

# Low DNA Binding Products

Low Binding Plates for sensitive applications like NGS sample prep



## Inert - Reliable - Safe

- Low-binding property results from the selection of low-bind polymers; no coating is used to achieve the binding characteristics  
No contamination or modification of the samples
- Tested under a broad temperature range  
Maximum DNA recovery after low temperature storage and high temperature incubations
- No DNA loss during incubation steps or sample transfer in NGS sample prep and library construction  
Ideally suited for sensitive applications with ultra-low DNA input

# Low DNA Binding Products

Polypropylene (PP) is the best plastic material for PCR tubes as PP is chemically inert, resistant to solvents, and well suited for injection moulding, allowing for production of thin-walled tubes for optimum PCR results.

DNA has been shown to bind to PP tubes especially at high ionic strength, despite the very hydrophobic nature of this material. Different PP polymers are used for the production of PCR consumables as they differ in their characteristics, including surface charges, resulting in binding of DNA in varying amounts.

DNA binding to PP surfaces has typically only been an issue for incubation and storage but not for PCR/qPCR as during amplification, DNA stuck to the tube walls is released during denaturation steps, maintaining DNA accessibility for the reaction. Nevertheless, due to a progressing miniaturisation of reaction volumes and with new technologies such as Next Generation Sequencing (NGS), PCR/qPCR tubes are increasingly recommended for other sensitive applications which may require ultra low DNA binding.

## Features

### Smarter plastics for advanced applications

- Maximum nucleic acid sample recovery after incubation
- No chemical additives or coatings are used to achieve low binding characteristics
- Better plastic consumables for wider use in more applications
- Several plate formats available to suit your needs (other formats available on request)

## Experimental Data

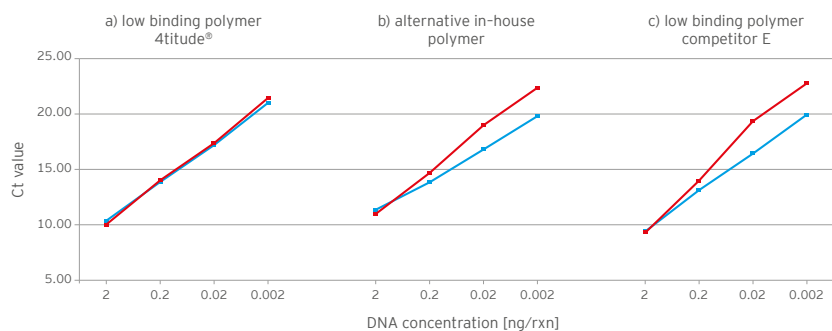
Ten-fold dilution series of a 1.1 kb linear DNA fragment (Fig. 1) and mouse genomic DNA (Fig. 2) were applied to a PCR plate and incubated for 30 minutes. The DNA was then transferred to the next row of the plate for an additional 30 minute incubation. This procedure was repeated seven times so that each concentration of the DNA was consecutively incubated in 8 different tubes for a total of 240 minutes.

The DNA was subsequently subjected to qPCR analysis and compared to the original dilution series. Average Ct values obtained from the different DNA concentrations are shown.

**Fig. 1 Binding of linear DNA to different PP polymers - qPCR comparison**

**Result:**

The 4titude<sup>®</sup> low binding material showed no significant loss of DNA after incubation while alternative materials and low binding plates from competitors revealed a loss of DNA at low DNA starting concentration, indicated by an increased Ct value.

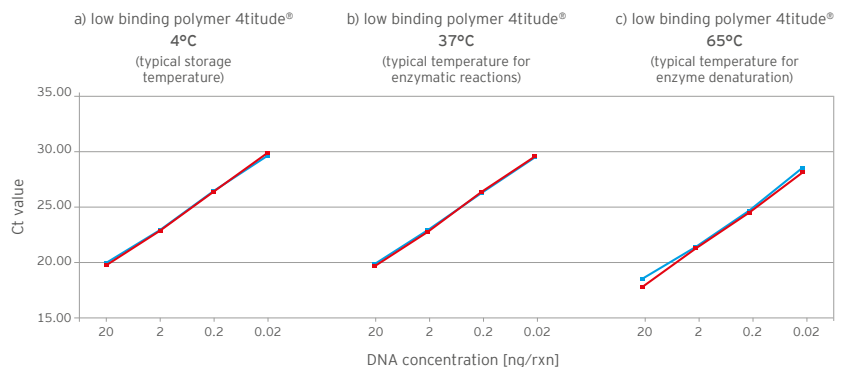


**Fig. 2 Binding of mouse genomic DNA to 4titude<sup>®</sup> low binding PP polymer at different temperatures - qPCR comparison**

**Result:**

The 4titude<sup>®</sup> low binding material showed no significant DNA loss after incubation at three different temperatures.

The 4titude<sup>®</sup> low binding products are perfectly suited for sensitive applications with low DNA input such as NGS sample preparation.



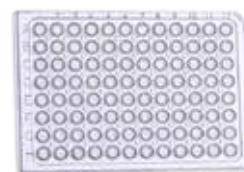
■ Ct value after incubation with PCR plastic surface ■ Ct value control (no incubation with PCR plastic surface)

## FrameStar® Low Binding Plates

Two FrameStar® plates frequently used for NGS sample prep applications are now available as low binding plates.

