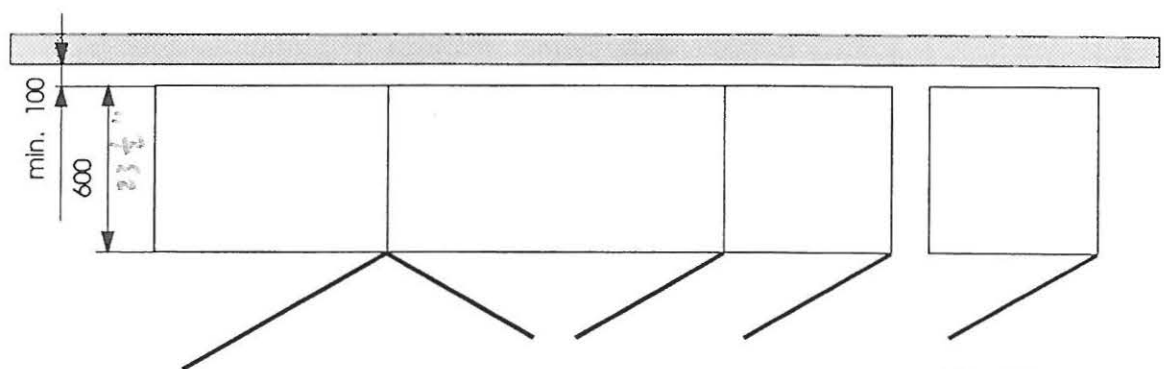
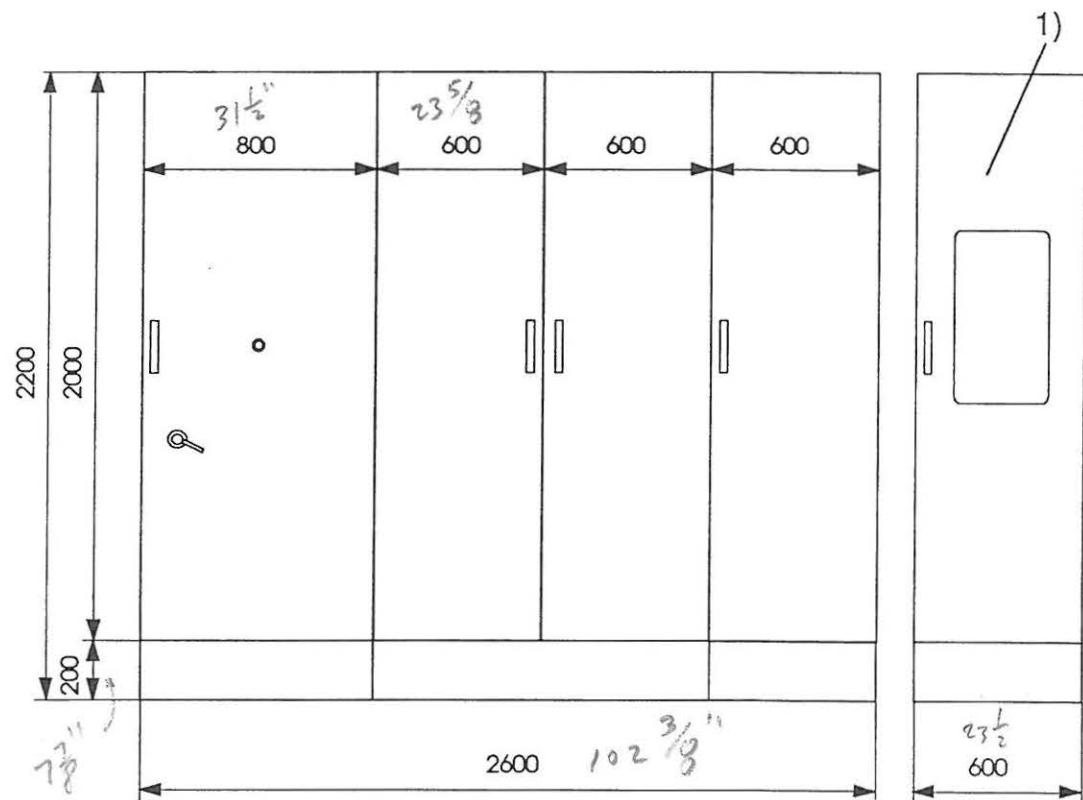


Steuer- und Starkstromschrank ACRON
Armoire de pilotage et de courant fort ACRON
Control and power cabinet ACRON

- 1) Zusatzausrüstung: (C90) Druckerschrank
 1) Accessoires: (C90) Armoire de l'imprimante
 1) Accessories: (C90) Printer cabinet



AR_CON_D

Änderungen vorbehalten
 Sous réserve de modifications
 Subject to modification without notice

4.2 Connections

Earthing: earthed system. (transition resistance $> 20 \text{ M}\Omega$)

Protection class: IP 55 (acc. to DIN 40050)

Voltage fluctuation: maximum $\pm 10 \%$ of the nominal voltage

4.2.1 External supply

**WARNING !**

The fusing of the external supply is matter of the customer! Under all circumstances the local regulations are applicable!

