

Automated Microplate Sealing and Unsealing with SealTite

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Introduction

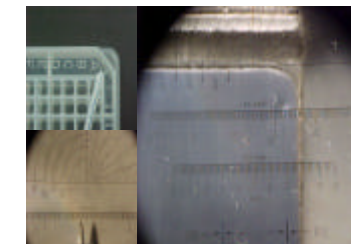
Automation technology has now advanced to provide a process for unsealing microplates and transporting the unsealed samples directly to a replication/reformatting or assay platform. TekCel's SealTite seals and PlateServer/PlateStore offer a fully automated microplate storage and processing system that form a superior solution for preserving the integrity of your compound library asset. The containment of the sample processing steps within the automation equipment removes the risk of chemical exposure to laboratory personnel and minimizes the exposure of the library to atmospheric conditions that degrade sample quality. SealTite use is independent of microplate type and it is applicable to a variety of storage conditions.

SealTite seals employ a stainless steel "M" compression spring cage and a reinforced stainless steel plate covered with a layer of non-porous foam backing and a layer of Teflon for the sealing surface. Robotic operations utilize the "friendlies" on the spring cage for transport and storage.

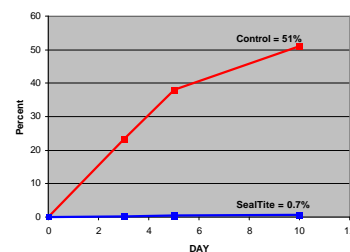
The PlateServer assembles and disassembles the SealTite seals and microplates using a quad position robotics arm. Three sets of assembly/disassembly stations are standard. SealTites and microplates are placed into stackers that are easily loaded into the swing-out assembly located behind the door. The sealed units are served out to the TekCel PlateStore via shuttle track or are served back to the stackers. Unsealed plates may be served to the stacks or to a robotic delivery arm that could be connected to a third party device. The delivery arm was designed to reduce total sample exposure to seconds per use. Active thawing racks are available to accelerate processing. All robotics operations are conducted in inert atmosphere.

Conclusions

1. High quality automated microplate sealing and unsealing is now possible.
2. Exposure of laboratory personnel to the compound library can be minimized.
3. Cross contamination is minimized by the precision of the PlateServer.
4. Library storage at low temperature in inert atmosphere maximizes lifetime.
5. SealTite can be effectively utilized to seal samples under many storage conditions.

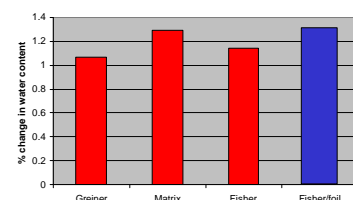


Water Uptake by DMSO @6.5°C



Unsealed microplates containing DMSO rapidly absorb water in a laboratory refrigerator. SealTite seals effectively prevent moisture uptake under these conditions. n=3

Water Uptake by DMSO in Different Microplates Sealed with SealTite @-20°C

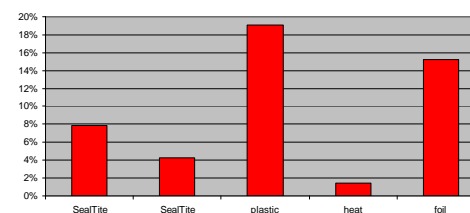


SealTite is effective at low temperatures. SealTite or a foil seal (last bar) applied to different 384-well microplates containing fresh DMSO incubated in a freezer for 24 hours. Water content determined by Karl Fischer titration. n=2 (customer data)

Humidity	Time Hours	Greiner	Matrix	Fisher
95% 37 degree C	0	100.00	100.00	100.00
	1	100.49	101.93	102.04
	2	100.36	100.31	100.28
	4	100.49	100.43	100.47
	8	100.84	100.72	100.76
	24	101.82	101.57	101.55
Room RH ~40-50%	0	100.00	100.00	100.00
	1	100.01	100.02	100.00
	2	100.02	100.02	100.01
	4	100.07	100.06	100.04
	8	100.14	100.10	100.08
	24	100.38	100.27	100.23
RH 10% Rm Temp (21 degree C)	0	100.00	100.00	100.00
	1	99.97	99.99	99.99
	2	99.97	99.97	99.98
	4	99.95	99.97	99.98
	8	99.94	99.92	99.93
	24	99.77	99.79	99.79

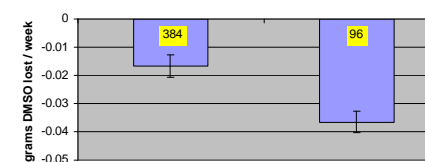
Effects of relative humidity and temperature on sealing efficiency of SealTite applied to different 384-well microplate types. Data are % changes in the weights of fresh DMSO contained in the wells of the microplates. n=1 (customer data)

Evaporation of Crystallization Buffers /100Days



Two sets of SealTite seals compared to plastic and foil adhesive seals and heat seals on limiting evaporation of protein crystallization buffers at room conditions. n=3 (customer data)

SEALTITE DMSO EVAPORATION
Greiner, @-20°C, N2



Long term storage of compounds dissolved in DMSO is most effective at low temperatures in inert atmosphere. In this example, microplates were sealed with SealTite and stored in a freezer filled with nitrogen for one week. The sublimation/evaporation rate observed for the 384-well microplate equates to less than 5% per year. n=5

The placement and replacement of the SealTite onto the microplate is a critical process to avoid cross contamination. The TekCel system software insures that the same SealTite will always be used to seal the same microplate. The precision in the placement of the SealTite on a microplate is shown above. A sharp probe is inserted through a tiny hole in the microplate after the SealTite is attached by the PlateServer. The SealTite and microplate are cycled through several assembly/disassembly operations within the PlateServer with a probe insertion during each cycle. The resulting indentions in the Teflon seal are measured. Three such marks occur within 0.01 of an inch. This distance is about one third the width of the wall thickness of a 384-well microplate. This precision ensures that cross contamination due to seal placement is minimal.

