Sealing

4titude[®] offers the widest range of plate sealing solutions on the market.



You can choose between adhesive and heat sealing solutions. Both offer a wide selection of materials to choose from depending on your application requirements. See page 83 for application dependent selection of adhesive seals and page 73 for heat seals.

All 4titude[®] seals are certified free from nucleases and human genomic DNA.

Adhesive Seals:

Most adhesive seals are supplied with convenient tabs on both ends for easy application. These tabs also enable easy peeling to remove a seal without leaving adhesive residue on the sealing surface. For best sealing results we offer a roller, see page 53 to ensure even pressure is applied, for complete and secure application of all our adhesive seals.

Heat Seals:

Heat seals are available as sheets, for manual or semi-automatic heat sealers, as well as in roll formats for automated sealers. Heat sealing offers 100% effective sealing integrity and is a quick and cost-effective sealing solution.

Depending on throughput we recommend our semi-automatic 4s3 heat sealer page 64 or automated A4S sealer page 62 for applying your heat seal.



All seals are certified free from nucleases and human genomic DNA

titude

Heat Sealing

Heat sealing is the gold standard plate sealing method, minimising sample loss and maximising sample security, for PCR, qPCR, storage and other applications.

The sealing performance of heat seals is superior to cap, mat and adhesive sealing with clear reductions in sample loss and cross contamination. The optimized sealing performance allows use of smaller reaction volumes leading to reagent savings.

Heat sealing is the most cost efficient way to seal plates for a wide range of applications. Per well comparisons show a 3 to 5 five fold reduction in costs for qPCR application (list price comparison of Clear Weld Seal against caps and qPCR seal) and at least a 50% reduction for storage solutions (list price comparison of Peel Seal against caps and PCR seal). Costs can be further reduced by changing to use of the material format, using rolls rather than sheets.

The application of a heat seals is much faster than caps or adhesive seals. Typical sealing times are around 2,5 seconds. Depending on throughput the use of a semi-automatic or fully automatic heat sealer can guarantee a reproducible sealing quality by standardising the sealing parameters, time, temperature and pressure. Sealing performance variability between different users can be eliminated.

4titude[®] offers a wide choice of heat seals in both roll and sheet format. Different seals can be chosen to optimize the use depending on plate material, desired permeability or resistance, ability to peel or pierce the seal material and visualisation through the material. Please refer to the comparison table on page 73 for an overview of our heat sealing range.

All seals are certified free from nucleases and human genomic DNA contamination.

The best sealing results can be obtained by using flat, rigid plates with a raised rim design like our FrameStar[®] 2-component plates and reliable, high quality sealing instruments such as the 4s3 semi-automated heat sealer or the 4AS sealer.

For details of the instruments see page 62 and 64. For a demonstration or trial of a heat sealer please contact us at **info@4ti.co.uk**.





Automatic Heat Sealer A4S

The A4S automatic heat sealer completes our heat sealing range by providing the perfect solution for automated heat sealing of medium to high-throughput or full automation applications.

Crucially the A4S does not require an air supply allowing for flexible use on standard lab benches as stand-alone unit, or integrated within a robotic set-up. The sealer has a rapid heating element, for fast start-up, and has a stand-by function, to save energy when not in use.

The A4S sealer works with a wide range of plates from 384well and 24well PCR plates, to deep well or storage plates with an SBS footprint. Different plate heights, from 3mm to 60mm, can be accommodated with minimal adjustments on the instrument. Plates are presented in portrait format and the plate position on the shuttle allows good access for robotic integration.

169°C

urrent Prot

2.9 ser

Seal



Standard size, 78mm width rolls, can be loaded in either of two roll positions depending on roll length and available space enabling the entire instrument to fit under the gantree of many liquid handling robots.

The A4S doesn't produce any sealing material waste. The roll width covers an SBS footprint microplate and the seal is cut at the end of the plate leaving only minimal overhangs to allow for easy removal of the seal, but not interfering with plate stacking.

For our range of sealing materials see page 66 to 72. Sample rolls are available on request.

Code	Descriptio	n	Quantity
4ti-0665	A4S Auton	natic Sealer	1
			4 Libras
	01000	Current Protocol: THOMAS	
17	70°C	^{2.4} 2.5	Seal
Set To Status	emperature Ready	2.6	
	6	Ititude	

The modern user interface has a colour touchscreen, intuitive controls and can save individual sealing protocols for future use.



Feature:

- No air supply needed
- Colour-Touch-screen/ Institutive user interface
- Saved sealing protocols
- Auto stand-by function to save energy
- Compatible with a wide range of the plate types, including 1536well PCR plates
- Rapid heating element for fast start-up
- Optional cover
- 2 roll positions depending on available space and roll size
- Sealing cycle time of less than 15sec
- Up to 5000 seals without manual intervention

Technical Specification Weight: 25 kg Voltage: 110/230V Maximum power consumption: 750W Power saving mode: less than 20W Sealing Temp: 120-200C Sealing Time: 0-10sec Connection: RS-232 serial port

4s3

The 4s3 is a semi-automatic heat sealer compatible with a wide range of sealing materials and plates including PCR, qPCR, assay and storage plates.

Compared to less automated heat sealers on the market the 4s3 removes any user variation from seal application ensuring a reproducible seal time and time again and enabling confidence in the consistency of sealing results.

The pressure applied during sealing is constant and the time and temperature can be adjusted. This will enable the seal of choice to be attained reproducibly. An easily peelable seal or a strong seal for storage can be achieved without fear of under or over sealing.

Damage to microplates caused by oversealing is prevented enabling repeated resealing of plates.

The 4s3 is compatible with any standard SBS footprint plate and can also be used to seal racked tubes/tube strips.

4titude[®] offers the largest range of heat sealing materials available, with peelable, piercable and permeable sealing film and foils.

