forum

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Technical Notes and Applications for Laboratory Work

Content

1536 Well Cycloolefin Microplate for Compound Storage and Acoustic Liquid Handling

1. Cycloolefin Microplates

Cycloolefin microplates have become increasingly popular in research and high-throughput screening due to their excellent optical, chemical, and physical properties. Cycloolefins feature low water absorption and low impurities. Their high transparency and exceptional chemical resistance to polar solvents, especially DMSO, the commonly used solvent in compound management, render cycloolefin microplates ideal for drug discovery.

Greiner Bio-One is introducing a 1536 well low dead volume cycloolefin microplate for compound storage and liquid handling. The 1536 well microplate follows the most relevant ANSI recommendations and features a smooth microplate top absent of alphanumeric coding to facilitate flush lid mounting and heat sealing. The wells are more tapered than in classic 1536 well microplates, reducing the dead volume in different liquid handling systems. The new 1536 well microplate is suitable for acoustic liquid handling systems, pin tool liquid handling systems and optical density measurements in biochemical assays.

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2. Acoustic Liquid Handling in Drug Discovery

The quality of the chemical entities in a compound library and the size of a compound library are certainly key success factors in drug discovery. However, large compound libraries need clever compound management, high tech software and instrumentation in order to supply high quality active agents for the different screening units in a drug discovery team.

Active agents are commonly dissolved in 100 % DMSO for use in the screening process, and plastic disposable tips or metal pins are generally used for liquid transfer of DMSO solved compounds.

In recent years, acoustic based liquid handling systems have become of interest, as they allow a direct transfer of picoliter range sample droplets of highly concentrated compounds from storage to assay microplates. The compounds are directly transferred from the compound storage microplate into the final assay plate without intermediate dilution steps, simply by acoustic energy transfer (Fig. 1). This assay ready plate concept (Fig. 2) enables direct preparation of assay plates and, for several screening groups, circumvents preliminary dilution steps to allow the centralisation of compound management.

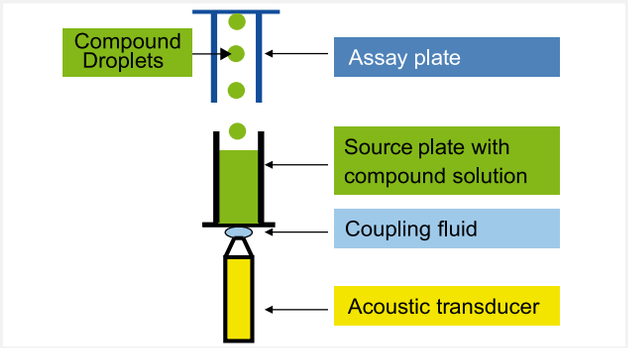


Figure 1: Acoustic droplet ejection (ADE) uses a pulse of ultrasound to move low volumes of fluids (typically nanoliters or picoliters) without physical contact. The technology focuses acoustic energy into a fluid sample to eject droplets. Acoustic liquid handling is a very gentle process, and it can be used to transfer proteins, high molecular weight DNA, and live cells without damage or loss of viability.
To eject a droplet, a transducer generates and transfers acoustic energy to a source well. When the acoustic energy is focused near the surface of the liquid, a mound of liquid is formed and a droplet is ejected. Unlike other liquid transfer devices, no pipette tips, pin tools or nozzles touch the source liquid or destination surfaces. The fluid transfer is performed directly from a source well into a well of an inverted destination plate. The fluid in any well of the source plate can be transferred to any well or position of the destination plate, and the transfer volumes are adjustable for each well. The acoustic device shoots a droplet from a source well upward to an inverted receiving plate positioned above the source plate. Liquids ejected from the source are captured by dry plates due to surface tension.
(Source: EDC Biosystems™ / http://www.edcbiosystems.com)

