



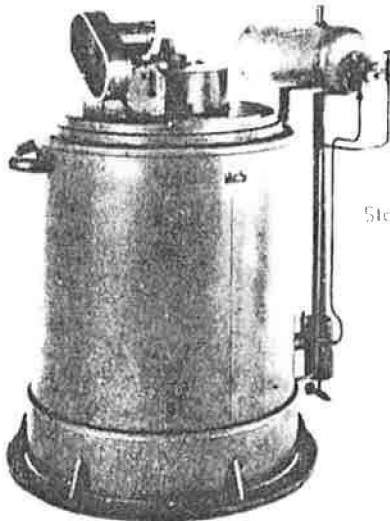
**BRØDRENE GRAM A/S**  
**6500 VOJENS · DENMARK**

SECTION AE3  
 SHEET 16-2  
 PAGE 1

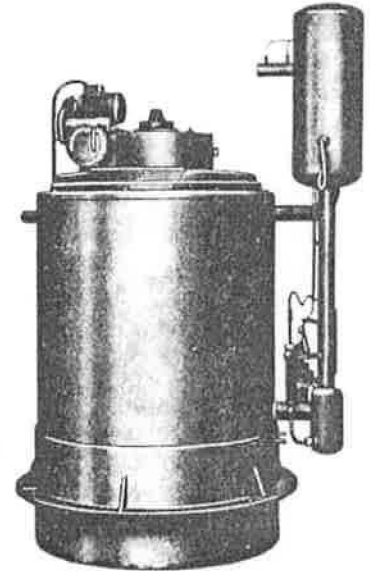
ISSUED September 72  
 VALID FROM  
 1st. September 1972

## TECHNICAL DATA

### GRAM FLAKE ICE MACHINES TYPE IKL



Stationary arrangement



Marine arrangement

		IKL-4				IKL-10				IKL-15		IKL-20		
Refrigerant		NH <sub>3</sub>		R 12 - R 22		NH <sub>3</sub>		R 12 - R 22		NH <sub>3</sub>	R12-R22	NH <sub>3</sub>	R12-R22	
Design*		I	II	I	III	I	II	I	III	I	I	I	I	
Nominal** ratings	Kg/24h	3,300	3,300	2,930	2,930	7,800	7,800	6,900	6,900	11,700	10,200	17,400	15,400	
	lbs/24h	7,250	7,250	6,460	6,460	17,200	17,200	15,200	15,200	25,800	22,500	38,300	34,000	
RPM of roller	Rmp.	0.5 - 1.0				0.5 - 1.0 - 2.0				0.5 - 1.0 - 2.0		0.5 - 1.0		
Motor size for roller HP	HP	0.25				0.35				0.15		1.0		
Charge	ltr.	20				45				83		100		
	US gal.	5.28				11.9				21.8		26.3		
Piping connections	Liquid line	inch.	3/8	3/8	5/8	5/8	3/8	3/8	3/4	3/4	1/2	1	1/2	1
	Suction line	inch.	1 1/4	1 1/4	1 1/4	1 1/4	2	2	2	2	2 1/2	2 1/2	3	3
	Thawing line	inch.	3/8	3/8			3/8	3/8					1/2	
	From pump	inch.	3/4	1	3/4	1	1	1	1	1	1	1	1	1
	To circulation tank	inch.	2	2	2	2	2	2	2	2 1/2	2	2	2	2
	Make-up water	inch.	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Circulation pump	Type		PS 24				PS 24				PS 24		PS 24	
	Capacity	ltr./min.	65/75				65/75				65/75		65/75	
		US gal./min.	17.2/19.8				17.2/19.8				17.2/19.8		17.2/19.8	
	Total head	metr.	5.5/4.5				5.5/4.5				5.5/4.5		5.5/4.5	
		W.G.												
		inch.	216½/177				216½/177				216½/177		216½/177	
Motor size	HP	0.50				0.50*				0.50		0.50		
Max. difference of level***	mm	3500				3000				2500		2500		
	inch.	138				118				98½		98½		

\* I: Freshwater stationary plant  
 II: Sea-water stationary plant  
 III: Sea-water marine plant  
 For operation on R-12 refrigerant the machine is only supplied in design I.

\*\* The nominal ratings are based on  
 RPM of spike roller: 1 rpm.  
 Evaporating temperature, freshwater plants: -20°C (-4°F)  
 sea-water plants: -23°C (-9.4°F)  
 Water temperature: 10°C.

\*\*\* The maximum difference of level is measured from the bottom of the circulation unit to the bottom of the ice crystal drum.

The dimensions are subject to confirmation.

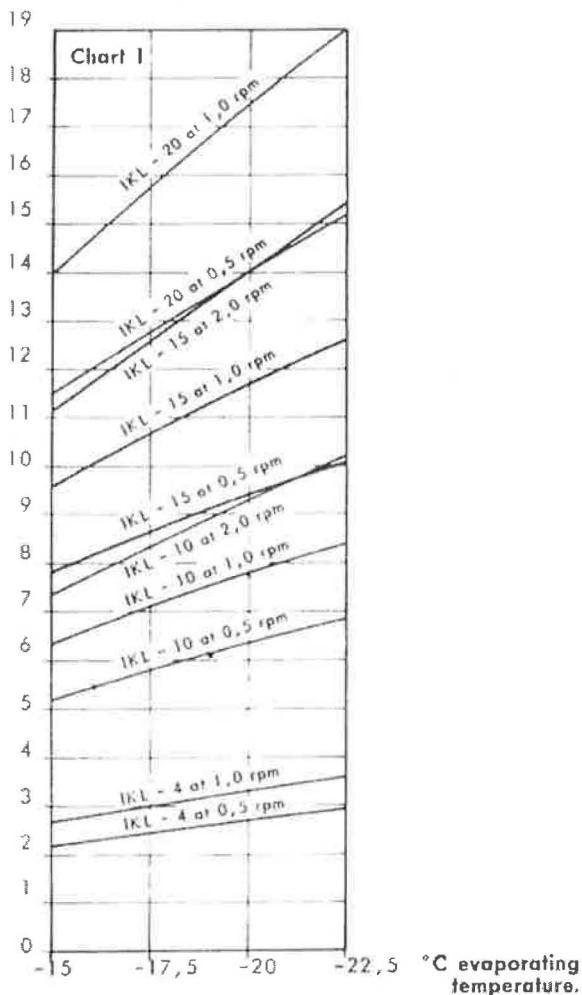


ISSUED September 72  
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 11th September 1972

