



From Brooks LIFE SCIENCES

# Sealing Solutions

Product Overview

# About us

## Manufacturing & Quality Standards

### 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



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## 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.

Sealing Solution	Application PCR		Application qPCR	
	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](mailto: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



### 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

Seal Integrity  
Temperature Range

-80 °C  
80 °C

\*110 °C with  
pressurised  
heated lid

Peelable



### 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) <sup>1</sup>	1
4ti-0540/80	Roll (80 m x 78 mm, approx. 640 seals) <sup>1</sup>	1
4ti-0540/REMP	Roll (500 m x 78 mm, approx. 4,200 seals) <sup>3</sup>	1
4ti-0540S	Sample roll (5 m x 78 mm)	1
4ti-0542	Roll (350 m x 115 mm, approx. 4,400 seals) <sup>2</sup>	1
4ti-0542/REMP	Roll (350 m x 115 mm, approx. 4,400 seals) <sup>4</sup>	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) <sup>1</sup>	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



### Features

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

Seal Integrity  
Temperature Range

-80 °C  
110 °C

\*Once autoclaved,  
not recommended  
for PCR



### 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) <sup>1</sup>	1
4ti-0573/122	Roll (122 m x 78 mm, approx. 1,000 seals) <sup>1</sup>	1
4ti-0573S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0574	Roll (500 m x 115 mm, approx. 6,250 seals) <sup>2</sup>	1
4ti-0574S	Sample roll (5 m x 115 mm) <sup>2</sup>	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



### 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

Seal Integrity  
Temperature Range

-80 °C  
80 °C

\*110 °C with  
pressurised  
heated lid

Peelable



### 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) <sup>1</sup>	1
4ti-0549/S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0548	Roll (250 m x 115 mm, approx. 3,140 seals) <sup>2</sup>	1
4ti-0548/S	Sample roll (5 m x 115 mm) <sup>2</sup>	1
4ti-05481	Sheets (125 mm x 78 mm)	100

<sup>1</sup> Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube

<sup>2</sup> Compatible with Agilent (Velocity 11) PlateLoc® · <sup>3</sup> Compatible with REMP Portrait Heat Sealer (PHS) · <sup>4</sup> Compatible with REMP Landscape / Stacking Heat Sealers (LHS / SHS)

## Clear Heat Seal 3730



### 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

Seal Integrity  
Temperature Range

-20°C  
80°C

\*110°C with  
pressurised  
heated lid

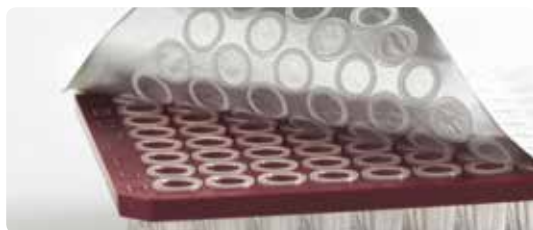


### Clear Heat Seal 3730

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) <sup>1</sup>	1
4ti-0580/122	Roll (122 m x 78 mm, approx. 1,000 seals) <sup>1</sup>	1
4ti-0580S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0582	Roll (500 m x 115 mm, approx. 6,250 seals) <sup>2</sup>	1
4ti-0582S	Sample roll (5 m x 115 mm) <sup>2</sup>	1
4ti-0581	Sheets (125 mm x 78 mm) on perforated roll	1,000

## Peel Heat Seal



### 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

Seal Integrity  
Temperature Range

-80°C  
90°C

\*110°C with  
pressurised  
heated lid

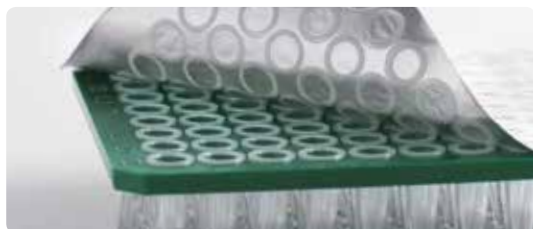


### Peel Heat Seal

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) <sup>1</sup>	1
4ti-0520/122	Roll (122 m x 78 mm, approx. 1,000 seals) <sup>1</sup>	1
4ti-0520S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0522	Roll (500 m x 115 mm, approx. 6,250 seals) <sup>2</sup>	1
4ti-0522S	Sample roll (5 m x 115 mm) <sup>2</sup>	1
4ti-0521	Sheets (125 mm x 78 mm)	100