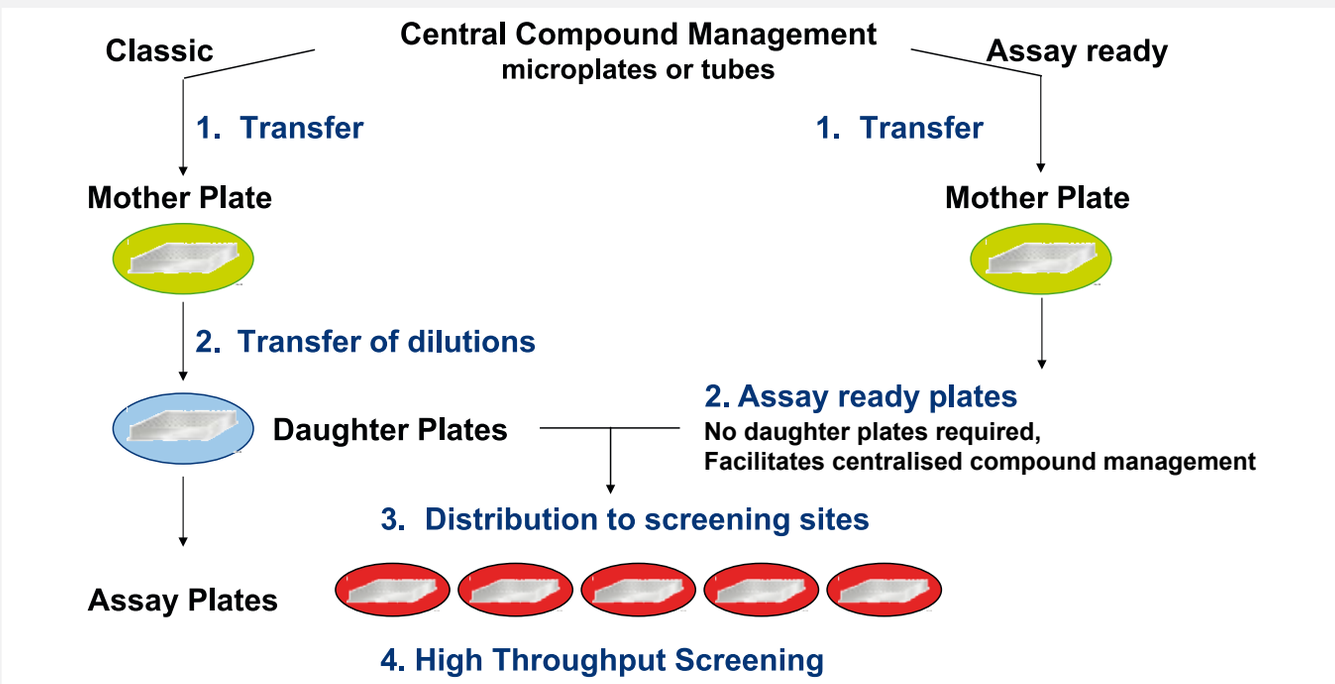


Figure 2: The assay ready plate concept
Diagram showing the assay ready plate compound management versus the classical compound management which is based on intermediate compound dilutions. The Assay ready plate concept allows the centralisation of compound managements and circumvents dilution steps.

