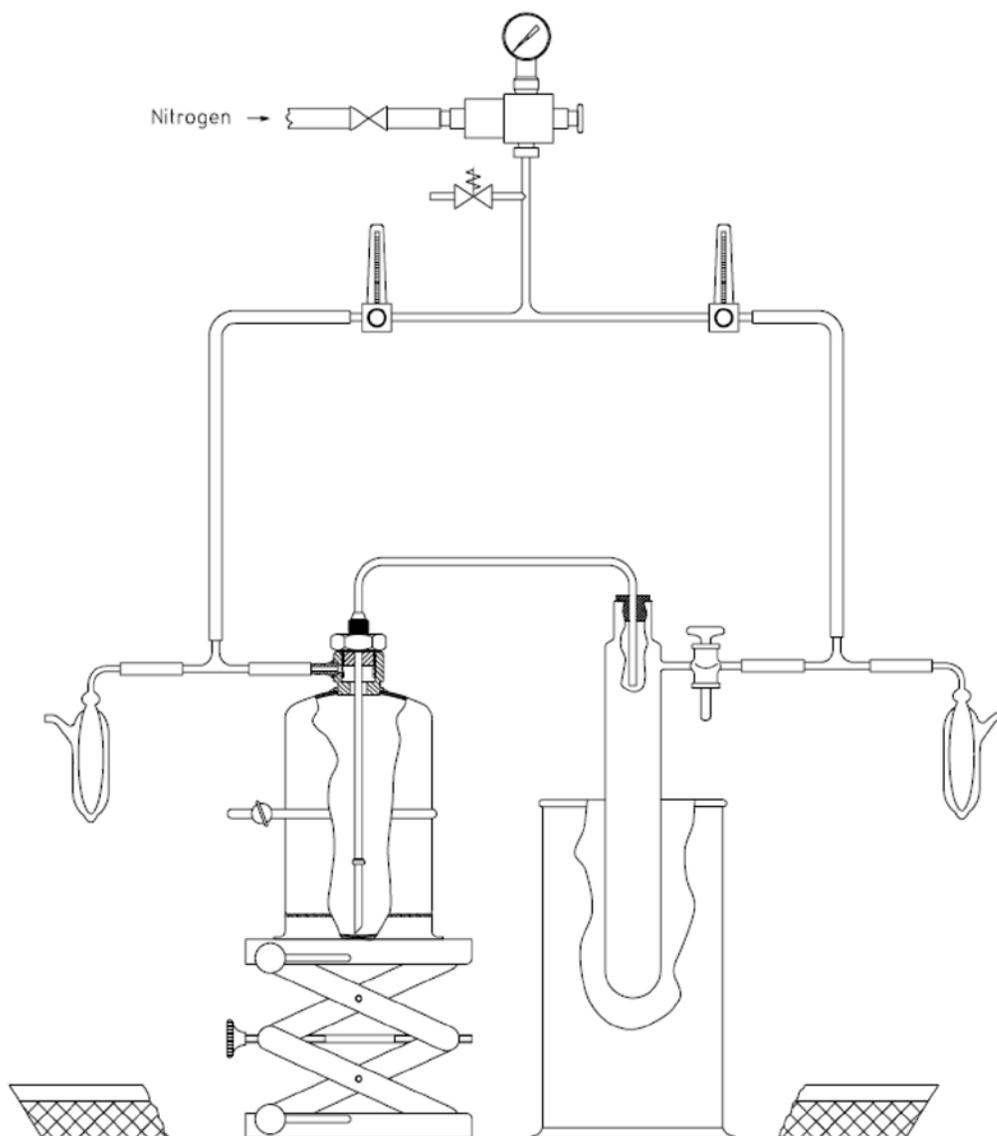


Transferring and Storage

A dip tube is available for Container 2 which can be screwed into the neck to permit safe transfer of product. Small quantities of metal alkyl can be withdrawn with the help of a syringe or suction pipette.