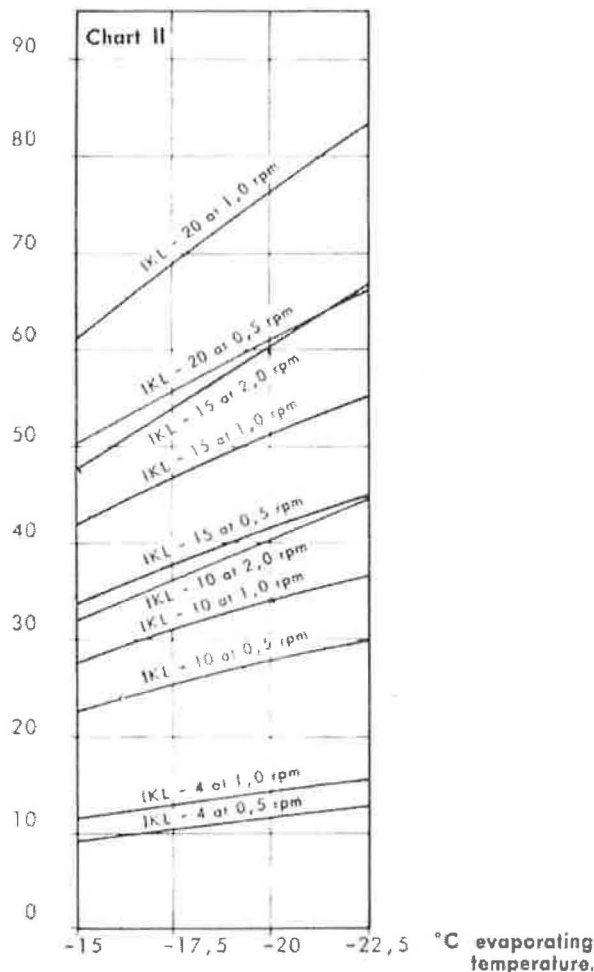
**TECHNICAL DATA**

GRAM FLAKE ICE MACHINES TYPE IKL FOR AMMONIA

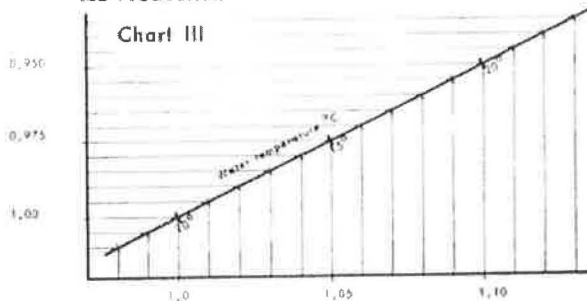
Ice Production in tons/24 hours.



Refrigeration Requirements in 1000 kcal/h.



Correction Factor for Ice Production



Correction Factor for Refrigeration Requirements.

0.5 rpm. will give an ice layer of approx. 2.9 to 4.0 mm thickness  
 1.0 rpm. will give an ice layer of approx. 1.8 to 2.6 mm thickness  
 2.0 rpm. will give an ice layer of approx. 1.0 to 1.5 mm thickness

The capacities given in the above (charts I and II) will be valid for a water temperature of approx. 10°C. If water of another temperature is used, the capacities shown should be multiplied with the correction factors from chart III.

Example: IKL-4 at 1 rpm., evaporating temperature -20°C and water temperature +15°C.  
 Ice production = 3.3 × 0.975 = 3,217 tons/24 hours.  
 Refrigeration requirements = 14,300 × 1.05 = 15,000 kcal/h.

It should be kept in mind that evaporating temperatures below -20° cannot be used for water with a high content of lime.

Dimensions are subject to confirmation.



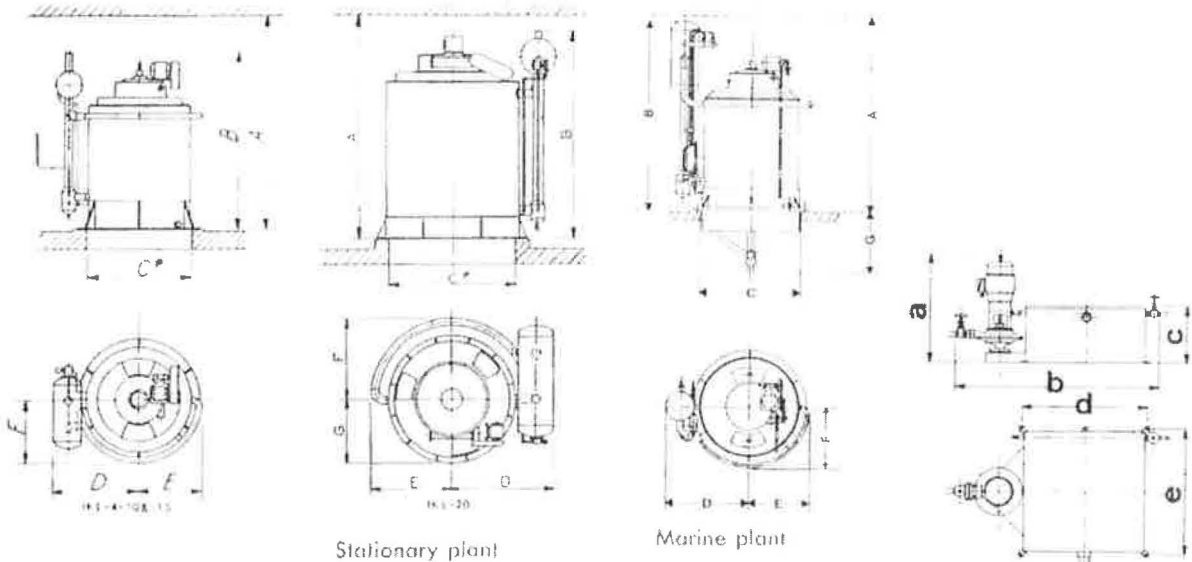
**BRØDRENE GRAM A/S**  
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SECTION AE3  
 SHEET 16-2  
 PAGE 2