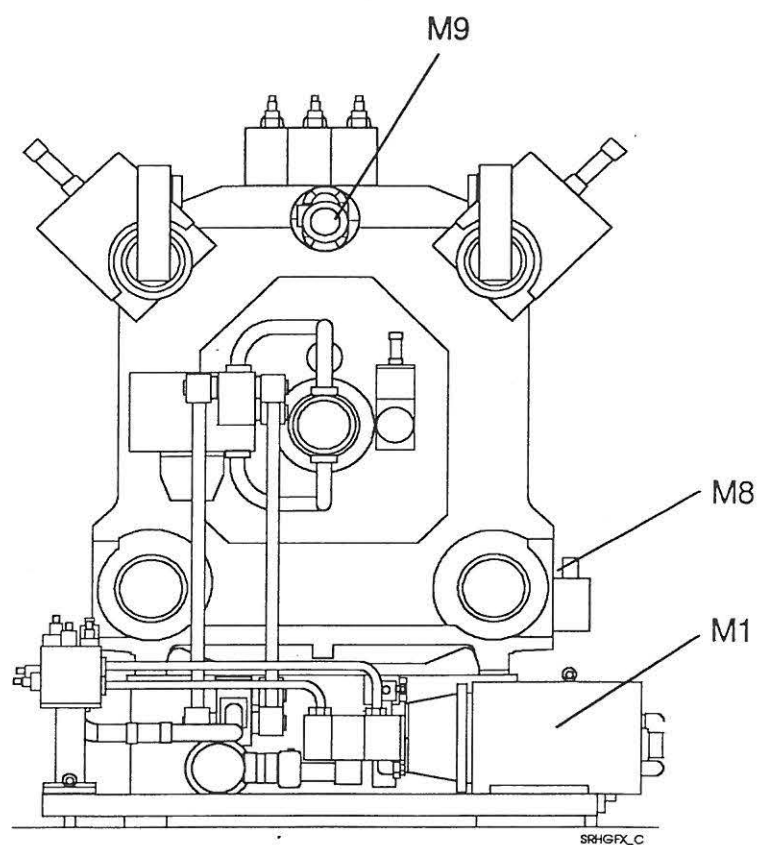
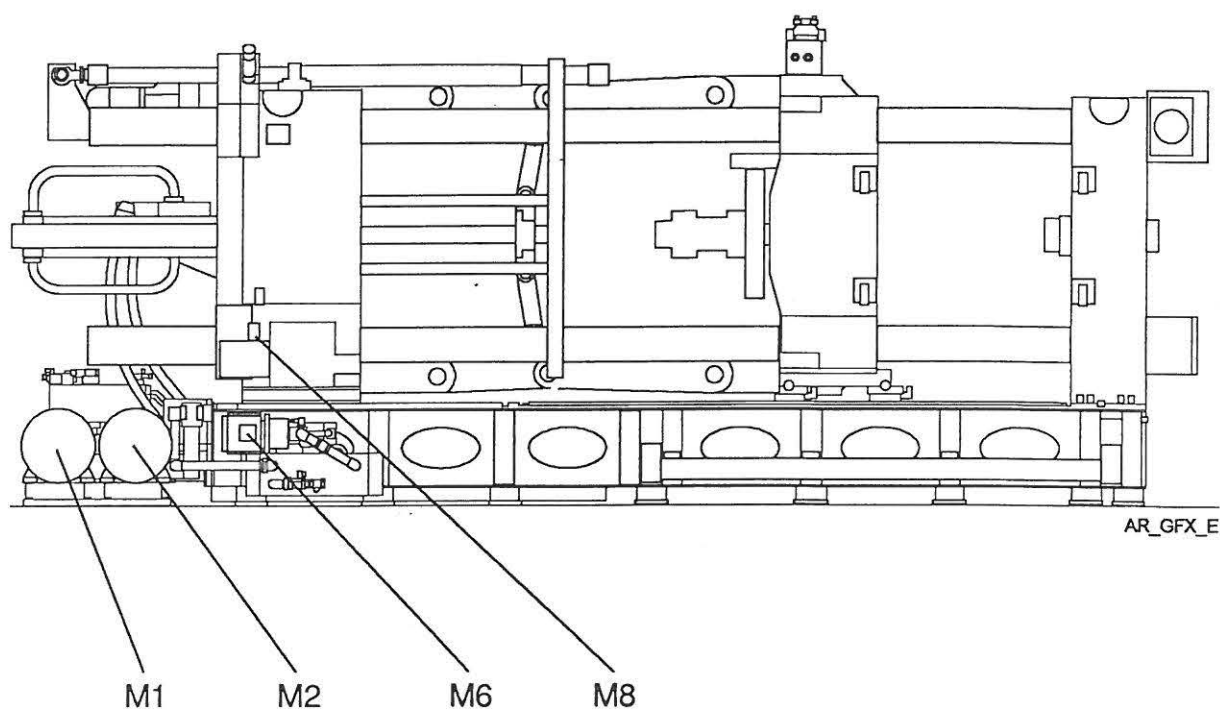
Type of wiring: 3 phase

1 protective conductor

	kW	V	A	Hz
Installed loads	120	575	250	60

S10120_B

250 amp o.k.?



4.2.2 Motors

M1 = driving motor for main pumps

M2 = driving motor for main pumps

M6 = circulation pump

M8 = central lubrication

M9 = die height adjustment

Motors	M1	M2	M6	M8	M9
Mode of connection					
Phases	3~	3~	3~	3~	3~
Protective conductor	1	1	1	1	1
Connection	Y/Δ	Y/Δ	Y/Δ	Y	Y
Installed loads					
kW	55	45	5.5	0.07	4
V	575	575	575	575	575
A	70	56	8	0.35	6
Hz	60	60	60	60	60

