4titude®

From Brooks LIFE SCIENCES

# Sealing Solutions

## Product Overview

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## About us

4titude® Ltd is a market leader in the design and manufacture of consumables and bench top instrumentation for a range of fields within the life sciences industry, *from Research to Molecular Diagnostics*.

Since our inception in 2005, 4titude® has grown and developed internationally, with facilities in Germany, France, USA, Hungary, and our UK-based head office and manufacturing plant located in the Surrey Hills, south of London.

The state-of-the-art manufacturing facility boasts 25,000 square feet of floor space, producing consumables for a wide range of life science and medical applications, including research into combatting cancer and infectious diseases, drug development, molecular diagnostics, and forensics.

Current off-the-shelf products include PCR consumables, sealing materials and heat sealing instrumentation, microplates for cell screening and storage, and solutions for sample tracking, including barcodes and 2D data matrix codes on products.

In addition to these products, we have the capability to offer completely tailored solutions, from custom design of bespoke products, right through to tool making & manufacturing of the parts. 4titude® can offer you a complete solution from concept to completion.

## 4titude® manufacturing & quality standards

4titude® are ISO 9001:2008 & ISO 13485:2012 certified to manufacture and supply consumables for the life sciences sector. Our management systems comply with the requirements to produce medical devices which we sell to diagnostics companies of all sizes including multinational corporations. We also provide complete custom design solutions from prototyping to tool design and contract manufacturing.

## Manufacturing standard

- ISO 9001:2008 & ISO 13485:2012 certified
- Process validation & mapping
- Fully document controlled manufacturing processes
- Statistical analysis of production processes
- Continuous improvement programs
- Injection moulding in ISO class 7 cleanrooms
- Virgin, medical grade polymers

## Quality standard

4titude® performs visual, physical and biological tests to ensure the integrity of our consumables and that they are contamination free at all times.

- Consumables are certified free from human genomic DNA, nucleases and pyrogens
- Skirted microplates and PCR plates meet the SBS standard footprint
- PCR inhibition tests are performed on polymers used
- Leak tests are performed on every well of every PCR plate
- White-well plates are checked for background fluorescence

# Sealing Solutions

## Contents



## Sealing Solutions

4titude® offers the widest range of plate sealing solutions available on the market. You can choose between sealing with strip caps, mats, lids, adhesive seals in strip or plate format, and heat seals in flexible formats up to plate size. The choice of an optimised sealing solution is particularly important for (q)PCR because thermal cycling can be associated with evaporation of reaction reagents.

## Heat Sealing & Adhesive Sealing

Dependant on your application requirements we offer a wide selection of materials to choose from within both our adhesive seal and heat seal ranges, You have the option to choose your seal based on a wide variety of properties offered, including peelability, pierceability, gas permeability, optical clarity, temperature stability and solvent resistance.

The best sealing results can be obtained by using flat rigid plates like FrameStar® plates and heat seals, using reliable, high quality sealing instruments for seal application, like the 4s3™ Semi-Automated Sheet Heat Sealer or the a4S Automated Roll Heat Sealer.

Alternatively, popular adhesive seals need to be applied well using a seal roller or seal applicator.

4titude® seals are produced and processed under strictly controlled environmental conditions and according to our ISO standard manufacturing. All of our seals are DNase, RNase, human genomic DNA, dust, endotoxin/pyrogen free. Dimensional and functional tests are performed on all production lots. If your seal of choice is not offered sterile as a stock product, then please contact us; we can offer custom sterilisation of any seals if required.

## Caps, Lids & Mats

As an alternative to sealing films, 4titude® offers multiple types of cap strips for sealing of both plates and tubes – domed and flat, strips of 8, strips of 12, and our new optically superior CrystalStrips™.

A variety of rigid polystyrene lids are available for PCR plates and microplates, as well as silicone sealing mats for our storage plate range. We offer lids that are compatible with our FrameStar® PCR plate range, and all assay plate ranges including the Vision Plate™ range and UltraVision™ Plates. The silicone cap mats are for use with our storage plates, and come in a variety of formats depending on the plate.

# Heat Sealing Consumables & Instrumentation

## Heat Sealing Consumables & Instrumentation

Heat sealing is the gold standard method of plate and tube sealing. It prevents sample loss and maximises sample security, by ensuring a complete seal and preventing evaporation, leakage and contamination.

The sealing performance of heat seals is superior to all other methods including cap, mat and adhesive sealing. The variability of sealing integrity seen when using adhesive seals, caps or mats is reduced. The optimised sealing performance of a heat seal allows the use of smaller reagent volumes, leading to reagent cost savings and thus making heat sealing the most cost efficient sealing method for a wide range of applications.

Heat seals are available as sheets, for manual or semi-automatic heat sealers, as well as in different roll formats for automated sealers. 4titude® sealing consumables are compatible with a wide range of heat sealers, please refer to the instrument compatibility table on page 10.

Depending on throughput, we recommend our 4s3™ Semi-Automatic Sheet Heat Sealer (page 16) or a4S Automated Roll Heat Sealer (page 14) for applying your heat seal.

In addition to instruments and consumables we also offer a Thermal Test Film for the optimisation and troubleshooting of heat sealing applications and a unique frame mounted heat sealing sheet for low throughput automation (page 13).

### Economic efficiency

Investing into heat sealing solutions leads to a per plate reduction of sealing costs for all applications including storage, PCR and qPCR as shown in the table below for (q)PCR. The cost is further reduced by changing to the use of rolls seals rather than sheet seals.

| | Application PCR | | Application qPCR | |
|---|---|---|---|---|
| Sealing Solution | Product | Costs/plate | Product | Costs/plate |
| Caps | 4ti-0751, Strips of 8 Flat Caps | £2.90 | 4ti-0755, CrystalStrip™ | £3.04 |
| Adhesive seal, sheet format | 4ti-0500, PCR Seal | £0.85 | 4ti-0560, qPCR Seal | £1.44 |
| Heat seal, sheet format | 4ti-0541, Clear Heat Seal | £0.49 | 4ti-0541, Clear Heat Seal | £0.49 |
| Heat seal, roll format | 4ti-0540, Clear Heat Seal | £0.13 | 4ti-0540, Clear Heat Seal | £0.13 |

**Table 1:** Exemplary per plate sealing costs (reference: UK List price 2017)

### Save your time

The application of heat seals is also easier and faster than when using caps or adhesive seals. Typical sealing times of a semi-automatic heat sealer, such as the 4titude® 4s3™ Semi-Automatic Sheet Heat Sealer, are around 2.5 seconds. A fully automatic roll heat sealer, such as the 4titude® a4S Automatic Roll Heat Sealer, allows for sealing cycle times of less than 15 seconds.

### Set your standard

Reproducible sealing quality can be guaranteed by standardising the sealing parameters: time, temperature and pressure. 4titude® offers the widest choice of heat seal materials available, with sheet formats for manual or semi-automatic heat sealers and roll formats for automated heat sealers.

### Choose your application

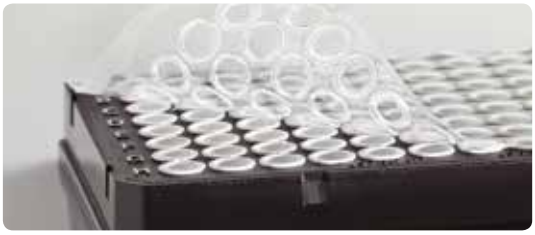
Depending on the material of the plate (PP, PE, PS, COC, PC), the presence of solvents like DMSO in your sample and the storage or application temperatures required, we can offer a wide range of seals covering 100% DMSO storage and sealing integrity temperatures between -200°C to +120°C.

Custom sealing materials or sizes can be produced, please contact us at 4ti-info@brooks.com.

### Highest quality standards

Our seals are produced according to our ISO standard manufacturing. All of our seals are DNase, RNase, human genomic DNA, dust, endotoxin and pyrogen free. If your seal of choice is not offered sterile as a stock product then please contact us as we can offer custom sterilisation of any seals if required.