### FrameStar® 96 Well Semi-Skirted PCR Plate, ABI® Style, Low Binding (4ti-LB0770/C)

- Designed for use on standard thermal cyclers including ABI® instruments
- Standard profile, 0.25 ml clear polypropylene wells, clear polycarbonate frame, cut corner at A12
- The **FrameStar® 96 Lid** (4ti-0289) is designed for use with this plate to efficiently protect samples from contamination and evaporation



### FrameStar® 96 Well Skirted PCR Plate, Extra Rigid, Low Binding (4ti-LB0960/RIG)

- Popular fully skirted plate with broad instrumentation compatibility, especially suitable for use in plate handling robots as tested on PerkinElmer® automation systems
- Low profile, 0.15 ml clear polypropylene wells, black polycarbonate frame with extra rigid skirt, cut corner at H1
- The **FrameStar® 96 NGS Lid** (4ti-0287) is designed for use with this plate to efficiently protect samples from contamination and evaporation

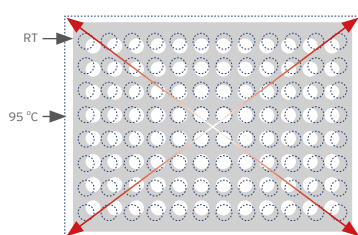


## Features of FrameStar® Two-Component PCR Plates

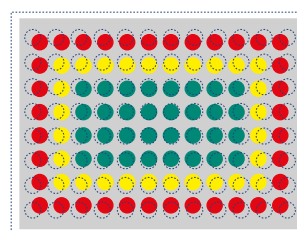
FrameStar® PCR plates prevent sample loss by minimising thermal expansion during PCR, enabling reductions in PCR volumes and cost savings on reagents.

Their two-component design combines the advantages of thin walled polypropylene (PP) tubes, for optimum heat transfer during amplification, with a rigid polycarbonate skirt and deck for highest thermal stability and rigidity making them the plates of choice for any robotic workflows.

- Seven frame colours with clear, frosted or white tubes available - **Flexible solutions for every application**
- Stable polycarbonate frame - **Reliable use with stackers and liquid handlers**
- Minimised thermal expansion - **Reduced evaporation for improved consistency of PCR**



Standard polypropylene plates expand by up to 2 mm during thermal cycling which leads to movement of wells away from the plate centre. This movement is most significant in corner positions and outer rows.



Sealing sheets do not expand at this rate and the movement of the wells weakens the seal leading to sample evaporation, particularly in corner positions and outer rows (red).

Fig. 3 Evaporation from standard one-component polypropylene PCR plates

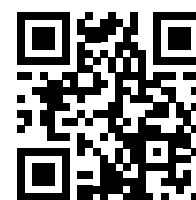
Our FrameStar® two-component technology reduces evaporation from PCR plates, improving your results and allowing you to reduce the volume of expensive reagents to save you money.

## Sealing Solutions

4titude® offers the widest range of plate sealing solutions available on the market. You can choose between sealing with individual caps, strip caps, lids, mats, adhesive seals and heat seals.

Within both our adhesive seal and heat seal ranges we offer a wide selection of materials to choose from, dependant on the application requirements. 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.

Most seals are available in both sheet and roll format for manual, semi-automated and automated heat sealer use.



[www.4ti.co.uk/seal](http://www.4ti.co.uk/seal)

## Low Binding Microplates

Two Microplates frequently used for NGS sample prep applications are now available as low binding plates.

### 96 Deep Well Storage Microplate, for use with magnetic separators, Low Binding (4ti-LB0125)

- Designed for use with magnetic separators for bead separation protocols
- 1.0 ml round wells, V-shaped base, clear polypropylene
- Replaces the "96-well storage plates, round well, 0.8 ml (MIDI plate, Fisher Scientific® part number AB-0859)", in e.g. Illumina® protocols
- The **96 Round Well Sealing Cap Mat, clear silicone** (4ti-0124) is designed for use with this plate to efficiently protect samples from contamination and evaporation



**Fig. 4 Special shape of the stacking ribs** - the plate sits much lower on the magnetic separator than standard round well plates thus facilitating the speed and efficiency of the separation process.

### 96 Well Low Volume Storage Microplate, Low Binding (4ti-LB0109)

- Designed for low volume storage
- 0.2 ml round wells, V-shaped base, clear polypropylene
- Stacking ribs under the deck for improved stability, strengthening the plate for use in robotic automation applications (not suitable for use on PCR blocks)



## Next Generation Sequencing

Sample preparation for Next Generation Sequencing (NGS) requires a variety of different strips, plates and seals. Suppliers of NGS sample prep kits typically have recommendations for these items in their manuals.

4titude® supply researchers worldwide with perfect solutions for NGS, especially for fully automated workflows requiring additional storage and reagent plates.

4ti-0960/RIG and 4ti-0125 are frequently part of consumable solutions we offer for NGS workflows. The low binding versions now offer advantages especially for this sensitive workflow.



### Ordering Information

Code	Description	Quantity
4ti-LB0770/C	FrameStar® 96 Well Semi-Skirted PCR Plate, ABI® Style, Low Binding	50
4ti-LB0960/RIG	FrameStar® 96 Well Skirted PCR Plate, Extra Rigid, Low Binding	50
4ti-LB0125	96 Well Deep Well Storage Microplate, for use with Magnetic Separators, Low Binding	50
4ti-LB0109	96 Well Storage Microplate, 0.2 ml round wells, Low Binding	50
4ti-0289	FrameStar® 96 Lid, for use with 4ti-0770	50
4ti-0287	FrameStar® 96 NGS Lid, for use with 4ti-0960/RIG	50
4ti-0124	96 Round Well Sealing Cap Mat, clear silicone, for use with 4ti-0125	50

These low binding products are suitable for most qPCR instruments and typical NGS protocols. However, additional products with ultra-low binding properties may be added on request. Please contact 4titude®.

