

Effortless and Secure Heat Sealing of Thermo Scientific KingFisher Deep-well 96 Plates

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Goal

The sealable Thermo Scientific™ KingFisher™ deep-well 96 plates can help to further streamline the purification process in the KingFisher Flex and the KingFisher Duo Prime automated purification systems. The deep-well 96 plate can be heat sealed until it is ready to be used. The sealing tape can be easily peeled off when the user is ready to process the plates, with the samples preserved in the individual wells.

Introduction

KingFisher instruments employ an automated magnetic particle technology. The instruments, coupled with optimized plastic consumables and magnetic particle kits, comprise a convenient, automated purification system for nucleic acids, proteins and cells. KingFisher deep-well (DW) 96 plates (95040450, 95040460) have been specifically designed to work together with the KingFisher Flex and KingFisher Duo Prime purification instruments as part of a system to automate the sample preparation in 96- and 24-well plate formats. The enhanced heat sealing features of the KingFisher DW 96 plate provides easy, secure sealing of reagent plates. While it was possible to seal previous versions of the plate, enhanced raised rims make the seal firmer and more reliable. This allows users to prepare the plates well in advance for use in the KingFisher Flex or KingFisher Duo Prime instruments.

Materials and Methods

KingFisher DW 96 plates were heat sealed with Thermo Scientific™ ALPS 3000™ microplate heat sealer (Figure 1). The ALPS 3000 heat sealer offers rapid plate sealing with the option to select different temperatures and duration for sealing. Several sealing temperatures and time combinations were tested with sealing tapes together with the KingFisher DW 96 plate. Different liquids have various effects on sealing, thus sealing solutions should be always validated for the intended application.



Figure 1: ALPS 3000 microplate heat sealer.

The effectiveness of the sealing has been studied by colorimetric and fluorometric tests. Colorimetric experiments included plates filled with 80% ethanol and Ponceau S. In the fluorometric experiments, plates were filled with Tris and fluorescein. The liquids were dispensed into the plates with the Thermo Scientific™ Multidrop™ Combi reagent dispenser in a chess board pattern, every second well filled with a colored or colorless liquid. Subsequently, the plates were heat-sealed with the ALPS 3000. In combination with variable sealing parameters, two sealing tapes—the Thermo-Seal (AB-3559) and Easy Peel (AB-3739)—were tested.

The Thermo-Seal is a very strong seal for sealing microplates making it suitable for long-term storage. Following several different storage periods at variable conditions, the plates were turned upside down for 24 hours. Next the plates were centrifuged and opened with a foil stripper (AB-0592). Leakage from well to well was analyzed either visually (Ponceau S) or fluorometrically (fluorescein). For fluorometric analysis, samples from each well of the KingFisher DW 96 plate were transferred into a black 96-well microplate with the Thermo Scientific™ Versette™ automated liquid handler. Fluorescence was measured with the Thermo Scientific™ Varioskan™ LUX multimode microplate reader.

Results

With the ALPS 3000 heat sealer and Thermo-Seal or Easy Peel sealing tapes, our recommended sealing parameters for KingFisher DW 96 plates are 170°C for two seconds (Table 1). Plates sealed with these conditions and sealing tapes stored at -20°C did not have significant weight change during six weeks of storage. No leakage from well to well was detected after the storage period (Figures 2 and 3). In the experiment at higher temperatures, the seal was intact after storage up to +40°C for two weeks. The sealing did not affect the features important to the purification process in the KingFisher Flex: DNA purification on plates that were sealed and peeled succeeded similarly to the non-sealed plates. Additionally, the seals remained intact during international shipment of the plates via ground transport or air mail.

Plate description and cat. no	Tested Sealing Tapes	Recommended Sealing Temperature	Examples of Tested Storage Conditions
KingFisher deep-well 96 plate, 95040450	Thermo-Seal (AB-3559)	At 170°C for two seconds	At -20°C for up to six weeks, at +40°C for up to two weeks
KingFisher deep-well 96 plate, sterile, 95040460	Easy Peel (AB-3739)		

Table 1: Recommended sealing conditions for KingFisher deep-well 96 plate.