M10120_B

4.3 Laying cables

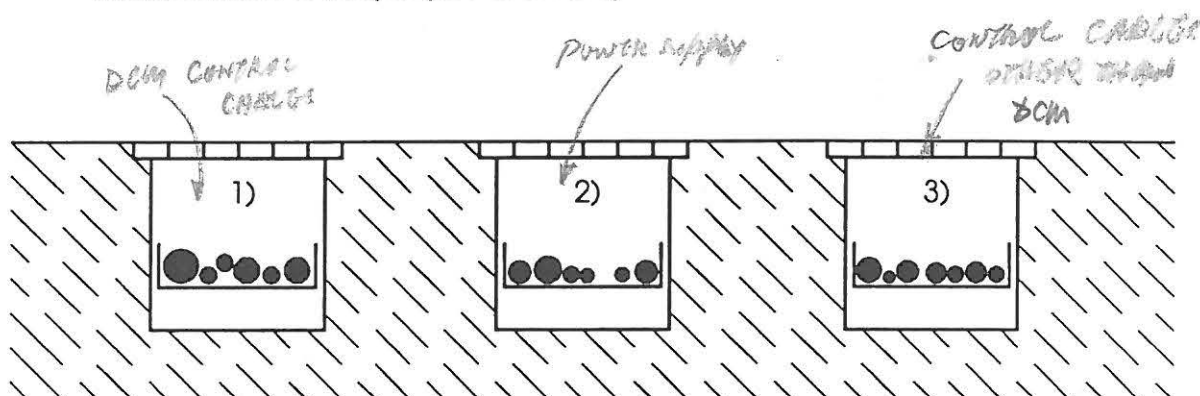


CAUTION!

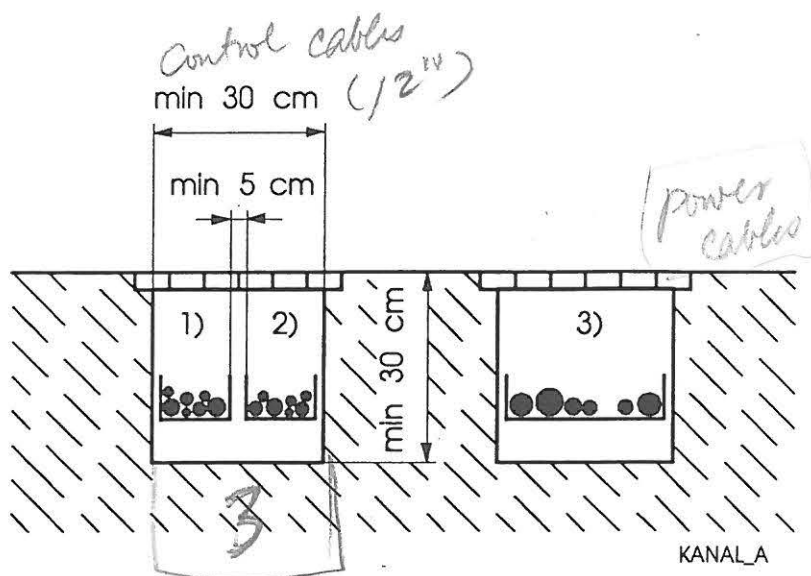
Wrongly laid cables will lead to faults which can be eliminated only by difficult and elaborate fault finding!

Cable ducts are to be provided for:

- control cables of the DCM 1)
- power supply for the control system and motors 2)
- control cables of the peripheral units 3)



The control cables of the DCM and those of the peripheral units can be laid together when inside the ducts, a space is left between these groups.



5 Preparing the energy connections

Contents

5.1	Important directions	1
5.2	Water cooling systems	3
5.2.1	Cooling of the hydraulic fluid	3
5.2.2	Buhler die and shot unit cooling system	4
5.3	Pneumatic system	6
5.3.1	Mechanical die closing safety	6
5.3.2	Plunger lubricating unit	7
5.4	List of materials	8
5.5	Enclosures	8

5.1 Important directions

Service water

**CAUTION !**

Service water becomes contaminated by substances that are harmful to the environment and health, such as hydraulic fluids, spraying agents etc. !

Application:

- for cooling of hydraulic fluid
- for cooling of die and shot unit
- for spraying the die

Measures to be taken:

- Use a closed-circuit service water system with water treatment unit.
- Service water only to be drained after passing a treatment installation.

Regulations: observe the local regulations.

Cooling water systems

The DCM has the following cooling water systems:

- cooling of the hydraulic fluid
- cooling of the die on moving platen
- cooling of the die on the fixed platen
- cooling of the shot unit

Types of cooling water

Following types of water can be used for cooling:

- well water
- fresh water
- industrial service water

Quality of cooling water

- The total contents of sulphate (SO_4^{2-}), nitrate (NO_3^-), chloride (Cl^-) must not exceed 70 mg/l.
- The total hardness degree must not exceed 6 dH°. 1 dH° (German degree of hardness) is equivalent to 1.25 eH° (English hardness degrees) or 1.79 fH° (French hardness degrees).

Note

If the cooling water does not have the required quality we recommend to install a water treatment plant in the cooling system!

Cooling water filters

Filters of 0.25 mm mesh should be fitted for all cooling water systems.

Shut-off devices

All energy connections must have the appropriate shut-off devices which can interrupted from the DCA or DCI.

Peripheral units

The connected loads of the peripheral units can be taken from the relevant instruction manuals.

