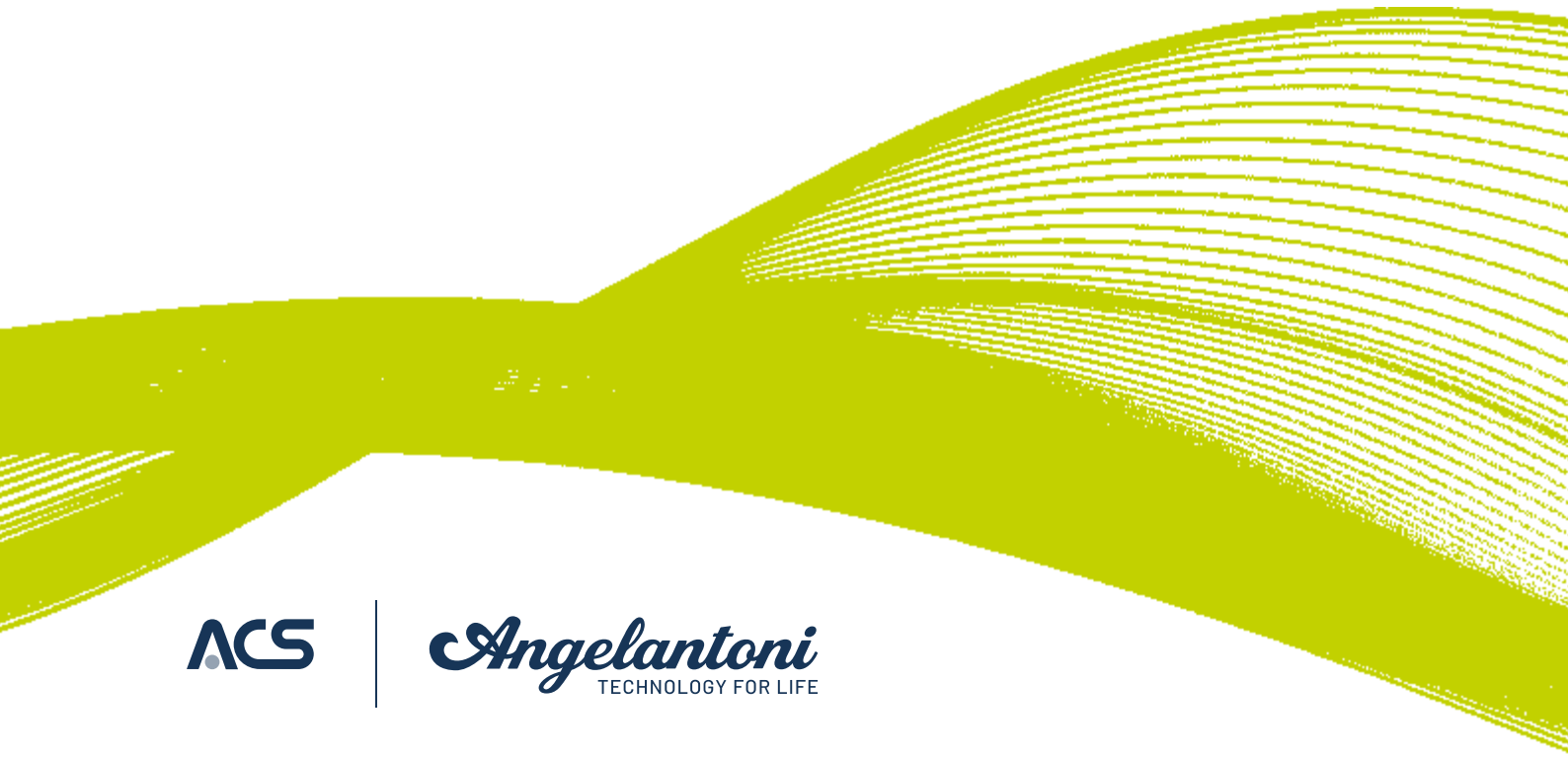
ACS | TESTING FOR A BETTER PLANET

Angelantoni

# Thermal Shock Chambers

acstestchambers.com



ACS | Angelantoni TECHNOLOGY FOR LIFE

**Angelantoni Test Technologies**
stay ahead to meet the needs
of the Industry of the Future, where
**Internet Technology,**
**Remote Connections,**
**Communication & Networking**
are the keywords for success.