ISSUED September 72  
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## TECHNICAL DATA

### GRAM FLAKE ICE MACHINES TYPE IKL



Water Circulation Unit					
	a	b	c	d	e
mm	630	1200	332	728	728
inch.	24 <sup>7</sup> / <sub>8</sub>	47 <sup>1</sup> / <sub>4</sub>	13 <sup>1</sup> / <sub>8</sub>	28 <sup>5</sup> / <sub>8</sub>	28 <sup>5</sup> / <sub>8</sub>

		IKL-4				IKL-10				IKL-15		IKL-20	
		NH <sub>3</sub>		R 12 - R 22		NH <sub>3</sub>		R 12 - R 22		NH <sub>3</sub>	R12-R22	NH <sub>3</sub>	R12-R22
Design*		I	II	I	III	I	II	I	III	I	I	I	I
A min.	mm inch.	1535 60 1/2	1485 58 1/2	1535 60 1/2	1970 77 5/8	2050 80 7/8	2050 80 7/8	2050 80 7/8	2810 110 3/4	2605 102 1/2	2605 102 1/2	2450 96 3/8	2550 100 1/4
B	mm inch.	1320 52	1235 48 5/8	1330 52 3/8	1295 51	1845 72 3/4	1845 72 3/4	1865 73 5/8	2150 84 3/8	2400 94 3/8	2420 95 1/8	2300 90 3/8	2460 96 3/4
C	mm inch.	830 32 5/8	660 26	830 32 5/8	885 34 7/8	1100 43 3/8	1100 43 3/8	1100 43 3/8	1100 43 3/8	1100 43 3/8	1100 43 3/8	1450 57 1/8	1450 57 1/8
D	mm inch.	740 29 1/8	755 29 3/4	715 28 1/4	715 28 1/4	890 35	890 35	890 35	890 35	965 38	965 38	1170 46 1/8	1170 46 1/8
E	mm inch.	540 21 1/4	730 28 3/4	540 21 1/4	730 28 3/4	670 26 3/8	670 26 3/8	670 26 3/8	670 26 3/8	700 27 1/2	700 27 1/2	950 37 3/8	950 37 3/8
F	mm inch.	540 21 1/4	520 20 1/2	540 21 1/4	500 19 3/4	670 26 3/8	670 26 3/8	670 26 3/8	670 26 3/8	750 29 1/2	750 29 1/2	950 37 3/8	950 37 3/8
G	mm inch.				600 23 5/8				650 25 5/8				
Net weight	Kg lbs	700 1545	700 1545	700 1545	700 1545	1530 3070	1530 3070	1530 3070	1530 3070	1850 3700	1850 3700	3500 7700	3500 7700
Gross weight	Kg lbs	850 1875	850 1875	850 1875	850 1875	1850 3700	1850 3700	1850 3700	1850 3700	2250 4520	2250 4520	4200 9250	4200 9250
Shipping volume	m <sup>3</sup> cu. ft.	2.3 81	2.3 81	2.3 81	2.3 81	4.6 182	4.6 182	4.6 182	4.6 182	6 212	6 212	9.2 325	9.2 325

- \* I: Freshwater stationary plant (For operation on R-12 refrigerant the machine is only supplied in design I)  
 II: Sea-water stationary plant  
 III: Sea-water marine plant

The weights and shipping volume given for the stationary design include water circulation unit.  
 The dimensions are subject to confirmation.

0011/0021

73-015-I

INSTRUCTION MANUAL  
for

FLAKE ICE MACHINE TYPE IKL-10/15

7 row<sup>le</sup>  
fast

INDEX:

- A      Projecting
- B      Installation
- C      Service and Repairs
- D      Operation
- R      Spare Parts List



Projecting

73-015-I

Projecting Instructions

The present directions are intended to give the general information required for the projecting of a plant.

Experience shows that during this projecting a number of special problems will always turn up which will have to be dealt with individually as it is impossible to give rules of universal validity. If a silo is used, special precautions must be taken to avoid that cold from the ice silo will cause troubles in the operation of the flake ice machine. We shall, however, always be glad to provide any information required for the projecting.

It is a condition for a troublefree performance of the machine (besides the daily attendance) that it is overhauled once a year (use original spare parts only).

Index:-

Capacities and power consumption .....	Page A 2
Compressor size .....	Page A 2
Specific gravity of the ice produced .....	Page A 3
Refrigerant charge .....	Page A 3
Water circulation unit .....	Page A 3
Piping .....	Page A 3
Location of the machine .....	Page A 4
Fields of application for flake ice .....	Page A 4
Insulation .....	Page A 4
Flake ice machine hooked up with silo .....	Page A 5
Defrosting the flake ice machine .....	Page A 5
Schematic sketch .....	Page A 6
Dimensions, weight .....	Page A 7



73-015-0011/0021

Capacities and power consumption.

The table below gives the capacities for suction temperatures of  $-15^{\circ}\text{C}$ ,  $-17.5^{\circ}\text{C}$ ,  $-20^{\circ}\text{C}$ , and  $-22.5^{\circ}\text{C}$  at main shaft speeds of 0.5 and 1.0 rpm.

The machine is equipped with a 0.35 hp electric motor for operation at 0.5 and 1.0 rpm of the main shaft, and the variation in power consumption will only be insignificant.

Suction temperature in $^{\circ}\text{C}$	Speeds			
	0.5 rpm approx. 2.7 to 3.8 mm ice		1.0 rpm approx. 1.5 to 2.3 mm ice	
	tons/24h	kilos/h	tons/24h	kilos/h
-15	4.60	192	5.50	229
-17.5	5.10	212	6.20	258
-20	5.60	233	6.80	283
-22.5	5.90	246	7.30	304

NOTE: The above capacities apply on the assumption that water of  $+10^{\circ}\text{C}$  is used. For each degree Centigrade rise in the water temperature, the capacity will be reduced by approx. 0.5%.

