4titude®

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

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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.

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)[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

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	Autoclavable

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

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

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

[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

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

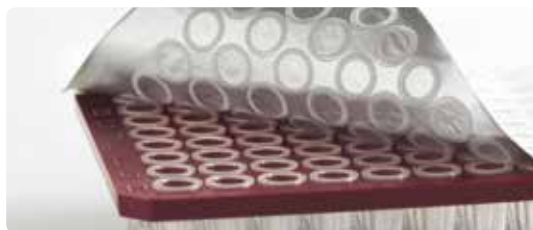| Seal Integrity Temperature Range	−20°C 80°C*	*110°C with pressurised heated lid	Pierceable

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

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	Autoclavable	Peelable

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

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

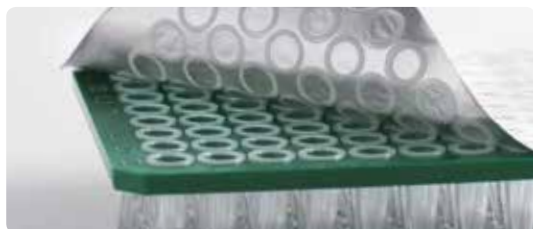| Seal Integrity Temperature Range	−80°C 90°C*	*110°C with pressurised heated lid	Autoclavable	Peelable

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 ✓ |

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

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

Pierce Heat Seal

| | Seal Integrity Temperature Range | -20°C 120°C | Autoclavable 121°C ✓ | Pierceable ✓ |

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

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 Strong

| | Seal Integrity Temperature Range | -20°C 120°C | Pierceable ✓ |

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.

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

[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 121°C ✓ | 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 ✓ |

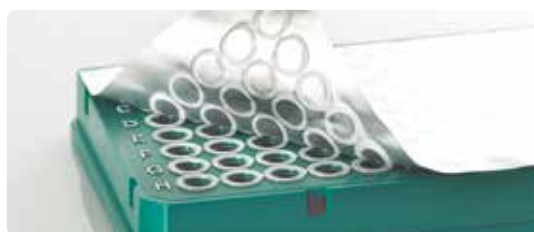## Polystyrene Foil Heat Seal

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

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

Thermal Bond Heat Seal

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

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

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

Gas Permeable Heat Seal Mark 2

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

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

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

[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 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^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®

	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 $m^3/m^2/day$; Moisture vapour transmission: 20$g/m^2/day$	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 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 respectice 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.

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 - 200ºC
- 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

Temperature/ Duration	150ºC	160ºC	170ºC	180ºC	190ºC	200ºC	210ºC
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

a4S Automatic Roll Heat Sealer

a4S Automatic Roll Heat Sealer

The main advantage of the a4S is that it is independent from an external air supply, which gives it the flexibility to be used on standard lab benches as a stand-alone unit, or integrated within a robotic set-up. The sealer's rapid heating element enables a fast start-up, and the stand-by function saves energy when the unit is not in use.

The a4S sealer is compatible with a wide range of SBS footprint plates, including all PCR plate formats from 96 to 1536 wells, assay plates, deep well storage plates and microplates. Varying plate heights, from 3 mm to 60 mm can be accommodated, with minimal adjustment of the instrument. Plates are presented in the portrait format and the plate position on the shuttle allows good access for robotic integration up to roll change.

- Unrivalled sealing performance and consistency
  5,000 perfect seals without intervention
- SiLA compatible
  Easy integration into robotic systems
- No external air supply required
  Cost-saving and compact device, simple installation

Features

Installation
- No need for compressed air – installation is fast and flexible
- 2 positions for different roll sizes – increased flexibility
- Optional roll cover – seal protection for sensitive applications
- Special short roll formats available when using lower roll position and the optional dust cover for protection of the roll
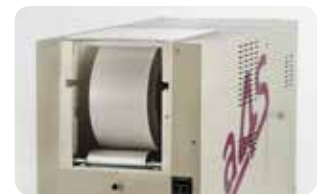
Figure 4: Optional roll cover to protect the seal roll

