

DESIGNING AND EXECUTING
HYDRAULIC POWERPACKS

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10.4 Safety Measures

Hydraulic installations in civil engineering must be designed for a maximum of operational safety. This must be considered during the project designing and execution of systems.

Here are some of the essential features and devices:

- Cylinders designed to satisfy the requirements of civil engineering with robust layout and multi-lipped seals.
- Cylinder guideways adequately dimensioned.
- Cylinder guides in bronze or teflon slip bands.
- Spherical clevis with appropriate sealing arrangement, in order to guarantee at all times proper seating and to prevent the ingress of dirt and water into the clevis so that the clevis can be maintained in constant functioning order.
- Mounting of control manifolds with hydraulically operated shut-off valves and manual stop cocks directly to the cylinder ports without intermediate pipelines.
- Pressure safety relief valves in the control manifolds directly on the cylinder to prevent pressure peaks and also to avoid inadmissible pressure rises due to temperature or effects of external forces.
- Pipework system is to be dimensioned for a safety factor of at least 4 and must be executed with suitable corrosion protection.
- Hoselines are to be of highest pressure resistance and fitted with appropriate isolator armatures.
- The system is to be constructed such that pressure peaks in the system resulting from acceleration and deceleration forces or switching actions will be definitely excluded.

- Pipelines must be monitored for ruptures. In the event of a pipe rupture, the installation must be switched off immediately. In such a case the gate must be held safely at all times by the cylinders.
- The system must be provided with sufficient pressure relief valves, with the various circuits having separate relief valves according to the possibly differing operating pressures. It is also recommended to have maximum pressure safety relief valves in the individual circuits, which will shut down the installation when activated.
- In large-scale plants it is also advisable to have pressure switches to monitor the function of the pumps.
- In order to ensure a maximum degree of operational safety, at least 2 pumps must be provided per gate, whereby the delivery rate can be shared at 50% between 2 pump groups. In the event of failure of one pump it is therefore still possible to operate the gate at half speed.
- The oil tank must also be equipped with appropriate monitoring devices which control the level in the oil tank. Generally a design with 2 switching points 1) alarm and 2) shut-down are sufficient.

Filters are indispensable for fault-free operation. Filters utilized are return line and/or pressure filters with adequate dimensions (approximately 3 times the nominal flow). Filters must be fitted with optical or electrical clogging indicators.

In addition, the oil tank must be equipped with devices which prevent formation of condensation in the tank. This is usually done by means of moisture adsorbers.

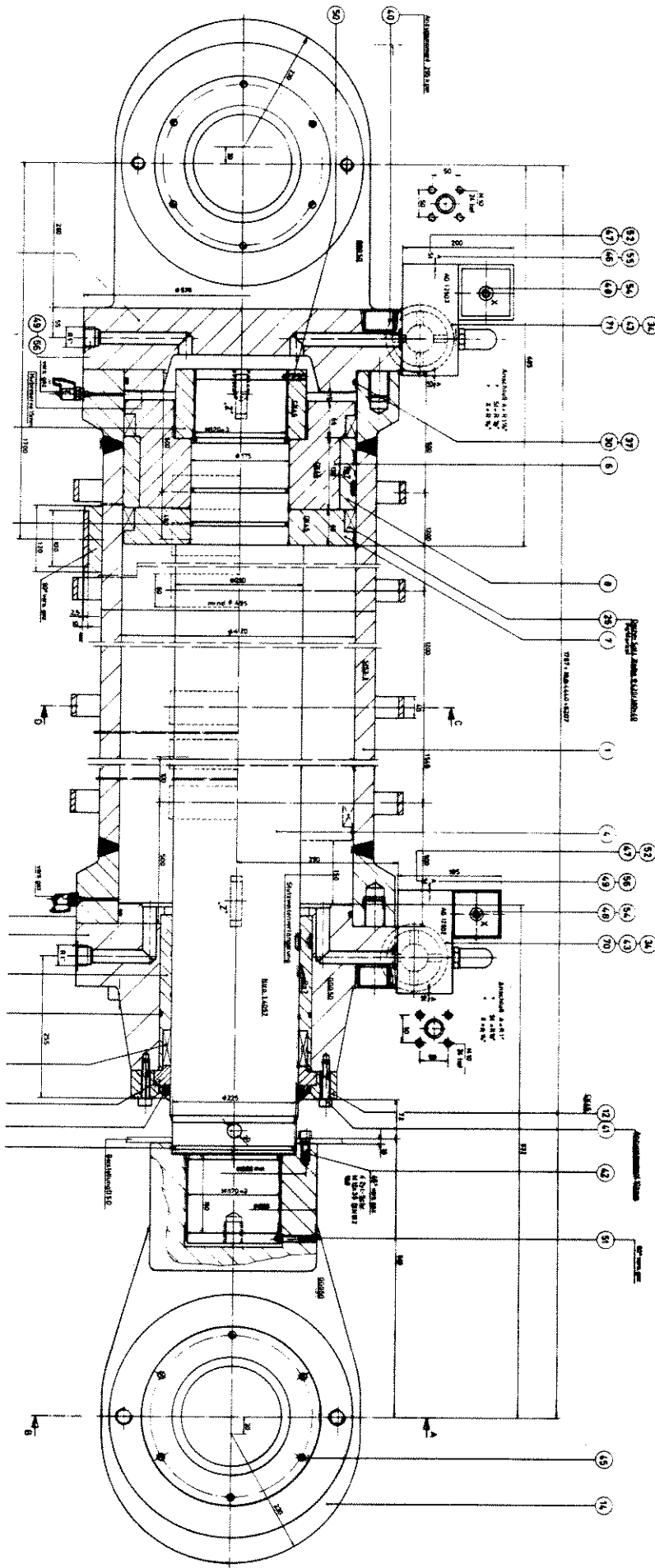
Other essential features which contribute to the safety of the plant are the selection of suitable oil types with long operating lives, good air and water separating qualities, good lubricating properties and with a viscosity curve of the lowest possible gradient. The oil tank itself must be provided with an absolutely oil-proof corrosion protection in order to avoid dissolving of the paint into the oil.