# spinner
# CST130/2T
## Thermal Shock Chamber

**ACS** is proud to announce the **new** Thermal Shock Chamber CST130/2T “spinner”!

A new design for a **more compact** and precise equipment, equipped now with **Weazy™**, the new onboard HMI providing an intuitive and responsive interface for our Powerful Control System.

# spinner CST130/2T

The CST130/2T “spinner” vertical thermal shock test chamber is made up of two test chambers placed one on top of the other: a hot chamber above and a cold chamber below.
The machine takes its name from the “spinner”, the mechanism that moves the basket from one chamber to the other. The basket, which holds the products to be tested, is moved electrically by means of a motorized worm drive that ensures a fast transfer speed and significantly reduced vibrations.

weazy™

The HMI makes it possible to manage and monitor the chamber via the 7” on-board panel.



WinKratos

WinKratos software (optional) enables full control of chamber functions, from manual operation to the creation of customized test profiles via a graphical editor.

myangel24™
SUPPORT SAFETY & CARE

**Advanced Services Platform (optional)** offering services such as automatic reporting, remote chamber control, and monitoring of main components status for preventive maintenance. The chamber can be connected to our servers through SIM card via mobile network or through LAN connection via Ethernet.

NEW ECO FRIENDLY REFRIGERANT
**R449A**

With low GWP (Global Warming Potential), compliant with European Regulation 517/2014

# CST130/2T “spinner”

## Main Technical Data

| |
|---|
| Basket capacity 130 lt |
| Basket useful dim. 475x650x385 (WxDxH) mm approx |
| Maximum basket load 50 Kg |
| Chamber external dim. 977x2301x2605 (WxDxH) mm |
| Temperature range (measured at room temperature of 22°C, empty working space and nominal voltage):<br>• upper chamber +70/+220°C<br>• lower chamber -80/+180°C |
| Temperature fluctuation: ±1°C |
| Basket displacement speed <10 sec. |
| Max load with MIL 883 test (15 min resetting time on specimen):<br>• 12 kg Ics distributed on 3 shelves with MIL 883 test D |

## Main Standards

| | |
|---|---|
| MIL-STD-883H, method 1010.8, test conditions A, B, C, D, F | ✔ |
| MIL-STD-810G (*), method 503.5 procedures I-B, I-C, I-D | ✔ |
| IEC 60068-2-14 test Na | ✔ |

(*) with dedicated SW

## Rich basic configuration

- Electronic control of the ON/OFF solenoid valves makes it possible to optimize the operation of the cooling system according to the machine’s working conditions
- Compressed air drying columns to improve chamber performance in terms of productivity, for long-term tests without the need to use defrosting cycles
- The new CST130/2T “spinner” allows you to add a preconditioning and postconditioning stage to the test cycle:
  - Preconditioning allows the obtaining of cycles that are closer to the thermal profile set in the first stages;
  - Postconditioning allows the specimen to be moved more rapidly at the end of the cycle. To speed up the cooling of the hot chamber, it is equipped with a compressed-air flushing system
- Hardware device for intelligent control of the heating elements, which by means of dedicated software algorithms reduces the absorption peaks, and thus saves energy
- Internal design conceived to obtain an ideal air flow that is optimized for the most demanding standards, such as the MIL-STD-883H METHOD 1010.8
- Free PT100 sensor inside the basket, Port (45 mm), Electrical panel with IP54 protection, inspection window

# CST130/2T “spinner”

weazy™

# a lightweight, responsive and unique HMI for ACS chambers

**Weazy™** is the onboard HMI, providing an intuitive and responsive interface for our powerful Control System, designed for use across an extensive range of our chambers.

**Available on 7 inch display**

**Simple to use graphical interface**

Clarity, consistency and efficiency of use



### Fully Modular and User-Configurable Control System

The chamber is equipped with a **PLC** (Programmable Logic Controller) for managing all the chamber’s functions and safety interlocks.

The chamber basic control is supplied by **Weazy™**, a very flexible HMI accessible on the 7 inch on board display.

**WinKratos** (optional) allows the complete management of the chamber functions: from manual control to the creation (through the graphic editor) of test profiles, including monitoring and recording, processing, graphical representation and analysis of data.

**MyAngel24™** (optional) is the Advanced Services Platform developed by ACS to offer fast, effiicient and secure remote activities, allowing Automatic Reporting and Preventive Maintenance.