# Clear Heat Seal



Seal Integrity Temperature Range -80°C 80°C*

*110°C with pressurised heated lid

Peelable

### Features

- Optically clear, peelable
- Suitable for imaging, fluorescent detection, and colorimetric assays
- Recommended for qPCR and other imaging techniques including crystallisation
- Available as Gas Permeable Clear Heat Seal with 3 mm slits, suitable for insect studies/seed storage

### Clear Heat Seal

Peelable heat sealing film, optically clear, suitable for qPCR and optical applications

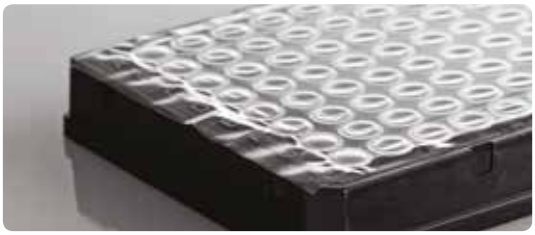
| Code | Details | | Sheets or Rolls/Case |
|---|---|---|---|
| 4ti-0540 | Roll | (500 m x 78 mm, approx. 4,200 seals)[1] | 1 |
| 4ti-0540/80 | Roll | (80 m x 78 mm, approx. 640 seals)[1] | 1 |
| 4ti-0540/REMP | Roll | (500 m x 78 mm, approx. 4,200 seals)[3] | 1 |
| 4ti-0540S | Sample roll | (5 m x 78 mm) | 1 |
| 4ti-0542 | Roll | (350 m x 115 mm, approx. 4,400 seals)[2] | 1 |
| 4ti-0542/REMP | Roll | (350 m x 115 mm, approx. 4,400 seals)[4] | 1 |
| 4ti-0542S | Sample roll | (5 m x 115 mm) | 1 |
| 4ti-0541 | Sheets | (125 mm x 78 mm) | 100 |
| 4ti-0541/FS | Clear Heat Seal FrameSeal™ stackable frames | | 50 |

### Gas Permeable Clear Heat Seal

Clear Heat Seal, with 3 mm slits for gas transfer, suitable for insect studies/seed storage

| Code | Details | | Sheets or Rolls/Case |
|---|---|---|---|
| 4ti-0540/SLIT | Roll | (450 m x 78 mm, approx. 3,800 seals)[1] | 1 |
| 4ti-0540/SLIT/S | Sample roll | (5 m x 78 mm) | 1 |
| 4ti-0541/SLIT | Sheets | (125 mm x 78 mm) | 100 |

# Clear Weld Heat Seal Mark 2



Seal Integrity Temperature Range -80°C 110°C*

*Once autoclaved, not recommended for PCR

Autoclavable

### Features

- Permanent seal
- Suitable for PCR/qPCR, even without the use of a pressurised heated lid
- Suitable for low and very high temperature uses

### Clear Weld Heat Seal Mark 2

Optically clear heat sealing film, non-peelable, difficult to pierce, suitable for qPCR, optical applications and storage

| Code | Details | | Sheets or Rolls/Case |
|---|---|---|---|
| 4ti-0573 | Roll | (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0573/122 | Roll | (122 m x 78 mm, approx. 1,000 seals)[1] | 1 |
| 4ti-0573S | Sample roll | (5 m x 78 mm)[1] | 1 |
| 4ti-0574 | Roll | (500 m x 115 mm, approx. 6,250 seals)[2] | 1 |
| 4ti-0574S | Sample roll | (5 m x 115 mm) [2] | 1 |
| 4ti-0575 | Sheets | (125 mm x 78 mm) | 100 |
| 4ti-0575/FS | Clear Weld Heat Seal Mark 2 FrameSeal™ stackable frames | | 50 |

# Clear Heat Seal Plus

Seal Integrity Temperature Range -80°C 80°C*

*110°C with pressurised heated lid

Peelable

### Features

- Forming a peelable seal to PP, PS and COC plates
- Excellent tensile strength for sealing of microplates during homogenisation or disruption of seeds or other material such as bead mill applications

### Clear Heat Seal Plus

High tensile strength heat sealing film, optically clear, peelable, suitable for bead mill applications

| Code | Details | | Sheets or Rolls/Case |
|---|---|---|---|
| 4ti-0549 | Roll | (250 m x 78 mm, approx. 2,100 seals)[1] | 1 |
| 4ti-0549/S | Sample roll | (5 m x 78 mm)[1] | 1 |
| 4ti-0548 | Roll | (250 m x 115 mm, approx. 3,140 seals)[2] | 1 |
| 4ti-0548/S | Sample roll | (5 m x 115 mm)[2] | 1 |
| 4ti-05481 | Sheets | (125 mm x 78 mm) | 100 |

[1] Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube
[2] Compatible with Agilent (Velocity 11) PlateLoc® · [3] Compatible with REMP Portrait Heat Sealer (PHS) · [4] Compatible with REMP Landscape / Stacking Heat Sealers (LHS / SHS)

## Clear Heat Seal 3730

Seal Integrity Temperature Range -20°C 80°C*

*110°C with pressurised heated lid

Pierceable

### Features

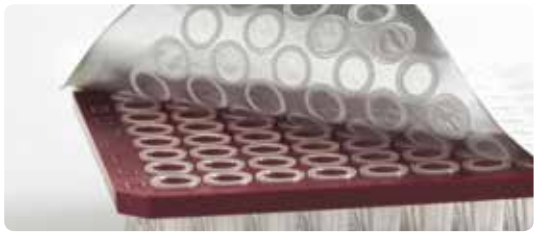
- Forming a permanent seal to PP, PE, PS and COC plates
- Easily pierceable with autosampler needles
- Suitable for use with ABI® 3730 sequencers removing the need for the use of expensive septa mats
- Suitable for imaging, fluorescent detection, and colorimetric assays

### Clear Heat Seal 3730

Thin polyester heat sealing film, easily pierceable with autosampler needles/ABI® 3730, suitable for PCR, qPCR and optical applications

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-0580 | Roll (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0580/122 | Roll (122 m x 78 mm, approx. 1,000 seals)[1] | 1 |
| 4ti-0580S | Sample roll (5 m x 78 mm)[1] | 1 |
| 4ti-0582 | Roll (500 m x 115 mm, approx. 6,250 seals)[2] | 1 |
| 4ti-0582S | Sample roll (5 m x 115 mm)[2] | 1 |
| 4ti-0581 | Sheets (125 mm x 78 mm) on perforated roll | 1,000 |

## Peel Heat Seal



Seal Integrity Temperature Range -80°C 90°C*

*110°C with pressurised heated lid

Autoclavable

Peelable

### Features

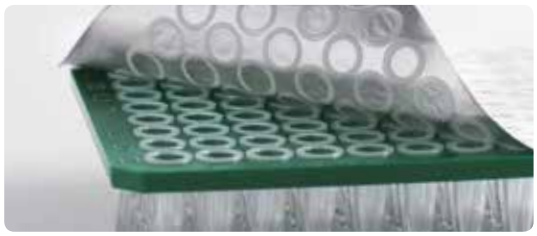
- Laminate seal compatible with PP and COC plates
- Peelable from PP plates, even when a plate has been removed directly from -80°C storage
- Suitable for low temperature sample storage and high temperature uses, such as PCR

### Peel Heat Seal

Peelable heat sealing foil, suitable for low temperature storage, high temperature uses and PCR

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-0520 | Roll (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0520/122 | Roll (122 m x 78 mm, approx. 1,000 seals)[1] | 1 |
| 4ti-0520S | Sample roll (5 m x 78 mm)[1] | 1 |
| 4ti-0522 | Roll (500 m x 115 mm, approx. 6,250 seals)[2] | 1 |
| 4ti-0522S | Sample roll (5 m x 115 mm)[2] | 1 |
| 4ti-0521 | Sheets (125 mm x 78 mm) | 100 |

## Universal Peel Heat Seal



Seal Integrity Temperature Range -80°C 90°C*

*110°C with pressurised heated lid

Autoclavable

Peelable

### Features

- Compatible with PP, PE, PS, COC and PC plates
- Peelable
- Pierceable with needle, but not standard pipette tips
- Resealable by applying another Universal Peel Heat Seal directly on top of a previously pierced seal
- Wide material compatibility allows for high throughput sealing of different plates without the need for roll changes
- Suitable for low temperature sample storage and high temperature uses, such as PCR

### Universal Peel Heat Seal

Peelable heat sealing foil, suitable for low temperature storage, high temperature uses and PCR

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-0523 | Roll (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0523S | Sample roll (5 m x 78 mm)[1] | 1 |
| 4ti-0524 | Roll (500 m x 115 mm, approx. 6,250 seals)[2] | 1 |
| 4ti-0524S | Sample roll (5 m x 115 mm)[2] | 1 |
| 4ti-05231 | Sheets (125 mm x 78 mm) | 100 |

[1] Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube
[2] Compatible with Agilent (Velocity 11) PlateLoc® · [3] Compatible with REMP Portrait Heat Sealer (PHS) · [4] Compatible with REMP Landscape / Stacking Heat Sealers (LHS / SHS)

## DMSO Resistant Peel Heat Seal

Seal Integrity Temperature Range -80°C 40°C

Peelable

### Features

- Peelable from PP and COC plates, forms a weld seal to PE plates
- Suitable for low and room temperature compound storage in DMSO and organic solvents

### DMSO Resistant Peel Heat Seal

Solvent resistant heat sealing foil, peelable, suitable for low and room temperature compound storage

| Code | Details | | Sheets or Rolls/Case |
|---|---|---|---|
| 4ti-0585 | Roll | (500 m x 78 mm, approx. 4,200 seals)[1] | 1 |
| 4ti-0585/100 | Roll | (100 m x 78 mm, approx. 800 seals)[1] | 1 |
| 4ti-0585/REMP | Roll | (500 m x 78 mm, approx. 4,200 seals)[3] | 1 |
| 4ti-0585S | Sample roll | (5 m x 78 mm)[1] | 1 |
| 4ti-0586 | Roll | (500 m x 115 mm, approx. 6,200 seals)[2] | 1 |
| 4ti-0586/REMP | Roll | (500 m x 115 mm, approx. 6,200 seals)[3] | 1 |
| 4ti-0586S | Sample roll | (5 m x 115 mm)[2] | 1 |
| 4ti-0587 | Sheets (125 mm x 78 mm) on perforated roll | | 100 |