Never use water of a temperature lower than  $+8^{\circ}\text{C}$  on account of the risk of freeze-ups.

Compressor Size:

The size of the compressor will depend upon the water temperature and is determined on basis of the following table:-

Water temperature, $^{\circ}\text{C}$	10	15	20	25
Compressor output in kcal per kg of ice produced	105	110	115	120



Example: An IKL-10 will be operating at  $-15^{\circ}\text{C}$  suction temperature using water of  $+15^{\circ}\text{C}$  and running at 0.5 rpm.

Refrigeration requirements:  $110 \times 192 = 21120$  kcal/h

All normal losses in pipe lines have been included in the above figure.

Specific Gravity of the Ice Produced:

When calculating the dimensions of a silo, the specific gravity of the ice is an important figure. You may allow for a specific gravity of approx. 0.5 to 0.55. - However, when dimensioning a silo, only allow for 300 to 400 kg of ice per  $\text{m}^3$ .

Refrigerant Charge:

The freon charge of the IKL-10 is 45 litres in the machine proper with normal liquid level up to the phial of the thermostatic level control.

Water Circulation Unit:

This unit is equipped with a 0,50 hp pump motor. The supply of make-up water is controlled by means of a float valve.

Piping:

The IKL-10 has a 2" suction pipe. The liquid pipe is a  $5/8$ " copper pipe. The supply of freon is controlled automatically by a thermostatic level control.

If ice should build up in the bottom ring, hot water can be conducted to the pipe coil of the bottom ring.

If the IKL is hooked up with its own compressor of the correct size, it will not be necessary to arrange an automatic control of the suction temperature. If not, it may be necessary to allow for a back pressure control. In order to prevent the risk of roller and cylinder suffering damage on account of changes in dimensions occasioned by excessive temperature differences the suction line should be connected to a pressure control ensuring that the suction pressure will not drop below  $-25^{\circ}\text{C}$ .

In respect of flow diagrams and wiring diagrams we would recommend that you approach us for advice, particularly if special plants are concerned.

In places where there is a risk of temperature below  $0^{\circ}\text{C}$ , e.g. in cold stores, water piping etc. should be insulated.

Location of the Machine:

In most cases the machine is installed direct on top of the ice silo. Due respect will, however, have to be paid to the location, depending upon the silo, the arrangement, and the temperature. In this way, a conveyor for transport of the ice produced from the IKL machine to the silo will not be necessary. On the other hand, the height required of the building for this set-up must be considered.

Fields of Application for Flake Ice:

The ice produced can be used for a number of different purposes, and among those for which it is particularly suitable we would mention the icing of fish and poultry as well as flowers and fruit.

On board fishing vessels the ice is used to a large extent because it is extremely handy, provides a good protection of the fish, gives uniform cooling, is inexpensive, and packs easily without bruising the skin of the fish, in short, it will give a higher quality of the catch.

Insulation:

The machine is supplied without insulation of the surge drum and its interconnecting pipes. If the dripping of condensing water on to floor and base is to be prevented, it will be necessary to provide these items as well as the bottom cover and the water supply piping with insulation.

In most cases, however, an insulation of this nature should not be necessary, because the water dripping will be reduced to a minimum as long as the machine is operating. Only when the machine is stopped, the ice on the surge drum will melt, but the water resulting from this melting can be removed easily by fitting a gutter round the machine.

73-015-I

Flake Ice machine Hooked up with silo.

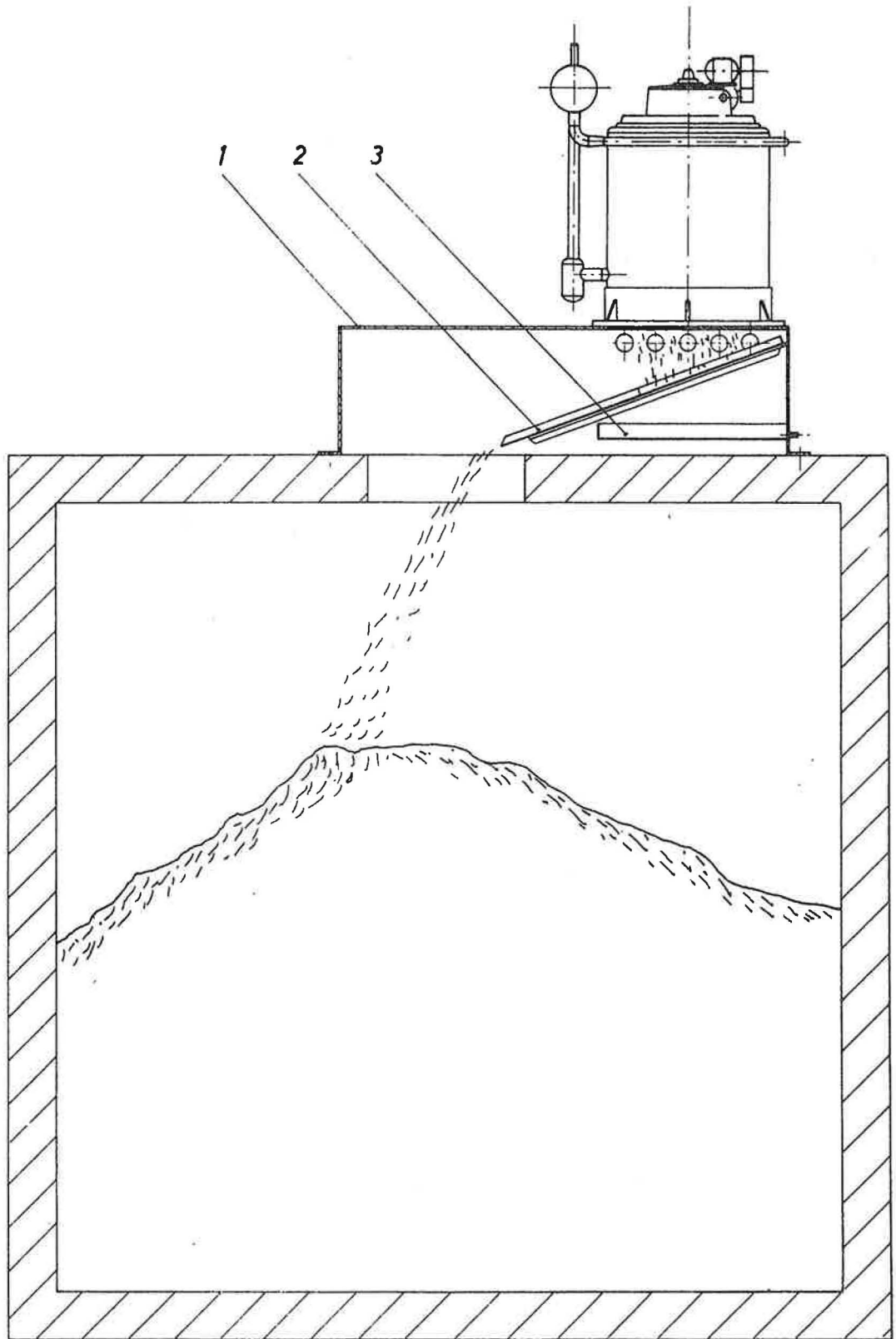
Between flake ice machine and silo should be installed a box (1) with holes through which the air can pass, in order to prevent the cold air from the silo from passing up into the flake ice machine.