Transferring in the Laboratory

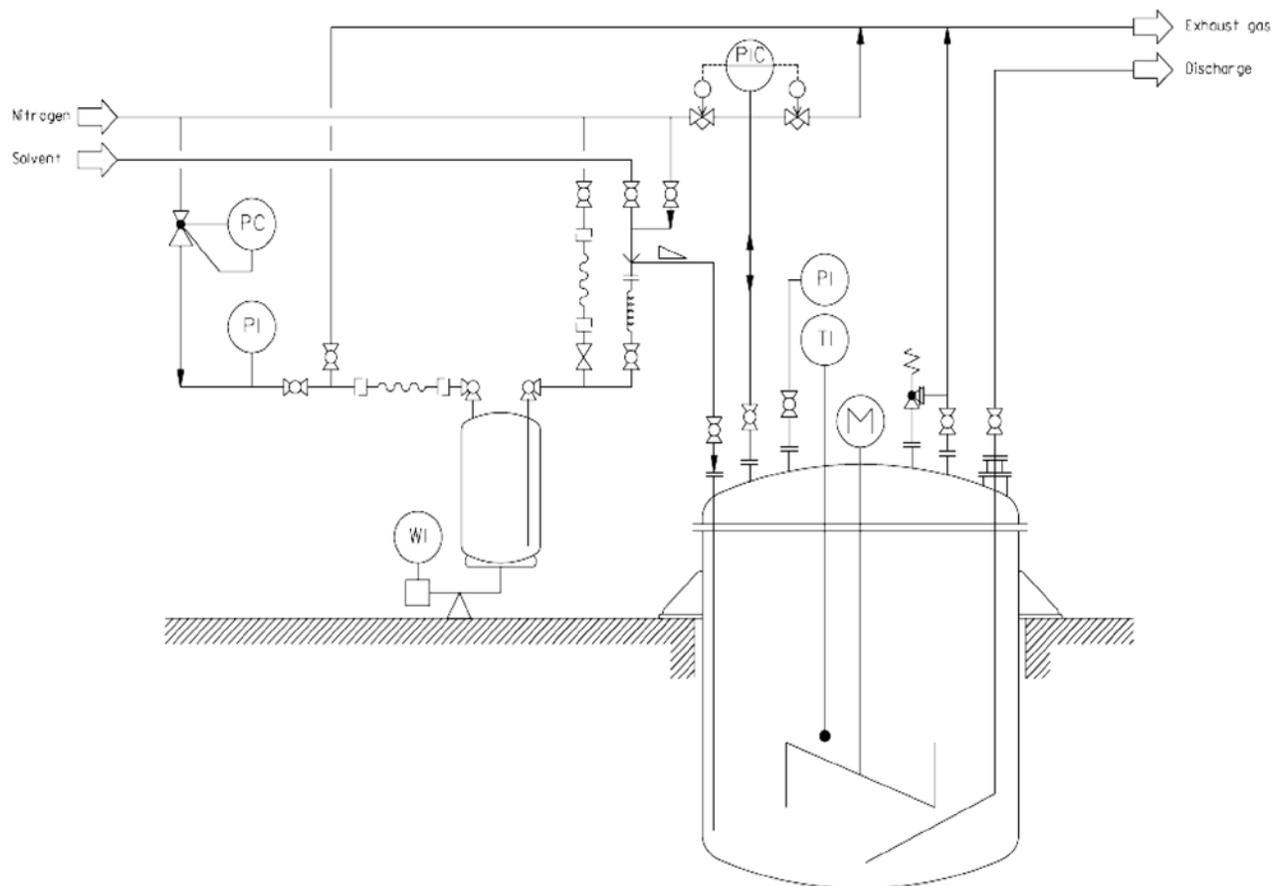


Transferring and Storage

Transferring on a Pilot Plant Scale

Container 3 and 4 are particularly suitable for pilot plant work. An example is illustrated schematically below.

Container 3 and 4 are particularly suitable for pilot plant work. An example is illustrated schematically below.



Transferring and Storage on an Industrial Scale

The flow diagram for a transfer station with ancillary tank storage is represented as an example at the end of this section.

Every transfer station can be divided into the following main components:

- transfer area with leakage collecting system
- control room with measuring, regulating and control devices
- metal alkyl storage tank with pump
- nitrogen supply and exhaust gas system

The constructional and technical design of the above mentioned facilities must always conform to the respective national regulations. In Germany the "Verordnung über brennbare Flüssigkeiten" (VbF) together with the corresponding technical rules (TRbF) apply.

Constructions of Transfer Stations

The transfer area where the container is connected and emptied, should be constructed to allow unhindered access in height and width for positioning container 5 to 9 on a trolley jack, fork lift truck, lorry trailer or rail car. An operating platform is recommended depending on the size of the transport container.

The concrete floor should slope with a gradient of approx. 1% towards the outside wall. A gully should be installed in the vicinity of the outside wall which connects the transfer area via an underground pipe to a containment area or ditch. This allows metal alkyl to be removed from the transfer area in an emergency and to burn away safely. The distance between transfer station and containment area or ditch should be at least 10 meters. Openings should be left in the lower region of the outside wall to allow leaking metal alkyl to flow to the containment area or ditch.

It is essential that the leakage collecting system is protected from rain, either by a roof or by pumping away.

The openings in the brickwork should be designed to ensure good ventilation in the transfer area and the brickwork should provide adequate protection against the weather. The roofing should be light so that in the case of fire it is immediately destroyed allowing flames and fumes to escape easily. This ensures that fire

Transferring and Storage

fighting is not hampered by smoke. In order to keep the potential hazard as low as possible the transfer area should be kept as free as possible of other equipment which can be placed elsewhere.

Next to the transfer area and separated by a fireproof wall is the control room. In the example shown in the diagram the operating and control facilities are installed on a platform construction. A viewing window (of heat resistant glass) in the wall permits observation of the transfer process from a safe position.

Constructional measures for protection against the weather should be carried out according to local conditions.