## Pierce Heat Seal

Seal Integrity Temperature Range -20°C 120°C

Autoclavable

Pierceable

### Features

- Compatible with PP and PS plates
- Suitable for PCR
- Good solvent resistance – suitable for low temperature and room temperature compound storage in DMSO and organic solvents
- Available also in sheet format with printed grid reference

### Pierce Heat Seal

Pierceable heat sealing foil, high solvent resistance, resealable, suitable for PCR/ storage/shipping

| Code | Details | | Sheets or Rolls/Case |
|---|---|---|---|
| 4ti-0530 | Roll | (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0530/122 | Roll | (122 m x 78 mm, approx. 1,000 seals)[1] | 1 |
| 4ti-0530/REMP | Roll | (610 m x 78 mm, approx. 5,000 seals)[3] | 1 |
| 4ti-0530S | Sample roll | (5 m x 78 mm)[1] | 1 |
| 4ti-0532 | Roll | (500 m x 115 mm, approx. 6,200 seals)[2] | 1 |
| 4ti-0532/REMP | Roll | (500 m x 115 mm, approx. 6,200 seals)[3] | 1 |
| 4ti-0532S | Sample roll | (5 m x 115 mm)[2] | 1 |
| 4ti-0531 | Sheets | (125 mm x 78 mm) | 100 |
| 4ti-0531/GR | Sheets | *as above*, with printed grid reference | 100 |

## Pierce Heat Seal Strong

Seal Integrity Temperature Range -20°C 120°C

Pierceable

### Features

- Compatible with PP (gives a weld seal) and COC (peelable seal) plates
- Pierceable with a pipette tip manually, or by a liquid handling robot
- Suitable for PCR, sample shipping, low and room temperature compound storage with DMSO and other organic solvents

### Pierce Heat Seal Strong

Strong heat sealing foil, peelable from COC plates, pierceable, suitable for PCR/ sample shipping/compound storage

| Code | Details | | Sheets or Rolls/Case |
|---|---|---|---|
| 4ti-0538 | Roll | (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0538S | Sample roll | (5 m x 78 mm)[1] | 1 |
| 4ti-0539 | Roll | (500 m x 115 mm, approx. 6,200 seals)[2] | 1 |
| 4ti-0539S | Sample roll | (5 m x 115 mm)[2] | 1 |
| 4ti-05381 | Sheets | (125 mm x 78 mm) | 100 |

Also available as a Random Access Seal, 96 individual seals in sheet or roll format, see following page.

[1] Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube
[2] Compatible with Agilent (Velocity 11) PlateLoc® · [3] Compatible with REMP Portrait Heat Sealer (PHS) · [4] Compatible with REMP Landscape / Stacking Heat Sealers (LHS / SHS)

## Random Access Pierce Heat Seal Strong

Seal Integrity Temperature Range -20°C 120°C

Pierceable

### Random Access Pierce Heat Seal Strong

96 foil seal spots for sealing of individual wells for storage or PCR, sheet or roll format

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-05381/RA | Sheets (127 mm x 100 mm) | 100 |
| 4ti-0539/RA | Roll (420 m x 100 mm, approx. 3,200 sealed PCR plates)[5] | 1 |

**Features**

- Compatible with PP (weld seal) and COC (peelable seal) plates
- 96 individual foil seal spots on a removable backing
- Recommended for storage, sample shipping and PCR applications
- Best used in combination with our Random Access 96 Well Skirted PCR Plate (4ti-0960/RA)
- Sheet format: 4 pin holes for exact positioning in special adapters of the 4s3™ Semi-Automatic Sheet Heat Sealer (see page 16)
- Roll format: optical windows for exact positioning in the a4S[RA] Automatic Random Access Heat Sealer (see page 12)
- For details on Random Access Heat Sealing also see page 12

## 96 INDI™ Heat Seal

Seal Integrity Temperature Range -195°C 120°C

Peelable

Pierceable

### 96 INDI™ Heat Seal

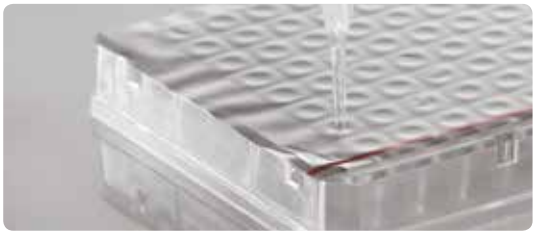
96 perforated individual sealing caps in a foil frame, peelable, pierceable, suitable for low temperature storage

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-0543 | Sheets (130 mm x 80 mm) | 50 |

**Features**

- Compatible with most PP 96 round well plates and racked tubes
- 96 individual round seals held on a convenient to handle sealing sheet
- Following application of this seal, the frame can be removed to leave 96 individually sealed wells or tubes
- The individual seals can be removed as required, by hand or using forceps, via the seal removal tab
- Good solvent resistance, including DMSO
- Suitable for low temperature storage and high temperature incubations

## Foil Heat Seal



Seal Integrity Temperature Range -20°C 110°C

Autoclavable

Peelable

Pierceable

### Foil Heat Seal

Aluminium heat sealing foil, resealable, peelable, pierceable, suitable for compound storage/PCR

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-0535 | Roll (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0535/122 | Roll (122 m x 78 mm, approx. 1,000 seals)[1] | 1 |
| 4ti-0535/REMP | Roll (610 m x 78 mm, approx. 5,000 seals)[3] | 1 |
| 4ti-0535S | Sample roll (5 m x 78 mm)[1] | 1 |
| 4ti-0537 | Roll (500 m x 115 mm, approx. 6,200 seals)[2] | 1 |
| 4ti-0537/REMP | Roll (500 m x 115 mm, approx. 6,200 seals)[3] | 1 |
| 4ti-0537S | Sample roll (5 m x 115 mm)[2] | 1 |
| 4ti-0536 | Sheets (125 mm x 78 mm) | 100 |

**Features**

- Compatible with PP and PS plates, peelable
- Pierceable with a pipette tip, manually or by liquid handling robots
- Resealable by applying another Foil Heat Seal directly on top of a previously pierced seal

[1] Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube
[2] Compatible with Agilent (Velocity 11) PlateLoc® · [3] Compatible with REMP Portrait Heat Sealer (PHS) · [4] Compatible with REMP Landscape / Stacking Heat Sealers (LHS / SHS)
[5] Compatible with 4titude® a4S[RA] Automatic Random Access Heat Sealer

## Polystyrene Foil Heat Seal

Seal Integrity Temperature Range -20°C 110°C | Peelable | Pierceable

### Features

- Compatible with PP, PS and PC plates
- Produces a stronger seal to PS plates than our standard Foil Heat Seal
- Pierceable with a pipette tip, manually or by liquid handling robots
- Resealable by applying another Polystyrene Foil Heat Seal directly on top of a previously pierced seal

### Polystyrene Foil Heat Seal

Peelable heat sealing foil, seals to polystyrene plates, resealable, pierceable, suitable for compound storage

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-0545 | Roll (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0545/122 | Roll (122 m x 78 mm, approx. 1,000 seals)[1] | 1 |
| 4ti-0545S | Sample roll (5 m x 78 mm)[1] | 1 |
| 4ti-0546 | Roll (500 m x 115 mm, approx. 6,200 seals)[2] | 1 |
| 4ti-0546/S | Sample roll (5 m x 115 mm)[2] | 1 |
| 4ti-0547 | Sheets (125 mm x 78 mm) | 100 |

## Thermal Bond Heat Seal

Seal Integrity Temperature Range -200°C 110°C | Autoclavable | Peelable

### Features

- Compatible with PP plates
- Heavy duty laminate foil seal suitable for providing a very strong, but peelable seal
- Suitable for long term storage and transportation as well as for very low temperature storage

### Thermal Bond Heat Seal

Heavy duty heat sealing foil, peelable, suitable for long term storage/transportation

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-0590 | Roll (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0590/100 | Roll (100 m x 78 mm, approx. 800 seals)[1] | 1 |
| 4ti-0590S | Sample roll (5 m x 78 mm)[1] | 1 |
| 4ti-0592 | Roll (300 m x 115 mm, approx. 3,700 seals)[5] | 1 |
| 4ti-0592S | Sample roll (5 m x 115 mm)[5] | 1 |
| 4ti-0591 | Sheets (125 mm x 78 mm) | 100 |

## Gas Permeable Heat Seal Mark 2

Seal Integrity Temperature Range -20°C 80°C | Autoclavable | Peelable | Pierceable

### Features

- Compatible with PP, PS and COC plates
- Suitable for cell culture, overnight incubations, insect and seed storage
- Small pore size (<20 µm) enables gas exchange, per 24 hours of >20 g/m$^2$, whilst evaporation is reduced to a minimum
- Small pore size prevents microbial contamination
- Surface without adhesive to interfere with the well contents