Designing of the power units in civil engineering should take into account functional safety, life and above all ease of maintenance and therefore cover the following criteria:

- Adequate dimensioning of the oil tank
- Minimum oil level approx. 4 times max. volumetric flow
- A generously calculated reserve capacity so that a cylinder can be drained to tank during maintenance work.
- Easily accessible drainage armatures
The tank must have adequate clearance from the floor for this.
- Easily visible oil level indicators - equipped with shut-off armatures as the case requires.
- A Level switch to monitor the oil level.
- Well-sized return line filters with clogging indicators, fitted with electrical indicators for practicality.
- Moisture adsorbers to prevent the formation of condensation inside the tank.
- For large plants where the pump groups are located outside the tank, there should be shut-off elements directly on the oil tank and possibly with electrical monitoring.
- Clear arrangement of the controls
These should be located on the oil tank in smaller installations and on separate control stands in larger installations.
- Controls gathered together in control blocks. All solenoid operated valves with manual override, preferably in tamper-proof design. Depending on the configuration of the installation, pilot operated components may require an emergency manual override on the main spool.

- In large installations it is advisable to have plugs with luminous diodes. These simplify trouble-shooting in the event of failure.
- If it is not possible to fit pressure gauges to all measuring points (for space reasons), the appropriate pressure gauging ports should be provided.
- Adequate labelling of the individual components is very important. This also applies to labelling of the various sub-assemblies.
- Another equally important point is proper corrosion protection for the installation, especially on the inner surfaces of the oil tanks. Rust removal by sand blasting the inner surfaces is imperative.

X, On the connections of the pipes to the cylinders also cocks should be provided in adequate numbers.