5.2 Water cooling systems

5.2.1 Cooling of the hydraulic fluid

Operating pressure:

- maximum 10 bar
- minimum 3 bar

Temperature supply line:

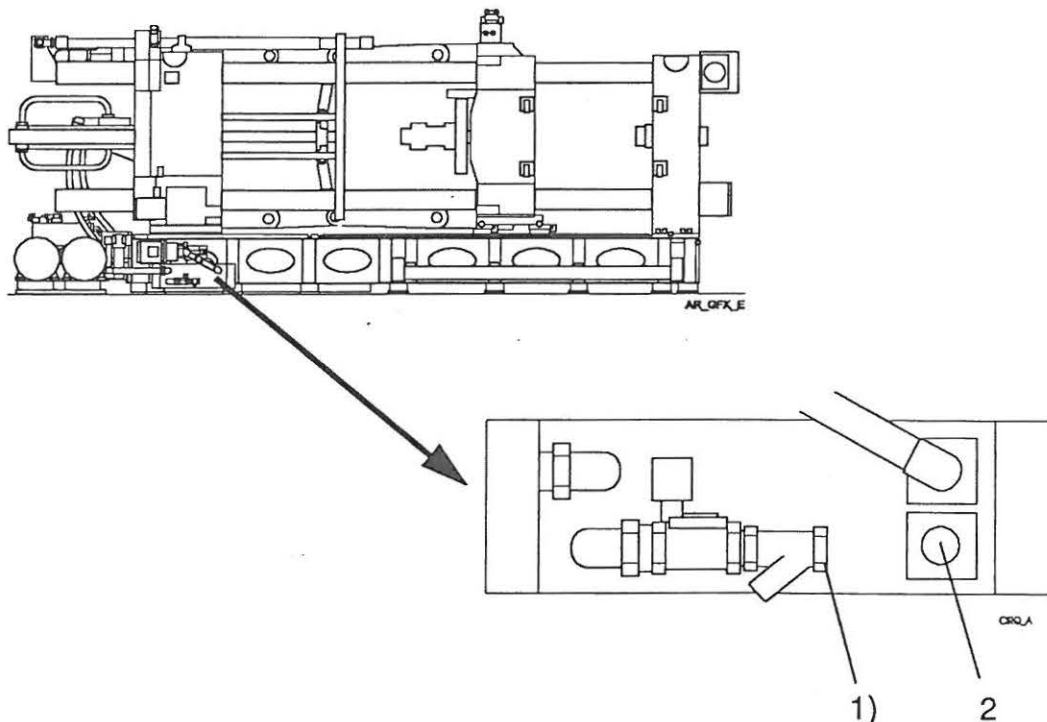
- maximum 30 °C
- minimum 5 °C

Consumption:

- at $\varnothing$ supply line = 30°C and a cycling time of 52 s 4 m³/h

Pressure loss:

- Δp at 4m³/h 0,3 bar



Connections: (see also the enclosed "Installation plan")

- 1) Supply line G 1 1/4"
- 2) Return line G 2"

5.2.2 Buhler die and shot unit cooling system

The three independent cooling systems

- die cooling moving platen (maximum 18 circuits)
- die cooling fixed platen (maximum 15 circuits)
- cooling of the shot unit (maximum 3 circuits)

are controlled by central flow control unit which can be placed at any suitable place (see also enclosed "Installation plan").

Operating pressure:

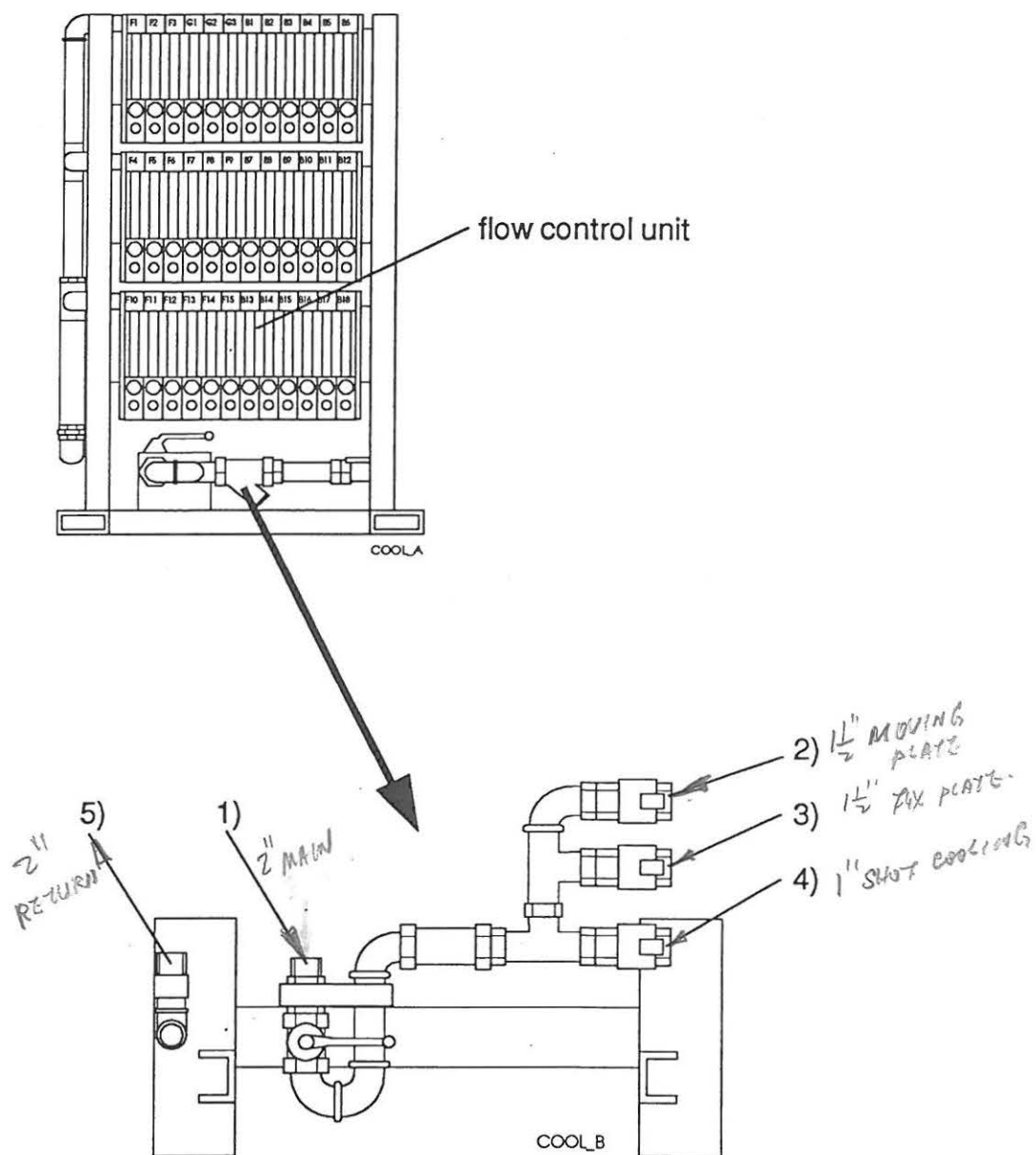
- maximum 10 bar
- minimum 3 bar

Temperature supply line:

- maximum 30 °C
- minimum 5 °C

Consumption:

- Since the wall thicknesses of the casting vary it is practically impossible to determine the cooling water consumption for the dies accurately.
- According to a rule of the thumb the die and the shot unit require about four times the amount of cooling water of the hydraulics-cooling system.



Connections

- | | | | |
|----|---|---|--------|
| 1) | Main supply line | G | 2" |
| 2) | Supply line die cooling moving platen | G | 1 1/2" |
| 3) | Supply line die cooling fixed platen | G | 1 1/2" |
| 4) | Supply line shot unit cooling | G | 1" |
| 5) | Return line | G | 2" |

5.3 Pneumatic system

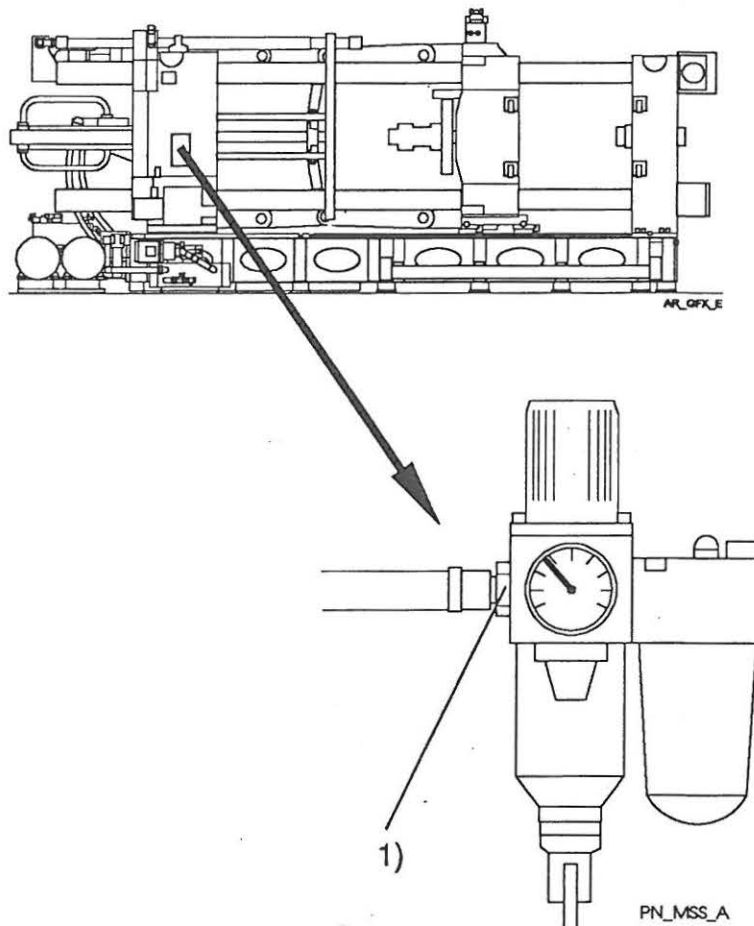
5.3.1 Mechanical die closing safety

Operating pressure:

- maximum 6 bar
- set operating pressure 5 bar

Consumption:

- compressed air approx. 1 Nl/min



Connections

- 1) Supply line G 3/8"