For a demonstration or trial of a 4s3 please contact 4titude or your local distributor.



set temperature

press "operate"

(4)



set time



plate is sealed automatically



load plate & seal



remove sealed plate



Features and Benefits

- 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 wide vareity of consumables
- RS-232 serial port enables unit to be integrated into automated systems
- Full range of heat seals available
- Small footprint
- Low temperature sealing for use with adhesive seals

Plate Formats

The 4s3 is compatible with all types of SBS footprint plates:

- SBS standard footprint polypropylene & polystyrene plates, use adapter 4ti-0615
- SBS deep-well plates (96 or 384-well), use adapter 4ti-0615
- 96well PCR plates (skirted, semi-skirted or non-skirted), use adapter 4ti-0625

Adapters and Sealing Aids

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 carrier (4ti-0615, supplied with the unit). For all 96well PCR plate segments and tube strips, an additional plate carrier (4ti-0625, optional extra) must be used. Both plate carriers can be combined for easier handling of shallow well plates, such as 384-well PCR plates.

For improved sealing of films or foils that have a tendency to curl, we offer sealing aids. A weighted platen (4ti-0602) for use with deep-well plates is supplied with the unit and a sealing frame for use with all other plate designs is supplied when ordering the optional 4ti-0625 adapter.

Real Time Display

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

Energy Saving Functions

When the unit is left idle, it automatically switches into stand-by mode, during which the temperature of the heating element is reduced to 60°C, 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 stand-by and switch-off modes can be adjusted to suit the users' needs.

RS-232 Serial Port for Automated Integration

The addition of a serial port at the back of the unit means the 4s3 can be integrated into an existing LIMS system where it truly becomes an automated, walk-away heat sealer.

The 4s3 is SILA compatible and a driver for plug and play use in integration systems is available



Ordering Information		
Code	Description	
4ti-0655	4s3 Heat Sealer	
	Includes universal power supply, power cord, manual, standard plate	
	adapter (4ti-0615) and weighted seal platen (4ti-0602)	
Sealing Accessories and Tools		
4ti-0615	Adapter for deep-well and 384-well PCR plates	
4ti-0616	Adapter for Roche 1536-well PCR plates	
4ti-0602	Weighted seal platen to hold down	
	sealing sheets with a tendency to curl	
4ti-0625	Adapter for 96-well PCR plates, includes sealing frame (4ti-0612)	
4ti-0612	Sealing frame for use with 4ti-0625 adapter	



Real-time temperature display



4ti-0625: 96-well PCR plate adapter



4ti-0615: Standard plate adapter



4ti-0615 & 4ti-0625 interlocked for easy handling of shallow well plates



4ti-0616 & 4ti-0625 interlocked for easy handling of Roche 1536-well plates



4ti-0616: Roche 1536-well plate adapter



4ti-0602: Weighted sealing platen



4ti-0612: Sealing frame

Technic	al Specifica	ation	
Weight:	9kg		
Dimensi	ons: 310 x 2	275 x 181m	m (HxDxW)
Voltage:	110/230V		
Power: 3	300W		
Sealing	Temp: 60-2	00°C	
Sealing	Time: 0 - 10) seconds	
Connect	ion: RS-232	2 Serial por	rt

Clear Seal



Clear seal is an optically clear film which forms an easily peelable yet PCR/qPCR tight seal. Its optical clarity allows use for all optical applications. The clear seal can be used to seal most plate types including polypropylene, polyethylene, polystyrene and COC plates. Available as sheets or on a roll for automated sealers.

Code	Pack Size/Dimensions
4ti-0540	500m x 78mm roll ¹ Approx 4200 seals
4ti-0540/REMP	500m x 78mm roll ³ Approx 4200 seals
4ti-0540S	Trial roll ¹ 5m x78mm
4ti-0542	350m x 115mm roll ² Approx 4400 seals
4ti-0542/REMP	500m x 115mm roll ⁴ Approx 6250 seals
4ti-0542S	Trial roll
4ti-0541	100 sheets (125mm x 78mm) 5m x115mm

Clear Weld Seal Mark II



Clear weld seal is an optically clear polymer film which forms a permanent bond to polypropylene plates that can not be peeled and is difficult to pierce. The seal has a good solvent resistance for safe long term storage.

Sample can be accessed if required using a blade or needle.



Now also available as FrameSeal product see page 75

Code	Pack Size/Dimensions
4ti-0573	610m x 78mm roll ¹ Approx 5000 seals
4ti-0573S	Trial roll ¹ 5m x 78mm
4ti-0574	500m x 115mm roll ² Approx 6250 seals
4ti-0574S	Trial roll ² 5m x 115mm
4ti-0575	100 sheets (125mm x 78mm)
4ti-0575/FS	Sealing Frame: 50 seals/frame per pack



Applications

- qPCR or other optical applications (e.g. fluorescence or colorimetric assays)
- Short term compound storage
- Suitable for most plate materials
- Available in sheet or roll format for automated sealers
- Free from DNase, RNase and human genomic DNA



Applications

- PCR
- water bath thermal cyclers
- qPCR and other optical applications (e.g. fluorescence and colorimetric assays)
- Storage and disposal of hazardous materials
- Recommended for use with DMSO
- Available as sheets or in roll format for automated sealers
- Free from DNase, RNase and human genomic DNA

Clear Seal 3730



The Clear Seal 3730 is a clear polyester backed film which is particularly thin. It seals to polypropylene, polystyrene, polyethylene and COC microplates. This seal has good optical clarity with moderate solvent resistance. The thin nature of this seal enables it to be easily pierced with an auto-sampler needle, or the probe from the ABi 3730 sequencer.

The seal is only available in roll format, but a roll with perforated sheets can be used for low throughput.