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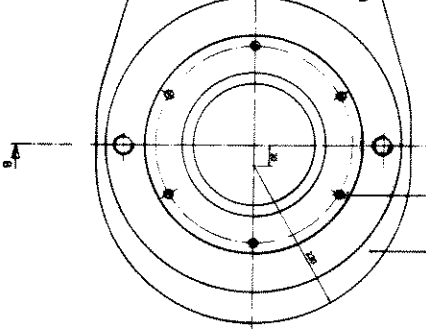
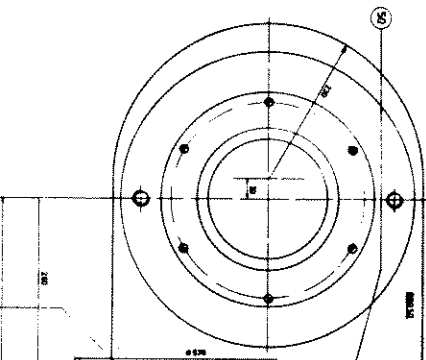
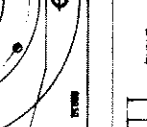
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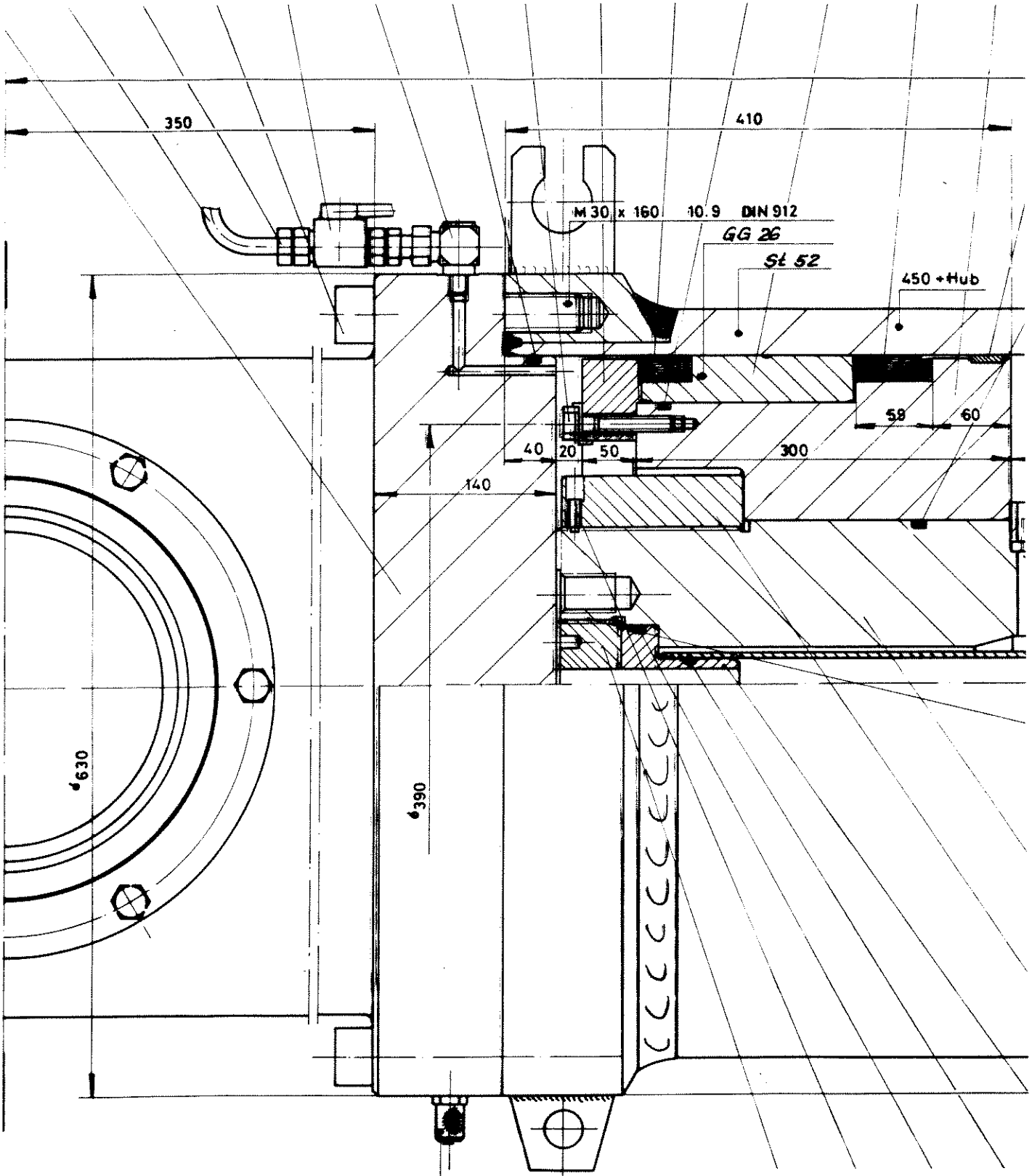
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MICRO-HOSE-COUPLING
MinimeB-Schraubkuppl
als Entlüftung