Handling
- Colour touch screen with intuitive user interface – ease of use
- Unlimited password protected protocols – 3 security levels save personalised and SOP set temperatures and times
- Rapid heating – fast start up time, block uniformity is maintained to ± 1°C
- Variable time/temperature controls – adjustment of time and temperature settings enables the perfect seal to be established for any sealer friendly, high-quality plate type, e.g. all 4titude® plates
- Up to 5,000 seals without manual intervention – true walk-away-system

Figure 5: Colour touch screen with intuitive user interface - ease of use

Sealing
- Reproducible sealing – a fixed pressure and accurate time and temperature controls ensure consistent sealing
- High sealing pressure – improved seal uniformity on the widest range of plates
- Sealing cycle time of less than 15 sec – time saving

Figure 6: Protocol management function - unlimited password protected protocols

Providing the perfect solution for automated heat sealing

Flexibility

- Compatible with a wide range of plate types, from racked tubes to 1536 well PCR plates – highest flexibility
- Flexibility of seal material choice – 4titude® offers a wide range of sealing materials, with a variety of properties for use with the a4S
- Compatible with gas permeable heat seals – no instrument modification necessary for maximum convenience

Figure 7: Compatibility with a wide range of plate types - two adapters supplied for optimal sealing results, with custom adapters available on request

Economic efficiency

- Competitive pricing – save money without compromises
- Auto standby mode – saves energy and prolongs component life
- 2 year warranty on parts and labour
- Extended warranty and service contracts available – for peace of mind

Plug and Play Robotic Integration

All 4titude® sealing instruments are compliant with SiLA standards for rapid integration of automated systems (www.sila-standard.org). This means they can be "plug and play" connected with other instruments, such as readers, robotic arms and liquid handlers, to give a custom automated system without the need to write expensive custom drivers.

The a4S heat sealer is extremely versatile leaving you the freedom to expand and reconfigure your systems such as adding robotic plate handling.

- Full communication protocol available – operate the instrument and record sealing conditions for each seal using the RS232 communication port
- SiLA compatible – quick and easy integration with other SiLA compliant devices using the SiLA driver

SiLA Rapid Integration®

Technical Specifications

Parameter	Specification
Dimensions (W x L x H) *Please note: Additional space is required if large seal rolls are used*	230 x 507 x 276 mm
Sealing Temperature Range	100-195ºC
Sealing Time Range	0.1-10 sec
Weight (without roll)	27 kg
Power Supply	V in: AC 100-240 V V out: DC 24 V 320 W
Power Consumption	700 W (max)
Working Temperature Range	10-30ºC
Operating Humidity (RH)	0-85%
Connection	RS-232 serial port, USB port

a4S Automatic Roll Heat Sealer

Includes: Power cord, manual, plate support adapters A (4ti-0665-2) and B (4ti-0665-3), 24 months parts and labour warranty

Code	Details	Qty
4ti-0665	a4S Automatic Roll Heat Sealer	1

Accessories

Code	Details	Qty
4ti-0665-1	a4S Seal Loading Tool	1
4ti-0665-2	a4S Plate Support Adapter A	1
4ti-0665-3	a4S Plate Support Adapter B	1
4ti-0665-4	a4S Roll Holder Set Contents: spindle, clamping wheels, locking nuts, O-rings	1
4ti-0665-5	a4S Vacuum Cups, Front, clear, set of 2	2
4ti-0665-6	a4S Vacuum Cups, Back, black, set of 2	2
4ti-0665-8	a4S Clear Plastic Roll Dust Cover	1
4ti-0665-41	SiLA driver for a4S heat sealer	1

Figure 8: Flexibility of seal material choice - 4titude® offers a wide range of sealing films and foils

4s3™ Semi-Automatic Sheet Heat Sealer

4s3™ Semi-Automatic Sheet Heat Sealer

The 4s3™ is a semi-automatic sheet heat sealer which is compatible with a wide range of seals and plates of differing designs and heights.

With variable temperature and time settings, sealing conditions are easily optimised to produce a 100% tight seal, eliminating sample loss.

Plate and seal are placed on the holder, the "*Operate*" button pressed and the drawer automatically closes. The sealing process is controlled by an electric mechanism.

Heat sealers provide a mechanism for controlled plate sealing, eliminating variation and giving consistent sealing every time.