## Universal Peel Heat Seal



### 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

Seal Integrity  
Temperature Range

-80°C  
90°C

\*110°C with  
pressurised  
heated lid



### 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) <sup>1</sup>	1
4ti-0523S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0524	Roll (500 m x 115 mm, approx. 6,250 seals) <sup>2</sup>	1
4ti-0524S	Sample roll (5 m x 115 mm) <sup>2</sup>	1
4ti-05231	Sheets (125 mm x 78 mm)	100

<sup>1</sup> Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube

<sup>2</sup> Compatible with Agilent (Velocity 11) PlateLoc® - <sup>3</sup> Compatible with REMP Portrait Heat Sealer (PHS) - <sup>4</sup> Compatible with REMP Landscape / Stacking Heat Sealers (LHS / SHS)

## DMSO Resistant Peel Heat Seal



### 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

Seal Integrity  
Temperature Range

-80°C  
40°C

Peelable



### 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) <sup>1</sup>	1
4ti-0585/100	Roll (100 m x 78 mm, approx. 800 seals) <sup>1</sup>	1
4ti-0585/REMP	Roll (500 m x 78 mm, approx. 4,200 seals) <sup>3</sup>	1
4ti-0585S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0586	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>2</sup>	1
4ti-0586/REMP	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>3</sup>	1
4ti-0586S	Sample roll (5 m x 115 mm) <sup>2</sup>	1
4ti-0587	Sheets (125 mm x 78 mm) on perforated roll	100

## Pierce Heat Seal



### 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

Seal Integrity  
Temperature Range

-20°C  
120°C



### 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) <sup>1</sup>	1
4ti-0530/122	Roll (122 m x 78 mm, approx. 1,000 seals) <sup>1</sup>	1
4ti-0530/REMP	Roll (610 m x 78 mm, approx. 5,000 seals) <sup>3</sup>	1
4ti-0530S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0532	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>2</sup>	1
4ti-0532/REMP	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>3</sup>	1
4ti-0532S	Sample roll (5 m x 115 mm) <sup>2</sup>	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



### 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

Seal Integrity  
Temperature Range

-20°C  
120°C



### 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) <sup>1</sup>	1
4ti-0538S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0539	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>2</sup>	1
4ti-0539S	Sample roll (5 m x 115 mm) <sup>2</sup>	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.

<sup>1</sup> Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube

<sup>2</sup> Compatible with Agilent (Velocity 11) PlateLoc® · <sup>3</sup> Compatible with REMP Portrait Heat Sealer (PHS) · <sup>4</sup> 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) <sup>5</sup>	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<sup>RA</sup> 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) <sup>1</sup>	1
4ti-0535/122	Roll (122 m x 78 mm, approx. 1,000 seals) <sup>1</sup>	1
4ti-0535/REMP	Roll (610 m x 78 mm, approx. 5,000 seals) <sup>3</sup>	1
4ti-0535S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0537	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>2</sup>	1
4ti-0537/REMP	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>3</sup>	1
4ti-0537S	Sample roll (5 m x 115 mm) <sup>2</sup>	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

<sup>1</sup> Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube

<sup>2</sup> Compatible with Agilent (Velocity 11) PlateLoc® - <sup>3</sup> Compatible with REMP Portrait Heat Sealer (PHS) - <sup>4</sup> Compatible with REMP Landscape / Stacking Heat Sealers (LHS / SHS)