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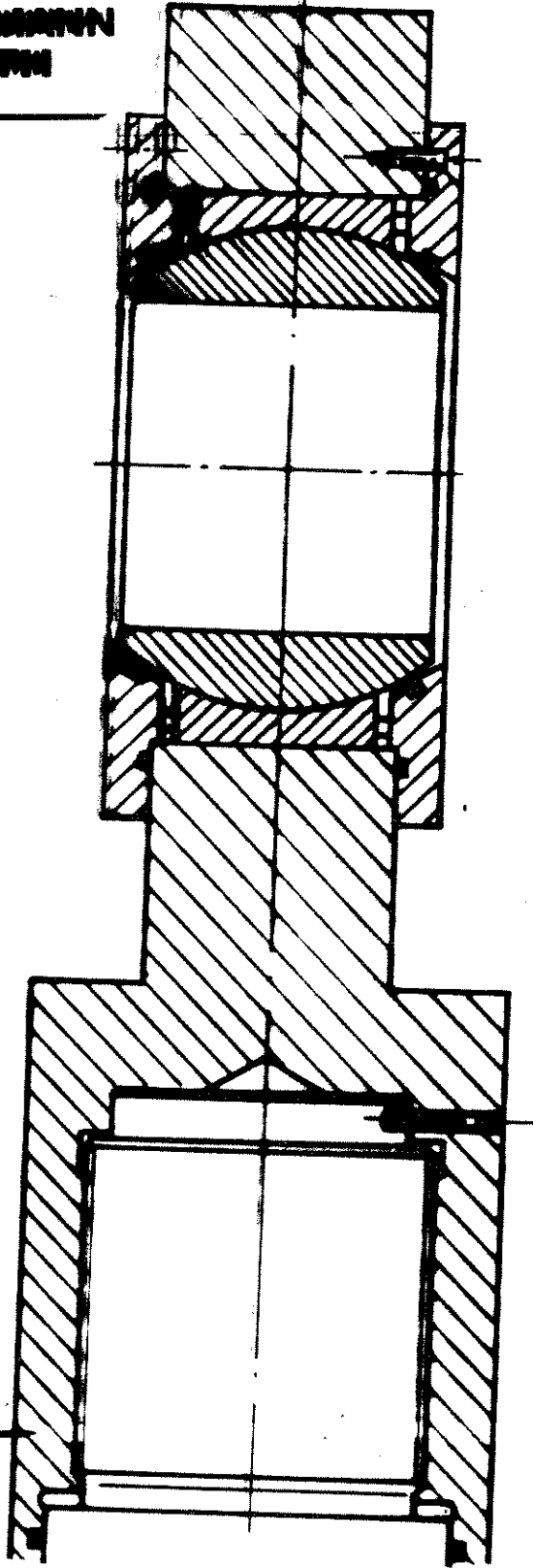
