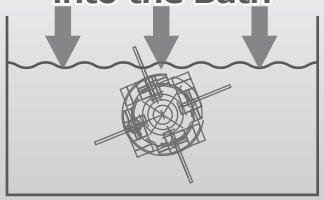





Conduct the Test in a Row

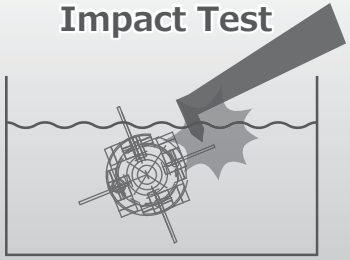
Dip the Holder into the Bath



Holding Time

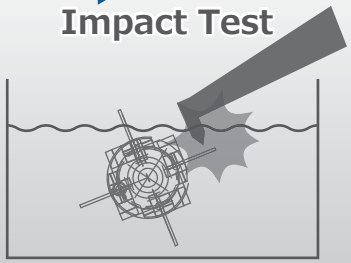
3min

Impact Test

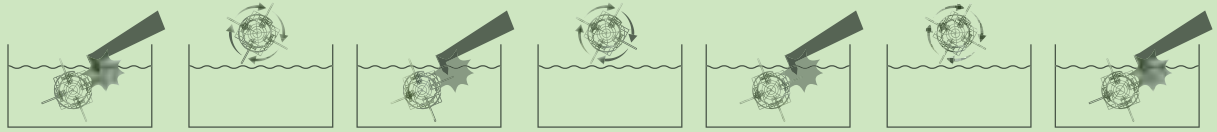


Rotate the Holder
Feed the Samples

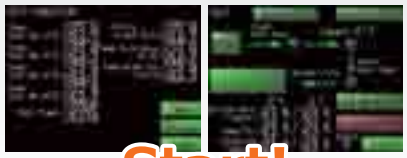
Impact Test



Stable Temperature Management by Refrigerator



Operate with Touch Panel Input Test Condition



Start!

Maximum 4 Cycle Testing are Aoutomatic !

Point !

Test End

Finish!

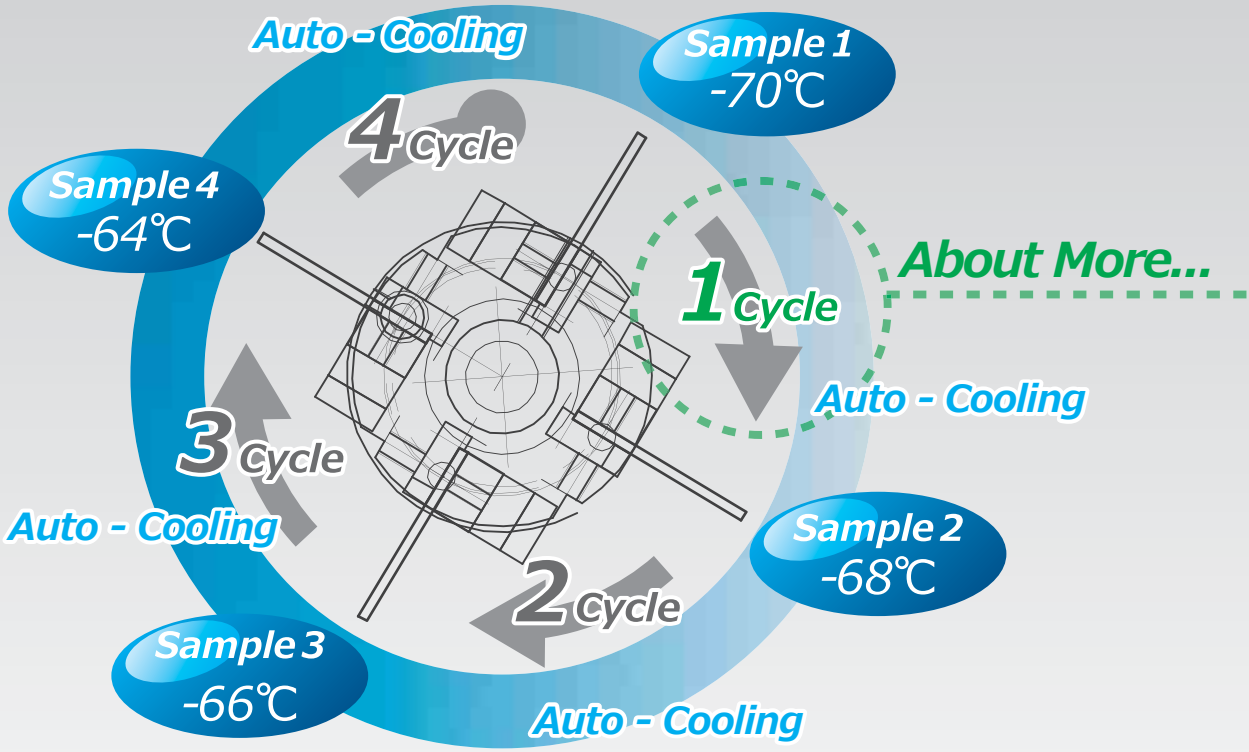
121-RA
BRITTLENESS TEMPERATURE TESTER

Q. What is Automatic?

Operator is to Conduct only Attaching Samples and Setting the Test Condition from the Touch Panel. 121-RA Operates Automatic Cooling and 4 cycle Automatic Testing in a Row.

