APPLICATION NOTE

Thermal cyclers

Applied Biosystems thermal cyclers: reliability and quality testing

Introduction

The reliability and quality of our Applied Biosystems™ thermal cyclers is of utmost importance. These terms can be used without any definition or explanation, and some manufacturers claim to produce reliable, high-quality instruments without any supporting evidence. Here we provide an inside look at some of the testing we perform prior to releasing a new instrument to the market. This testing helps to ensure that you have the best possible experience with Applied Biosystems thermal cyclers in your lab.

Component reliability

To help ensure the highest reliability of components we put into Applied Biosystems thermal cyclers, we use robotic assemblies to repeatedly test, stress, and push the physical boundaries of the components. This includes frequently used instrument components such as the heated cover (Figure 1), touch-screen interface, docking mechanism (Applied Biosystems™ ProFlex™ PCR System only), and temperature cycling components. See Table 1 for the results of this stress testing for durability of hardware components.

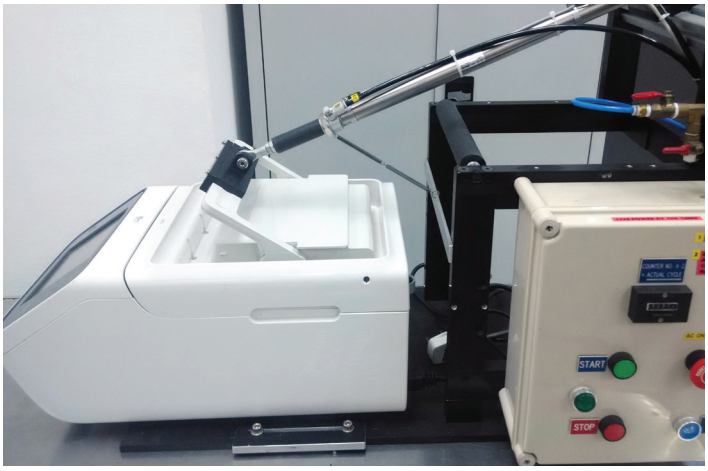

Figure 1. ProFlex PCR System instrument in "lid actuation robot". This testing involves repeated opening and closing of the heated cover to determine the lifespan of the lid mechanism.

Environmental testing

To add rigor to the component testing, Applied Biosystems instruments are tested in a variety of different environmental conditions, including high and low temperatures, high and low relative humidity, and elevation testing. This work is done in an environmental chamber that simulates the various conditions in a typical lab (Figure 2). We recognize that our customers perform experiments in different climates and want to be sure the instruments consistently perform in a variety of locations around the world.

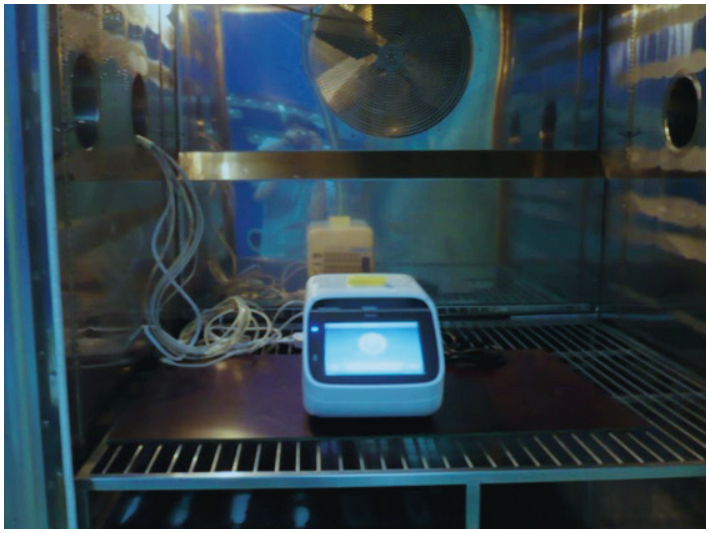

Figure 2. High-temperature testing of the Applied Biosystems™ SimpliAmp™ Thermal Cycler inside an environmental chamber.

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Shipping testing

Performance and environmental testing help ensure that the instrument performs well once you receive it, but the instrument must also reach your lab in good condition. To help ensure that every Applied Biosystems thermal cycler arrives in excellent working condition, we conduct rigorous shock and vibration testing according to ISTA standards* (Figure 3).

Conclusions

Table 1 shows the test methods employed for the Applied Biosystems™ Veriti™, ProFlex™, and SimpliAmp™ thermal cyclers prior to their commercial release. Together, these methods help ensure that you receive the highest-quality instrument. Additional information about our test methods is available upon request.

Figure 3. ProFlex PCR System shown in shipping box drop testing.

Table 1. Durability and environmental testing results for the Veriti, ProFlex, and SimpliAmp instruments.

Test performed		Test method	Requirement	Result
Component reliability	Temperature cycles	1 cycle = 95°C (15 sec), 60°C (60 sec)	>350,000 cycles	Pass
	Heated cover opening and closing	Lid actuation robot: 1 cycle = close, open, close	>29,000 cycles	Pass
	Touch-screen touches	Touch-screen actuation robot: 1 cycle = touch, release	>2,900,000 touches	Pass
	Docking mechanism (ProFlex PCR System only)	Docking actuation robot: 1 cycle = dock, release, dock	>5,500 cycles	Pass
Environmental testing	Temperature	Chemistry performance in environmental chamber	15–30°C	Pass
	Humidity	Chemistry performance in environmental chamber	15–80%	Pass
	Elevation	Chemistry performance in environmental chamber	6,000 ft (812 mbar)	Pass
Shipping testing		ISTA-recommended shock and vibration testing	Pass	Pass

* International Safe Transit Association, www.ista.org

Find out more at **thermofisher.com/thermalcyclers**

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