<table>
<thead>
<tr>
<th>Technical Bulletin</th>
<th>UN-Pac Packing System and Transfer Procedure for Type DS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL-209</td>
<td></td>
</tr>
</tbody>
</table>

**Caution:**

Due to the hazardous nature of many of the products packaged in Aldrich UN-Pac containers we strongly recommend that all users read this bulletin carefully and completely before starting any actual laboratory/production work. If you are unsure of any of these procedures or need assistance, please contact us prior to use.

**UN-Pac cylinders**

- **UN-Pac-200-DS**
  - 200 Liter stainless steel
  - Actual color is metallic

- **UN-Pac-100-DS**
  - 100 Liter stainless steel
  - Actual color is metallic

- **UN-Pac-20-DS**
  - 20 Liter stainless steel
  - Actual color is metallic
The Aldrich UN-Pac packaging/dispensing system provides a convenient method for storing and dispensing laboratory and development scale quantities of high purity anhydrous solvents, fine organics, and other high hazard liquids. The properties of these products require the prevention of external contamination and/or personal exposure be kept to a minimum. Many of the liquids must be handled and stored without exposure to atmospheric moisture or oxygen. Fortunately, the design of the Aldrich UN-Pac system allows ready and convenient transfer of these liquids using the equipment and techniques described in detail in this bulletin. Aldrich provides the special equipment needed for handling these deposit containers and their contents. A complete and detailed listing of the equipment is described in the equipment selection of this bulletin.

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- Specifications
- Handling
- Recommended transfer procedure
- Storage
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Specifications:

Aldrich UN-Pac containers are available with a nominal capacity of 20 liters. (UN-Pac-20-DS) and 100 liters (UN-Pac-100-DS). Figure 1 shows a drawing of the UN-Pac container and Table 1 provides detailed specifications for the containers. Each UN-Pac is equipped with high skirt to protect the attached valves. Thus, when a specification UN1A1 container is an acceptable shipping container, no additional packaging is required when shipped by common carrier.

Table 1

<table>
<thead>
<tr>
<th>Specifications for UN-Pac cylinders Type DS</th>
<th>20 l (UN-Pac-20-DS)</th>
<th>100 l (UN-Pac-100-DS)</th>
<th>200 l (UN-Pac-200-DS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total capacity (L)</td>
<td>22,2</td>
<td>125</td>
<td>217</td>
</tr>
<tr>
<td>Working capacity, L</td>
<td>20,0</td>
<td>112,5</td>
<td>200,0</td>
</tr>
<tr>
<td>(90% of total capacity)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material of construction;</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>container and dipube</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valves, adapter</td>
<td>Brass</td>
<td>Brass</td>
<td>Brass</td>
</tr>
<tr>
<td>UN Specification</td>
<td>UN1A1/X2.3/900/..,/D/</td>
<td>UN1A1/X2.3/900/..,/D/</td>
<td>UN1A1/X2.0/600/..,/D/</td>
</tr>
<tr>
<td>Shipping pressure, approximate (bar)</td>
<td>0,3 – 0,7</td>
<td>0,3 – 0,7</td>
<td>0,3 – 0,7</td>
</tr>
<tr>
<td>Maximum working pressure (bar)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Maximum allowable pressure (bar)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Drum design pressure (bar)</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Tare weight, with valves, approximate (kg)</td>
<td>12,8</td>
<td>25,1</td>
<td>64,2</td>
</tr>
<tr>
<td>Shipping cube dimensions, LxWxH (mm)</td>
<td>400x400x404</td>
<td>400x400x1126</td>
<td>680x680x1090</td>
</tr>
<tr>
<td>Reccommended operating temperature</td>
<td>Ambient</td>
<td>Ambient</td>
<td>Ambient</td>
</tr>
<tr>
<td>Nitrogen inlet/vent valve fitting</td>
<td>R ¼ Zoll</td>
<td>R ¼ Zoll</td>
<td>R ¼ Zoll</td>
</tr>
<tr>
<td>Liquid outlet fitting</td>
<td>G ¼ Zoll</td>
<td>G ¼ Zoll</td>
<td>G ¼ Zoll</td>
</tr>
</tbody>
</table>
Since this is a highly specialized, pressure rated container, a deposit is required upon purchase. Each container is stamped with a unique serial number, and a detailed individual history is maintained. If the container is returned in good condition within six months by the purchaser, credit will then be issued for the deposit amount.