Enable to Set 4 range of Temperature Automatic Temperature Adjusting

Enable to Set 4 Range of Temperature for each Holder from Touch Panel. Also the Temperature Adjusting is done by Automatically.



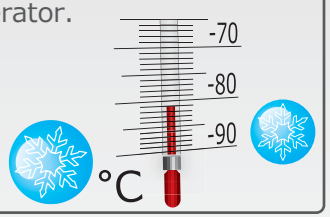
Maximum 4 Cycle Testing is Automatic !

4 Cycle Testing is Automatic !

Operator is to Set the Test Condition from Touch Panel and 121-RA Conduct the Testing Automatically. Even the Test Temperatures are Different, 121-RA Automatically Adjust the Temperatures, so that the Operator can do another Work While 121-RA is in Function.

Dual Function Refrigerator System

121-RA Produces Powerful and Stable Freezing Ability by Dual Function Refrigerator System which has 750W and 1100W Refrigerator.



Approx. 90 min is Required to Cool Down to -70 ℃ from Ordinary Temperature…How can We Use this Time Effectively?

Q. Let's say Your Boss Ordered you to Conduct the Test in a Early Morning . . .Do you have to wake up early ??

Don't Worry!

Mon 10 2

If the Tests are Scheduled, use Calendar Timer Function and make Time Effective!
Set the Freezing Start Time and Just Go Home!

Tue 10 3

Cooling Starts at the Time which is Set Previous Day and the Temperature will become Stable around -70℃ at 9 a.m. The Operator can start the Test as soon as he Arrives at the Office.

Just set the Freezing Start Time before you Leave your Office !!

Leave the Office

Freezing Starting Time

90 min

Test Starting Time

*Since Ethanol can Create Flammable Vapor, Do Ventilate the Testing Room and also Close the Bath Lid while Preparing for the Test.

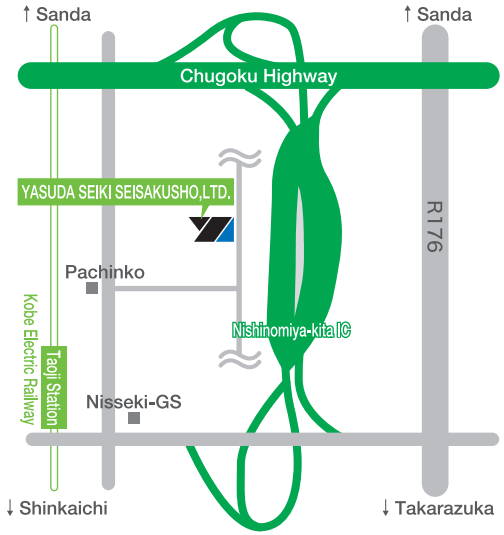
Compare 121 Series

YASUDA Offers Rich Lineup for 121 Series
BRITTLENESS TEMPERATURE TESTER to Meet
Various Needs of Users.

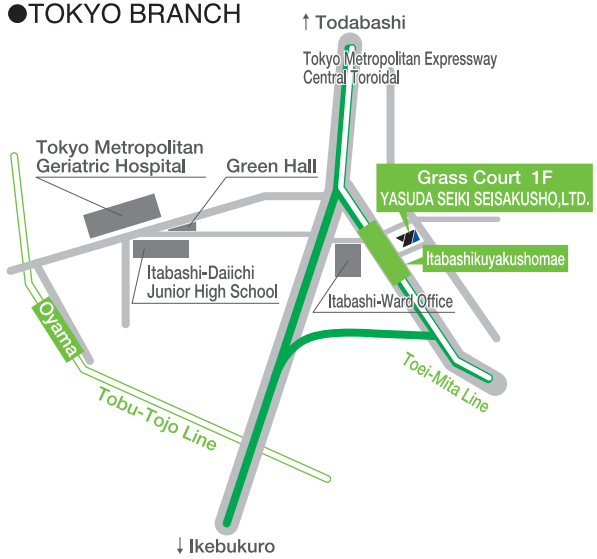
	Refrigerator	Rotary Type Holder	Auto Testing	Calendar Timer
No.121 Single Holder / Dry Ice Type 	—	Option	—	—
No.121-R Rotary Type Holder Compatible Automatic Cooling with Refrigerator 	Standard	Option	—	—
No.121-RA Automatic Cooling & Testing with Rotary Type Holder & Refrigerator 	Standard	Standard	Standard	Option

株式会社 安田精機製作所
YASUDA SEIKI SEISAKUSHO,LTD.

●HEAD OFFICE · FACTORY



●TOKYO BRANCH



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