<sup>5</sup> Compatible with 4titude® a4S™ Automatic Random Access Heat Sealer



## Polystyrene Foil Heat Seal



### 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

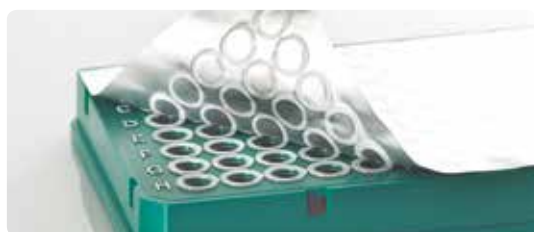


### Polystyrene Foil Heat Seal

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) <sup>1</sup>	1
4ti-0545/122	Roll (122 m x 78 mm, approx. 1,000 seals) <sup>1</sup>	1
4ti-0545S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0546	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>2</sup>	1
4ti-0546/S	Sample roll (5 m x 115 mm) <sup>2</sup>	1
4ti-0547	Sheets (125 mm x 78 mm)	100

## Thermal Bond Heat Seal



### 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) <sup>1</sup>	1
4ti-0590/100	Roll (100 m x 78 mm, approx. 800 seals) <sup>1</sup>	1
4ti-0590S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0592	Roll (300 m x 115 mm, approx. 3,700 seals) <sup>5</sup>	1
4ti-0592S	Sample roll (5 m x 115 mm) <sup>5</sup>	1
4ti-0591	Sheets (125 mm x 78 mm)	100

## Gas Permeable Heat Seal Mark 2



### 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<sup>2</sup>, 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) <sup>1</sup>	1
4ti-0598/122	Roll (122 m x 78 mm, approx. 1,000 seals) <sup>1</sup>	1
4ti-0598S	Sample roll (5 m x 78 mm) <sup>1</sup>	1
4ti-0599	Roll (500 m x 115 mm, approx. 6,200 seals) <sup>2</sup>	1
4ti-0599S	Sample roll (5 m x 115 mm) <sup>2</sup>	1
4ti-0597	Sheets (125 mm x 78 mm)	100
4ti-0597/ST	Sheets as above, sterile	10 x 10

<sup>1</sup> Compatible with 4titude® a4S Automatic Roll Heat Sealer / Thermo Fisher ALPS 300™ and ALPS 3000™ / KBiosystems Wasp™ / KBioscience FlexiSeal and Cube

<sup>2</sup> Compatible with Agilent (Velocity 11) PlateLoc® · <sup>3</sup> Compatible with REMPO Portrait Heat Sealer (PHS) · <sup>4</sup> Compatible with REMPO Landscape / Stacking Heat Sealers (LHS / SHS)

<sup>5</sup> 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 Short term compound storage	PCR, esp. water bath cyclers qPCR 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 Short term room temperature compound storage (<5 days) PCR	Low temperature compound storage High temperature applications PCR	Low/room temperature compound storage with DMSO & other organic solvents	
Special Properties	Good optical clarity Moderate solvent resistance	Good optical clarity Resistance to DMSO	Good optical clarity Some solvent resistance	High tensile strength	Can be peeled directly from -80°C freezer Moderate resistance to solvents at room temperature	Moderate solvent resistance Re-sealable with another Universal Peel Heat Seal	Can be peeled directly from -80°C freezer 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™ 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 Sample shipping Low temperature storage and high temperature incubations	PCR Compound storage Sample shipping	PCR Compound storage Sample shipping	Low temperature compound storage Short-term room temperature compound storage PCR	Low temperature compound storage Short-term room temperature compound storage PCR	Low temperature transportation & storage PCR, esp. water bath cyclers Storage of organic solvents, acids & alkalines	Cell culture Over night incubation Seed and insect storage	Storage e.g. for seeds or insects
	96 perforated individual sealing caps in a foil frame Can be resealed Good solvent resistance, including DMSO	Easily pierceable Resistant to DMSO Re-sealable with another Pierce Heat Seal Colour print identifies non-sealing surface	Easily pierceable Resistant to DMSO Re-sealable with another Pierce Heat Seal Colour print identifies non-sealing surface	Re-sealable with another Foil Seal Resistant to DMSO Colour print identifies non-sealing surface	Re-sealable with another Foil Seal Resistant to DMSO	Very strong seal with PP Resistant to DMSO and other solvents	Small pore size of 20 µm allows gaseous exchange & limits evaporation Gas permeability: 180 m³/m²/day Moisture vapour transmission: 20g/m²/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 3 s	160-175°C 2 s	170-180°C 2 s	165-180°C 2 s	165-180°C 2 s	170-180°C 2-3 s	170°C 2 s	175-185°C 2-3 s
	N/A	160-175°C 2 s	170-180°C 2 s	165-175°C 2-3 s	165-175°C 2-3 s	160-170°C 2 s	170°C 2 s	165-180°C 3 s
	N/A	185-200°C 3 s	180-200°C 3 s	185-200°C 3 s	185-200°C 3 s	N/A	170°C 2 s	185-200°C 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					