Code	Pack Size/Dimensions
4ti-0580	610m x 78mm roll ¹ Approx 5000 seals
4ti-0580S	Trial roll ¹ 5m x 78mm
4ti-0582	500m x 115mm roll ² Approx 6250 seals
4ti-0582S	Trial roll ² 5m x 115mm
4ti-0581	Roll of 1000 perforated sheets 125mm x 78mm



Applications

- PCR
- qPCR and other optical applications (e.g. fluorescence and colorimetric assays)
- Piercable by autosamples needles
- Piercable by the ABI 3730
- Available in roll format for automated sealers
- Free from DNase, RNase and human genomic DNA

Peel Seal



This popular laminate material gives a peelable heat seal to PP and COC plates. It can be peeled directly from the plate following removal from the freezer and is a good barrier to aqueous solutions. The seal shows moderate resistance to solvents at room temperature and forms a weld-seal to polyethylene plates (can not be peeled).

Code	Pack Size/Dimensions
4ti-0520	610m x 78mm roll ¹ Approx 5000 seals
4ti-0520S	Trial roll ¹ 5m x 78mm
4ti-0522	500m x 115mm roll ² Approx 6250 seals
4ti-0522S	Trial roll ² 5m x 115mm
4ti-0521	100 sheets (125mm x 78mm)



Applications

- Very low temperature compound storage.
- Mid-term (<5 days) room temperature compound storage
- PCR
- Available as sheets or in roll format for automated sealers
- Free from DNase, RNase and human genomic DNA
- 1 Compatible with Thermo Fisher ALPS 300 $^{\prime\prime}$ / ALPS 3000 $^{\prime\prime}$ / KBiosystems Wasp $^{\prime\prime}$ / 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
- Compatible with REMP Landscape / Stacking Heat Sealers (LHS/SHS)
 COC = Cyclic Olefin Copolymer

+44 (0)1306 884885

DMSO Resistant Peel Seal



This laminate material gives a peelable heat seal to polypropylene and COC plates. It can be peeled directly from the plate immediately after removal from the freezer. The DMSO resistant peel seal is an excellent barrier to aqueous solutions and solvents, in particular DMSO, even at room temperature.

It forms a weld-seal to polyethylene plates (can not be peeled), requiring a blade or needle for access.

Code	Pack Size/Dimensions
4ti-0585	500m x 78mm roll ¹ Approx 4200 seals
4ti-0585/REMP	500m x 78mm roll ³ Approx 4200 seals
4ti-0585S	Trial roll ¹ 5m x 78mm
4ti-0586	500m x 115mm roll ² Approx 6200 seals
4ti-0586/REMP	500m x 115mm roll ⁴ Approx 6200 seals
4ti-0586S	Trial roll ² 5m x 115mm
4ti-0587	100 sheets (125mm x 78mm)

Pierce Seal



This foil-based heat seal is suitable for to polypropylene and polystyrene plates and can be easily pierced with a manual or auto pipette tip. It has very good solvent resistance, including to DMSO. Seals can be applied on top of each other allowing multiple access/resealing of samples. A blue colour print identifies the non-sealing surface for ease of application. This seal remains intact to very high temperatures.

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Code	Pack Size/Dimensions
4ti-0530	610m x 78mm roll ¹ Approx 5000 seals
4ti-0530/REMP	610m x 78mm roll ³ Approx 5000 seals
4ti-0530S	Trial roll ¹
4ti-0532	500m x 115mm roll ² Approx 6200 seals
4ti-0532/REMP	500m x 115mm roll ⁴ Approx 6200 seals
4ti-0532S	Trial roll ²
4ti-0531	100 sheets (137mm x 76mm)



Applications

- Low and room temperature compound storage with DMSO* and other organic solvents
- 100% DMSO can be stored at room temperature for 12 months with no deterioration of the seal quality
- Available in sheet and roll format for automated sealers
- Free from DNase, RNase and human genomic DNA



Applications

- PCR
- Low and room temperature compound storage with DMSO and other organic solvents
- Sample shipping
- Available in sheet and roll format for automated sealers
- Free from DNase, RNase and human genomic DNA

96 INDI[™] Seal



The INDI Seal is a foil-based heat seal that seals to polypropylene and is suitable for low temperature storage. The seal consists of 96 perforated individual sealing caps in a foil frame. The frame is removed after heat sealing leaving each well with an individual air tight seal. The seals have tabs for easy removal by hand or with forceps, without leaving any residue.

Mainly developed for use with tubes in cluster racks some plates can also be sealed.

Re-sealing and piercing are possible.

Code	Pack Size/Dimensions	
4ti-0543	INDI Seal for individual tube sealing	
	(125mm x 78mm sheets)	50 sheets

Foil Seal



An aluminium heat seal that seals to PP and PS plates and can be pierced with a pipette tip or peeled by hand. Good solvent resistance including DMSO. Resealing onto an existing seal is possible. A red colour print identifies the non-sealing surface for ease of application.

Code	Pack Size/Dimensions
4ti-0535	610m x 78mm roll ¹ Approx 5000 seals
4ti-0535/REMP	610m x 78mm roll ³ Approx 5000 seals
4ti-0535S	Trial roll ¹ 5m x 78mm
4ti-0537	500m x 115mm roll ² Approx 6200 seals
4ti-0537/REMP	610m x 115mm roll ⁴ Approx 6200 seals
4ti-0537S	Trial roll ² 5m x 115mm
4ti-0536	100 sheets (125mm x 78mm)



Applications

- Compound storage
- Sample shipping
- Free from DNase, RNase and human genomic DNA



Applications

- Low temperature compound storage
- Short-term room temperature compound storage
- PCR
- Resealable
- Available in sheet and roll format for automated sealers
- Free from DNase, RNase and human genomic DNA

¹ Compatible with Thermo Fisher ALPS 300[™] / 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) COC = Cyclic Olefin Copolymer

Polystyrene Foil Seal



The polystyrene foil seal creates a strong, but peelable seal to polystyrene plates. The seal can also be pierced with a pipette tip and has a good solvent resistance, including to DMSO. Resealing onto an existing seal is possible.