Aldrich has a complete maintenance program to insure that each customer receives a deposit container in the best possible condition. Please do not mark directly on or place additional labels on the UN-Pac containers, use tags or place labels on the plastic sleeve to label as partial or empty. Since chemical residue on the exterior of the container may damage the container please remove any spillage if it occurs. Containers returned with damage due to chemical residue may result in loss of the deposit.

On receiving an Aldrich UN-Pac, read and closely follow the standard procedure described in this bulletin, regardless of the quantity needed or the chemical transferred. Aldrich offers a wide variety of adapters and transfer equipment. These are described in detail later in the equipment section of this bulletin. Since the products packaged in UN-Pac containers are sensitive to external contamination, highly hazardous, or sensitive to water, oxygen or both, they must be handled while using appropriate personal protective equipment and must never be exposed to the atmosphere.

Figure 1 illustrates the valve configuration on a UN-Pac container. The nitrogen outlet valve is connected to the vapor space inside the container. The liquid outlet valve is connected to a diptube inside the container.

Handling:

The user must be a fully qualified and experienced laboratory or chemical production worker to handle these reagents. All users must be aware of the hazardous nature of many of these products. The material safety data sheet (MSDS), which is provided with each order, must be read and understood by the user prior to starting any work with the product contained in a UN-Pac container. In general, handle these products only under an inert atmosphere and exercise caution to prevent inhalation of vapors or direct contact with the skin. Operators must wear appropriate clothing with long sleeves, chemical resistant gloves, goggles, and full face shield. Additional personal protective equipment must be used as required. In case of contact, immediately flush eyes or skin with water for at least 15 minutes while removing contaminated clothing and shoes. Seek medical attention promptly.

In case of fire, use a dry chemical extinguisher; do not use water with moisture reactive products. Store UN-Pac containers upright in a cool location, away from heat and direct sunlight. Refrigerate if necessary.

During all nitrogen-pressure transfer, the flowing liquid can generate a static charge. Therefore, the UN-Pac container and receiver must be connected to a suitable ground. Aldrich offers a 6-ft length of flat braid bare cable with copper clips at each end which makes a convenient grounding strap (Z15,030-4).

Technical experts are available by telephone to answer your questions regarding the proper handling of products packaged in UN-Pac containers. Contact Aldrich immediately if an inadvertent deviation from the recommended transfer procedure occurs during use of a UN-Pac container.
Legend
A- Liquid outlet valve
B- Handle for Liquid outlet valve
C- Nitrogen inlet/vent valve
D- Handle for Nitrogen inlet/vent valve
H- Inside thread for adapter assembly H
G- Inside thread for adapter assembly G
Figure 3: Typical transfer system for UN-Pac Type DS

magnification see page 14, 15, 16

Figure 6a

Figure 6 b, c
**Recommended Transfer Procedure**

(Refer to Figure 3 while following this procedure)

**Caution:**
Due to the hazardous nature of the products packaged in UN-Pac containers appropriate personal protective equipment must be worn throughout the entire transfer procedure. Read all steps before starting and do not work alone. This procedure must only be performed by technically qualified individuals.

**Step 1**
Place the UN-Pac container in a secure and upright position in a safe and well ventilated area. If the product is to be delivered by weight secure the container on a floor scale. Ground the container using an appropriate grounding strap (Z15,030-4).

**Step 2**
Make sure the liquid outlet valve A is closed to the diptube by turning handle B (red cap) clockwise.

**Step 3**
Make sure the nitrogen inlet/vent valve C is closed by turning the handle D (green Cap) clockwise.

**Step 4**
Carefully remove plug F from the nitrogen inlet/vent valve C. Save this plug for later replacement. The plug is fastened on a warp shown in Fig. 2.

**Step 5**
Connect a nitrogen-inlet adapter G to a suitable nitrogen source using flexible plastic tubing. Adapter G (shown in Fig. 5) is supplied in a plastic bag with the cylinder. Secure the tubing in place. The nitrogen should be pressure-regulated at 0,4-0,7 bar.