4titude® recognises that designated trademarks and brands of the Instrument Compatibility Table are the property of their respective owners.

# 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](http://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<sup>RA</sup> 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 be 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.

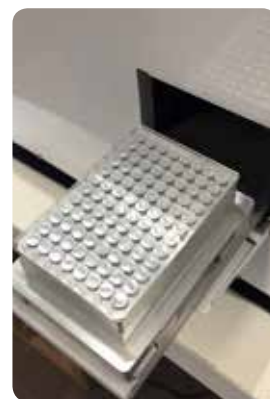


Figure 3: Random Access Sealing Procedure using the a4S<sup>RA</sup> Automatic Random Access Heat Sealer (4ti-0675, prototype shown)

### 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 <sup>RA</sup> 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.



### 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

### 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.

## 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.



### 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

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

### Thermal Test Film Colour Chart

Temperature/ Duration	160°C	165°C	170°C	175°C	180°C	185°C	190°C
1 second							
10 seconds							
60 seconds							

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



### 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](http://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 mm 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



### 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



### 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

Seal Integrity  
Temperature Range

-80°C  
110°C

\*110°C with  
pressurised  
heated lid

Peelable



### 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



### 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

Seal Integrity  
Temperature Range

-40°C  
120°C

Peelable



Pierceable



### 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



### Features

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

Seal Integrity  
Temperature Range

-80°C  
110°C

Peelable



Pierceable



### 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)

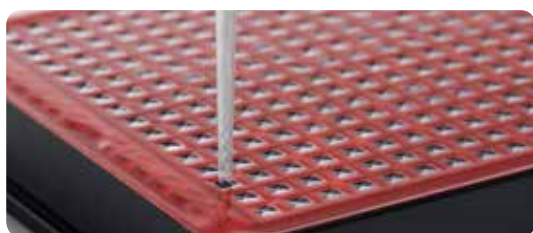
Code	Details	Sheets/Case
4ti-0566*	Sheets (135 mm x 77 mm)	100

\*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



### 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

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

## 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

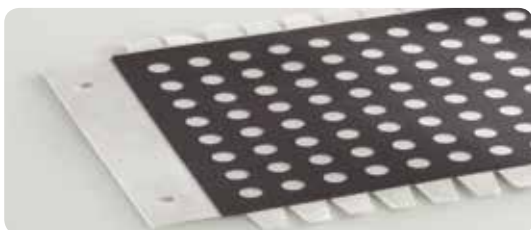
Low strength adhesive film, transparent, peelable, suitable for short term storage

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

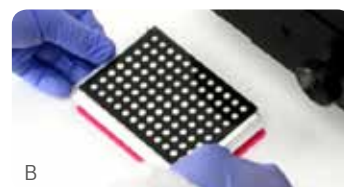
### Typical Molecular Diagnostic workflows - an example