Code	Pack Size/Dimensions
4ti-0547	100 sheets (125mm x 78mm)

Thermal Bond



This is a heavy duty laminate material that seals to polypropylene to give a very strong but peelable seal. This seal affords a high degree of sample protection. Good solvent resistance including DMSO.

Code	Pack Size/Dimensions
4ti-0590	500m x 78mm roll ¹ Approx 4200 seals
4ti-0590S	Trial roll ¹ 5m x 78mm
4ti-0592	300m x 115mm roll ² Approx 3700 seals
4ti-0591	100 sheets (125mm x 78mm) 5m x 78mm



Applications

- Low temperature compound storage
- Short-term room temperature compound storage
- Resealing is possible
- Free from DNase, RNase and human genomic DNA



Applications

- Long term storage, including storage and transportation at low temperature
- Storage of organic solvents, acids and alkalines including DMSO
- PCR
- Suitable for water bath thermal cyclers
- Available in sheet and roll formats for automated sealers
- Free from DNase, RNase and human genomic DNA

Black Seal



This is a foil-based heat seal which is coated on the sealing surface with a low autofluorescence black pigment for use with light sensitive samples or for fluorescent assays. The Black Seal forms a peelable seal to polystyrene plates.

Code	Pack Size/Dimensions
4ti-0525	610m x 78mm roll ¹ Approx 5000 seals
4ti-0526	500m x 115mm roll ² Approx 6200 seals
4ti-0527	100 sheets (125mm x 78mm

Gas Permeable Seal Mk 2



This heat seal has a smaller pore size than the discontiuned Gas Permeable Seal (4ti-0596) which still allows for gaseous exchange, but limits evaporation. Handling in automated sealers is improved. The Gas Permeable Heat Seal Mk2 is suitable for cell culture and is available as sterile product for this application.

Code	Pack Size/Dimensions
4ti-0598	Gas Permeable Seal Mk 2 roll (610m x 78mm) ¹ Approx 5000 seals 1 roll
4ti-0598/ST	Gas Permeable Seal Mk 2 roll, sterile (610m x 78mm) ¹
	Approx 5000 seals 1 roll
4ti-0599	Gas Permeable Seal Mk 2 roll (500m x 115mm) ² Approx 6200 seals 1 roll
4ti-0599/ST	Gas Permeable Seal Mk 2 roll, sterile (500m x 115mm) ²
	Approx 6200 seals 1 roll
4ti-0597	Gas Permeable Seal Mk 2 sheets (125mm x 78mm) 100 sheets
4ti-0597/ST	Gas Permeable Seal Mk 2 sheets, sterile (125mm x 78mm) 100 sheets
	(10 packs x 10 sheets)



Applications

- Fluorescent and other light sensitive assays.
- Pierces with a force greater than 10N (ASTM D1000)
- Available in sheet and roll formats for automated sealers
- Free from DNase, RNase and human genomic DNA



Applications

- Cell culture
- Overnight incubation
- Seed and insect storage
- Permeability rate is > 20g/m2/24h
- Pore size is <20µm
- Available in sheet and roll format for automated heat sealers
- Free from DNase, RNase and human genomic DNA

¹ Compatible with Thermo Fisher ALPS 300[™] / ALPS 3000[™] / KBiosystems Wasp[™] / KBioscience FlexiSeal and Cube ² Compatible with Agilent (Velocity 11) PlateLoc[®] COC = Cyclic Olefin Copolymer

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Gas Permeable Clear Seal



This is a clear polymer film forming a peelable seal to polypropylene, polyethylene, polystyrene and COC plates with good optical clarity and moderate solvent resistance. The film has 3mm slits across the entire width of the roll or sheet, allowing gaseous exchange. Due to its wider temperature tolerance compared to the Gas Permeable Heat Seal it can be used for storage e.g. for seeds or insects.

Code	Pack Size/Dimensions
4ti-0540/SLIT	480m x 78mm roll ¹ Approx 4000 seals
4ti-0541/SLIT	100 sheets (125mm x 78mm)



Applications

- Insect studies
- Seed storage
- Available in sheet and roll format for automated sealers
- Free from DNase, RNase and human genomic DNA

¹ Compatible with Thermo Fisher ALPS 300[™] / ALPS 3000[™] / KBiosystems Wasp[™] / KBioscience FlexiSeal and Cube ² Compatible with Agilent (Velocity 11) PlateLoc[®] COC = Cyclic Olefin Copolymer