The ice is passed from the flake ice machine through a chute (2) to the silo. At the same time this chute will catch the drip water and thus ensure that the ice is dry. The chute must be removed frequently and cleaned of ice. If the machine is to be thawed out, the chute (2) is removed and the drip water is caught by a drip water tray (3). See schematic sketch No. 73-015-0350.

Defrosting the Flake Ice Machine.

It may be necessary to defrost the flake ice machine at frequent intervals as ice may collect in places where the scraper blade will not be capable of removing it fully, e.g. under the bottom of the freezing cylinder.

For this defrosting, the flake ice machines operating on ammonia are equipped with a hot-gas defrosting system. For plants operating on freon, defrosting must take place e.g. by circulating water through the machine. A fast defrosting can be ensured by heating the circulation water by means of a heater in the circulation tank.



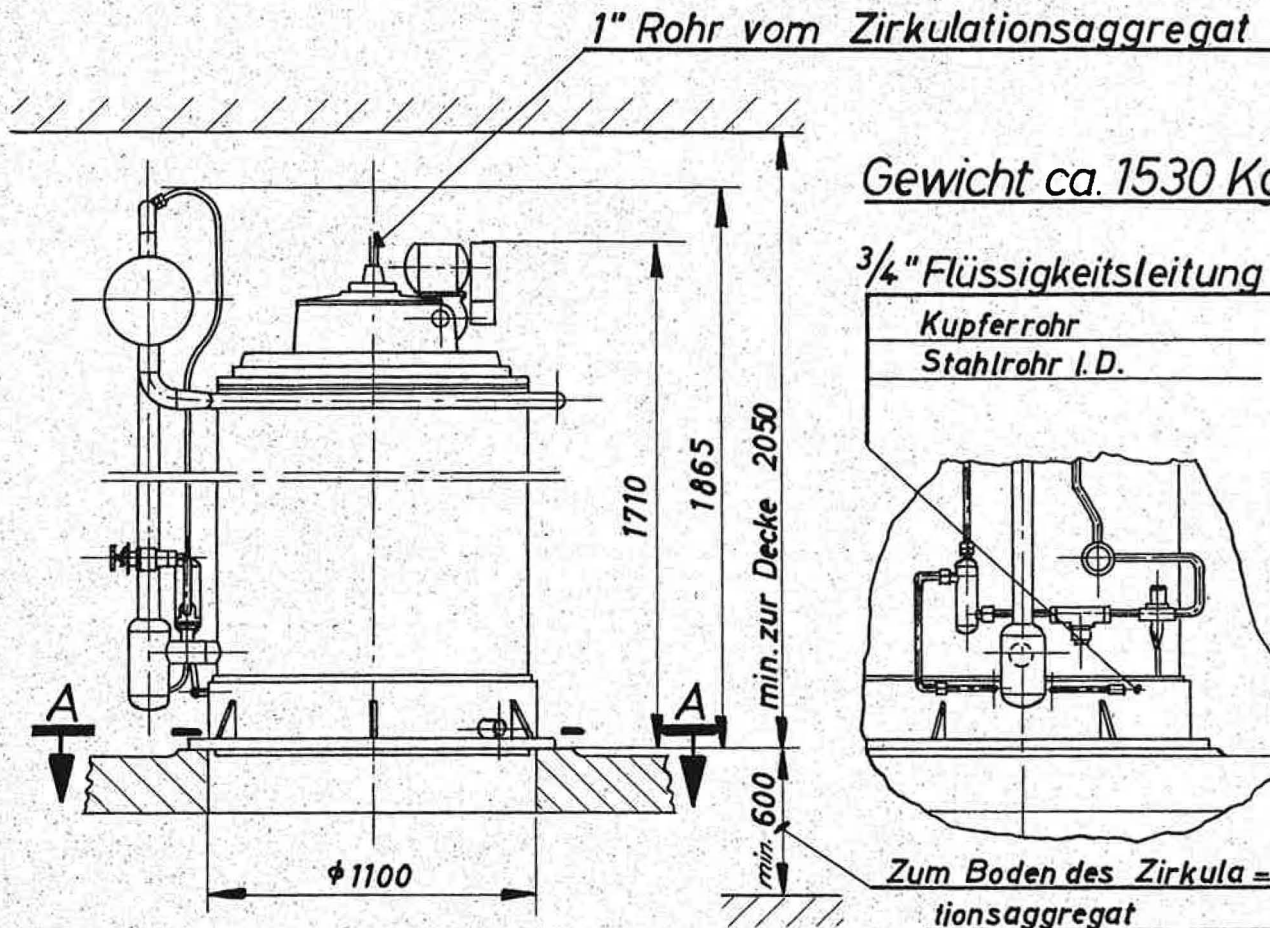
73-015-0350



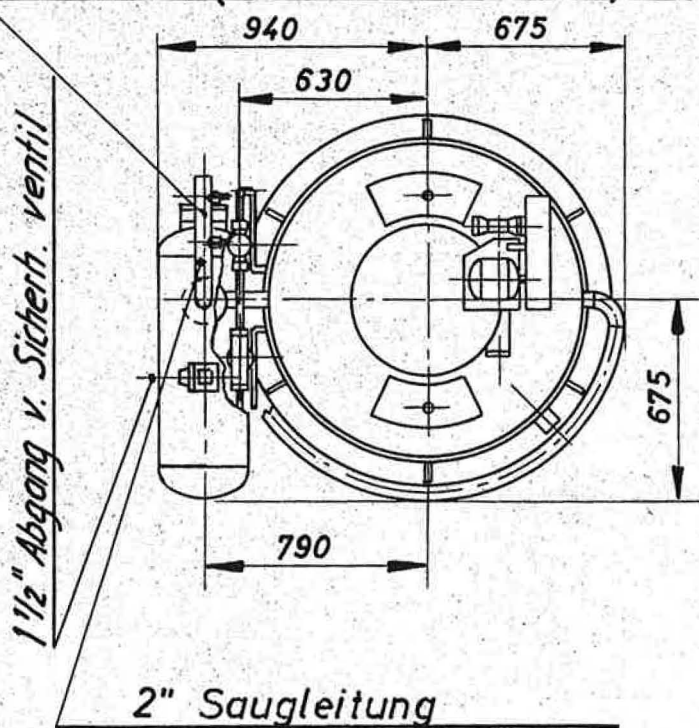
# Eiskristallmaschine IKL 10

# K 15 B 11

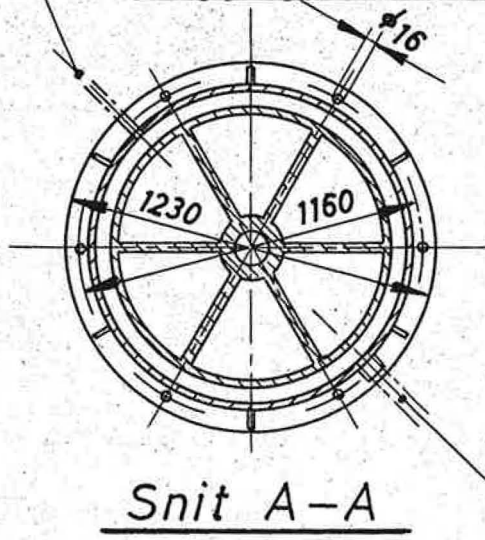
Polygon Eis R 12-22-502



24 Volt  $\approx$  (Heizelement 15 Watt)



1/2" Rohr vom Zirkulationsaggregat



2" Rohr zum Zirkulationsaggregat

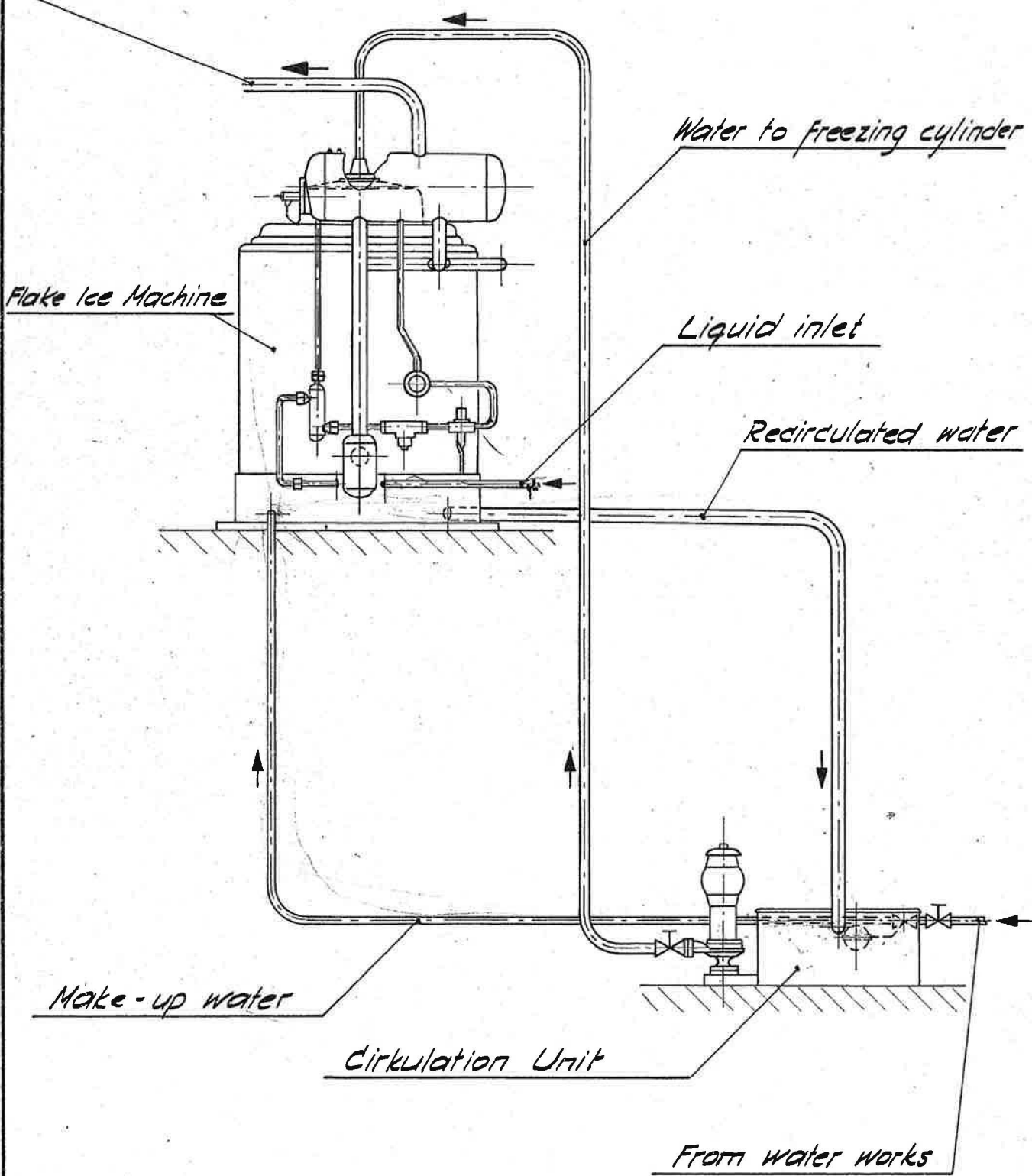
# Diagram showing piping

between IKL and Circulation Unit (F12/22)