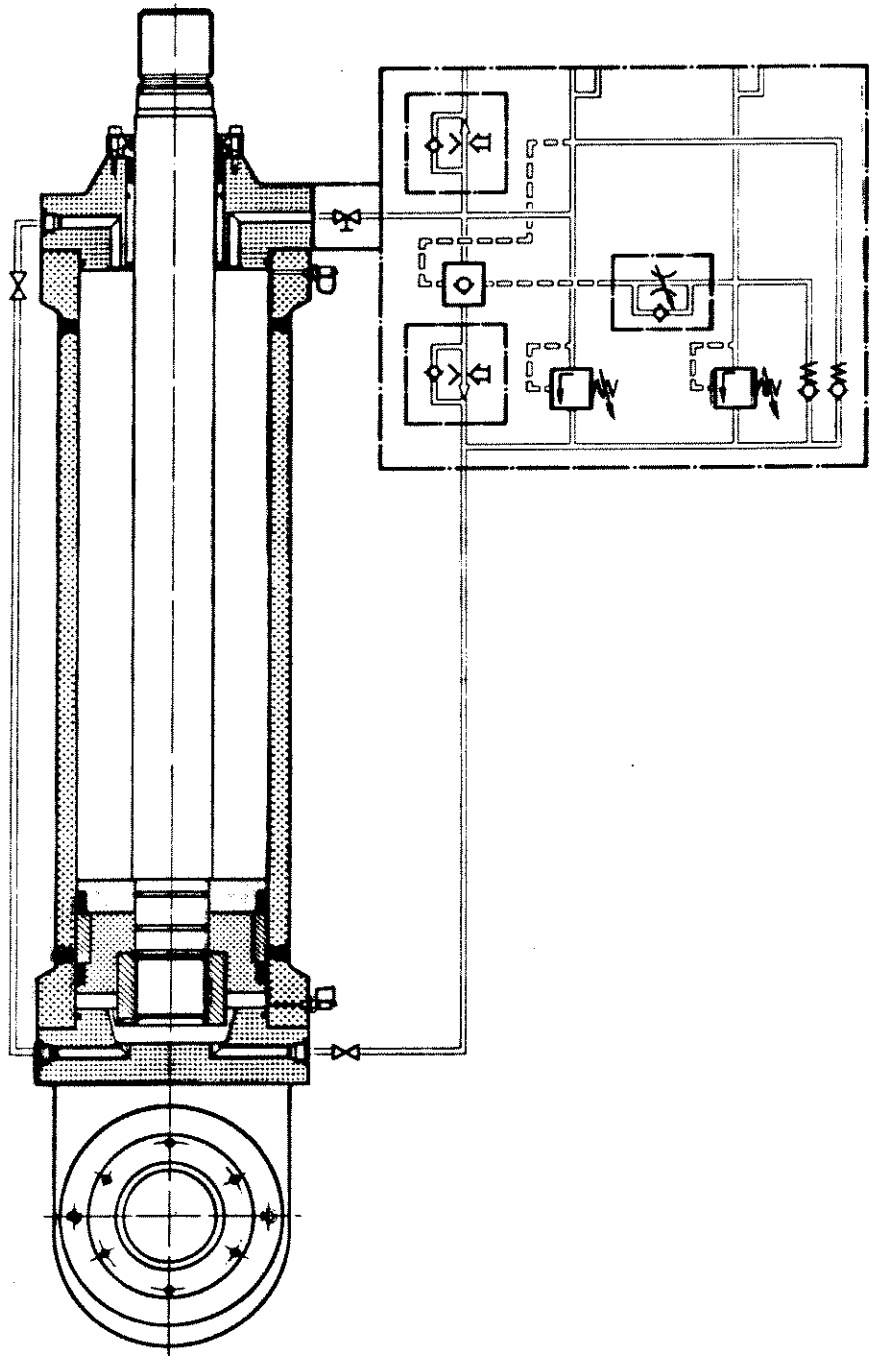
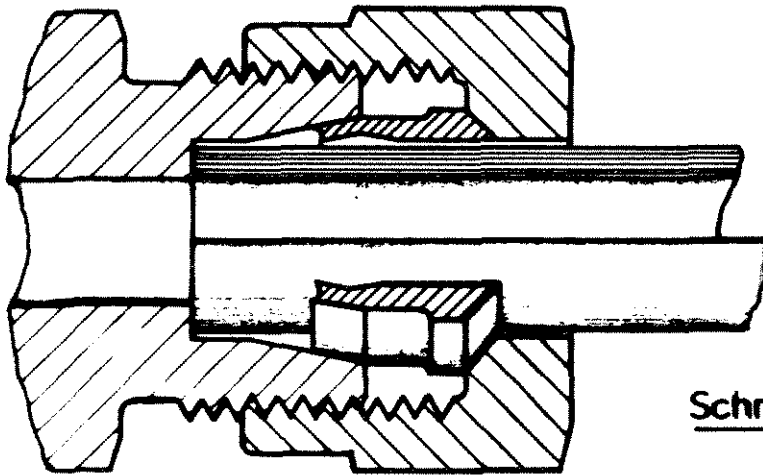
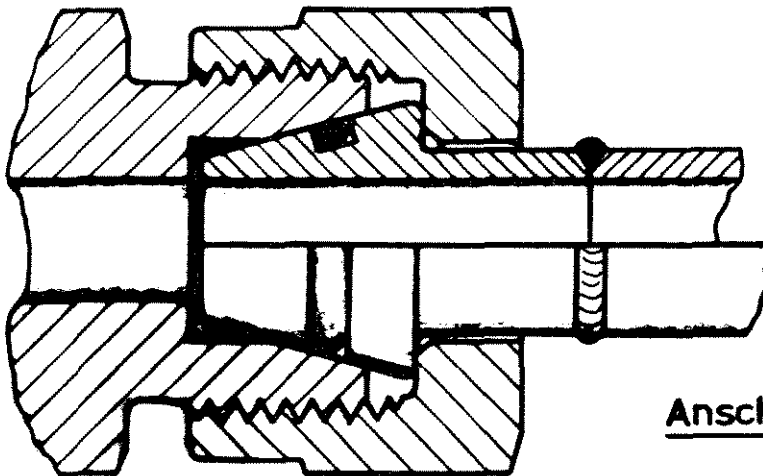