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Pack of 100 sheets (125mm x 78mm)	Roll 115mm4	Roll 115mm2	Roll 78mm3	Roll 78mm1	Product Codes	4s3 sealing time with Vision Plates (°C /secs)^	4s3 sealing time with 384well PP Plates (°C/secs)^	4s3 sealing time with 96well PP Plates (°C/ secs)^	Seals to	Material	RNase / DNase free	Peelable	Piercable	Max Temp	Min Temp	Special Properties	Application		
4ti-0541	4ti-0542/ REMP	4ti-0542	4ti-0540/ REMP	4ti-0540		185-200 / 3	165-180 / 3	175-185 / 2-3	PP, PE, PS, COC	Laminate	•	•		80°C (or 110°C with pressurised PCR heated lid)	-80°C	Good optical clarity. Moderate solvent resistance.	qPCR, short term compound storage.	p66	Clear Seal
4ti-0545	4ti-0574/REMP	4ti-0574	4ti-0573/REMP	4ti-0573		,	170-175 / 2-3	175-185 / 2-3	PP	Laminate	•			110°C	-80°C	Good optical clarity & resistant to DMSO.	PCR (esp. water bath), qPCR. Storage & disposal of hazardous materials.	p66	Clear Weld Seal Mark II
4ti-0581	4ti-0582/ REMP	4ti-0582	4ti-0580/ REMP	4ti-0580		175-185 / 2-3	165-175 / 2	165-175 / 3	PP, PE, PS, COC	Polymer	•		•	80°C (or 110°C with pressurised PCR heated lid)	-20°C	Good optical clarity, some solvent resistance.	gPCR and for use with ABI 3730 Sequencer.	p67	Clear Seal 3730
4ti-0521	4ti-0522/REMP	4ti-0522	4ti-0520/REMP	4ti-0520			170-175 / 2-3	175-185 / 3	PP, COC	Laminate		•		90°C (or 110°C with pressurised PCR heated lid)	-80°C	Can be peeled directly from -80°C freezer. Moderate resistance to solvents at room temperature.	Low temperature, compound storage, short term room temperature compound storage (<5 days), PCR.	p67	Peel Seal
4ti-0587#	4ti-0586/REMP	4ti-0586	4ti-0585/REMP	4ti-0585			170-175 / 2-3	175-185 / 3	PP, PE	Laminate		•		40°C	-80°C	Can be peeled directly from -80°C freezer. High resistance to solvents even at elevated temperatures.	Low temperature / room temperature compound storage with DMSO & other organic solvents.	p68	DMSO Resistant Peel Seal
4ti-0531	4ti-0532/REMP	4ti-0532	4ti-0530/REMP	4ti-0530		185-200 / 3	160-175 / 2	160-175 / 2	PP, PS	Foil			•	120°C	-20°C	Easily pierceable. Resistant to DMSO. Re-sealable with another Pierce Seal. Colour print identifies non- sealing surface	PCR, compound storage, sample shipping	p68	Pierce Seal
4ti-0536	4ti-0537/REMP	4ti-0537	4ti-0535/REMP	4ti-0535		185-200 / 3	165-175 / 2-3	165-180 / 2	PP, PS	Foil	•	•	•	110°C	-20°C	Re-sealable with another Foil Seal. Resistant to DMSO. Colour print identifies non- sealing surface. (Foil Seal only)	Low temperature compound storage.short-term room temperature compound storage, PCR.	p69/70	Foil Seal & PS Foil Seal
4ti-0591	4ti-0592/REMP	4ti-0592	4ti-0590/REMP	4ti-0590		,	160-170 / 2	170-180 / 2-3	РР	Laminate	•	•		110°C	-200°C	Very strong seal with PP. Resistant to DMSO and other solvents	Low temperature transportation & storage. PCR, esp. water bath cyclers. Storage of organicsolvents, acids & alkalines.	p70	Thermal Bond
4ti-0527	4ti-0526/ REMP	4ti-0526	4ti-0525/REMP	4ti-0525		185-200 / 3	,		PS	Foil	•	•		120°C	-80°C	A foil-based heat seal, coated on the sealing surface with a low fluorescence black pigment	Fluorescent & other light sensitive assays	p71	Black Seal
4ti-0597	4ti-0599/REMP	4ti-0599	4ti-0598/REMP	4ti-0598		170 / 2	170 / 2	170 / 2	PP, PS, COC	Woven material		•	•	80°C	-20°C	Small pore size that allows gaseous exchange, but limits evapor, but Permeability rate >20g/sqm/24h 20µm pore size	Cell culture, over night incubation, seed and insect storage	p71	Gas Permeable Seal Mk 2
4ti-0541/SLIT		4ti-0542/SLIT		4ti-0540/SLIT		185-200 / 3	165-180 / 3	175-185 / 2-3	PP, PE, PS, COC	Laminate			•	100°C	-80°C	3mm slits across entire surface of seal makes this permeable to gases	Storage e.g. for seeds or insects	p72	Gas Permeable Clear Seal
4ti-0543	,							175 / 3	PP	Laminate	•		•	120°C	-195°C	96 perforated individual sealing caps in a foil frame. Can be resealed	Compound storae, sample shipping	69d	INDI Seal

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Supplied on a perforated roll A Add 1 second to the sealing time when a weighted platen is used (4ti-0602) Compatible with Thermo Fisher ALPS3 300^m / ALPS3000^m / KBiosystems Chameleon^m / KBioscience FexiSeal & Remp/Tecan Plate Sealer Compatible with Adjuent (Velocity 11)PlateLoc® 3 Compatible with REMP Portrait Heat Sealer (PHSO) Compatible with REMP Landscape/Stacking Heat Sealers (LHS/SHS)

PP COC

Polypropylene Polystyrene Cyclic Olefin Copolymer Polythene

NB

Some seals available as sterile on request Rolls are also available on 150mm core for Remp/Tecan sealers. Please enquire.

Heat Seal Selection Table

This table makes it simpler for you to select the right heat seal for your sealer:

Choose which type of seal you require across the top and follow down to the correct row for your heat sealer, listed on the left. Take a note of the product code.