K 15 B 14

Land plants only (engelsk)

Suction line to compressor



Flake Ice Machine

Water to freezing cylinder

Liquid inlet

Redirculated water

Make-up water

Cirkulation Unit

From water works

M.d. 3-4-73



# Water Circulating Aggregate

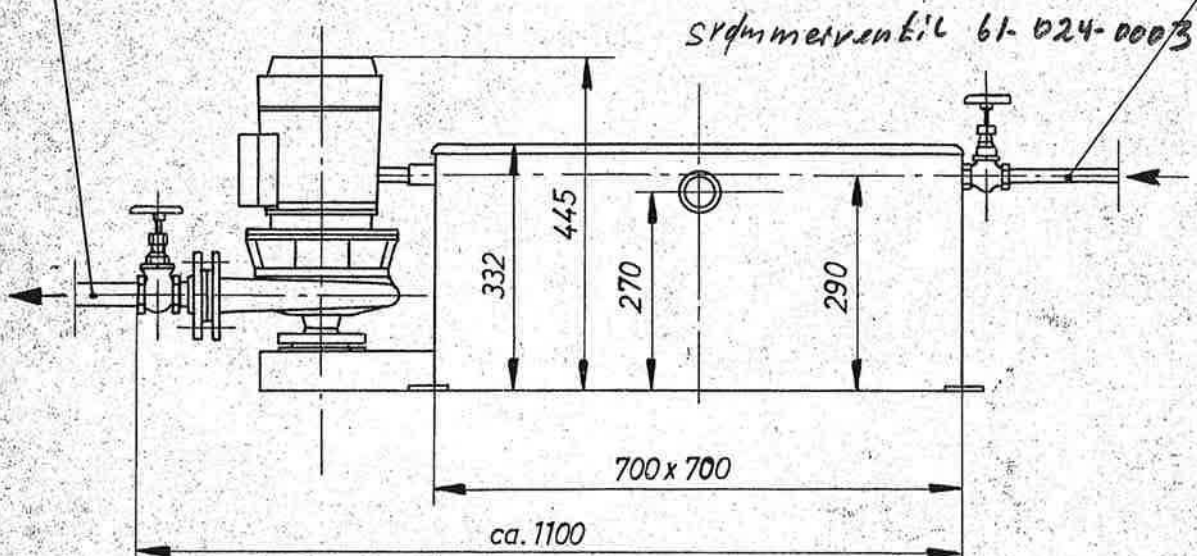
for Ice Crystal Machine IKL 4-10-15-20

K 10 B 70

engelsk

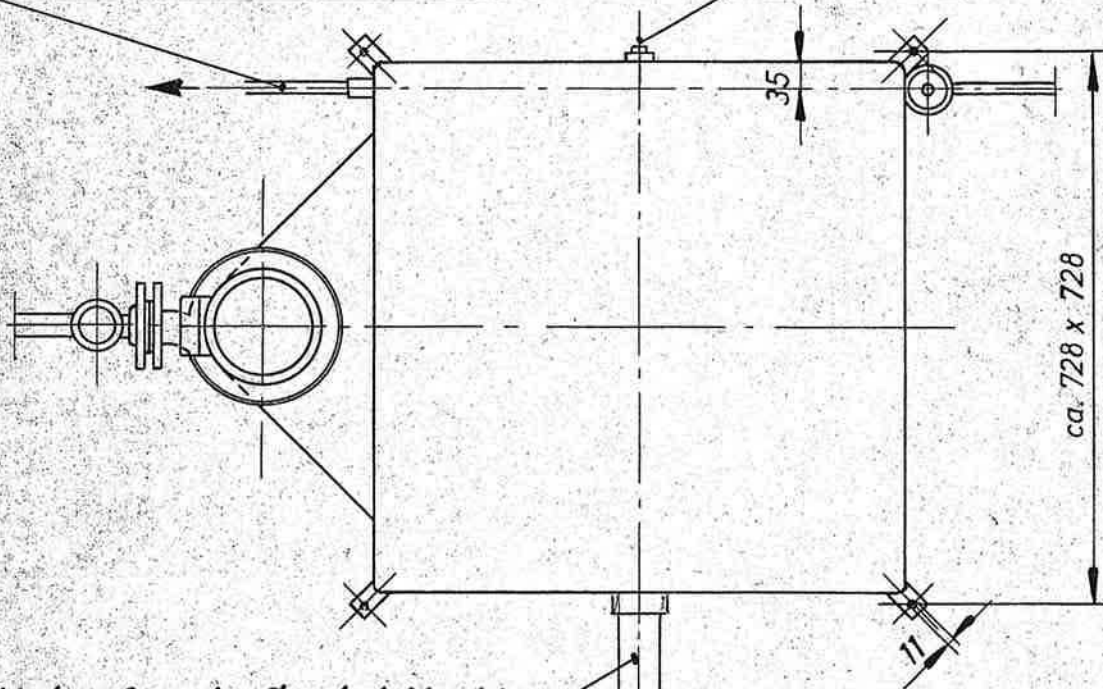
1" tubes to Ice Crystal Machine

1/2" tubes from Water Works



1/2" tubes to Ice Crystal Machine

3/4" Connecting Sleeve f. overflow



2" tubes from Ice Crystal Machine

3" for IKL 20

**Circulation Pump:**  
Krüger LC 25V-0,75HP-1400 rpm  
75 l/min. - 4,5 m W.C.

BRÖDRENE  
**GRAM** A/S  
Vejlars

Dimension - Sketch

Date: 23. 2. 73.

Wild.