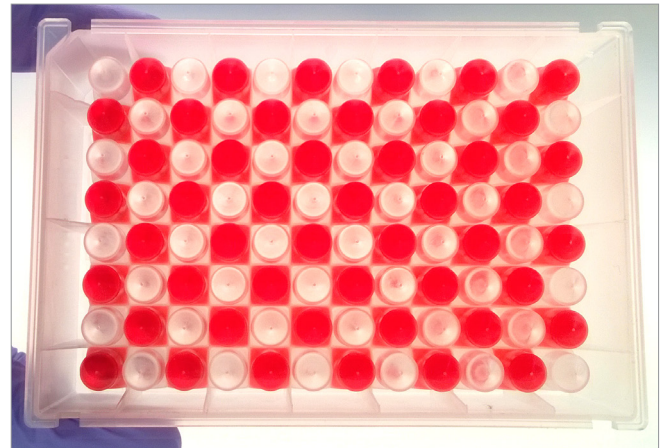


Figure 2: Picture of a KingFisher deep-well 96 plate after storage for six weeks. The plates were filled in a chess board pattern, every second well filled with colored or colorless 80% ethanol, sealed and stored. After storage the plates were turned upside down for 24 hours to challenge the sealing. No leakage from well to well was detected.

Figure 3A

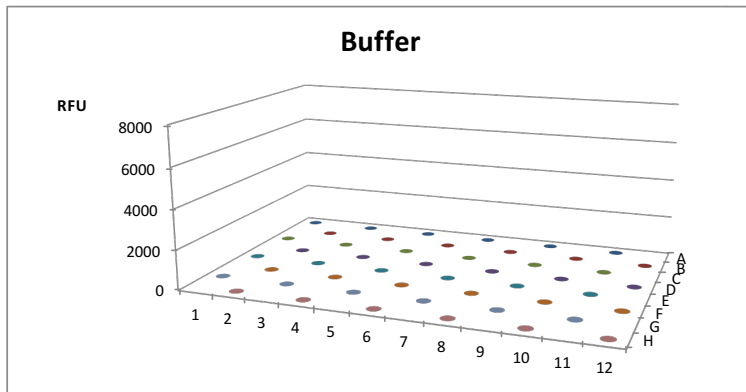
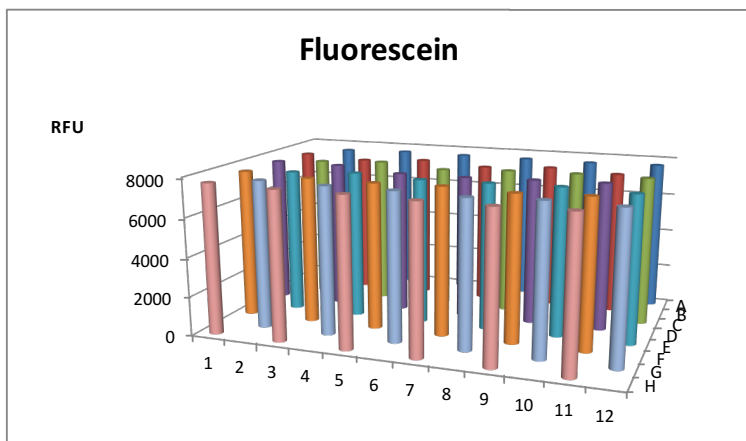


Figure 3: The KingFisher deep-well 96 plates were filled in a chess board pattern with Tris buffer, every second well containing Tris or Tris including fluorescein, and stored for six weeks. After storage the plates were turned upside down for 24 hours to challenge the sealing.

A. Fluorescence values of the buffer wells show that no leakage from well to well was detected.

B. Fluorescence values of the wells filled with Fluorescein.

Figure 3B



Conclusions

The new enhanced sealing capability of the KingFisher DW 96 plates offers an option to further streamline the purification process in the KingFisher systems. Both Thermo-Seal and Easy Peel sealing tapes are suitable for sealing polypropylene microplates for long-term storage. The sealing properties of the KingFisher DW 96 plate ensure that the reagents and samples remain securely within the individual wells, without risk of cross-contamination. Sealing the plates protects the contents from evaporation and condensation during storage.

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