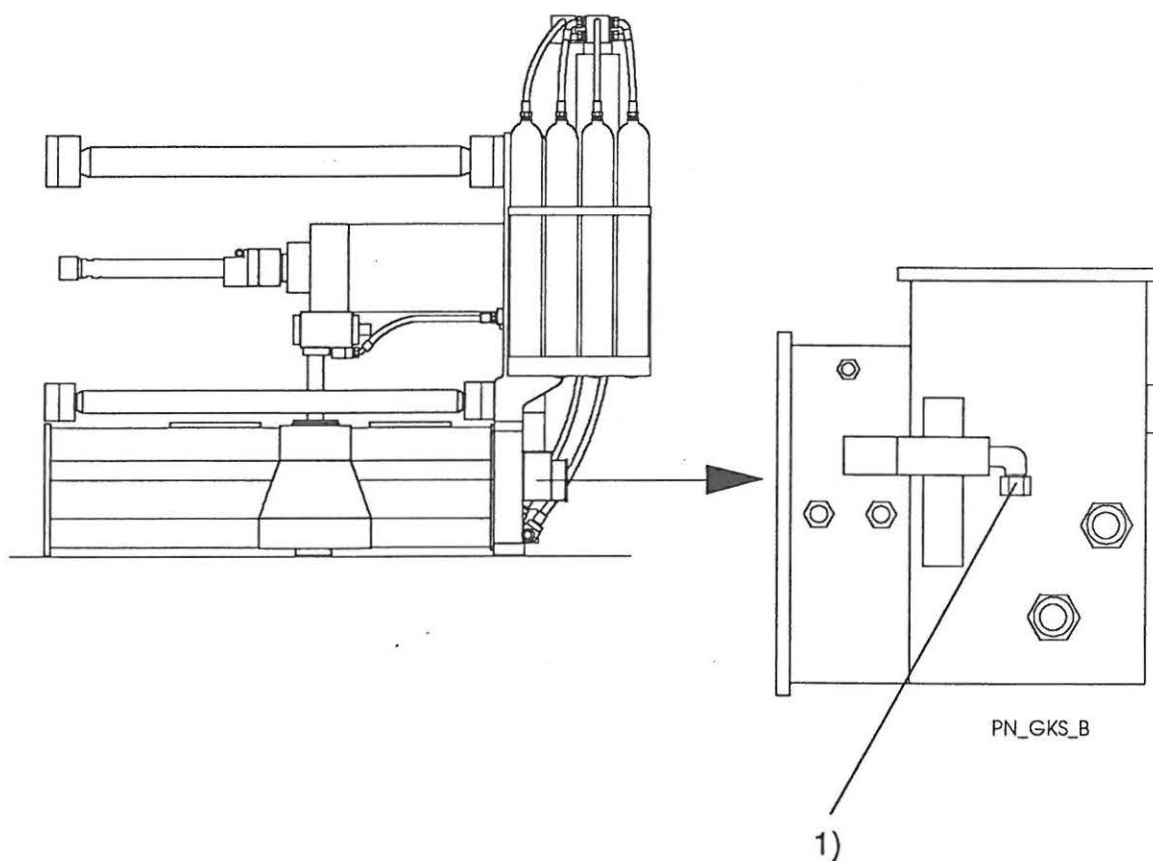
5.3.2 Plunger lubricating unit

Operating pressure:

- maximum 6 bar
- minimum 3 bar

Consumption:

- compressed air approx. 2 Nl/min

**Connections**

- 1) Supply line Ermeto 8 mm

5.4 List of materials

The following table shows which material has to be furnished by which contracting party.

To be furnished by	Customer	Buhler
Pipe lines for cooling water	✓	
Pipe lines for compressed air	✓	
Shut-off devices	✓	
Connecting material	✓	
Tools for pipe fitter	✓	

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5.5 Enclosures

Checklist

Installation plan

Check list for preparation of power connections

Check following points according to check list:

OK = ✓

- The water quality meets the requirements ☐
- Cleaning and disposal of service water is ensured ☐
- The required supply of cooling water is available ☐
- The required supply of compressed air is available ☐
- The necessary shut-off devices are available ☐
- The necessary material has been provided according to material lists ☐
- The preparations for peripheral units have been made ☐

Notes

Date:

Signature:

6 Operating materials (HFC)

Contents

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6.1 Instructions for application and maintenance of flame-resistant hydraulic fluids Type HFC for Buhler die casting machines

6.1.1 Introduction

In order to take into account the requirements for accident-free and safe die-casting plants we recommend the use of flame-resistant hydraulic fluids of the HFC type.

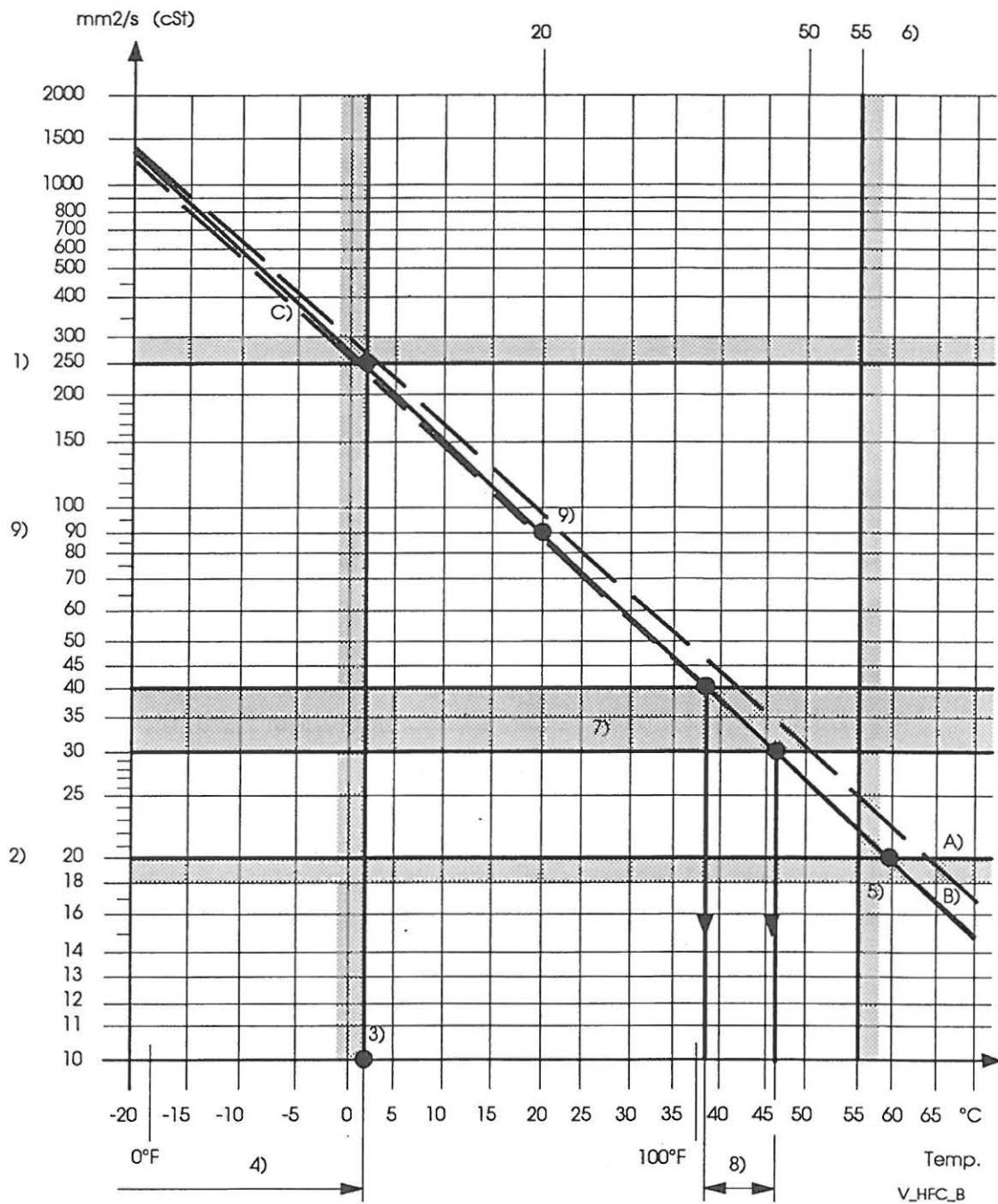
HFC fluids are safety fluids on water-glycol basis.