	Clear Seal	Clear Weld Seal Mark II	Clear Seal 3730	Peel Seal	DMSO Resistant Peel Seal	Pierce Seal	Foil Seal	PS Foil Seal	Thermal Bond	Black Seal	Gas Permeable Seal Mk 2	Gas Permeable Clear Seal	INDI Seal
	p66	p66	p67	p67	p68	p68	p69	p70	p70	p71	p71	p72	p69
4titude													
4s3	4ti-0541	4ti-0575	4ti-0581	4ti-0521	4ti-0587	4ti-0531	4ti-0536	4ti-0547	4ti-0591	4ti-0527	4ti-0597	4ti-0541/SLIT	4ti-0543
A4S	4ti-0540	4ti-0573	4ti-0580	4ti-0520	4ti-0585	4ti-0530	4ti-0535	4ti-0545	4ti-0590	4ti-0525	4ti-0598	4ti-0540/SLIT	ı
Agilent													
PlateLoc	4ti-0542	4ti-0574	4ti-0582	4ti-0522	4ti-0586	4ti-0532	4ti-0537		4ti-0592	4ti-0526	4ti-0599		
KBioscience													
FlexiSeal	4ti-0540	4ti-0573	4ti-0580	4ti-0520	4ti-0585	4ti-0530	4ti-0535		4ti-0590	4ti-0525	4ti-0598	4ti-0540/SLIT	
KBiosystems													
E-Fly 2	4ti-0541	4ti-0575	4ti-0581	4ti-0521	4ti-0587	4ti-0531	4ti-0536	4ti-0547	4ti-0591	4ti-0527	4ti-0597	4ti-0541/SLIT	4ti-0543
Wasp	4ti-0540	4ti-0573	4ti-0580	4ti-0520	4ti-0585	4ti-0530	4ti-0535		4ti-0590	4ti-0525	4ti-0598	4ti-0540/SLIT	
Chameleon TM	4ti-0540	4ti-0573	4ti-0580	4ti-0520	4ti-0585	4ti-0530	4ti-0535		4ti-0590	4ti-0525	4ti-0598	4ti-0540/SLIT	
REMP													
EasySealer	4ti-0541	4ti-0575	4ti-0581	4ti-0521	4ti-0587	4ti-0531	4ti-0536	4ti-0547	4ti-0591	4ti-0527	4ti-0597	4ti-0541/SLIT	4ti-0543
Portrait	4ti-0540	4ti-0573	4ti-0580	4ti-0520	4ti-0585	4ti-0530	4ti-0535		4ti-0590	4ti-0525	4ti-0598	4ti-0540/SLIT	
Thermo Fisher													
ALPS 300 TM	4ti-0540	4ti-0573	4ti-0580	4ti-0520	4ti-0585	4ti-0530	4ti-0535		4ti-0590	4ti-0525	4ti-0598	4ti-0540/SLIT	
ALPS 3000 TM	4ti-0540	4ti-0573	4ti-0580	4ti-0520	4ti-0585	4ti-0530	4ti-0535		4ti-0590	4ti-0525	4ti-0598	4ti-0540/SLIT	
ALPS TM 50	4ti-0541	4ti-0575	4ti-0581	4ti-0521	4ti-0587	4ti-0531	4ti-0536	4ti-0547	4ti-0591	4ti-0527	4ti-0597	4ti-0541/SLIT	4ti-0543
ALPS TM 25	4ti-0541	4ti-0575	4ti-0581	4ti-0521	4ti-0587	4ti-0531	4ti-0536	4ti-0547	4ti-0591	4ti-0527	4ti-0597	4ti-0541/SLIT	4ti-0543

All roll seal formats are available in a trial roll. Add 5 to the end of the product code to order If you would like assistance in choosing the correct seal for your application and heat sealer, please contact technical support on +44 (0) 1306 884885 or info®4ti.co.uk

FrameSeal™

Frame Seal[™] utilises a sheet of standard 4titude[®] heat seal material mounted onto a disposable, rigid, 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 are compatible with the 4S3 heat sealer. After sealing, there is the option to remove the frame by tearing along pre-cut lines leaving the heat seal in place on the plate surface.

	Code	Description	Qty
	4ti-0575/FS	Clear Weld Seal Mk II FrameSeal™, stackable heat seal frames	50
MING DON	4ti-0541/FS	ClearSeal FrameSeal™	50
MING	4ti-0531/FS	Pierce Seal FrameSeal™	50

Application example:

Our Clear Weld Seal Mk II (4ti-0575) heat sealing film is now available pre-mounted to create a FrameSeal. Together with Fraunhoffer IPA Institute FrameSeal[™] has been used in a fully integrated solution for sealing 1536well PCR plates before analysis of RNAi screening with a Roche Lightcycler1536.

Using a robotic arm, a single FrameSeal[™] is placed onto a 1536well PCR plate. By adjusting the position of the robot gripper, the plate and FrameSeal[™] combination are then transferred to the draw of a 4S3 Heat Sealer which seals the part via a software command through its RS232 port.

After the sealing process has been carried out, the sealed plate is transferred to the De-Framer, which seperates the frame from the film at each point along the edge of the film. The frame can then be removed leaving the sealed plate to be placed in the cycler.

Together the heat sealer and the FrameSeal[™] presented here are:

- The most cost effective automated heat sealing solution available
- An approach in line with demands of diagnostics for a sterile, single-use consumable
- The most compact instrument for integration

Key advantages

- Key advantages compared to sheets of sealing film or roll material, are the ease of handling and the ability to sterilise and improve the quality control of every single seal.
- The FrameSeal[™] also enables the use of sheeted sealing material in automation.



4s3™ shown next to the De-Framer



Automation cell, showing the 4LABTM, 4s3TM and De-Framer fully integrated

NEW

Adhesive Sealing

4titude[®] offer a wide range of seals from general microplate covers to specialised gas permeable seals for cell culture applications.

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 provided with end tabs for easy application and removal.

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 comparison table page 83 which describes the recommended applications and technical features of each seal.

To obtain the best sealing results with adhesive seals we strongly recommended the use of high quality plates like ours with raised rim sealing rings for optimal sealing integrity and guaranteed flatness. To improve seal application we offer supplementary products like the seal roller page 53 and the compression pad see page 52.

We have added three new seals to our range for more specialised applications including gas permeable seals and an InterSeal[™] ideally suited for kit manufacturers, p82.





PCR Seal



The PCR seal is a durable transparent polyester film with a strong adhesive layer. This seal enables a high seal integrity and efficiently prevents sample evaporation. It is recommended for PCR, qPCR and other optical applications (e.g. fluorescence or colorimetric measurements) as well as sample storage.

Adhesive free end tabs facilitate application and removal. The seals can be easily peeled from the plate without leaving any sticky residue.

Code	Pack Size/Dimensions
4ti-0500	100 sheets (135mm x 80mm)
4ti-0501	1 laminated roll (100m x 80mm) Approx 700 seals

Q-Stick[™] qPCR Seal



Applications

- PCR
- qPCR and other optical applications
- low temperature storage and transportation
- available in sheet and roll format
- Free from DNase, RNase and human genomic DNA

For best results

FOR ALL ADHESIVE SEALS, THE BEST SEALING RESULTS ARE ACHIEVED USING THE ADHESIVE SEAL ROLLER (4TI-0502).