**Step 6**
Adjust the nitrogen source to give a slow stream exciting from nitrogen inlet adapter G and connect to the nitrogen inlet/valve C. See Figure 6b. Finally, check the connections for absence of leaks using Snoop (Z27,391-0) or a water/soap solution.

**Step 7**
Slowly and carefully remove plug E from the liquid outlet port of liquid outlet valve A. Save these plug for later replacement. The plug is fastened on a warp shown in Fig.2.

**Caution:**
Occasionally there may be liquid or solid under the plugs and some fuming may occur with the more reactive reagents. Without operating the valve, remove any solid from the valve opening by washing with a stream of odorless mineral spirits form a wash bottle and use a wire brush to clean the threads if necessary. Wear appropriate protective equipment.

**Step 8**
Prepare a liquid-transfer line which is clean and dry. Exchange the outlet of the container. Remove the outlet adapter P from the transfer line. Insert the male tube adapter (1/4 NPT) of assembly H into the transfer line (See Figure 5). Wrap Teflon-tape (Catalogue No. Z10438-8 or Z14881-4) around the threads.
Figure 4: Transfer Line with Adapter (P)

Note:

The complete list of available transfer lines is given in Table 2 with a representative system shown in Fig. 7. Technical Information Bulletin No. AL-150 gives a complete list of available needles for these transfer lines.

Step 9

Open ball valve J and needle valve K and insert needle L into a septum on nitrogen-flushing adapter M, which is easily prepared by putting septa (sleeve stoppers) on both ends of a short piece of glass, plastic or metal tubing (See Figure 3). We recommend using our septum (Catalog No. Z12,437-0) on each end of a 6-inch length of 14-mm ID glass or 3/8-inch ID polyethylene, polypropylene or stainless steel tubing.

Step 10

The flow through nitrogen-flushing needle N is adjust to give a fast exit stream, then N is inserted in the other septum on M. Please consult Aldrich Technical Information Bulletin No. AL-134 for a complete description of the use of septa and needles in handling air-sensitive reagents.

Step 11

Connect the female part of assembly H to the liquid-transfer line. This assembly H shown in Fig.5 is then attached to the liquid outlet valve A (G1/4 Zoll) with the other side of adapter (R1/4 Zoll). Tighten the nut (back up wrench) on the adapter as shown on the bag container of adapter and Figure 5a. Use two wrenches when tightening.
Figure 5: Assembly H (Bottom 2 pieces) + Adapter G

The first installation  Reinstallation

1 ¼ turns past finger thight  ¾ turn past finger thight

Figure 5a: Ferrule Lock Nut Tightening Assembly

Note: Always use two wrenches: one to hold the tube fitting body while using the other to tighten the nut

Step 12  The nitrogen stream is now exiting through septum inlet Q. At this point install a septum R (Catalog No. Z10,072-2 or Z12,435-4) to inlet Q and wire in place.

Step 13  Check all connections in entire transfer line for absence of leaks using a Snoop or a water/soap solution.

Step 14  Remove nitrogen-flushing needle N from adapter M and insert into septum R on inlet Q.

Step 15  Remove adapter M from needle L and nitrogen will exit from the end of needle L.
Step 16  Insert needle L into septum S on septum-inlet adapter T which is on a clean, dry, nitrogen-flushed receiver or reaction apparatus. Push needle L into the system until the end of the needle is beyond any fitting between the reaction apparatus and adapter T (Note: The reaction apparatus or receiver should have been flushed previously with nitrogen and connected to a mineral oil bubbler).

Step 17  Needle valve K can now be turned off and nitrogen-flushing needle N can be removed from septum R or inlet Q.

Step 18  Cautiously open handle B (turn counter-clockwise) on valve A and watch the end of needle L and the level of mineral oil in the exit bubbler from the reaction apparatus. If liquid flow is not observed from needle L soon or if the oil level rises (suck-back) in the center tube of the mineral oil bubbler, immediately turn off valve A (turn handle B clock wise) and proceed to Step 19.

If flow is noted, go to Step 20.

Step 19  Cautiously open handle D (turn counter-clockwise) on valve C.