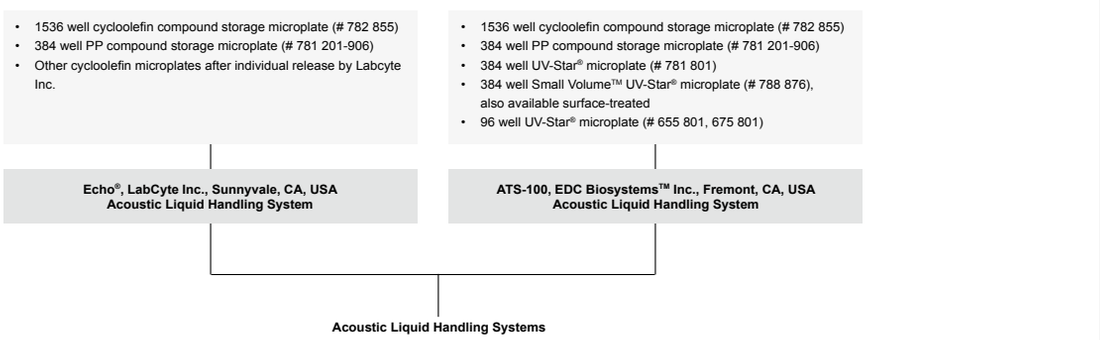


Figure 3: Compound storage source plates for different acoustic liquid handling systems.
The ATS acoustic liquid handling system from EDC Biosystems™ (Fremont, CA, USA) works with almost all types of microplates with a preference to cylcoolefin film or cycloolefin solid bottom microplates. The Echo fom LabCyte Inc. is limited to a selection of microplates with different pre-installed plate definition files on the device. The 384 well polypropylene F-bottom microplates (Cat. No. 781 201-906) and now 1536 well Cycloolefin microplates for compound storage (Cat. No. 782 855) are compatible with one of the installed plate definition files.

3. Features of the new 1536 Well Compound Storage Microplate for Acoustic Liquid Handling

The new compound management microplate is manufactured of cycloolefin copolymer (COC) (Fig. 4) that demonstrates excellent acoustic liquid handling properties comparable to existing low dead volume cycloolefin compound storage microplates (Fig. 5).

Due to an exceptionally precise design and manufacture, the new microplate is suitable for use with existing plate definition files of low dead volume source plates in existing acoustic liquid handling systems. The generic design of the microplate fulfills major ANSI requirements and can be used within most automated HTS systems without time-consuming or complicated adaptations (Fig. 6).

The wells of the 1536 well storage and source plate are more tapered than those of classic 1536 well microplates, thereby reducing the dead volume in different liquid handling systems (Fig. 6).

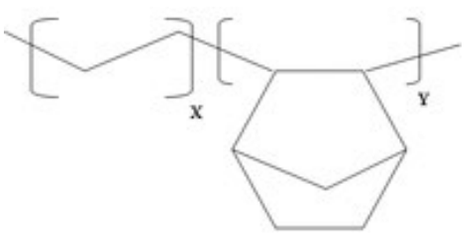


Figure 4: Cyclic olefin copolymers (COC) are produced by chain copolymerisation of cyclic monomers such norbornene or tetracyclododecene with ethylene

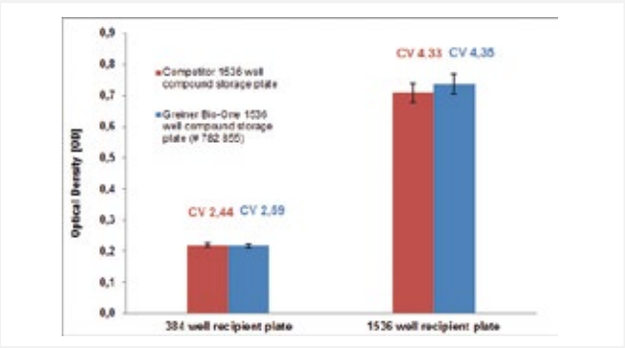
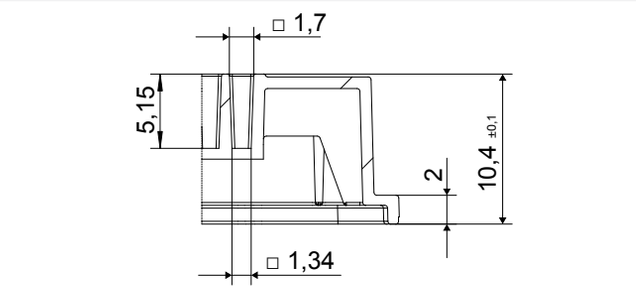