### Gas Permeable Heat Seal Mark 2

Heat sealing membrane, limits evaporation, peelable, pierceable, suitable for cell culture/seed and insect storage

| Code | Details | Sheets or Rolls/Case |
|---|---|---|
| 4ti-0598 | Roll (610 m x 78 mm, approx. 5,000 seals)[1] | 1 |
| 4ti-0598/122 | Roll (122 m x 78 mm, approx. 1,000 seals)[1] | 1 |
| 4ti-0598S | Sample roll (5 m x 78 mm)[1] | 1 |
| 4ti-0599 | Roll (500 m x 115 mm, approx. 6,200 seals)[2] | 1 |
| 4ti-0599S | Sample roll (5 m x 115 mm)[2] | 1 |
| 4ti-0597 | Sheets (125 mm x 78 mm) | 100 |
| 4ti-0597/ST | Sheets *as above*, sterile | 10 x 10 |

[1] Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube
[2] Compatible with Agilent (Velocity 11) PlateLoc® · [3] Compatible with REMP Portrait Heat Sealer (PHS) · [4] Compatible with REMP Landscape / Stacking Heat Sealers (LHS / SHS)
[5] ***NOT*** compatible with Agilent (Velocity 11) PlateLoc®

# Heat Sealing Consumables Comparison & Instrument Compatibility Table

| | Clear Heat Seals | | | | Peelable Heat Seals | | |
|---|---|---|---|---|---|---|---|
| Name | Clear Heat Seal | Clear Weld Heat Seal Mark 2 | Clear Heat Seal 3730 | Clear Heat Seal Plus | Peel Heat Seal | Universal Peel Heat Seal | DMSO Resistant Peel Heat Seal |
| Details see page | 5 | 5 | 6 | 5 | 6 | 6 | 7 |
| **Specifications** | | | | | | | |
| Application | qPCR<br>Short term compound storage | PCR, esp. water bath cyclers<br>qPCR<br>Storage & disposal of hazardous materials | qPCR and for use with ABI 3730 Sequencer | Homogenisation or disruption of seeds or other material, e.g. bead mill applications | Low temperature compound storage<br>Short term room temperature compound storage (<5 days)<br>PCR | Low temperature compound storage<br>High temperature applications<br>PCR | Low/room temperature compound storage with DMSO & other organic solvents |
| Special Properties | Good optical clarity<br>Moderate solvent resistance | Good optical clarity<br>Resistance to DMSO | Good optical clarity<br>Some solvent resistance | High tensile strength | Can be peeled directly from -80°C freezer<br>Moderate resistance to solvents at room temperature | Moderate solvent resistance<br>Re-sealable with another Universal Peel Heat Seal | Can be peeled directly from -80°C freezer<br>High resistance to solvents even at elevated temperatures |
| Seal Integrity Min Temperature | -80°C | -80°C | -20°C | -80°C | -80°C | -80°C | -80°C |
| Seal Integrity Max Temperature | 80°C (or 110°C with pressurised heated PCR lid) | 110°C | 80°C (or 110°C with pressurised heated PCR lid) | 80°C (or 110°C with pressurised heated PCR lid) | 90°C (or 110°C with pressurised heated PCR lid) | 90°C (or 110°C with pressurised heated PCR lid) | 40°C |
| Pierceable | | | ✓ | | | (✓) | |
| Peelable | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| RNase/DNase free | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Material | Laminate | Polymer | Polymer | Polymer | Laminate | Laminate | Laminate |
| Seals to | PP, PE, PS, PC, COC | PP | PP, PE, PS, COC | PP, PS, COC | PP, COC | PP, PE, PS, PC, COC | PP, PE, COC |
| Sealing parameters with 96 Well PP Plates | 175-185°C 2-3 s | 175-185°C 2-3 s | 165-175°C 3 s | 175-185°C 2-3 s | 175-185°C 3 s | 175°C 2 s | 175-185°C 3 s |
| Sealing parameters with 384 Well PP Plates | 165-180°C 3 s | 170-175°C 2-3 s | 165-175°C 2 s | 165-180°C 3 s | 170-175°C 2-3 s | 175°C 2 s | 170-175°C 2-3 s |
| Sealing parameters with Vision Plates™ | 185-200°C 3 s | N/A | 175-185°C 2-3 s | 185-200°C 3 s | N/A | 180°C 2 s | N/A |
| **Product Codes/Instrument Compatibility** | | | | | | | |
| Compatible with 4titude® a4S Automatic Roll Heat Sealer \| Thermo Fisher ALPS 300™ and ALPS 3000™ \| KBiosystems Wasp™ and Chameleon™ \| KBioscience FlexiSeal and Cube | | | | | | | |
| Roll, 78 mm width | 4ti-0540 | 4ti-0573 | 4ti-0580 | 4ti-0549 | 4ti-0520 | 4ti-0523 | 4ti-0585 |
| Roll, 78 mm width, short roll* | 4ti-0540/80 | 4ti-0573/122 | 4ti-0580/122 | | 4ti-0520/122 | | 4ti-0585/100 |
| Sample roll, 78 mm width | 4ti-0540S | 4ti-0573S | 4ti-0580S | 4ti-0549/S | 4ti-0520S | 4ti-0523S | 4ti-0585S |
| Compatible with Agilent (Velocity 11) PlateLoc® | | | | | | | |
| Roll, 115 mm width | 4ti-0542 | 4ti-0574 | 4ti-0582 | 4ti-0548 | 4ti-0522 | 4ti-0524 | 4ti-0586 |
| Sample roll, 115 mm width | 4ti-0542S | 4ti-0574S | 4ti-0582S | 4ti-0548/S | 4ti-0522S | 4ti-0524S | 4ti-0586S |
| Compatible with REMP Portrait Heat Sealer (PHS) | | | | | | | |
| Roll, 78 mm width, large core | 4ti-0540/REMP | | | | | | 4ti-0585/REMP |
| Compatible with REMP Landscape \| Stacking Heat Sealers (LHS / SHS) | | | | | | | |
| Roll, 115 mm width, large core | 4ti-0542/REMP | | | | | | 4ti-0586/REMP |
| Compatible with 4titude® 4s3™ Semi-Automatic Sheet Heat Sealer \| Thermo Fisher ALPS™ 25 and ALPS™ 50 \| KBiosystems E-Fly 2 \| REMP EasySealer | | | | | | | |
| Sheets | 4ti-0541 | 4ti-0575 | 4ti-0581 | 4ti-05481 | 4ti-0521 | 4ti-05231 | 4ti-0587 |
| Compatible with 4titude® 4s3™ Semi-Automatic Sheet Heat Sealer | | | | | | | |
| Random Access, sheets | | | | | | | |
| Compatible with 4titude® a4S$^{RA}$ Automatic Random Access Heat Sealer | | | | | | | |
| Random Access, roll, 100 mm width | | | | | | | |

* For use with the 4titude® a4S Automatic Roll Heat Sealer when using lower roll position and the optional dust cover for protection of the roll · ** NOT compatible with Agilent (Velocity 11) PlateLoc®