This will pressurize the vapor space in the cylinder to 0.4-0.7 bar of Nitrogen. Return to Step 18.

Step 20  When the desired amount of liquid has been transferred, close outlet valve A and ball valve J; then close inlet valve C (if open). During the actual transfer of liquid, inlet valve C can be opened and closed as needed to maintain a reasonable flow of product from needle L. If necessary, the nitrogen pressure can be increased up to 2 bar to increase the rate of flow.

Step 21  Needle L, can be removed from septum S and placed in a new septum on another reaction apparatus or it can be removed from septum S and placed in an adapter M for short-term storage (less than a few hours). For long-term storage (more than a few hours) or when the container is empty, the transfer apparatus should be removed from the container as described in Steps 22-31.

Step 22  With needle L still in the reaction apparatus or inserted in a septum on a suitable receiver, open ball valve J and insert nitrogen-flushing needle N into septum R.

Step 23  Open needle valve K to flush residual liquid from the transfer line.

Step 24  Close needle valve K followed by ball valve J and remove needle L from the receiver and place into the septum on adapter M.

Step 25  Check to make sure that inlet valve C is closed, then remove adapter G and replace plug F.
Step 26  Check to make sure outlet valve A is closed; then remove adapter assembly H (turn clockwise to remove). Caution: A small amount of liquid will remain behind adapter assembly H in the valve opening. If the reagent is highly reactive with air some fuming may result. It is necessary to cap the open ends as mentioned immediatly to prevent excessive reactivity.

Step 27  Once removed from the container, place the transfer line in an empty metal bucket and carry to a safe distance from the container.

Step 28  Return to the cylinder. Rinse the inside of the valve opening with a stream of odorless mineral spirits (catalog No. 26256-0) from a wash bottle. Clean the threads, if necessary, using a small wire brush to remove any solid.

Step 29  If necessary, clean the threads on plug E in a similar fashion, then wrap Teflon tape around the threads only. This is not done to improve the seal but to aid in later removal of the plug.

Step 30  Replace plug E in valve A and tighten just using a adjustable wrench.
Note: Do not open the cleaning whole in the middle of the top. The whole is closing with a 2 zoll stainless steel snatch with a gasket and saved with a Tri-Sure cap.

Step 31  Remove any chemical residue from the exterior of the container.
Note: Do not mark directly on or place additional labels on the Aldrich UN-Pac containers. Use tags or place labels on the on the plastic sleeve to label as partial or empty.
Failure to remove chemical residue from exterior can result in damage to the Container and may lead to loss of the deposit.

Step 32  The UN Pac container can now be returned to storage or shipped back to Aldrich. The transfer apparatus should be cleaned as described in Steps 33-36.

Step 33  If a pure solvent was handled, then the transfer line can be brought inside and cleaned via normal procedures for laboratory apparatus. If a highly reactive reagent was handled, the transfer line is left outdoors with adapter M and septum R removed and needle valve K and ball valve J open.

Step 34  While still outdoors, rinse the line with a stream of odorless mineral spirits into an empty metal bucket. Caution: If the product is phoric, this sometimes results in a fire. (Note: The transfer line should be rinse as soon as possible after it is removed form the container. If this is not done, partially hydrolyzed material will often plug the ends of the inner material remains active. This can cause problems when the transfer line is eventually cleaned.)
Step 35  After the rinse with odorless mineral spirits, flush the line with water, dilute acid (if needed to dissolve solids formed on hydrolysis), water and finally acetone or methanol.

Step 36  The transfer line can be brought inside for a final clean-up following normal procedure for laboratory apparatus.

Storage:

UN-Pac containers which contain product should be stored upright under 0.4 bar nitrogen pressure in a well ventilated area out of direct sunlight. Refrigerate when necessary. The liquid outlet valve and the nitrogen inlet valve must be closed and the plugs must be in place and tightened. Any chemical residue on the outside or on top of the container must be removed. Failure to remove chemical residue from the exterior of the container can result in damage to the container. UN-Pac containers must be clearly labeled with the product name and hazard labels. Please do not mark directly on the UN-Pac containers. Use tags or place labels on the plastic sleeve to label as partial or empty.