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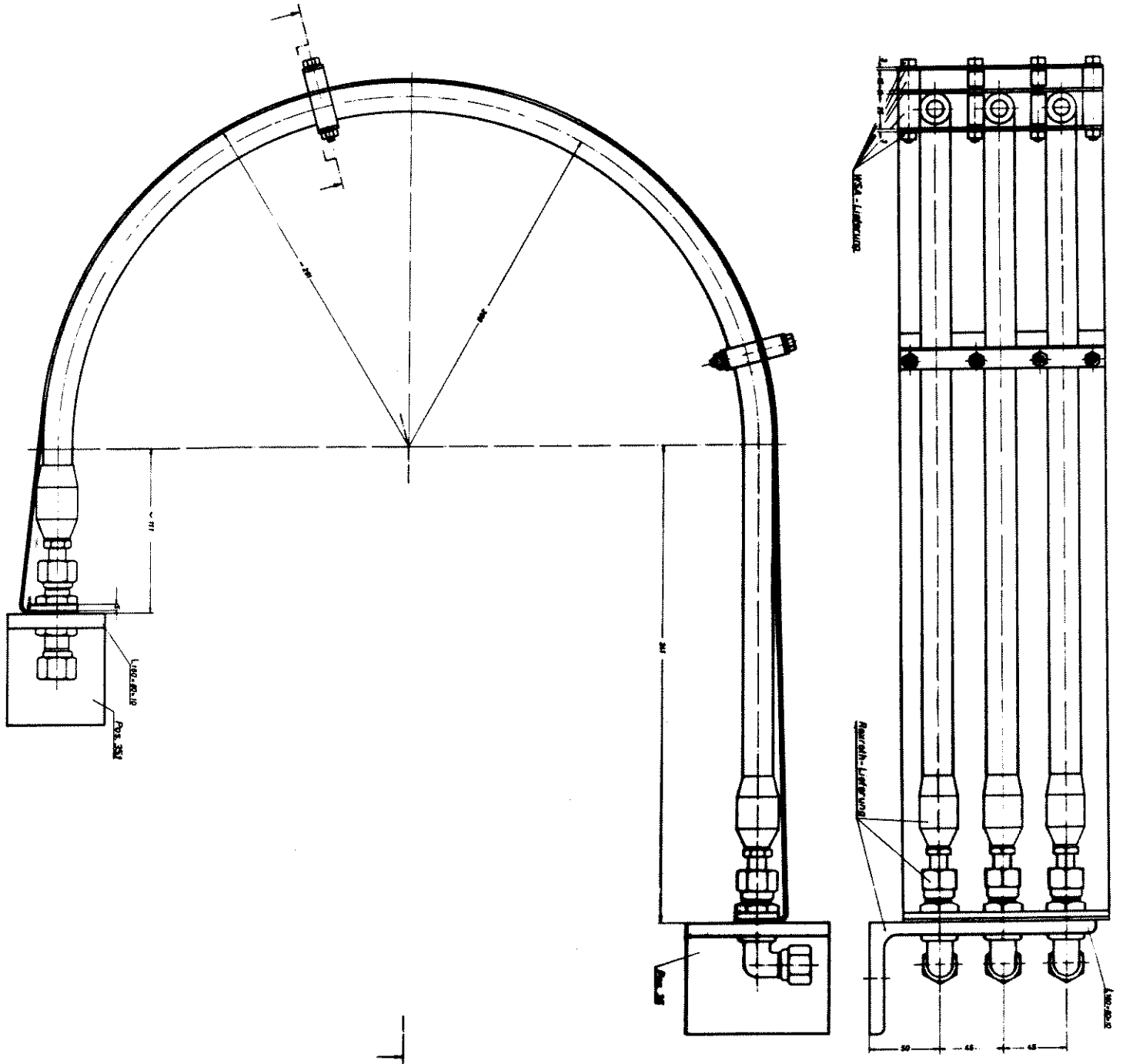