# Heat Sealing Consumables Comparison & Instrument Compatibility Table

| | Pierceable Heat Seals | | Foil Heat Seals | | | Gas Permeable Heat Seals | |
|---|---|---|---|---|---|---|---|
| 96 INDI™ Heat Seal | Pierce Heat Seal | Pierce Heat Seal Strong | Foil Heat Seal | Polystyrene Foil Heat Seal | Thermal Bond Heat Seal | Gas Permeable Heat Seal Mark 2 | Gas Permeable Clear Heat Seal |
| 8 | 7 | 7 | 8 | 9 | 9 | 9 | 5 |
| Compound storage<br>Sample shipping<br>Low temperature storage and high temperature incubations | PCR<br>Compound storage<br>Sample shipping | PCR<br>Compound storage<br>Sample shipping | Low temperature compound storage<br>Short-term room temperature compound storage<br>PCR | Low temperature compound storage<br>Short-term room temperature compound storage<br>PCR | Low temperature transportation & storage<br>PCR, esp. water bath cyclers<br>Storage of organic solvents, acids & alkalines | Cell culture<br>Over night incubation<br>Seed and insect storage | Storage e.g. for seeds or insects |
| 96 perforated individual sealing caps in a foil frame<br>Can be resealed<br>Good solvent resistance, including DMSO | Easily pierceable<br>Resistant to DMSO<br>Re-sealable with another Pierce Heat Seal<br>Colour print identifies non-sealing surface | Easily pierceable<br>Resistant to DMSO<br>Re-sealable with another Pierce Heat Seal<br>Colour print identifies non-sealing surface | Re-sealable with another Foil Seal<br>Resistant to DMSO<br>Colour print identifies non-sealing surface | Re-sealable with another Foil Seal<br>Resistant to DMSO | Very strong seal with PP<br>Resistant to DMSO and other solvents | Small pore size of 20 µm allows gaseous exchange & limits evaporation<br>Gas permeability: 180 $m^3/m^2$/day<br>Moisture vapour transmission: 20g/$m^2$/day | 3 mm slits across entire surface of seal makes this permeable to gases |
| -195°C | -20°C | -20°C | -20°C | -20°C | -200°C | -20°C | -80°C |
| 120°C | 120°C | 120°C | 110°C | 110°C | 110°C | 80°C | 100°C material integrity (not seal) |
| ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Laminate | Foil | Foil | Foil | Foil | Laminate | Woven material | Laminate |
| PP | PP, PS | PP, COC | PP, PS | PP, PS, PC | PP | PP, PS, COC | PP, PE, PS, COC |
| 175°C<br>3 s | 160-175°C<br>2 s | 170-180°C<br>2 s | 165-180°C<br>2 s | 165-180°C<br>2 s | 170-180°C<br>2-3 s | 170°C<br>2 s | 175-185°C<br>2-3 s |
| N/A | 160-175°C<br>2 s | 170-180°C<br>2 s | 165-175°C<br>2-3 s | 165-175°C<br>2-3 s | 160-170°C<br>2 s | 170°C<br>2 s | 165-180°C<br>3 s |
| N/A | 185-200°C<br>3 s | 180-200°C<br>3 s | 185-200°C<br>3 s | 185-200°C<br>3 s | N/A | 170°C<br>2 s | 185-200°C<br>3 s |
| | 4ti-0530 | 4ti-0538 | 4ti-0535 | 4ti-0545 | 4ti-0590 | 4ti-0598 | 4ti-0540/SLIT |
| | 4ti-0530/122 | | 4ti-0535/122 | 4ti-0545/122 | 4ti-0590/100 | 4ti-0598/122 | |
| | 4ti-0530S | 4ti-0538S | 4ti-0535S | 4ti-0545S | 4ti-0590S | 4ti-0598S | 4ti-0540/SLIT/S |
| | 4ti-0532 | 4ti-0539 | 4ti-0537 | 4ti-0546 | 4ti-0592** | 4ti-0599 | |
| | 4ti-0532S | 4ti-0539S | 4ti-0537S | 4ti-0546/S | 4ti-0592S** | 4ti-0599S | |
| | 4ti-0530/REMP | | 4ti-0535/REMP | | | | |
| | 4ti-0532/REMP | | 4ti-0537/REMP | | | | |
| 4ti-0543 | 4ti-0531 | 4ti-05381 | 4ti-0536 | 4ti-0547 | 4ti-0591 | 4ti-0597 | 4ti-0541/SLIT |
| | | 4ti-05381/RA | | | | | |
| | | 4ti-0539/RA | | | | | |

# Random Access Heat Sealing

## Random Access Product Range

FrameStar® is our superior technology of making PCR plates with ultra-thin polypropylene wells fitted into a robust polycarbonate frame that provides excellent stability. Our Random Access plates develop this technology further to supply a novel 96 well plate with individually removable wells combining both flexibility and robustness. Each well is moulded into a rigid frame suitable for use with automation. For details on our FrameStar® and Random Access product range please see www.4ti.co.uk.

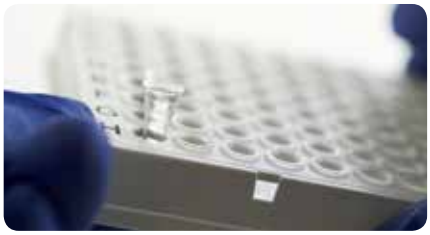


**Figure 1:** Random Access 96 Well Skirted PCR Plate

## Manual Random Access Heat Sealing

The 96 well Random Access plate can be sealed in one step using Random Access Pierce Seal Strong, 96 individual foil seal spots on a removable backing (4ti-05381/RA, see page 8). These seals result in individually sealed tubes that are pierceable, allowing for sample access.

Random Access Heat Seals are currently available in sheet format for use with the 4s3™ Semi-Automated Sheet Heat Sealer (using the 4ti-0613 Random Access adapter).

**Figure 2:** Random Access Sealing Procedure using the 4s3™ Semi-Automatic Sheet Heat Sealer (4ti-0655)

## NEW Automatic Random Access Heat Sealing

The roll-fed a4S$^{RA}$ Automatic Random Access Heat Sealer allows for automatic sealing of Random Access plates using Random Access Heat Seal rolls.

The roll with the indexed groups of 96 individual sealing discs is automatically fed through the heat sealer. The accurate sealing is controlled by a sensor which gets activated by optical windows in the material feed, but can also by adjusted. Sealing temperature, time of sealing and exit delay (for cooling) can be controlled via the instrument's touchscreen.

Custom versions of instrument and sealing material are possible.

**Figure 3:** Random Access Sealing Procedure using the a4S$^{RA}$ Automatic Random Access Heat Sealer (4ti-0675, prototype shown)

Manual Random Access Heat Sealing

| Code | Details | Qty |
|---|---|---|
| 4ti-0655 | 4s3™ Semi-Automatic Sheet Heat Sealer | 1 |
| 4ti-0613 | 4s3™ Plate Support Adapter, Random Access, *for low profile plates* | 1 |
| 4ti-0614 | 4s3™ Plate Support Adapter, Random Access, *for standard profile plates* | 1 |
| 4ti-05381/RA | Random Access Pierce Heat Seal Strong, sheets, (127 mm x 100 mm) | 100 |
| 4ti-0960/RA | Random Access 96 Well Skirted PCR Plate, low profile, clear wells white frame | 50 |

Automatic Random Access Heat Sealing

| Code | Details | Qty |
|---|---|---|
| 4ti-0675 | a4S$^{RA}$ Automatic Random Access Heat Sealer | 1 |
| 4ti-0539/RA | Random Access Pierce Heat Seal Strong, roll (420 m x 100 mm, approx. 3,200 sealed PCR plates) | 1 |
| 4ti-0960/RA | Random Access 96 Well Skirted PCR Plate, low profile, clear wells white frame | 50 |

# FrameSeal™ & Thermal Test Film

## FrameSeal™

Our FrameSeal™ utilises a sheet of standard 4titude® heat sealing material mounted onto a disposable, rigid, stackable plastic frame. A FrameSeal™ can be placed either manually, or with a robotic gripper, onto a wide range of skirted and semi-skirted microplates (including PCR plates) and is compatible with our 4s3™ Semi-Automatic Sheet Heat Sealer (see page 16). After sealing, there is the option to remove the frame by tearing along pre-cut lines to leave the heat seal in place on the plate surface.

**FrameSeal™**

Heat sealing sheets held within a disposable, rigid, stackable frame, suitable for automation

| Code | Details | Frames/Case |
|---|---|---|
| 4ti-0541/FS | Clear Heat Seal FrameSeal™ (see page 5) | 50 |
| 4ti-0575/FS | Clear Weld Heat Seal Mark 2 FrameSeal™ (see page 5) | 50 |

*Please refer to the corresponding product page to see all features and specifications of the respective heat sealing material.*

**Features**

- Easy handling compared to sheet or roll formats
- Perforated for easy removal following heat sealing
- Allows for the use of sheeted sealing material in automation

## Thermal Test Film

4titude®'s Thermal Test Film was developed to check the uniformity and reproducibility of a heat sealer's heating block.

The film features a thermosensitive colour-forming layer plus a protective layer, both attached to a base material. Depending on the temperature applied to the film, a colour is produced in varying density and hue – giving a perfect image of heat distribution across the heating block of your heat sealer.

**Thermal Test Film**

Thermosensitive colour-forming film, for evaluation of consistent temperature across a heating block

| Code | Details | Sheets or Roll/Case |
|---|---|---|
| 4ti-0640 | Sheets (125 x 80 mm) | 25 |
| 4ti-0641 | Starter Kit, contents: sheets (125 x 80 mm) and 1 silicone pad | 10 |
| 4ti-0642 | Roll Kit, contents: roll (1 m x 80 mm) and 1 silicone pad | 1 |

**Features**

- To effectively test the temperature of a heat sealer's heating block between 160 – 200°C
- Colour change varies according to dwell time and temperature
- The shorter the duration, the paler and more blueish the colour; The longer the duration, the more saturated and reddish the colour, see colour chart right
- Available in sheet and roll format to be used with sheet fed and roll fed heat sealers
- For details, please refer to the corresponding webpage

**Thermal Test Film Colour Chart**


*Note: This colour chart is just an example based on the results of the tests performed in our laboratories. Before using the Thermal Test Film, a similar chart needs to be created that is based on your actual measurement conditions*

# Adhesive Sealing Consumables & Sealing Accessories

## Adhesive Sealing Consumables & Sealing Accessories

Adhesive seals provide a versatile, yet robust, method for protecting samples. The seals are supplied as sheets and some are also available in roll format. Most adhesive seals are supplied with convenient tabs on both ends for easy application and removal. These tabs also enable easy peeling to remove a seal without leaving adhesive residue on the sealing surface.

All our seals are produced and processed under strictly controlled environmental conditions and certified free from DNase, RNase and human genomic DNA.

To choose the most suitable seal, please refer to the comparison table on page 24 which describes the recommended applications and technical features of each seal.

To obtain the best sealing results with adhesive seals, we strongly recommend the use of high quality plates with raised rim sealing rings for optimal sealing integrity and guaranteed flatness. All 4titude® PCR plates are designed with these features.