Container return:

To return a UN-Pac container to Aldrich the container must be empty (except for residual product) with all valves in the positions as described in the storage section above. Any chemical residue on the outside or on top of the container must be removed. Failure to remove chemical residue from the exterior of the container can result in damage to the container and may lead to loss of the deposit. Empty UN-Pacs contain product residue which is fully regulated as hazardous material and must be shipped in accordance with all applicable shipping regulations. Please do not mark directly on the containers. Use tags or place labels on the plastic sleeve to label as empty and as needed for shipping purposes.

Return empty UN-Pac containers to:
Sigma-Aldrich Chemie GmbH
Riedstraße 2
D 89555 Steinheim

UN-Pac containers must be returned in good condition within six month of the date of purchase to receive a full credit of the deposit amount. Please contact our Customer Service Department with any further questions regarding the return of Aldrich`s UN-Pac containers.

Equipment

We offer a wide variety of adapters and liquid-transfer apparatus. The liquid from all transfer lines exits through a stainless steel needle. Common syringe needle. Common syringe needles equipped with luer hubs can be used on some of supplied apparatus. However, due to the small gauge of available needles with luer hubs, unacceptable slow flow rate often results. Therefore, we offer transfer lines equipped with 1/8- inch ferrule locks for special 11-gauge needles to give a medium flow rate. In order to obtain a fast flow rate, we recommend using one of our transfer lines or needle-tubing connectors which is equipped with a 3/16-inch ferrule lock for a special 7-gauge needle.
Brass adapters can be reused many times and are inert to hydrocarbon and ether solvents. However, when corrosives are used or if acid is used clean-up, then stainless steel adapters must be used. The valves on UN-Pac containers are brass and the cylinder is as the reagents shipped are not corrosive to brass stainless steel in the absence of atmospheric moisture.

Many customers may prefer to simply order a preDesigned and fabricated transfer system. Therefore, we offer completely assembled outlet lines in brass and stainless steel. These are constructed of threaded pipe and metal-braided Teflon tubing and end in either a luer lock, 1/8-inch ferrule lock or 3/16-inch ferrule lock for connection to a needle which must be ordered separately. The complete list of available transfer lines is given in Table 2 with a representative system shown in Fig.7. Technical Information Bulletin No. AL-150 gives a complete list of available needles for these transfer lines.

Table 2 Transfer lines for liquid removal from UN-Pac containers.

<table>
<thead>
<tr>
<th>Pipe, valves* flexible tubing</th>
<th>Needle Connection**</th>
<th>Relative flow rate</th>
<th>Catalog No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>Luer look</td>
<td>Slow</td>
<td>Z15,021-5</td>
</tr>
<tr>
<td>SST</td>
<td>Luer look</td>
<td>Slow</td>
<td>Z15,022-3</td>
</tr>
<tr>
<td>BT</td>
<td>1/8-in FL</td>
<td>Medium</td>
<td>Z15,023-1</td>
</tr>
<tr>
<td>SST</td>
<td>1/8-in FL</td>
<td>Medium</td>
<td>Z15,025-8</td>
</tr>
<tr>
<td>BT</td>
<td>3/16-in FL</td>
<td>Fast</td>
<td>Z15,026-6</td>
</tr>
<tr>
<td>SST</td>
<td>3/16-in FL</td>
<td>Fast</td>
<td>Z15,027-4</td>
</tr>
</tbody>
</table>

BT-brass pipe, brass valves and brass-braided Teflon tubing; SST-stainless steel pipe, stainless steel valves, and stainless steel-braided Teflon tubing; FL-ferrule lock.

* Needle valve is for nitrogen flush of transfer line and requires a septum (Catalog No. Z10,072-2 or Z12,435-4) which must be ordered separately.

** Needle not provided; must be ordered separately.
Figure 7: Liquid-transfer line for Aldrich UN-Pac containers

More informations about adapters, tubings and equipment’s you can find in the following references.


The foregoing discussions and procedures are given to assist our customers in the transfer and use of our products supplied in UN-Pac containers. The user must read this bulletin carefully, consult the figures, and follow each step in the transfer procedure. If you need further assistance at any time, please contact us.