# Air-to-Air or Liquid-to-Liquid: **Extreme versatility**

**ACS** complete line of thermal shock chambers includes either **Air-to-Air** or **Liquid-to-Liquid** models, designed for thermal shock tests on components or complete equipment by submitting them to rapid temperature changes automatically.
They are suitable **for Quality Control Laboratories or in Production plants** for the screening of commercial and military components.



## The ACS **Air-to-Air** thermal shock chambers meet the following standards:

- MIL-STD-883H, method 1010.8, test conditions A, B, C, D, F
- MIL-STD-810G (*), method 503.5, procedures I-B, I-C, I-D
- IEC 60068-2-14 test Na

(*) with dedicated SW

## The ACS **Liquid-to-Liquid** thermal shock chambers meet the following standards:

- MIL-STD-202G, method 107, test conditions AA, BB, CC
- MIL-STD-883H, method 1011.9, test conditions A,B,C
- IEC 60068-2-14 test Nc

The extreme versatility of **ACS** chambers allows users to carry out a wide range of tests necessary to determine thermal characteristics under the effect of two alternating extreme temperatures. It is possible to offer standard or custom-designed models, either vertical, horizontal or "walk-in" types.
Their wide range of accessories, the large range of temperatures, the reliability of the mechanical cooling systems and the After-Sales Service Assistance contribute to make ACS chambers an essential factor for Quality Control and Production facilities.

# The Traditional Approach

## Air-to-Air Thermal Shock Chambers: Two temperature method, specimen moving with the basket

### Traditional version with specimen moving in the basket

- Vertical model, chain movement = CST320 2T
- Horizontal models, pneumatic movement = CST500 2T, CST1000 2T
- The two test compartments can be placed vertically or horizontally.
- An electrically driven basket moves between the two temperature zones which will produce a thermal shock on the specimen.
- The vertical model is available with basket useful volume of 320 litres; horizontal models are available with basket useful volumes of 500 and 1000 litres.
- Special models are available on request.
- The external structure is in painted carbon steel grey RAL7035; the interior and the basket are in AISI 304 stainless steel.
- The doors (one for each test compartment) are fitted with safety microswitches which immediately stop the chamber's operation when one of the doors is open.

| MODEL | Basket dims. mm (WxDxH) | Ext. dims. mm (WxDxH) | Thermal load (Kg*) | Weight (Kg) | Voltage** (VAC) |
|---|---|---|---|---|---|
| CST320 2T | 700x700x650 | 1530x2900x2400 | 15/7 | 1600 | 400 V ±10%/50Hz/3ph + N + G |
| CST500 2T | 630x900x900 | 3830x2060x2640 | 25/13 | 3500 | 400 V ±10%/50Hz/3ph + N + G |
| CST1000 2T | 730x1000x1400 | 4490x2360x2650 | 50/30 *** | 4500 | 400 V ±10%/50Hz/3ph + N + G |

* reference value in order to achieve the following "recovery times": 2 min in the range -55/+125°C - 5 min in the range -65/+150°C
** other voltages or frequencies on request, according to customers' specifications
*** reference value in order to achieve the following "recovery times": 6 min in the range -55/+125°C - 11 min in the range -65/+150°C

# An Alternative Approach

## Air-to-Air Thermal Shock Chambers: Two temperature method, specimen fixed in its position

### Alternative version with specimen fixed in its position, “flapper” models

**The concept**

“flapper” is an innovative approach to thermal shock which can dramatically improve the space crowded situation of many testing laboratory and increase the use flexibility. The specimen is fixed in its position and the chamber is connected alternatively to hot and cold chambers (by “flaps”). This technical solution creates the possibility of the unit being capable of performing as a standard thermal shock chamber and also gives the possibility to perform ESS tests and conventional thermal cycles. This style eliminates the problem of having to worry about cables that may need to “travel” with your test items. Since the unit under test stays in place it is easy to connect any wiring or sensors necessary to verify test results. The number of cycles before defrosting is considerably increased thanks to a pressure compensation system (bellows connected to both cold and hot rooms).



