

TechNotes

QA

How does a Thermo Scientific Cell Locker System isolate cell cultures and projects in a CO₂ incubator, protecting them from cross-contamination?

Cell culture contamination is a concern for any lab. The Thermo Scientific™ Cell Locker™ System consists of six sealed chambers fitted with 0.2 µm membrane filters. These chambers prevent transmission of microorganisms but allow exchange of temperature, gases and humidity inside a CO₂ incubator. The Cell Locker System isolates sensitive cells, new cultures or individual projects in separate chambers inside a single incubator.

In a Thermo Scientific Heracell VIOS 160i or Thermo Scientific Forma Steri-Cycle i160 CO₂ incubator, the HEPA system filters the entire incubator air volume to achieve ISO Class 5 cleanroom air quality. The Cell Locker System further protects from cross contamination by dividing the incubator into six individual chambers. Each Cell Locker is effectively a quarantine chamber.

The dual 0.2 µm membrane filters on each Cell Locker are hydrophobic, oleophobic and prevent transmission of even small microorganisms when filtering air. To confirm this prevention, the Cell Locker System was independently tested with circulating microorganisms to prove that microorganisms cannot pass through the membrane filter to any Cell Locker.

An individual Cell Locker can be placed inside any CO₂ incubator and the complete Cell Locker System offers additional benefits of environmental stability and flexibility.



What tests were performed?

The retention abilities of our microporous membrane filter are about ten times greater when filtering air than when filtering liquid¹. Thus, the Cell Locker filter offers an effective 0.02 µm pore size, preventing transmission of all microorganisms. However, we wanted to provide proof by independent tests. Selected microorganisms were distributed into the air stream in a Thermo Scientific Heracell VIOS 160i CO₂ incubator equipped with the six chamber Cell Locker System. The Heracell VIOS incubators feature a HEPA filtration system that delivers ISO Class 5 cleanroom conditions, but the HEPA filter was not used for these tests so that the test microorganisms would freely circulate.

To spread the microorganisms throughout the CO₂ incubator and the Cell Locker System, a nebulizer driven by pressurized air distributed either *Staphylococcus aureus* or *Mycoplasma orale*. *S. aureus* are as small as 0.5 µm and *M. orale* are as small as 0.1 µm. These are common cell culture contaminants and their size makes them excellent test subjects for our purposes.

Sterile Petri dishes with the appropriate growth agar were placed inside the incubator, positioned outside and inside the Cell Lockers, with a total of 24 dishes inside and 48 dishes outside the chambers. The dishes were uncovered just before commencing the test and the nebulizer was switched on for one hour to circulate the bacteria. After the nebulizer was switched off, the dishes were covered and incubated 1-14 days at 37 °C. As shown in Table 1, the agar dishes outside the Cell Lockers were filled with bacteria but the agar plates inside the Cell Lockers remained sterile, showing no growth of any kind.

Summary:

Thermo Scientific Cell Lockers and Thermo Scientific Cell Locker Systems provide an effective isolation of cultures and projects, preventing microbial cross-contamination in a CO₂ incubator.

¹Boomus M. Bacteria and virus retention in air by microporous membrane. Medical Device & Diagnostic Industry Magazine, 2006

Microorganism Tested	Total Circulated	Total Outside Cell Lockers	Total Inside Cell Lockers
<i>Staphylococcus aureus</i> ATCC 6538	9.6 x 10 ⁴	TNTC*	0**
<i>Mycoplasma orale</i> DSM 25590	9.3 x 10 ⁴	TNTC*	0**

*TNTC = too numerous to count. For each test, 48 Petri dishes containing appropriate growth agar were placed open on top of the Cell Lockers.

**A total of 24 agar-containing Petri dishes were placed open inside the Cell Lockers. All showed zero growth.

Table 1: Test results demonstrate that circulating microorganisms are unable to enter Cell Lockers. Each test was performed 3 times with the complete Cell Locker System (6 Cell Lockers) inside a Heracell VIOS 160i CO₂ incubator with no HEPA filter present.

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