- Automatic sealing process for unmatched sealing consistency
- Variable temperature and time settings for easy optimisation of sealing conditions
- Simple, single button operation
- Rapid heating element for fast start up
- Real-time temperature display
- Auto stand-by function to save energy
- Auto switch off function for added safety
- Compatible with a wide variety of consumables
- RS-232 serial port enables full integration with robotic automation systems
- Full range of heat seals available
- Small footprint
- Low temperature sealing for use with adhesive seals

Figure 9: Real-time temperature display

Features

Real Time Display
- The rapid heating element allows for a quick start-up within minutes
- The temperature is displayed in real-time so that the heating up process can be monitored

Energy Saving Functions
- When the unit is left idle it automatically switches into standby mode, during which the temperature of the heating element is reduced to 60ºC to save energy
- When the sealer is left idle for longer periods it switches off automatically for added safety
- The times at which the unit switches into standby and switch off modes can be adjusted to suit your needs

RS-232 Port for Automation Integration
- The 4s3™ has an RS-232 port to enable it to be integrated into most automated systems
- SiLA compatible – quick and easy integration with other SiLA compliant devices using the SiLA driver

The 4s3™ is compatible with a wide range of seals and plates of differing designs and heights

Adapters

The 4s3™ employs a unique and cost saving adapter system

- Deep well plates and most other skirted plates can be sealed on the standard plate support adapter (4ti-0615)
- For all other 96 well PCR plates, an additional plate support adapter (4ti-0625, optional extra) must be used
- Both adapters can also be combined for easier handling of shallow plates such as 384 well PCR plates.
- For best sealing results with Random Access seals, 4 different adapters are available to offer the perfect plate support and seal alignment

Sealing Aids

For better sealing of films which have a tendency to curl, 4titude® offers sealing aids.

- A weighted platen (4ti-0602) for use with deep well blocks can be ordered separately
- A sealing frame for use with all other plate designs is supplied when ordering the optional 4ti-0625 plate support adapter

Plate Formats

The following plate formats can be used with the appropriate plate adapter:

- Standard SBS footprint PP & PS plates & deepwell blocks
- PCR plates (skirted, semi-skirted and non-skirted formats)

Figure 10: 4ti-0615 Plate Support Adapter, Standard

Figure 11: 4ti-0625 Plate Support Adapter, PCR 96

Figure 12: 4ti-0613 Plate Support Adapter, Random Access, Low Profile

Figure 13: 4ti-0614 Plate Support Adapter, Random Access, Standard Profile

Figure 14: 4ti-0602 Weighted Sealing Platen

Figure 15: 4ti-0612 Sealing Frame

FrameSeal™ Heat Sealing Frames

4titude® offers heat sealing sheets held within a disposable, rigid, stackable frame that are compatible with the 4s3™ heat sealer. Please see page 13.

Figure 16: FrameSeal™

4s3™ Semi-Automatic Sheet Heat Sealer

Includes: Power cord, manual, standard plate support adapter (4ti-0615), 12 months parts and labour warranty

Code	Details	Qty
4ti-0655	4s3™ Semi-Automatic Sheet Heat Sealer	1

Accessories

Code	Details	Qty
4ti-0615	4s3™ Plate Support Adapter, Standard, supplied with the unit, *for skirted 96 and 384 well plates*	1
4ti-0616	4s3™ Plate Support Adapter, Roche 1536, *for Roche 1536 well PCR plates*	1
4ti-0625	4s3™ Plate Support Adapter, PCR 96, *for 96 well PCR plates*	1
4ti-0618	4s3™ Plate Support Adapter, PCR 384, *for 384 well PCR plates*	1
4ti-0613	4s3™ Plate Support Adapter, Random Access, Low Profile, *for low profile plates*	1
4ti-0614	4s3™ Plate Support Adapter, Random Access, Standard Profile, *for standard profile plates*	1
4ti-0602	4s3™ Weighted Sealing Platen	1
4ti-0612	4s3™ Sealing Frame, *for use with Plate Support Adapter, PCR 96 (4ti-0625)*	1