To improve seal application by ensuring even pressure is applied, we offer a seal roller and a seal applicator, for complete and secure application of all our adhesive seals. We also offer supplementary products like the compression pad, details see page 23.

## PCR Seal

Seal Integrity Temperature Range -20°C 110°C*

*110°C with pressurised heated lid

Peelable

### Features

- Durable transparent polyester film with a strong adhesive layer
- Recommended for PCR, qPCR, and other optical applications as well as sample storage
- Also available in two flexible formats with perforated sheets, to enable tearing into 8 well and 12 well strips, respectively
- Also available as half plate seals to match the size of our FrameStar® 192 Well Semi-Skirted PCR Plate (half 384 well plate), please see www.4ti.co.uk for more details

### PCR Seal

Clear adhesive film, strong adhesive, peelable, suitable for PCR and optical applications

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0500 | Sheets | (135 mm x 80 mm) | 100 |
| 4ti-0500/8 | Perforated sheets (115 m x 100 mm) for tearing into 8 well strips | | 100 |
| 4ti-0500/12 | Perforated sheets (137 mm x 71 mm) for tearing into 12 well strips | | 100 |
| 4ti-0500/HP | Sheets | Half plate size (70 mm x 80 mm) | 100 |

## Q-Stick™ qPCR Seal

Seal Integrity Temperature Range -20°C 110°C*

*110°C with pressurised heated lid

Peelable

### Features

- Strongest sealing integrity with optimised optical properties, thanks to 96 adhesive-free windows
- Reduced contact of reagent and adhesive
- Recommended for qPCR and other optical applications, such as fluorescence or colorimetric measurements

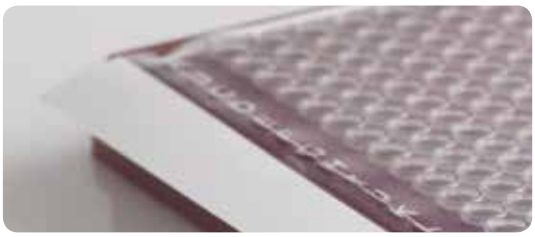
### Q-Stick™ qPCR Seal

Adhesive film with 96 optically clear windows, peelable, suitable for qPCR and optical applications

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0565** | Sheets | (133 mm x 76 mm) | 100 |

**Not available for purchase in or onwards distribution to the USA

## qPCR Seal



Seal Integrity Temperature Range -80°C 110°C*

*110°C with pressurised heated lid

Peelable

### Features

- Non-sticky film with a strong pressure-activated adhesive
- Non-sticky when removed from the packaging – improved handling when wearing gloves
- Specifically developed for optical applications, particularly qPCR
- Also available as half plate seals to match the size of our FrameStar® 192 Well Semi-Skirted PCR Plate (half 384 well plate), please see our website for more details

### qPCR Seal

Optically clear adhesive film, pressure activated adhesive, peelable, suitable for qPCR and optical applications

| Code | Details | | Sheets or Rolls/Case |
|---|---|---|---|
| 4ti-0560 | Sheets | (140 mm x 77 mm) | 100 |
| 4ti-0560/HP | Sheets | Half plate size (70 mm x 77 mm) | 100 |
| 4ti-0561 | Roll | (100 m x 80 mm, approx. 700 seals) | 1 |
| 4ti-0561/S | Sample Roll | (5 m x 80 mm) | 1 |

### Technical Note

qPCR Seal is a pressure-activated seal. The adhesive is released when pressure is applied firmly and evenly to the seal. Our Adhesive Seal Roller or Adhesive Seal Applicator are ideal for use with this product. We also recommend the use of our Optical Film Compression Pad during PCR with this product. For details see page 23.

## PCR Foil Seal

Seal Integrity Temperature Range -40°C 120°C

Peelable

Pierceable

### Features

- Aluminium foil seal with a strong acrylic adhesive producing a seal of high integrity
- Effectively prevents sample evaporation – suitable for PCR and other high temperature applications

### PCR Foil Seal

Pierceable adhesive aluminium foil, strong adhesive, peelable, suitable for high temperature applications

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0550 | Sheets | (130 mm x 80 mm) | 100 |

### Technical Note

When pierced, the foil tears in an irregular manner which prevents the formation of a vacuum

## PCR Foil Seal Strong

Seal Integrity Temperature Range -80°C 110°C

Peelable

Pierceable

### Features

- Pierceable aluminium foil seal with our strongest acrylic adhesive
- Recommended for PCR and low temperature storage

### PCR Foil Seal Strong

Adhesive aluminium foil, strong adhesive, peelable, pierceable, suitable for high temperature incubations and low temperature storage

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0500FL | Sheets | (137 mm x 80 mm) | 100 |

### Technical Note

Uses the same adhesive as our PCR Seal (4ti-0500, see page 18) ensuring the strongest adhesive seal

## DMSO Resistant Foil

Seal Integrity Temperature Range -20°C 80°C

Peelable

### DMSO Resistant Foil

Peelable adhesive foil, strong adhesive, high solvent resistance, suitable for long term storage

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0512 | Sheets | (122 mm x 80 mm) | 100 |

**Features**

- Peelable foil seal with a strong adhesive
- Chemically resistant silicone adhesive layer producing a seal with high levels of solvent resistance, including to Dimethyl Sulfoxide (DMSO)
- Long-term plate storage – samples containing <80% DMSO can be stored for up to 5 years

## Pierceable Film

Seal Integrity Temperature Range -20°C 110°C

Peelable

Pierceable

### Pierceable Film

Strong adhesive seal with cross-cut windows, peelable, pierceable, suitable for 96 well plates (auto samplers, HPLC, sequencers)

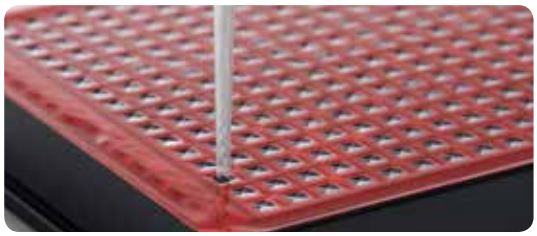
| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0566* | Sheets | (135 mm x 77 mm) | 100 |

*Not available for purchase in or onwards distribution to the USA

**Features**

- Peelable and pierceable film with a strong adhesive
- Adhesive-free, cross-cut windows allowing for easy access to the sample wells with a tip or probe with minimal pressure
- Adhesive-free windows avoid clogging of tips or needles during piercing
- Developed to facilitate easy sample application or retrieval, for use in automated systems and sample analysers such as HPLC and DNA sequencers

## Pierceable Film 384



Seal Integrity Temperature Range -80°C 120°C

Peelable

Pierceable

### Pierceable Film 384

Strong adhesive seal with cross-cut windows, red adhesive, peelable, pierceable, suitable for 384 square well plates

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0566/384 | Sheets | (117 mm x 80 mm) | 100 |

**Features**

- Peelable and pierceable film with a strong adhesive
- Good solvent resistance, including DMSO
- Adhesive-free, cross-cut windows allowing for easy access to the sample wells with a tip or probe with minimal pressure
- Adhesive-free windows avoid clogging of tips or needles during piercing
- Red adhesive for easier alignment during seal application
- Developed for use in automated systems and sample analysers such as HPLC and DNA sequencers

## Moisture Barrier Seal 24, 96, 384

Seal Integrity Temperature Range -20°C 80°C | Peelable | Pierceable

### Moisture Barrier Seal 24, 96, 384

Gas permeable adhesive film, optically clear, with adhesive free windows, peelable, pierceable, sterile, suitable for cell culture

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0516/24* | Sheets | (140 mm x 80 mm), with 24 adhesive free windows | 5 x 10 |
| 4ti-0516/96* | Sheets | (137 mm x 80 mm), with 96 adhesive free windows | 5 x 10 |
| 4ti-0516/384* | Sheets | (137 mm x 80 mm), with 384 adhesive free windows | 5 x 10 |

*Not available for purchase in or onwards distribution to the USA

### Features

- Clear film allowing for a uniform gas exchange, whilst acting as a moisture barrier & preventing evaporation
- Available with 24, 96, or 384 adhesive free, optically clear windows allowing for imaging
- Applications: Plate readers, eukaryotic & bacterial cell culture, long-term incubation, live cell assays, confocal microscopy

## Air-O-Seal

Seal Integrity Temperature Range -20°C 40°C | Peelable

### Air-O-Seal

Gas permeable adhesive seal, peelable, suitable for cell culture

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0517 | Sheets | (135 mm x 80 mm) | 100 |
| 4ti-0517/ST | *As above*, sterile | | 10 x 10 |

### Features

- Prevents evaporation and contamination whilst enabling cells to breathe
- Suitable for cell culture, enables long term culture with significantly reduced evaporation
- Resistant to acids, DMSO, detergents, ethanol, glycerol, isopropanol and sodium hypochlorite (bleach)
- Due to its paper-based material it should not be used in wet conditions (e.g. for shaking culture)
- Available sterile