**According to** MIL STD 883 and IEC 68-2-14

| | |
|---|---|
| Temperature range | -80°C/+220°C |
| Temperature accuracy in time | ±0.5°C |
| Heating temperature rate from -55°C to + 125°C* | 40°C/min |
| Cooling temperature rate from +125°C to -55°C* | 20°C/min |
| Recovery time (-55°C / +125°C ) with 5 Kg load (IC) | 15 min |

(*) with reference temperature sensor on the air blow out

| MODEL | Basket dims. mm (WxDxH) | Ext. dims. mm (WxDxH) | Max load (Kg) | Weight (Kg) | Voltage** (VAC) |
|---|---|---|---|---|---|
| **CST130 S “flapper”** | 580x510x420 | 1400x1780x1950 | 30 | 1300 | 400 V ±10%/ 50Hz/3ph + N + G |
| **CST320 S “flapper”** | 700x700x650 | 2740x1700x2450 | 50 | 2400 | 400 V ±10%/ 50Hz/3ph + N + G |

** other voltages or frequencies on request, according to customers’ specifications

# Air-to-Air **Optional Accessories**



**LN2 Auxiliary Cooling**
ACS thermal shock chambers can be equipped with an auxiliary cooling system with LN2 supplied by means of centralized tank or bottles. This auxiliary cooling system achieves a fast temperature recovery time in the same T range when the thermal load in the basket is exceeding the load limits. Another application is when the test has to perform low temperature values that cannot be achieved with the traditional mechanical cooling systems only (e.g. down to -180°C with LN2). In this case the equipment must be adapted with suitable thermal insulation and special construction. On request we can supply our chambers with LN2 only, without mechanical cooling.

**Specimen Temperature Recording**
Additional thermal probes can be connected to the recorder to measure the temperatures at additional points. The probes are installed in the movable basket passing through two special dedicated portholes (see further accessories).

**Connecting Portholes**
Various sizes of portholes are available according to chamber models. They allow an easy electric connection between equipment external to the chamber and the devices under test in the basket.

**Gaseous Nitrogen (N2) Purging System**
This system allows to avoid the condensation of internal humidity on the specimen under test, thus increasing the number of cycles before defrosting. The use of this option also eliminates the presence of oxygen in the chamber to prevent oxidation phenomena at high temperature on the contacts of the components under test. It is optional for 500 and 1000 l horizontal models, while it is included for 320 l vertical model (not available for “flapper” models).

**Set of no. 8 auxiliary contacts**

**RS 232 interface + Winkratos SW**
For remote control and programming via PC.

**Remote air condenser**
(on request)

**Special voltages or frequency**
(on request)

# Air-to-Air **Features and benefits**

| Constructive features | Your Advantages |
|---|---|
| • Carbon steel, industrial paint finish, exterior; stainless steel AISI 304 interior, 18/8. | Heavy and rabust construction, ergonomic features and elegant design. No rust formation. |
| • Argon welded internal chamber. The internal structure is connected to the external structure by means of phenolic joints. | No humidity penetration. No thermal bridge between internal chambers and external environment, resulting in energy savings. |
| • 2 ea. large full-light doors with soft double silicone gaskets and key-locks. | Full accessibility to the chambers. No water vapour infiltration at low temperatures. Possibility to use the cabinets separately. |
| • Internal ventilation realized by means of powerful propeller fans driven by external motors. They are provided with stainless steel shafts. | Quick response of the specimen to temperature changes. Uniform temperatures inside the cabinets. |
| • Cooling systems driven by two cascade compressors complete with safety valves and thermal protections. Refrigerants: R449A for the first stage and R23 for the second stage. | Rapid cooling with low noise level. Maximum reliability of the equipment. Low level of vibration. Ozone friendly and non-inflammable refrigerants. Low cost of operation. |
| • Heating system by means of armored finned type electric heaters. They are protected by adjustable failsafe overtemperature switches. | Fast recovery times due to low thermal inertia. Heat radiation in the cabinet is minimized. |
| • Control and regulation by means of a PLC controller/programmer. Its control is based on PID feedback principle. Input/output are connected to Pt100 platinum variable resistance probes. | Fast thermal response with continuous and linear control over the whole range. Precise control of temperatures by means of Pt100 thermal probes. |
| • Thermal probes: Pt100 platinum probes with 100 ohms at 0°C as per DIN specifications. | Fast response and good linearity in the range -100°C to + 200°C. |
| • Electric connections according to IEC specifications. | High reliability and operator safety. |
| • Blowers stop during the basket movement. | Reduced air mixing between the cold and hot chambers. |
| • Microswitches on chamber doors. | Chamber stop in case of doors opening. Operator safety. |
| • Safety push button in case of emergency. | Easy protection of chamber and specimen in case of failure. |
| • “Undercooling” or “overheating” operation modes available. | Faster temperature recovery time after basket transfer. |