Technical Specifications

Parameter	Specification
Dimensions (W x L x H)	181 x 275 x 310 mm
Sealing Temperature Range	60-200°C
Sealing Time Range	0-10 sec
Weight	9 kg
Power Supply	110/230V
Power Consumption	300 W (max)
Connection	RS-232 serial port

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 for more details

| Seal Integrity Temperature Range | -20°C 110°C* | *110°C with pressurised heated lid | Peelable ✔ |

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

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

| Seal Integrity Temperature Range | -20°C 110°C* | *110°C with pressurised heated lid | Peelable ✔ |

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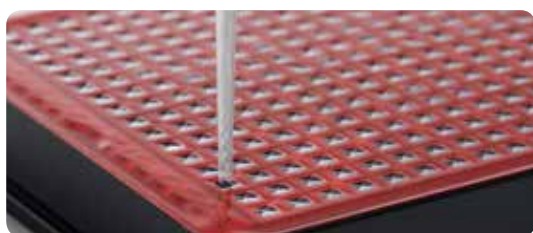
Code	Details		Sheets/Case
4ti-0566*	Sheets	(135 mm x 77 mm)	100

*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

| 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

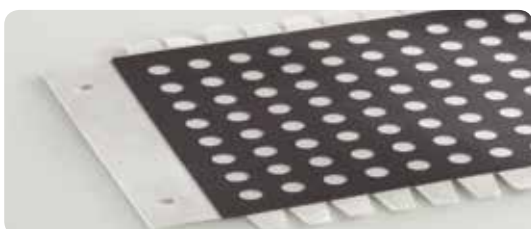| Seal Integrity Temperature Range | -20°C 80°C | | Peelable ✓ |

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
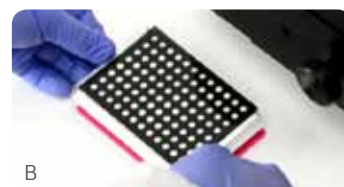
Typical Molecular Diagnostic workflows – an example

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

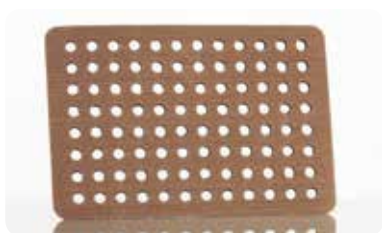| Code		Qty
4ti-0502	Adhesive Seal Roller	1
4ti-0503	Adhesive Seal Applicator	1

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\n\n96-well microplates only	qPCR & other fluorescent applications\n\nImaging techniques incl. crystallisation\n\nPlate readers, microscopy	PCR & sample storage\n\nIncubations	High temperature incubations & low temperature storage	Microplate sealing containing solvents incl. DMSO	Sample application or retrieval\n\n96 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\nFormat\nDimensions	4ti-0500\nSheets\n135 mm x 80 mm	4ti-0565\nSheets\n133 mm x 76 mm	4ti-0560\nSheets\n140 mm x 77 mm	4ti-0550\nSheets\n130 mm x 80 mm	4ti-0500FL\nSheets\n137 mm x 80 mm	4ti-0512\nSheets\n122 mm x 80 mm	4ti-0566\nSheets\n135 mm x 77 mm	
Code\nFormat\nDimensions	4ti-0500/8\nPerforated sheets\n115 mm x 100 mm		4ti-0561\nRoll\n100 m x 80 mm					
Code\nFormat\nDimensions	4ti-0500/12\nPerforated sheets\n137 mm x 71 mm		4ti-0561/S\nSample roll\n5 m x 80 mm					
Code\nFormat\nDimensions	4ti-0500/HP\nHalf plate sheets\n70 mm x 80 mm		4ti-0560/HP\nHalf plate sheets\n70 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 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_2 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^2	Thin gas permeable, moisture barrier seal Allows air and CO_2 exchange, prevents evaporation	Medium strength transparent seal	Two sealing surfaces Optical windows	Special Properties
-80℃	-20℃	-20℃	0℃	-20℃	-20℃	Seal Integrity Min Temperature
120℃	80℃	40℃	40℃	80℃	110℃	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 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 *Note: Not compatible with low profile plates*	200

CrystalStrip™

4ti-0755

4ti-0751

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 *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

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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