This unique seal combines the strong sealing integrity of our PCR seal with improved optical properties thanks to 96 adhesive-free windows. It is recommended for qPCR and other optical applications (e.g. fluorescence or colorimetric measurements).

The use of adhesive free end tabs enables easy alignment of the windows on a 96well plate as well as easy removal of the seal.

Code	Pack Size/Dimensions
4ti-0565	100 sheets (133mm x 76mm)



* (with pressurised heated PCR lid)

Applications

- Suitable for qPCR and other optical applications
- For use with 96-well plates only
- Free from DNase, RNase and human genomic DNA

For best results

qPCR Seal



This optically clear seal was specifically developed for optical applications, particularily qPCR. It is non-tacky to skin and gloves enabling ease of handling and application and positioning. This seal is a pressure activated seal. The polyester film has adhesive held within capsules on the underside, and pressure must be applied to the top-side, around the raised-well rims to activate the adhesive.

Code	Pack Size/Dimensions
4ti-0560	100 sheets (140mm x 77mm)
4ti-0561	1 roll (100m x 80mm) Approx 700 seals



- No adhesive to come into contact with samples
- Enhanced optical clarity suitable for qPCR
- Suitable for all plate types
- Peelable without leaving sticky residue on the plate when the seal is peeled off
- Suitable for qPCR and other optical applications
- Available in sheet and roll format
- Free from DNase, RNase and human genomic DNA

For best results

FOR ALL ADHESIVE SEALS, THE BEST SEALING RESULTS ARE ACHIEVED USING THE ADHESIVE SEAL ROLLER (4TI-0502).

PCR Foil Seal



This aluminium foil seal had a strong acrylic adhesive which produces a seal of high integrity. This seal was developed for PCR and other high temperature applications due to its effectiveness in preventing sample evaporation. The PCR Foil Seal is a piercable seal. When pierced, the irregular manner in which the foil tears prevents the formation of a vacuum.

The seal has perforated end tabs for easy application and removal by peeling.

Code	Pack Size/Dimensions
4ti-0550	100 sheets (130mm x 80mm)
4ti-0551	1 roll (200m x 80mm) Approx 1400 seals



Applications

- PCR and other high temperature applications
- Sample storage
- Suitable for all plate types
- Available in sheet and roll format
- Free from DNase, RNase and human genomic DNA

For best results

Pierceable Film*



This strong adhesive seal was developed to facilitate easy sample removal with a manual or automated system. The seal is a transparent polyester film with a strong adhesive layer. 96 adhesive free windows have been cross-cut. This enables access to the sample wells with a tip or probe with minimal pressure.

Sample evaporation is minimized when auto samplers such as HPLC and capillary sequencers are used.

Code	Pack Size/Dimensions							
4ti-0566	100 sheets (135mm x 77mm)							
4ti-0567	1 roll (100m x 80mm) Approx 700 seals							

*Not available in the USA

Gas Permeable Seal



This adhesive seal is perforated with micropores so that it is permeable to gases but provides a barrier to bacteria and other solid contaminants. The gas permeable seal is a convenient option for covering cell cultures and can be pierced or peeled without any remaining sticky residue.

End tabs facilitate ease of application and removal.

Code	Pack Size/Dimensions							
4ti-0515	50 sheets (135mm x 80mm)							
4ti-0515/ST	50 sterile sheets (5 packs of 10 sheets, 135mm x 80mm)							
4ti-0515/R	1 roll (100m x 80mm) Approx 700 seals							



Applications

- Suitable for 96well plates (auto samplers, HPLC, DNA sequencers)
- Piercable for sample retrieval
- Available in sheet and roll format
- End tabs for ease of application and removal
- Free from DNase, RNase and human genomic DNA

For best results

FOR ALL ADHESIVE SEALS, THE BEST SEALING RESULTS ARE ACHIEVED USING THE ADHESIVE SEAL ROLLER (4TI-0502).



Applications

- Eukaryotic cell culture, bacterial culture and overnight incubations.
- Moisture Vapour Transmission Rate is 6200g/m2/day
- Air Porosity is 15sec/100cc/in2
- Suitable for all plate types
- Free from DNase, RNase and human genomic DNA

For best results

Gas Permeable Moisture Barrier Seal



This is a strong adhesive seal that has 96 or 384 adhesive free windows. These windows allow air and CO² exchange, but prevent moisture evaporation from the sample.

The seal is primarily used in cell culture for eukaryotic or bacterial cells. It is ultra clear for imaging without having to remove the seal.

Code	Pack Size/Dimensions
4ti-0516/96	50 sheets (5 packs of 10 sheets, 137mm x 77mm), 96 round-well only
4ti-0516/384	50 sheets (5 packs of 10 sheets, 137mm x 77mm), 384 square-well only



- Suitable for eukaryotic cell culture, bacterial culture and long-term live assays
- Suitable for 96 or 384well plates
- Moisture Vapour Transmission Rate is 1g/m2.d.bar
- Air Porosity is 600cm3/m2.d.bar
- · Peelable leaving no residue
- End tabs for ease of application and removal
- Free from DNase, RNase and human genomic DNA

For best results

FOR ALL ADHESIVE SEALS, THE BEST SEALING RESULTS ARE ACHIEVED USING THE ADHESIVE SEAL ROLLER (4TI-0502).

NEW Air-O-Seal



Air-O-Seal is a hydrophobic, gas permeable, adhesive seal which is made from tape with an acrylate adhesive. Air-O-Seal has a much lower moisture transfer rate than our standard Gas Permeable Adhesive Seal (4ti-O515). It is resistant to acids, DMSO, detergents, ethanol, glycerol, ispropanol, sodium hypochlorite (bleach) and suitable for bacterial or cell culture.