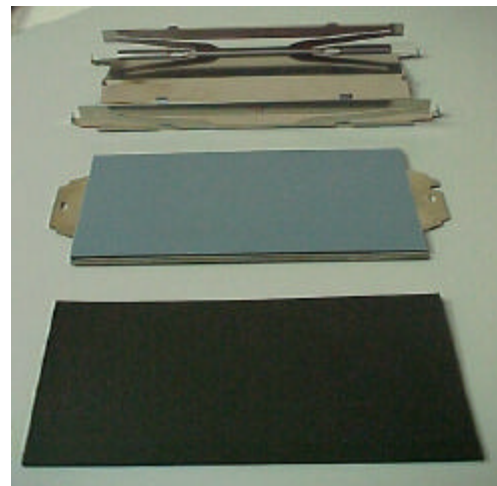
Acknowledgements

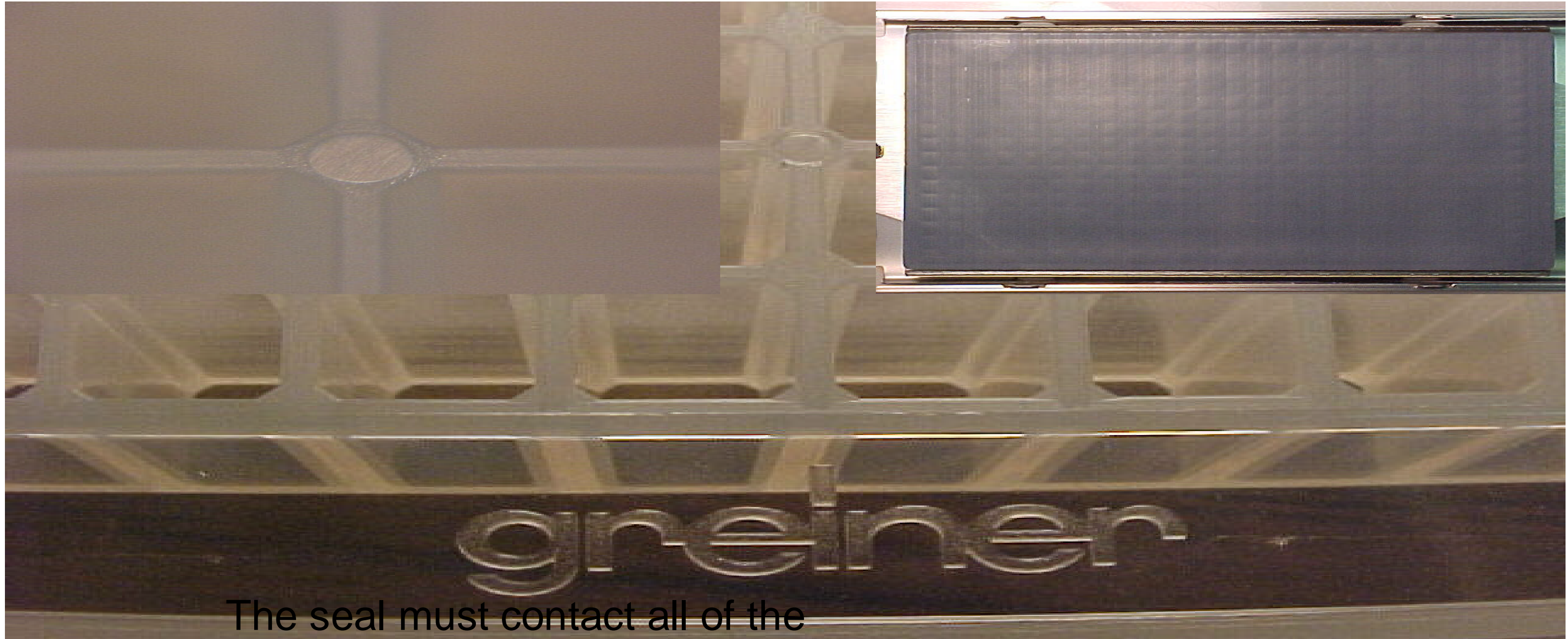
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**Stainless steel
spring**

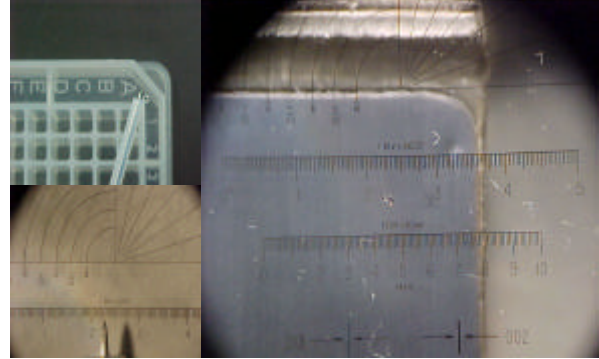
**Stainless steel
plate with Teflon
seal**

**PTFE Foam
backed Teflon
seal**

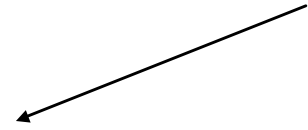




The seal must contact all of the



PlateServer precision
within 0.01" – 3 trials



Summary