The proportion of water of 35 to 50% in HFC fluids avoids quick ignition of residues of fluid at hot areas (e.g. at the molten metal). Spreading of the flames from these areas is prevented.

Liquid emitting under pressure from a leak (jet) is not ignited by flames.

The hydraulic system of every Buhler die-casting machine is designed in such a manner that, when using high quality HFC fluids as are normally available on the market and which conform to the current Report of Luxembourg, fail-safe operation is granted (provided correct maintenance as described under Paragraph 6.1.6 is executed).

Viscosity-temperature diagram



Manufacturer	Product	Viscosity mm²/s (cSt) at				Water-content
		-20 °C	0 °C	20 °C	50 °C	
A) Chem Trend USA	HF 28	1165	294	105	31	43%
B) Houghton	Houghto Safe 620 BU	1125	265	90	27	36%
C) Petrofer	Ultra Safe 620 BU	1080	255	87	27	40%

ENVHFC_A

6.1.2 Instructions on the use of HFC fluids

When selecting your HFC fluid make sure that a product is used which

- a) grants extensively low-risk operation of Bühler die-casting plants and
- b) based upon good experience, has been applied in die-casting plants more than once previously

Furthermore, we recommend to negotiate a guarantee agreement with the suppliers of the fluid. The guarantee should embrace faultless operation of all hydraulic components of the system, such as for example, pumps, solenoid valves etc..

Some examples of HFC fluids which usually meet these requirements are given in the table "Manufacturers of HFC fluids".

6.1.3 Operating conditions

Legend to the viscosity-temperature diagram

In the viscosity-temperature diagram the viscosity-temperature line is entered for an HFC fluid which meets the requirements as given under Par. 6.1.5, according to example A), B) and C).

By means of this line the different temperature points can be determined. The critical viscosity limits 20 cSt and 250 cSt are pre-determined by the used components in the hydraulic system.

- 1) Absolute maximum permissible viscosity
- 2) Absolute minimum permissible viscosity
- 3) Minimal cold-starting temperature based upon the maximum permissible viscosity (250 cSt)
- 4) Liquid must be pre-heated (external heating system)
- 5) Theoretical maximum liquid temperature based upon the minimum permissible viscosity (20 cSt)
- 6) Maximum permissible liquid temperature of the HFC fluids
- 7) Optimal range of the operating viscosity
- 8) Optimal range of the operating temperature
- 9) Machine ready for operation (approx. 80 cSt - 100 cSt).

Optimal operating conditions

In order to obtain optimal operating conditions the correct operating viscosity or operating temperature has to be maintained; factors of influence are:

- intake temperature of the cooling water
- quantity of cooling water
- ambient temperature of the machine
- average performance level (number of cycles) of the machine

All temperature points are permanently programmed in the machine control unit, for the ISO viscosity class ISO VG 46.

Note

In case due to local conditions (high ambient temperatures, poor cooling conditions etc.), other hydraulic fluids, for example of the ISO viscosity class VG 68, are used, the temperature points are programmed accordingly.

Changing from one viscosity class to another must not be done without previously consulting our customer service.

Optimal efficiency

In order to obtain the optimal efficiency of the hydraulic elements (pumps, hydraulic motors etc.) the installation should be operated within the most favourable operating viscosity of 32 - 47 cSt. The absolute maximum and maximally permissible minimum viscosity must not be exceeded.

Minimal cold-starting temperature

If the temperature of the fluid drops below the minimum cold-starting value, the hydraulic fluid has to be heated up to the laid down cold-starting temperature by means of an external heating system. When heating up with an external heating system only such is to be used as is designed specifically for the purpose (hence, no immersion heater, heating rods, etc.).