Schneidringverschraubung



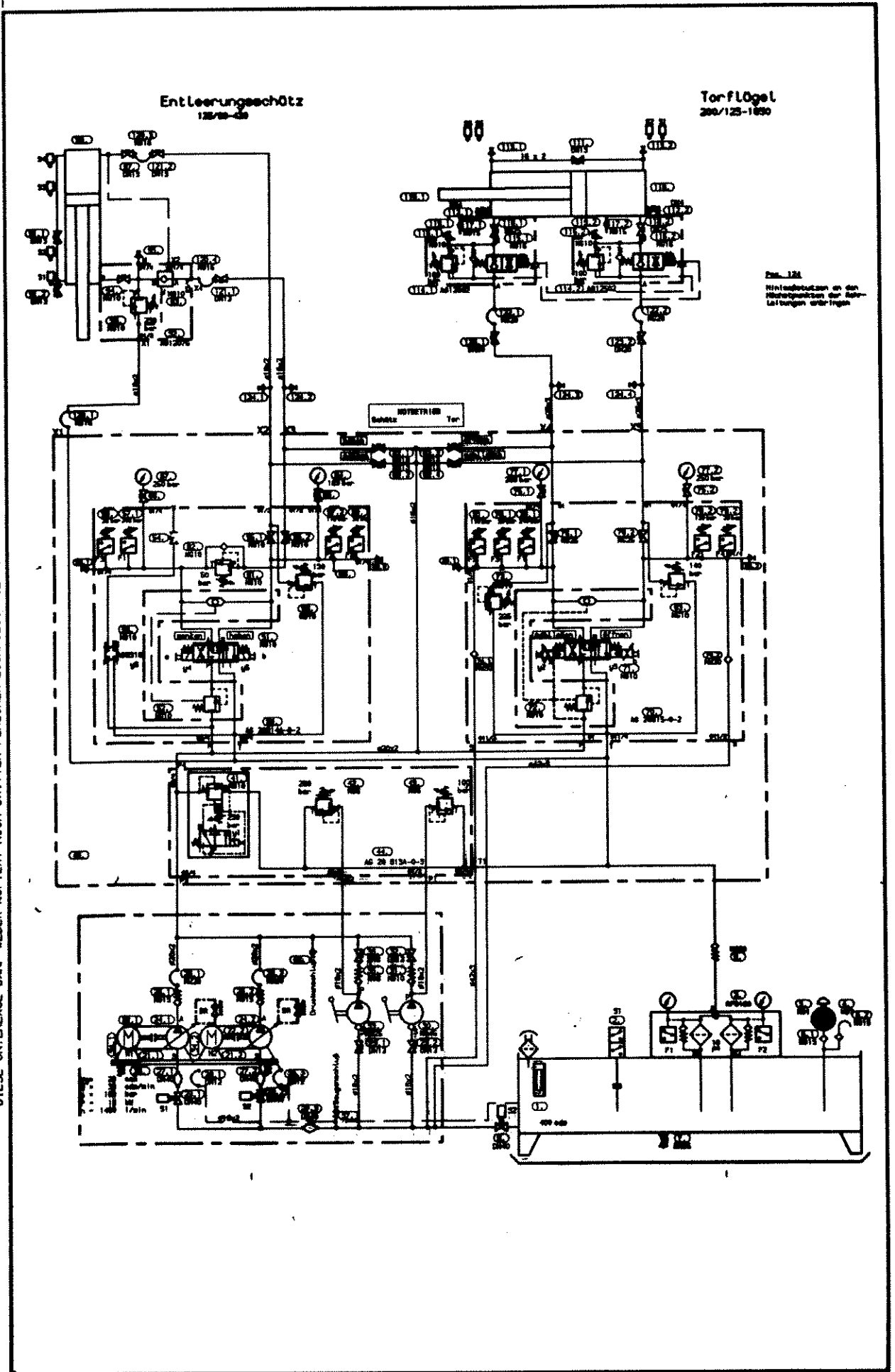
Anschweißkegel mit O-Ring

**ROHRVERBINDUNG
SCHNEIDRING - ANSCHWEISSKEGEL**



Gutenbach

DIESE UNTERLAGE DARF WEDER KOPIERT NOCH DRITTEN PERSONEN ZUGÄNGLICH GEMACHT WERDEN. GESETZ BETR. URHEBERRECHT.