#### 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



## Adhesive Seal Roller & Adhesive Seal Applicator



4ti-0502

### 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



4ti-0503

### 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 96-well microplates only	qPCR & other fluorescent applications Imaging techniques incl. crystallisation Plate readers, microscopy	PCR & sample storage Incubations	High temperature incubations & low temperature storage	Microplate sealing containing solvents incl. DMSO	Sample application or retrieval 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 Format Dimensions	4ti-0500 Sheets 135 mm x 80 mm	4ti-0565 Sheets 133 mm x 76 mm	4ti-0560 Sheets 140 mm x 77 mm	4ti-0550 Sheets 130 mm x 80 mm	4ti-0500FL Sheets 137 mm x 80 mm	4ti-0512 Sheets 122 mm x 80 mm	4ti-0566 Sheets 135 mm x 77 mm	
Code Format Dimensions	4ti-0500/8 Perforated sheets 115 mm x 100 mm		4ti-0561 Roll 100 m x 80 mm					
Code Format Dimensions	4ti-0500/12 Perforated sheets 137 mm x 71 mm		4ti-0561/S Sample roll 5 m x 80 mm					
Code Format Dimensions	4ti-0500/HP Half plate sheets 70 mm x 80 mm		4ti-0560/HP Half plate sheets 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-0-Seal	Double Skin Breathable Film	Microplate Seal	InterSeal	Name
	20	21	21	21	22	22	Details see page
Specifications							
	Sample application or retrieval 384 well plates only	Eukaryotic cell culture, bacterial culture and long-term live assays 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 Good solvent resistance, including DMSO	Gas permeable that allows air and CO <sub>2</sub> exchange, but prevents moisture evaporation Optically clear	Very low moisture transfer rate Suitable for bacterial or cell culture Air porosity: 10 sec/100 cc/in <sup>2</sup>	Thin gas permeable, moisture barrier seal Allows air and CO <sub>2</sub> exchange, prevents evaporation	Medium strength transparent seal	Two sealing surfaces 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 <sup>3</sup> /m <sup>2</sup> /day	8,900 m <sup>3</sup> /m <sup>2</sup> /day	900 m <sup>3</sup> /m <sup>2</sup> /day	N/A	N/A	Gas Permeability Rate
	N/A	1 g/m <sup>2</sup> /day	4,200 g/m <sup>2</sup> /day	450 g/m <sup>2</sup> /day	N/A	N/A	Moisture Vapour Transmission Rate
		✓	✓				Sterile
	✓	✓		✓			Pierceable
	✓	✓	✓	✓	✓	✓	Peelable
	✓	✓	✓	✓	✓	✓	RNase/DNase free
Product Codes							
	4ti-0566/384 Sheets 117 mm x 80 mm	4ti-0516/24 Sheets 140 mm x 80 mm	4ti-0517 Sheets 135 mm x 80 mm	4ti-0518 Sheets 135 mm x 83 mm	4ti-0510 Sheets 130 mm x 80 mm	4ti-0519 Sheets 148 mm x 98 mm	Code Format Dimensions
		4ti-0516/96 Sheets 137 mm x 80 mm	4ti-0517/ST Sheets, sterile 135 mm x 80 mm	4ti-0518/ST Sheets, sterile 135 mm x 83 mm			Code Format Dimensions
		4ti-0516/384 Sheets 137 mm x 80 mm					Code Format Dimensions
							Code Format 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 <i>Note: Not compatible with low profile plates</i>	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



### 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



### 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) <b>only</b>	Clear	Yes	50
4ti-0135	96 Round Well Sealing Cap Mat	96 Round Deep Well Storage Microplate (4ti-0120) <b>only</b>	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 <i>Not for use with 96 Round Deep Well Storage Microplate (4ti-0120) and 96 Round Well Microplate (4ti-0125)</i>	Clear	Yes	50
4ti-0139	384 Square Well Sealing Cap Mat	384 well storage plates, universal fit	Clear	Yes	50

### License Statement and Trademarks

Disclaimer: FrameStar®, 4s3™, CrystalStrips™, FrameSeal™, INDI™, Q-Stick™, Tear-A-Way™, UltraVision™, Vari-Plate™, Vari-Strips™ and Vision Plate™ are trademarks of 4titude® Ltd.

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FrameStar® PCR plates are covered by one or more of the following U.S. patents or their foreign counterparts, owned by Eppendorf AG: US Patent Nos. 7,347,977 and 6,340,589



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