# Liquid-to-Liquid
# **For more severe testing**

**ACS** has developed and is producing a full range of chambers for **Liquid-to-Liquid thermal shock tests**. This standard range of chambers meets any commercial or military test specification.
The chamber body is gray RAL 7035, the front is blue RAL 5015.
Two powerful compressors are connected in cascade and provide rapid and reliable temperature cooling performance. Environmentally friendly refrigerants are also used. The basket movement is electrically operated.
The time needed by the basket to move from one well to the other is less than 10 seconds. A plexiglass cover door closes the test volume in order to minimize the liquid consumption by evaporation.
The ACS Liquid-to-Liquid thermal shock chambers are designed to use one fluid only such as the GALDEN D02.

CSTL20

A special evaporator for the fluid vapour condensation (fitted as standard) is placed over the wells, and allows condensation and recovery of the fluid vapours.
These features put our chambers at the top range of the worldwide production with highly reduced fluid consumption (i.e.approx.3 g/h for CSTL20 and only 0,5 g/h for the CSTL12!!). The chamber is equipped with an expansion “bellow” used for pressure compensation during the test operations. This avoids overpressure inside the chamber that can force the door and cause fluorinert leaks.
The CSTL models can be equipped with a wide range of accessories (customized shelves for the specimen, vapour suction blower with automatic butterfly valve, etc.).



| MODEL | Basket dims. mm (WxDxH) | Ext. dims. mm (WxDxH) | Thermal load (Kg*) | Weight (Kg) | Voltage** (VAC) |
|---|---|---|---|---|---|
| CSTL12 | 120x120x120 | 1200x1100x1940 | 1,5/0,8 | 700 | 400 V ±10%/50Hz/3ph + N + G |
| CSTL20 | 200x200x200 | 1400x1300x2130 | 2,5/1,5 | 950 | 400 V ±10%/50Hz/3ph + N + G |

* reference value in order to achieve the following “recovery times”: 2 min in the range -54/+125°C - 5 min in the range -65/+150°C
** other voltages or frequencies on request, according to customers’ specifications

# Control system
# and user interface

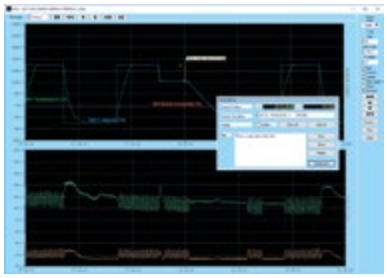
## Basic Configuration: KeyKratos Plus

### Hardware
- 65536 colours with TFT technology
- Faster control
- Memory support for recordings and alarms
- Secure digital card, pendrive (USB key style), Internal memory

### Software
- User friendly data input during editing, check and administration of cycle
- Real time recording of temperatures versus time (LOG on SD)
- USB interface on front panel for stick or printer
- Recordings in CSV format (Comma Separated Value) for easy export to Excel®, program files are easily convertible into graphic format
- The system is available in 6 languages: Italian, English, German, Spanish, French, Dutch

## Optional: WinKratos software for remote control and programming via PC

Winkratos S/W package (running under Windows 7 or higher) offers a powerful and flexible control & management system.
It allows the user to:
- Control and Monitor the chamber from a remote personal computer
- Create and Manage a test programs archive
- Record and Manage a test records archive



### Graphic functions
- Graphic monitoring of chamber measure behavior with multiple charts panel
- Delayed Start of the chamber to optimize time scheduling
- Graphic test pragrams editor with two editing mode: ”entry-level” and “advanced”

### Acquisition functions
- Record of occurred events such as alarms, commands, etc.
- Record of chamber values during tests

### Additional functions
- Print test programs in text format
- Export test data recorded in ASCII format
- Possibility to add notes on the graph
- Global monitor to control many chambers at the same time

**Angelantoni Test Technologies**, owned by the **Angelantoni Group**, is the only company capable of offering a comprehensive range of environmental test chambers - **ACS** branded - for a great variety of applications, thanks to the expertise and technical know-how of its teams of experts. Innovation, flexibility and organization have always been the keys to success for ACS, world-famous since 1952 also for its high-tech test equipment such as Thermal High Vacuum Chambers for Aerospace applications and Calorimeters.