## Double Skin Breathable Film

Seal Integrity Temperature Range 0°C 40°C | Peelable | Pierceable

### Double Skin Breathable Film

Gas permeable moisture barrier membrane, adhesive, optically clear, ultra thin, peelable, pierceable

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0518 | Sheets | (135 mm x 83 mm) | 100 |
| 4ti-0518/ST | *As above*, sterile | | 100 |

### Features

- Thin, optically clear membrane with an adhesive layer for effective sealing
- Membrane is gas permeable whilst proving an effective barrier to moisture and contamination
- Recommended for bacterial culture, particularly for long term incubations, where prevention of evaporation is essential
- Available sterile

# Microplate Seal

Seal Integrity Temperature Range -20°C 80°C

Peelable

### Microplate Seal

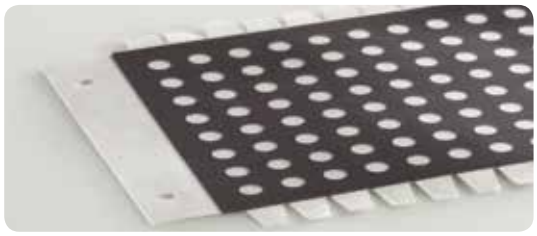
Low strength adhesive film, transparent, peelable, suitable for short term storage

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0510 | Sheets | (130 mm x 80 mm) | 100 |

### Features

- Transparent polyester-based film with low strength adhesive
- Low-cost sealing option, suitable for temporary storage and as a cover for applications such as centrifugation

# InterSeal



Seal Integrity Temperature Range -20°C 110°C

Peelable

### InterSeal

Double sided adhesive film, black, with 96 holes and a protective liner, peelable, suitable for re-sealing without the need for a heat sealer,

| Code | Details | | Sheets/Case |
|---|---|---|---|
| 4ti-0519 | Sheets | (148 mm x 98 mm) | 100 |

### Features

- A double sided adhesive film to facilitate the sealing, accessing (piercing) and resealing of strips or plates prior to PCR
- Allows flexible access to individual wells
- Ideal for kit manufactures, designed to work with Vari-Plate™, FrameStar® Break-A-Way, and Tear-A-Way™ plates

### Typical Molecular Diagnostic workflows - an example

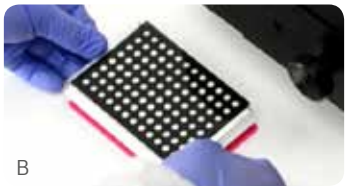
#### At the kit manufacturer

- The plate (e.g. Vari-Plate™ Frame loaded with Vari-Strips™, e.g. 4ti-0753/C/757) is filled with reagents on a robotic system
- The filled plate is sealed with a pierceable heat seal (e.g. Pierce Seal, 4ti-0530) resulting in lowest evaporation and best possible long-term storage (A)
- The protective InterSeal is placed on top of the pierceable seal to make sure there will be no damage of the seal during transportation (B)
- The sealed plate is cut into strips with the 4titude® PlateCutter (4ti-3000) - the pre-filled strips are ready for transport, e.g. to the point of diagnostic use (C)

#### At the point of diagnostic use

- The InterSeal protective layer is removed making the pierceable seal accessible (D)
- The sample is added to the pre-filled strip by piercing the seal (E)
- The strips can easily be resealed with foil or film strips by applying to the exposed black adhesive without the need for a heat sealer (F)
- After resealing, the strips are ready for PCR analysis


A


B

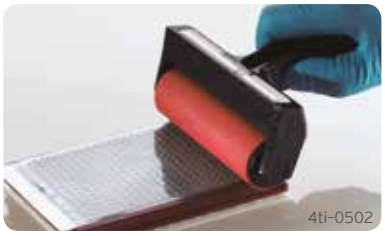

C


D


E


F

## Adhesive Seal Roller & Adhesive Seal Applicator


4ti-0502

4ti-0503

### Features

- To ensure even pressure is applied across the seal for complete application to the plate
- Recommended to obtain best sealing results when using our adhesive seals

### Adhesive Seal Roller

- Handle made of a durable plastic, with a semi-hard padded rolling wheel

### Adhesive Seal Applicator

- Convenient size for PCR plate format
- Straight rigid sides for even pressure application

### Technical Note

When applying adhesive seals to 384 well plates, we recommend using the Adhesive Seal Roller or Adhesive Seal Applicator in conjunction with our FrameStar® 384 Holder (4ti-0391) to support the 384 well plates during seal applications, and to give a level base.

### Adhesive Seal Roller & Adhesive Seal Applicator

Ensure consistent seal application across all wells, for use with adhesive seals

| Code | | Qty |
|---|---|---|
| 4ti-0502 | Adhesive Seal Roller | 1 |
| 4ti-0503 | Adhesive Seal Applicator | 1 |

## FrameStar® 384 Holder

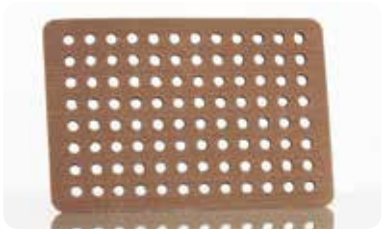
### Features

- Plate holder for use with 384 well plates
- Improves the application of adhesive seals
- Special design ensures a plate is held perfectly flat so that even pressure can be applied by the Adhesive Seal Roller (4ti-0502) or Adhesive Seal Applicator (4ti-0503)

### FrameStar® 384 Holder

| Code | Qty |
|---|---|
| 4ti-0391 | 1 |

## Optical Film Compression Pad



### Features

- Soft silicone foam mat laminated to a non-stick PTFE film
- Especially for thermal cyclers without pressurised lids
- Sits on top of the plate in a thermal cycler to improve adhesion between the adhesive seal and plate
- Improved results by reduced sample evaporation

### Optical Film Compression Pad

Silicone foam mat laminated to a non-stick PTFE film, to be used with adhesive seals, compatible with heated lid cyclers

| Code | Qty |
|---|---|
| 4ti-0563 | 1 |

## Pierce Plate

### Features

- Machine-engineered metal block with 96 pins aligned central to each well of a 96 well plate
- 96 pins pierce every well of a heat or adhesive-sealed 96 well PCR plate or microplate (pierceable seals only)
- Enables instant access to samples with a single or multichannel pipette or automated system

### Pierce Plate

Metal block with 96 pins, suitable for piercing every well of a heat or adhesive sealed 96 well plate

| Code | Qty |
|---|---|
| 4ti-0398 | 1 |

# Adhesive Sealing Consumables Comparison Table

| | Clear Seals | | | Foil Seals | | | Cross-cut Seals | |
|---|---|---|---|---|---|---|---|---|
| Name | PCR Seal | Q-Stick™ qPCR Seal | qPCR Seal | PCR Foil Seal | PCR Foil Seal Strong | DMSO Resistant Foil | Pierceable Film | |
| Details see page | 18 | 18 | 19 | 19 | 19 | 20 | 20 | |
| **Specifications** | | | | | | | | |
| Application | PCR | qPCR, fluorescence<br>96-well microplates only | qPCR & other fluorescent applications<br>Imaging techniques incl. crystallisation<br>Plate readers, microscopy | PCR & sample storage<br>Incubations | High temperature incubations & low temperature storage | Microplate sealing containing solvents incl. DMSO | Sample application or retrieval<br>96 well plates only | |
| Special Properties | Good optical clarity | Discreet optical windows for 96-well plates | Good optical clarity | Irregular tearing when pierced prevents formation of vacuum | Strong adhesive | High solvent resistance | Cross-cut reduces tip or probe becoming clogged | |
| Seal Integrity Min Temperature | -20°C | -20°C | -80°C | -40°C | -80°C | -20°C | -20°C | |
| Seal Integrity Max Temperature | 110°C | 110°C | 110°C | 120°C | 110°C | 80°C | 110°C | |
| Gas Permeability Rate | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| Moisture Vapour Transmission Rate | N/A | N/A | N/A | N/A | N/A | N/A | N/A | |
| Sterile | | | | | | | | |
| Pierceable | | | | ✓ | ✓ | | ✓ | |
| Peelable | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| RNase/DNase free | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| **Product Codes** | | | | | | | | |
| Code<br>Format<br>Dimensions | 4ti-0500<br>Sheets<br>135 mm x 80 mm | 4ti-0565<br>Sheets<br>133 mm x 76 mm | 4ti-0560<br>Sheets<br>140 mm x 77 mm | 4ti-0550<br>Sheets<br>130 mm x 80 mm | 4ti-0500FL<br>Sheets<br>137 mm x 80 mm | 4ti-0512<br>Sheets<br>122 mm x 80 mm | 4ti-0566<br>Sheets<br>135 mm x 77 mm | |
| Code<br>Format<br>Dimensions | 4ti-0500/8<br>Perforated sheets<br>115 mm x 100 mm | | 4ti-0561<br>Roll<br>100 m x 80 mm | | | | | |
| Code<br>Format<br>Dimensions | 4ti-0500/12<br>Perforated sheets<br>137 mm x 71 mm | | 4ti-0561/S<br>Sample roll<br>5 m x 80 mm | | | | | |
| Code<br>Format<br>Dimensions | 4ti-0500/HP<br>Half plate sheets<br>70 mm x 80 mm | | 4ti-0560/HP<br>Half plate sheets<br>70 mm x 77 mm | | | | | |