Equipment for Transfer Stations

The container is opened and connected in the transfer area. We recommend loading arms for the transfer. This gives a higher standard of safety than using hose connections. The transfer arms are adapted to the available space and are fitted with a counterweight for easy operation. The special swivel joints provide good maneuverability and safe emptying of the container.

We recommend seamless tubing (St 37.8 grade) for pipework. Flange connections should have a working pressure of 40 bar, and be constructed to DIN 2635 with raised face, form C. We use spherical seals of stainless steel with graphite surface and outer ring.

We use and recommend flanged ball valves with full bore. The stem shaft is fitted with a double sealing system. In case of fire the ball is sealed via metallic contact surfaces (fire safe design).

Control Room

The control room is separated from the transfer area by a fireproof wall with viewing window (of heat resistant glass). It contains all control and operating equipment which does not have to be installed in the transfer area.

The remote valves can be operated by push buttons from here. The central emergency trip system and remote indicators for pressure and level are also installed in this room.

The "Emergency Off" switch is easily accessible, its function is described at the end of this section.

Transferring and Storage

Metal Alkyl Storage with Pump

The flow diagram at the end of this section shows a double-walled storage tank for metal alkyls.

The tank is equipped with a breathing vent for the supply and discharge of nitrogen. An adequate supply of nitrogen must be ensured at all times.

The volume between the two walls of the tank is also filled with nitrogen at a pressure of approx. 0.02 bar for leak control purposes. If a leak in the outer wall occurs, the pressure loss is signaled as an alarm via a contact pressure gauge.

Leakage from the inside container is registered by a liquid probe in the reference vessel of the double wall.

All connections and outlets of the storage tank are fitted above the liquid level.

The storage tank liquid level is indicated by a suitably designed continuously recording level measuring device, for example, a displacement level gauge (Archimedes' Principle) directly installed in the tank from above.

Overfilling of the storage tank is prevented by a measuring device, which when actuated (max. filling level) trips the "Emergency Off" switch, and this stops discharge of the container.

A safety relief valve prevents the storage tank being used at impermissible operating pressures. The vent line leads to the exhaust gas collecting line which then passes to the main nitrogen separator.

A safety sight glass in the nitrogen vent line gives a visual control to determine whether product has been carried out with the vent stream.

Metal alkyl is pumped to the process via a dip pipe. For this we recommend a self-priming regenerative pump. Sealing is carried out using a closed magnetic drive or a double-acting mechanical seal with sealing liquid unit. Canned motor pumps have also been used successfully. Membrane pumps are used if the product is dosed directly from the storage tank into the reactor. These should have a double membrane fitted with a leak detector.

Transferring and Storage

Positive displacement meters (e.g. piston meters or oval wheel meters) or mass flowmeters, depending on the process conditions, can be used for measuring quantities.

Nitrogen Supply and Exhaust Gas System

As mentioned above, a continuous supply of nitrogen must be ensured for the operation of transfer station and storage tank. In order to prevent reduction in metal alkyl quality the nitrogen should have a maximum oxygen concentration of 10 vpm.

The exhaust nitrogen gas produced (e.g. the displaced nitrogen atmosphere of the storage tank during discharge of the container) is passed to the separator via an exhaust gas line. This separator is filled to a certain level with an inert solvent or oil. The vent line is passed under the liquid level (e.g. 200 mm) so that a low nitrogen pressure is maintained continuously in the system. In addition the vent line is continuously filled with a stream of nitrogen (approx. 50 ltrs/hr). The vent line is lead from the separator to a safe place (e.g. containment ditch or burning pit).

Starting Up

Before starting up the transfer station for the first time, all pipework, storage tanks, separators and pumps must be cleaned and flushed with inert solvent. To remove residual moisture the system is further flushed with an approx. 3% metal alkyl solution finally blowing dry with nitrogen.

For storage tanks and reactors which have already been operated with metal alkyls we have prepared instructions for inspection and recommissioning (TI-B 03).

Safety Installations

The transfer area in particular, can be the starting point for possible incidents and we have taken this into consideration in planning fire precautions.

The "Emergency Off" trip system, which is operated either manually or automatically in case of fire, closes ball valves in the product and nitrogen lines respectively and opens a ball valve in the vent line. This prevents any further flow of combustible product. The pneumatic control line is laid along the product transfer arm to the flange connection on the container. Any flames from a fire destroy the plastic tube and operate the "Emergency Off" trip system. The system can be operated manually by means of a push button switch situated by the viewing window in the control room. A second switch should be installed at a safe distance (approx. 25

Transferring and Storage

meters) from the transfer area. An adequate number of powder extinguishers should be installed at easily accessible positions outside the danger zone. Furthermore a water extinguishing shower with footboard should be installed next to the transfer area for extinguishing clothes fires.

Transfer of metal alkyls from a container to storage tank can be controlled and observed safely from the control room.

Operating personnel should receive detailed instructions on handling metal alkyls at regular intervals. See also our section “Instructions for Transfer of Metal Alkyls from Containers”

Our Technical Service will be pleased to assist you in every way possible in designing and planning metal alkyl transfer facilities.

Storage Tanks for Metal Alkyls