6.1.4 Manufacturers of HFC fluids

Manufacturer	Product	Water content
Agip	Arnica 104/FR	40%
American Chemical Technologies Inc, USA	FR WG 200 D	41%
Auschem S.p.A.	Flumin-A	44%
BASF	Glissosafe 602	45%
BASF	Glissosafe 602P	45%
BASF	Glissosafe 610	45%
BP Chemicals	Breox Hydrolub NF46/2180	36%
BP Chemicals	Breox Hydrolub NF46/2181	43%
BP Oil	BP Energol SFC-14	43%
BP Oil	BP Energol SFC-15	36%
BP Oil	Nafic H6046	43%
Castrol	Anwol WG 40	40%
Castrol	Anwol WG 46	36%
Castrol, F	Hydrosafe 620	40%
Castrol, F	Hydrosafe 646	50%
Chem Trend	HF 20	45%
Chem Trend, USA	HF 28	43%
Chem Trend	HF 70	45%
DA Stuart-Theunissen GmbH	Hydrocor CC 44	48%
Fragol Industrieschmierstoffe GmbH	Hydrolub 125	43%
Houghton	Houghto Safe 620 BU	36%
Igol France	Secur Fluid B 46	36%
Marston Bentley Ltd	Trustol 88/46	38%
Metalworking Lubricants Company, USA	Metsafe FR 215	40%
Mineralöl KG, Urberach	MKU Pressol SB 46	45%
Mobil Oil	Hydrofluid HFC 46	50%
Oiltech, AUS	Glycosafe C46	38%
Oiltech, AUS	Superglycol	36%
Petrofer	Ultra Safe 620 BU	40%
Texaco	Glytex F 46	50%
Fuchs Mineralölwerke GmbH	Hydrotherm 46 NF 3	45%

ENHHFC_A

6.1.5 Requirements for HFC fluids

The hydraulic fluid not only has the purpose of transferring pressure in hydraulic systems, it also acts as a lubricant and anti-corrosive agent. Furthermore, the hydraulic fluid must fulfil a high safety function regarding fire resistance.

From this ensue the requirements listed below:

- hydraulic fluid sprayed under pressure must not ignite.
- the minimum water content should be 35%.
- the density at 15°C must be under 1,1 kg/dm³.
- the pour-point temperature must lie under the lowest application temperature. Usually the pour-point temperature is $\leq -25^{\circ}\text{C}$.
- The shear stability (measured acc. to DIN 51382) must be sufficient. At + 20°C and + 50°C the viscosity may not drop more than 15%. Moreover, the water content may not decrease more than 8% and the pH-value not more than one unit.
- The pH value should be at the maximum 10 and at the minimum 8,5. When the pH value exceeds 10 it becomes difficult to handle the fluid because by then it is already quite aggressive to the skin. When the pH value drops below 8.5 there is a great risk that the anti-corrosive effect, particularly in the vapour phase, is drastically reduced.
- The tendency for foaming should not be higher than with mineral oil.
- The air release property should be as big as possible. The limit value of 20 minutes at 50°C at the maximum, should not be exceeded. Measured according to DIN 51381.
- A high ageing stability and good wearing properties are a precondition also at pressures above 140 bar.
The wearing resistance is measured with the Vickers pump test, or if only a small amount of fluid is available with the VKA test (400 N, 1 h).
- The product should have no, or only an extremely low toxicity and should be free of nitrite and morpholine.
- The hydraulic fluid should have good anti-corrosive properties in the liquid as well as in the vapour phase. No significant corrosive marks should appear. This related in particular to: - steel / cadmium - copper / zinc - aluminium / zinc and - steel / aluminium. The change of weight is measured at defined test plates.
- The swelling behaviour and changing of hardness of various sealing materials should be extremely low and be proved.

- It should be able to mix hydraulic fluids of the HFC type from different manufacturers, when they are fresh and have not yet been used. (which, however, is not to be recommended).
It should be possible to mix used and unused HFC-type fluids of the same manufacturer.
- Good biological degradability should be proven.

6.1.6 Instructions for maintenance

The hydraulic fluid in the tank of the machine must never sink below the marked minimum level. The level of the fluid should be checked at regular intervals, also on machines with automatic level control; in particular every time after servicing and repairs.

HFC fluids usually have a long service life when the instructions of the manufacturer on application and maintenance are adhered to. Most manufacturers of HFC fluids have their own testing service, which however, is not granted in all countries. Make sure these service facilities are available in your country.

Note

We recommend to make an agreement with your suppliers on regular testing and maintenance of the hydraulic fluid.

At regular intervals (about every 6 months, under unfavourable operating conditions possibly at shorter intervals, according to manufacturer, independent of the number of operating hours) a sample of approx. 1 litre should be taken and tested in the laboratories of the manufacturers. The results of the test and eventual measures to be taken are laid down in a test report.

The sample is tested upon:

- water content
- pH value
- density
- viscosity
- anti-corrosive behaviour
- solids and liquids contamination, etc.

Every time when the fluid is changed (the same product) the tank has to be cleaned.

With all maintenance work strictly observe cleanliness.

Carry out maintenance of the filters according to instructions; maintenance instructions are given in Manual 2 of the DCM documentation.

In the event of breakdown the filter elements must be replaced immediately (see Manual 2, Chapter "Maintenance").

6.1.7 Changing types of fluids

Different types of fluid must not be mixed together, for example mineral oil with HFC fluid, or HFC fluids of different manufacturers, or HFD fluid (synthetic fluids on phosphate-ester basis) with HFC fluids etc. Contamination with different types of fluids within the hydraulic system can lead to serious break-downs and damage.

Note

When changing to a different type of fluid such as from mineral oil to HFC fluid etc., request the necessary instructions on the procedure from your suppliers and follow these carefully. As a principle, in such cases the entire hydraulic system has to be rinsed out.

6.2 Instructions on application and maintenance of lubricating oil for central lubricating systems of Bühler die casting machines

6.2.1 Manufacturers of oil for central lubrication

Manufacturer	Product	Viscosity mm ² /s (cSt) at	
		20°C	40°C
AGIP	AGIP EXIDIA 68	190	64
ARAL	Deganit B 68	206	68
BP	Energol GHL 68	185	63
CASTROL	Magnaglide D 68	224	68
ELF	ELF MOGLIA 68	206	68
ESSO	FEBIS K 68	190	64
MOBIL	Vactra Oil No. 68	195	65
SHELL	Tonna Oil TX 68	203	68
VALVOLINE	WAYOIL 68	235	66

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