# Adhesive Sealing Consumables Comparison Table

| Cross-cut Seals | Permeable Seals | | | | | |
|---|---|---|---|---|---|---|
| Pierceable Film 384 | Moisture Barrier Seal 24, 96, 384 | Air-O-Seal | Double Skin Breathabe Film | Microplate Seal | InterSeal | Name |
| 20 | 21 | 21 | 21 | 22 | 22 | Details see page |
| | | | | | | Specifications |
| Sample application or retrieval<br>384 well plates only | Eukaryotic cell culture, bacterial culture and long-term live assays<br>Suitable for use on plate readers | Bacterial or cell culture | Bacteria culture | Aqueous sample storage | Diagnostic kit production | Application |
| Cross-cut reduces tip or probe becoming clogged<br>Good solvent resistance, including DMSO | Gas permeable that allows air and $CO_2$ exchange, but prevents moisture evaporation<br>Optically clear | Very low moisture transfer rate<br>Suitable for bacterial or cell culture<br>Air porosity: 10 sec/100 cc/in$^2$ | Thin gas permeable, moisture barrier seal<br>Allows air and $CO_2$ exchange, prevents evaporation | Medium strength transparent seal | Two sealing surfaces<br>Optical windows | Special Properties |
| -80°C | -20°C | -20°C | 0°C | -20°C | -20°C | Seal Integrity Min Temperature |
| 120°C | 80°C | 40°C | 40°C | 80°C | 110°C | Seal Integrity Max Temperature |
| N/A | 0.6 m$^3$/m$^2$/day | 8,900 m$^3$/m$^2$/day | 900 m$^3$/m$^2$/day | N/A | N/A | Gas Permeability Rate |
| N/A | 1 g/m$^2$/day | 4,200 g/m$^2$/day | 450 g/m$^2$/day | N/A | N/A | Moisture Vapour Transmission Rate |
| | ✓ | ✓ | | | | Sterile |
| ✓ | ✓ | | ✓ | | | Pierceable |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Peelable |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | RNase/DNase free |
| | | | | | | Product Codes |
| 4ti-0566/384<br>Sheets<br>117 mm x 80 mm | 4ti-0516/24<br>Sheets<br>140 mm x 80 mm | 4ti-0517<br>Sheets<br>135 mm x 80 mm | 4ti-0518<br>Sheets<br>135 mm x 83 mm | 4ti-0510<br>Sheets<br>130 mm x 80 mm | 4ti-0519<br>Sheets<br>148 mm x 98 mm | Code<br>Format<br>Dimensions |
| | 4ti-0516/96<br>Sheets<br>137 mm x 80 mm | 4ti-0517/ST<br>Sheets, sterile<br>135 mm x 80 mm | 4ti-0518/ST<br>Sheets, sterile<br>135 mm x 83 mm | | | Code<br>Format<br>Dimensions |
| | 4ti-0516/384<br>Sheets<br>137 mm x 80 mm | | | | | Code<br>Format<br>Dimensions |
| | | | | | | Code<br>Format<br>Dimensions |

# Caps, Lids & Mats

## Caps, Lids & Mats

As an alternative to sealing films, 4titude® offers multiple types of cap strips for sealing both plates and tubes – domed, flat, strips of 8, strips of 12, and our new optically superior CrystalStrips™.

A variety of rigid polystyrene lids are available for PCR plates and microplates, including lids compatible with our FrameStar®, Vision Plate™ and UltraVision™ Plate ranges. 4titude® also stock silicone sealing mats for use with our storage plate ranges and in a variety of formats depending on the well size, number and shape.

## Strips of 8 Caps & Strips of 12 Caps

**Features**

- Precision moulded to ensure effective sealing
- Flat caps are optically clear for fluorescence detection (e.g. qPCR)
- Large end tabs for easy removal

**Strips of 8 Caps & Strips of 12 Caps**

Clear, PP

| Code | Details | Strips/Case |
|---|---|---|
| 4ti-0751 | Strips of 8 Flat Optical Caps | 300 |
| 4ti-0783 | *as above* | 125 |
| 4ti-0752 | Strips of 8 Domed Caps | 300 |
| 4ti-0782 | *as above* | 125 |
| 4ti-0788 | Strips of 12 Flat Optical Caps<br>*Note: Not compatible with low profile plates* | 200 |

## CrystalStrip™


**Features**

- Optically superior crystal clear strips of 8 flat caps
- Made of a special polymer with improved optical properties leading to high transmission rates
- Reduced shrinking during heating and cooling phases – very tight, evaporation-safe fit
- Best used with compression mat (see 4ti-0563, Optical Film Compression Pad)
- Ideally suited for small volumes with low signal intensity such as low volume qPCR

**CrystalStrip™**

Strips of 8 flat optical caps, crystal clear, designed for small volume applications such as low volume qPCR

| Code | Details | Strips/Case |
|---|---|---|
| 4ti-0755 | Strips of 8 Flat Optical Caps | 300 |
| 4ti-0755/120 | *as above* | 120 |

# PCR Plate Lids, FrameStar® Lids and Microplate Lids


4ti-0287


4ti-0289

**Features**

- Rigid polystyrene lids for PCR plates, Vision Plates™ and assay plates
- Designed to give a quick and easy sealing solution to protect samples from contamination and evaporation

**PCR Plate Lids & FrameStar® Lids**

| Code | Name | For use with | Profile | Cut corner | Cond. rings* | Sterile | Lids |
|---|---|---|---|---|---|---|---|
| 4ti-0285 | Ultra-Low Universal Lid | The majority of PCR plates available | Ultra-Low | No | No | No | 100 |
| 4ti-0288 | PCR Plate Lid | The majority of PCR plates available | Low | H1 | No | No | 50 |
| 4ti-0287 | FrameStar® 96 NGS Lid | FrameStar® 96 Well Skirted PCR Plate, Extra Rigid (4ti-0960/RIG) | Low | H1 | Yes | No | 50 |
| 4ti-0289 | FrameStar® 96 Lid | FrameStar® 96 Well Semi-Skirted PCR Plate, ABI® Style (4ti-0770) | Low | A12 | No | No | 50 |

**Microplate Lids**

| Code | Name | For use with | Profile | Cut corner | Cond. rings* | Sterile | Lids |
|---|---|---|---|---|---|---|---|
| 4ti-0280 | Microplate 384 Lid | Vision Plates™ and assay plates | Low | A1/P1 | No | No | 100 |
| 4ti-0281 | Microplate 384 Lid, Sterile | Vision Plates™ and assay plates | Low | A1/P1 | No | Yes | 100 |
| 4ti-0282 | Microplate 96 Lid | 96 well Vision Plates™ and assay plates | Low | A1/H1 | Yes | No | 80 |
| 4ti-0283 | Microplate 96 Lid, Sterile | 96 well Vision Plates™ and assay plates | Low | A1/H1 | Yes | Yes | 80 |
| 4ti-0284 | Microplate 24 Lid | 24 well Vision Plates™ and assay plates | Low | A1 | Yes | No | 80 |
| 4ti-0286 | Microplate 24 Lid, Sterile | 24 well Vision Plates™ and assay plates | Low | A1 | Yes | Yes | 80 |
| 4ti-0290 | Universal Microplate Lid | Vision Plates™ and assay plates | Low | No | No | No | 50 |

* Condensation rings

# Silicone Sealing Mats


4ti-0124


4ti-0138

**Features**

- Mats made of silicone rubber – highly durable to high temperatures
- For sealing storage plates used for high-temperature storage to protect samples from evaporation

| Code | Name | For use with | Colour | Pierceable | Mats/Case |
|---|---|---|---|---|---|
| 4ti-0124 | 96 Round Well Sealing Cap Mat | 96 Round Deep Well Storage Microplate, For Magnetic Separators (4ti-0125) **only** | Clear | Yes | 50 |
| 4ti-0135 | 96 Round Well Sealing Cap Mat | 96 Round Deep Well Storage Microplate (4ti-0120) **only** | White | No | 100 |
| 4ti-0137 | 96 Square Well Sealing Cap Mat | 96 Square Deep Well Storage Microplate (e.g. 4ti-0126, 4ti-0132, and 4ti-0136) | Clear | Yes | 50 |
| 4ti-0138 | 96 Round Well Sealing Cap Mat | 96 round well plates, universal fit<br>*Not for use with 96 Round Deep Well Storage Microplate (4ti-0120) and 96 Round Well Microplate (4ti-0125)* | Clear | Yes | 50 |
| 4ti-0139 | 384 Square Well Sealing Cap Mat | 384 well storage plates, universal fit | Clear | Yes | 50 |

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**Pricing on any accessories shown can be found by keying the part number into the search box on our website.**

The specifications listed in this brochure are subject to change by the manufacturer and therefore cannot be guaranteed to be correct.
If there are aspects of the specification that must be guaranteed, please provide these to our sales team so that details can be confirmed.

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