Entleerungschütz
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Torflügel
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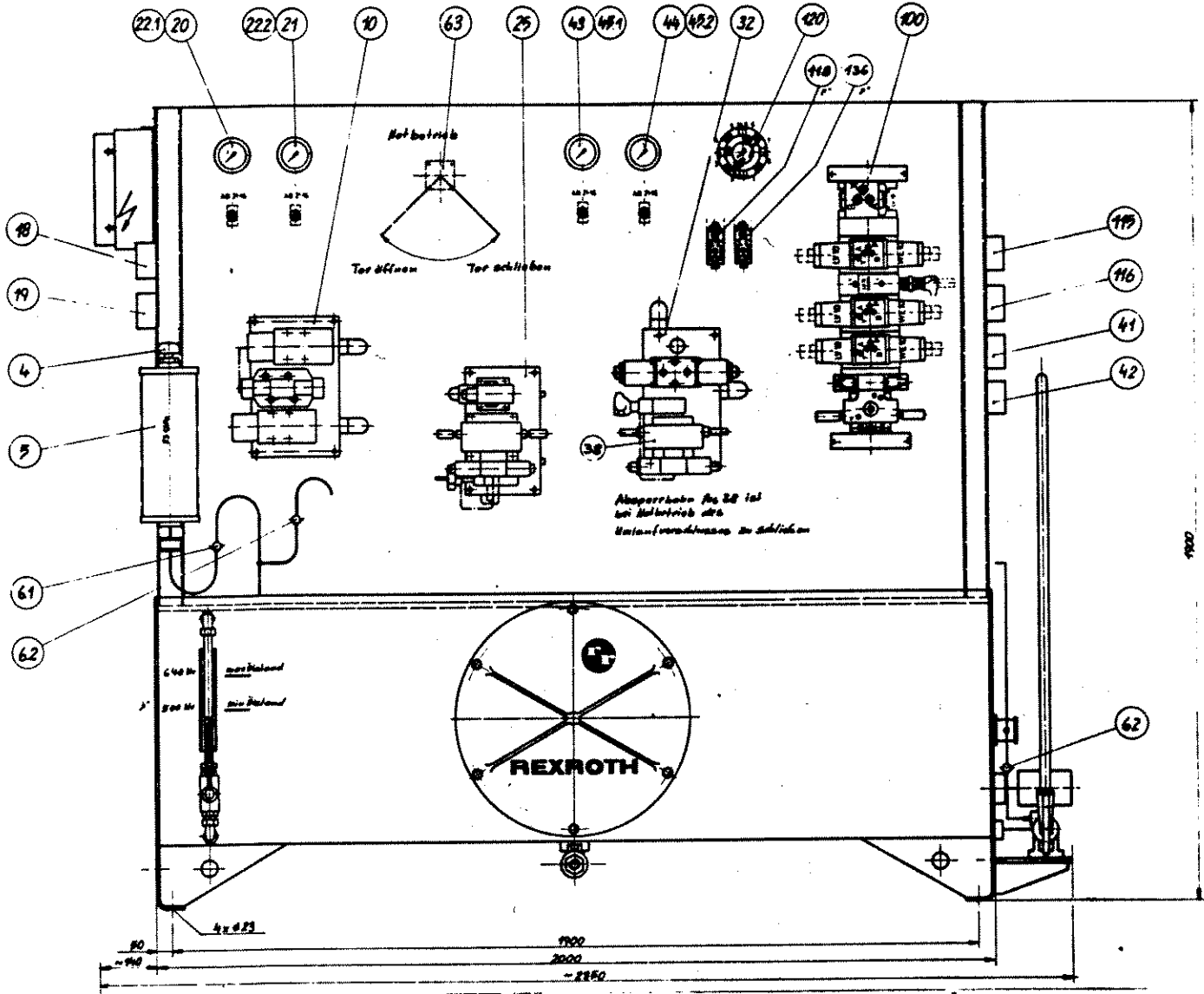
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Zur 124.
Hinweiszeichen in der
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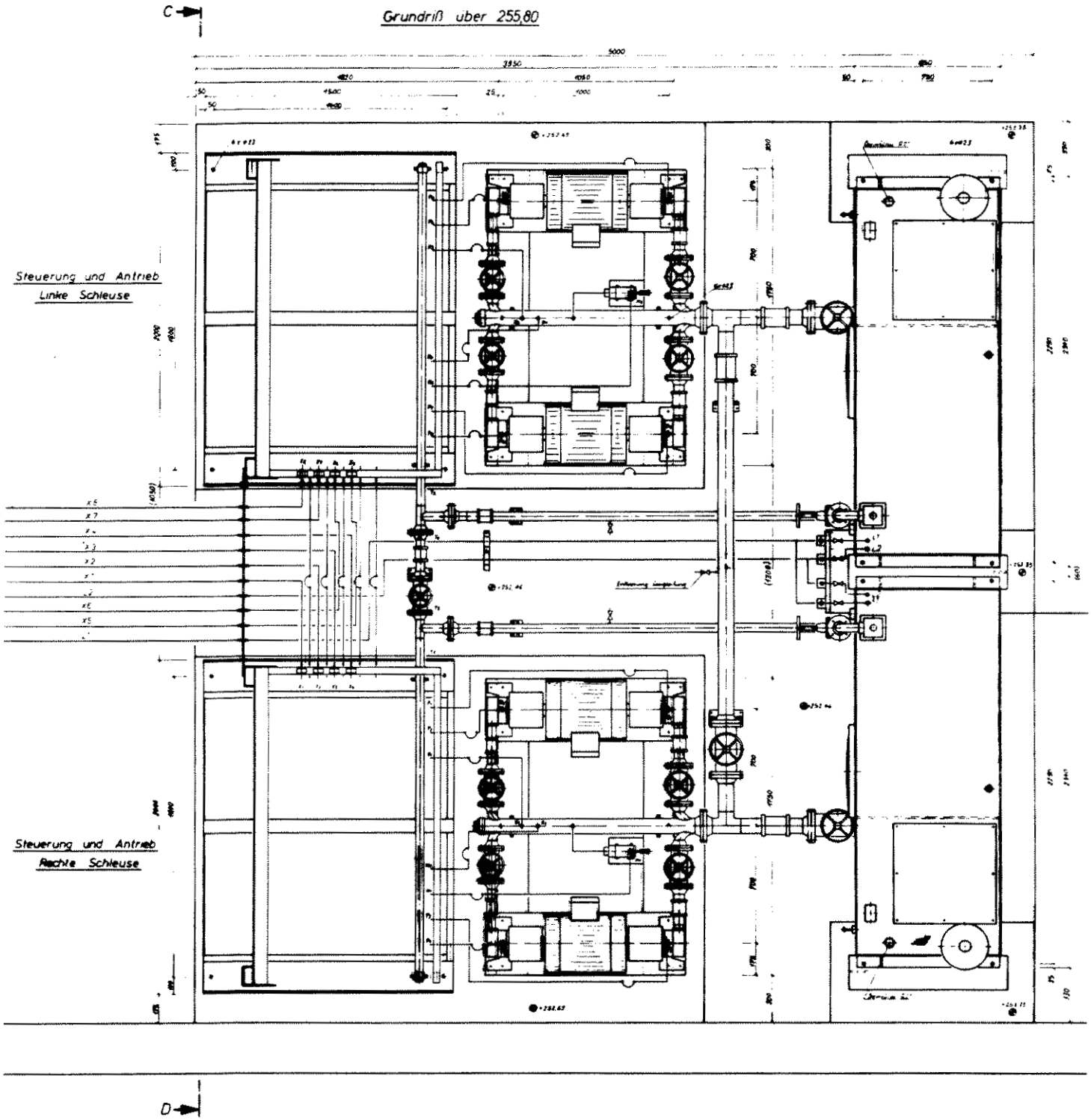


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Grundriß über 255,80





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