Code	Pack Size/Dimensions								
4ti-0517	100 sheets (135mm x 80mm)								
4ti-0517S	100 sterile sheets (10 packs of 10 sheets, 135mm x 80mm)								
4ti-0517R	1 roll (150m x 80mm) Approx 1250 seals								

* Not available in the USA



Applications

- Suitable for bacterial or cell culture.
- Moisture Vapour Transmission Rate is 4200g/m2/day
- Air Porosity is 10sec/100cc/in2
- Strong solvent resistance
- Available in sheet or roll format
- Free from DNase, RNase and human genomic DNA

For best results

Peelable Solvent Resistant Foil



This seal is based on an aluminium foil with a film layer and silicone adhesive. This laminate has a very high level of solvent resistance and is recommended for long term sample storage.

A single end tab aids application and removal by peeling.

Code	Pack Size/Dimensions	
4ti-0512	100 sheet (122mm x 80mm)	



Applications

- Suitable for medium to longterm (<5 yrs) storage of samples containing a high concentration (<80%) of DMSO.
- Strong adhesive seal
- Suitable for all plate types
- Free from DNase, RNase and human genomic DNA

For best results

FOR ALL ADHESIVE SEALS, THE BEST SEALING RESULTS ARE ACHIEVED USING THE ADHESIVE SEAL ROLLER (4TI-0502).

Microplate Seal



This transparent polyester based film has a medium strength adhesive. It is designed as a low cost sealing option and useful for temporary storage and as a cover for applications such as centrifugation.

End tabs allow for easy application and removal. This seal is removable without residue on the plate.

Code	Pack Size/Dimensions							
4ti-0510	100 sheet (130mm x 80mm)							
4ti-510/R	1 roll (110m x 80mm) Approx 800 seals							



Applications

- General microplate cover
- Reduces short term sample evaporation
- Eliminate risk of contamination (Aqueous samples only)
- Suitable for all plate types
- Available in sheet and roll formats
- Free from DNase, RNase and human genomic DNA

For best results

💷 Double Skin Breathable Film



This seal is an ultra thin opaque membrane which is gas permeable whilst providing an effective barrier to moisture. Air and CO² exchange is possible, but evaporation is prevented.

End tabs aid application of this seal and its removal by peeling.

Code	Pack Size/Dimensions
4ti-0518	100 sheets (135 x 83 mm)

NEW) InterSeal



A double sided black adhesive microplate film to facilitate the sealing, accessing (piercing) and resealing of VariStrips (4ti-0753) prior to PCR.

The strips or plates are filled with reagent and sealed with 4ti-0530 (Pierce Seal). The Interseal is overlaid and the strips or plates processed with the Plate Cutter 4ti-3000 into individually sealed strips. The strips can then be transported and opened at a customer site by peeling the protected liner of the InterSeal off and accessing the sample through the pierce seal. The strips can then be sealed with a foil or film which is applied to the exposed black adhesive without the need for a heat sealer.

Code Pack Size/Dimensions

4ti-0519 100 sheets (148 mm x 98 mm including liner)



Applications

- Bacterial culture
- Cell culture
- Moisture vapour transmission rate of 450gms/m2/day
- Free from DNase, RNase and human genomic DNA
- Suitable for all plate types



Applications

- Ideal for kit manufacturers to allow flexible access to individual wells
- For use with VariStrips (in a frame) or Break-A-Way plates
- Re-sealing without the need for a heat sealer
- End tabs for easy application and removal

Also see

VARIPLATES [™] (PAGE 42-43) PLATE CUTTER (PAGE 53)

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100 sheets	Measurements (mm)*	RNase / Dnase free	Peelable	Piercable	Sterile	Max Temp	Min Temp	Special Properties	Application		
4ti-0500	135mm x 80mm	٠	٠			110°C	-20°C	Good optical clarity	PCR	p77	PCR Seal
4ti-0565	133mm x 76mm	٠	٠			110°C	-20°C	Discreet optical windows for 96- well plates	qPCR, fluorescence. 96-well microplates only	p77	Q-Stick TM for qPCR
4ti-0560	140mm x 77mm	•	٠			110°C	-80°C	Good optical clarity	qPCR & other fluorescent applications	p78	qPCR Seal
4ti-0550	130mm x 80mm	•	٠	•		120°C	-40°C	Irregular tearing when pierced prevents formation of vacuum	PCR & sample storage	p78	PCR Foil Seal
4ti-0566	135mm x 77mm	٠	٠	٠		110°C	-80°C	Pre-cut with cross which reduces tip or probe becoming clogged	Sample application or retrieval. 96-well plates only.	p79	Piercable Film
4ti-0515	135mm x 80mm	•	٠	٠		80°C	-20°C	Gas permeable providing barrier to bacteria & other solid contaminants	Cell & bacterial culture	p79	Gas Permeable Seal
4ti-0516	137 mm x 77 mm	•	٠	•	•	80°C	-20°C	Gas permeable that allows air and CO2 exchange, but prevents moisture evaporation.	Eukaryotic cell culture, bacterial culture and long-term live assays.	p80	Gas Permeable Moisture Barrier Seal
4ti-0517	135mm x 80mm	•	٠		•	30°C	-20°C	Air-O-Seal has a much lower moisture transfer rate than our Gas Permeable Adhesive Seal (4tr0515) and is suitable for bacterial or cell culture.	Bacterial or cell culture	p80	Air-O-Seal
4ti-0512	122mm x 80mm	•	٠			80°C	-20°C	High solvent resistance	Microplate sealing containing solvents incl. DMSO	p81	Peelable Solvent Resistant Foil
4ti-0510	130mm x 80mm	۰	٠			80°C	-20°C	Medium strength transparent seal	Aqueous sample storage	p81	Microplate Seal
4ti-0518	135mm x 83mm	•	٠	•		40°C	0°C	Thin gas permeable, moisture barrier seal. Allows air and CO2 exchange but prevents evaporation.	Bacteria culture	p82	Double Skin Breathable Film
4ti-0519	148mm x 98mm	٠	٠			110°C	-20°C	2 sealing surfaces Optical windows	Diagnostic kit production	p82	InterSeal