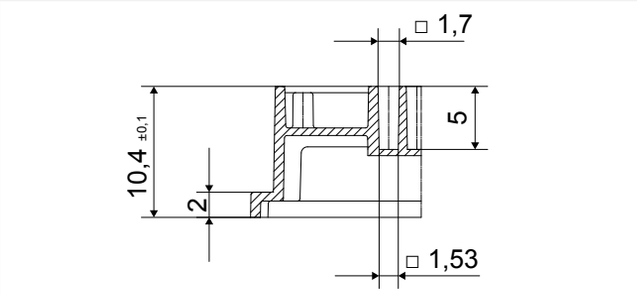
Figure 5: Acoustic Liquid transfer from 1536 well COC compound storage microplates into 384 well and 1536 well assay plates.
Compound transfer was simulated by acoustic liquid transfer of a 50 mmol Tartrazin-DMSO solution. Two different 1536 well COC compound storage microplates were used for a transfer into a 384 well (20 nL Tartrazin-DMSO into 20 µl water) and 1536 well (2.5 nL Tartrazin-DMSO into 2.5 µl water) recipient microplate. Subsequently the optical at 435 nm was measured and the homogeneity of the liquid transfer was evaluated by calculating the standard deviation and the coefficient of variation.
A difference between the two 1536 well COC compound storage microplates was not observed.
Measurements courtesy of Dr. Carsten Pieck / Merck Darmstadt / Germany

A 1536 well standard microplate height of 10.4 mm enables ease of handling within all existing automated systems without time consuming optimisation.

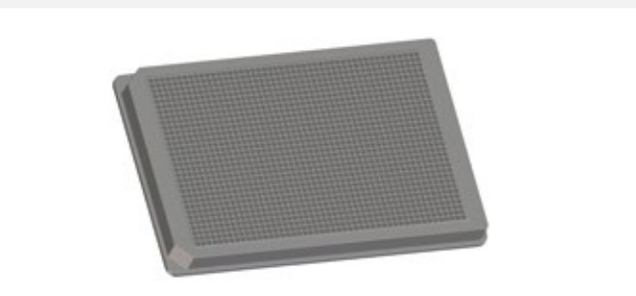
The low dead volume 1536 well compound storage microplate for acoustic liquid handling features a smooth microplate top absent of alphanumeric coding to facilitate flush lid mounting and heat sealing.

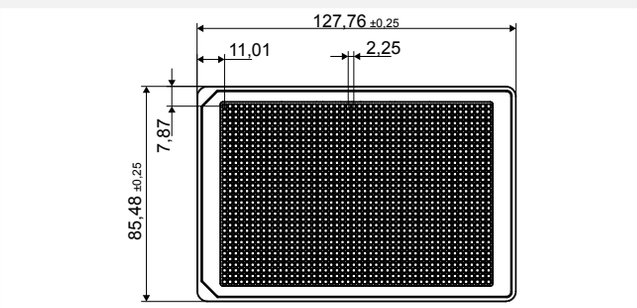
Due to its generic design and material selection, existing settings for 1536 well cycloolefin copolymer microplates can be used for heat sealing.





	Cat. No. 782 855	Cat. No. 782 101
Well depth	5.15 mm	5 mm
Well diameter top	1.7 mm	1.7 mm
Well diameter bottom	1.34 mm	1.53 mm
Microplate height	10.4 mm	10.4 mm





	Cat. No. 782 855	Cat. No. 782 101
Length	127.76 mm	127.76 mm
Width	85.48 mm	85.48 mm
Height	10.4 mm	10.4 mm
A1 position	7.87 / 11.01 mm	7.87 / 11.01 mm
Well to well	2.25 mm	2.25 mm

Figure 6: Well design of the 1536 well COC storage plate compared to the well design of a standard Polystyrene microplate (Cat. No. 782 101).
The more tapered well geometry of the new low dead volume 1536 well storage microplate (Cat. No. 782 855) reduces dead volume in different liquid handling systems.

4. Ordering Information

Cat.-No.	Description	Quantity per bag	Quantity per case
782 855	1536 well COC compound storage microplate for acoustic liquid handling, low dead volume, clear, solid bottom, non-treated	15	60

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