ENVIROMENTAL SYSTEM CERTIFICATION DNV·GL ISO 14001

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001

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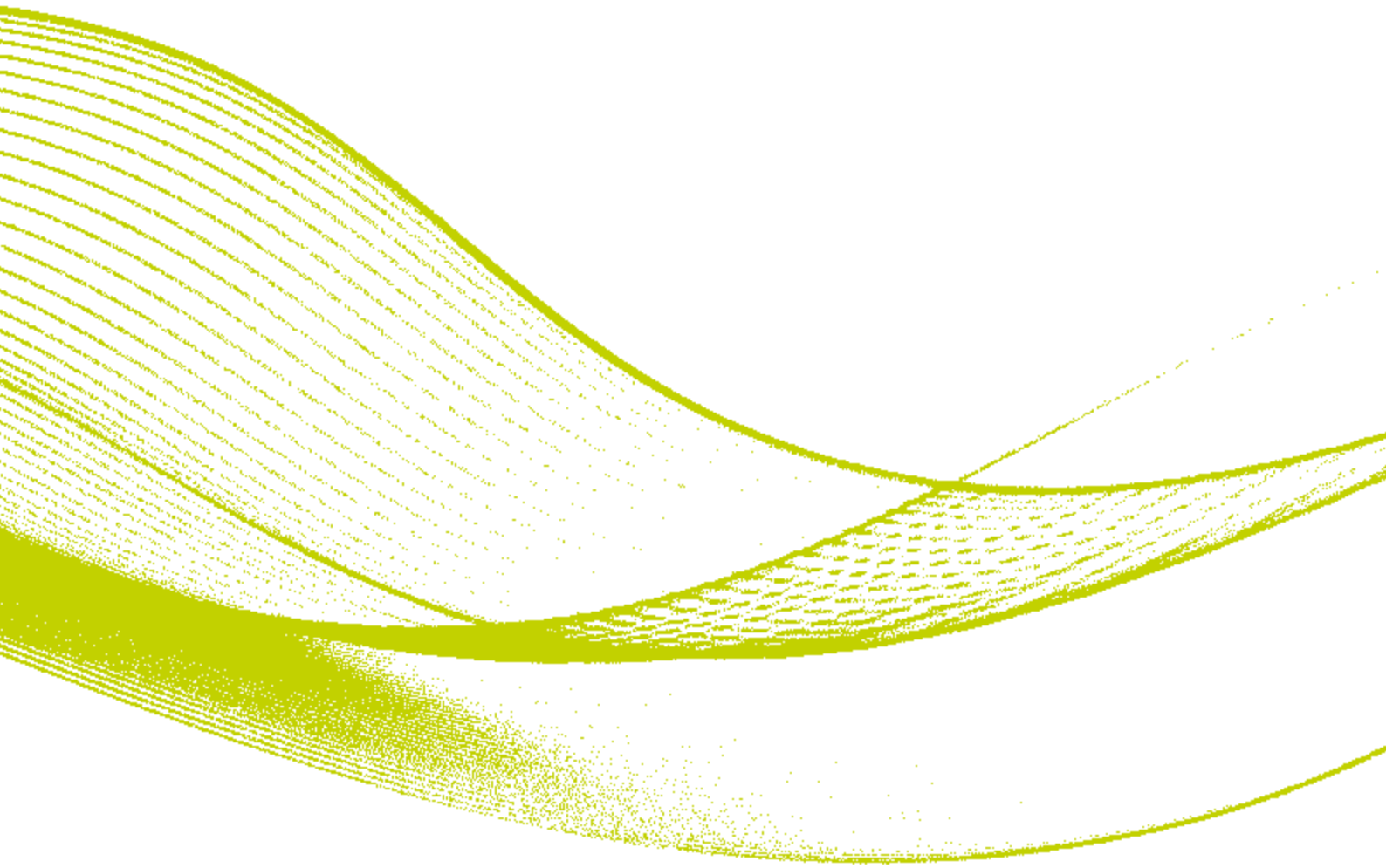

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TECHNOLOGY FOR LIFE

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