Installation

73-015-I

B 1

Index:

Installation of the IKL .....	Page B 2
Fitting the Electric Motor .....	Page B 2
Fitting the Water Circulation Unit .....	Page B 2
Refrigerant piping .....	Page B 3
Water piping .....	Page B 3
Gear Box Oil - Adding oil .....	Page B 4
Charging with Refrigerant .....	Page B 4
Handing over .....	Page B 4
Checking .....	Page B 4

73-015-0001/0011/0021/0031

Installation of the IKL-10:

The machine must be located vertically on a 2-3 cm cork layer due to the risk of freeze ups.

In respect of the holes for attachment we refer to the dimension table in the Projecting Instructions.

The opening in the top of the silo should be protected by a ring of galvanised sheet which is grouted in or bolted on. This ring should protude downward in the silo, passing by the insulation by about 100 mm so that humidity will not enter the insulation.

Fitting the Electric Motor:

The motor is fitted to a bracket with slits for the tightening of the belt. The direction of rotation is checked by looking at the main shaft of the IKL-10 from above as the main shaft should rotate counter-clockwise.

Fitting the Water Circulation Unit:

The water should be able to flow back into the water circulating unit from the bottom of the IKL-10, and consequently this unit must be located at a level at least 600 mm below the IKL-10. In places where there will be only the slightest risk of temperatures below 0°C, precautions must be made to prevent the water in the unit from freezing. The temperature of the water in the unit should be at least 1½ to 2°C, otherwise the water must be heated by electric heaters or by circulating warm water through a pipe coil in the unit.

All pipes should have a pitch towards the water circulation unit.

73-015 - I

Refrigerant Piping:

The pipes should be arranged in the most expedient way, i.e. with a minimum of bands and allowing for expansions and contractions due to variations in the temperature.

Suction and liquid lines should be connected as usual, whilst the thawing line should be run in a loop over the machine to prevent the liquid from flowing back into the hot gas pipe. All cold pipes which may cause condensing of water should be insulated.

At freon plants, the suction pipe should be passed back to the compressor through an oil loop, provided the compressor is installed at a higher level than the flake ice machine. In order to prevent the risk of roller and cylinder suffering damage on account of changes in dimensions occasioned by excessive temperature differences the suction line should be connected to a pressure control ensuring that the suction pressure will not drop below  $-25^{\circ}\text{C}$ .

Water Piping:

Also place these pipes as expediently as possible. In all places where there will be even the slightest possibility of temperatures below  $0^{\circ}\text{C}$ , the pipes should have a pitch towards drain cocks which are fitted according to requirements.

The pipes may have to be insulated, e.g. where passing a low temperature room etc.

The interconnecting pipe between the bottom of the IKL and the circulation unit should have a pitch of at least 4 mm per metre.

Gear Box Oil - Adding Oil:

Check that the oil level in the gear box of the machine is correct. Otherwise, add the proper oil grade, e.g. "S.A.E.140" from "Vacuum oil", "ESSO", "SHELL", or "BP".

## Installation

73-015-I

B 4

### Charging with Refrigerant:

When the plant has been blown through in order to remove impurities and checked for leaks, the machine is pumped down so that it will be ready for charging with refrigerant. The liquid level will be controlled by the float valve or the thermostatic level control, and consequently you will just have to open the liquid valve.

### Handing over:

As soon as the machine is in operation, everything must be checked carefully. Normally, it should not be necessary to make adjustments. The water supply from the circulation unit or the circulation tank must be controlled so that the temperature of the water is at least  $1\frac{1}{2}$  to  $2^{\circ}\text{C}$ .

The machine has been tested before shipment and consequently it will require no adjustments. However, in some places the chemical composition of the water may differ considerably from the composition of the water used here, and so it may be necessary to re-adjust the water supply and reset the spiked roller.

### Checking:

Before the machine is put into operation, it is of the highest importance that the following items are checked:-

- 1) the motor of the flake ice machine - 0.35 hp
- 2) the motor starting relay and the setting of the high pressure cut-out (test.)

As the starting relay acts as a protection for both motor and gear-box, it is obvious that these two components should be adapted carefully to each other. Besides, all wiring of the IKL-10 and the electric motor must be checked carefully before the machine is put into operation.

Possible impurities in the water supply will have to be removed as such impurities may otherwise be drawn into the machine.

73-015-I

Index.

How to Strip down the Machine.....	Page C 2
The Spiked Roller.....	Page C 3
The Gearbox.....	Page C 3
The Water Distributing System.....	Page C 3
The V-Belt Drive.....	Page C 3

Service and Repairs

C 2

73-015-0003-/0015/0025  
0001-/0011/0021

How to Strip down the Machine:

There are different ways of stripping down the machine, depending upon the nature of the possible trouble. In the following we are going to describe two ways of removing the main shaft:-

1) The entire shaft is lowered into the ice silo.

Unscrew the inside hexagon screws (57) so that the entire bottom ring (55) can be removed.

Then unscrew inside hex screws (133) and remove top cover (130). Access is now free to the nut (125) and the locking screw (126). Unscrew the locking screw, and the main shaft can now be lowered into the ice silo after having been secured by means of a tackle or the like.

2) Lifting the Main Shaft up from the Machine.

The main shaft can also be lifted up from the machine, provided there is sufficient height over the machine to do so.

Remove the screws (39) and pull the screen (38) free and down so that it comes to rest on the bottom ring (55). The inside hex screws (133) are then unscrewed and the top cover (130) can be removed. Slacken the nut (125) at top of the main shaft after having unscrewed the locking screw (126). The bolts (68) are removed and the gearbox can be lifted off. It will now be possible to lift up the main shaft from the machine.

It will appear clearly from drawing 73-015-0001 how the gearbox is dismantled.

The easiest way to dismount the spiked roller (8) is as follows:- Remove the screws (22) in the lower bracket (20). The bracket can now be taken down together with the spiked roller.



73-015-I

The Spiked Roller:

The distance between the spikes and the wall of the drum should be 0.3 mm and will have to be checked once a year. By means of the eccentric bushes (23), the distance can easily be adjusted in the following manner:

The locking screw and the nut (25 - 24) are unscrewed. The bush (23) can now be turned by means of the square top until the distance between the spikes and the wall of the drum is 0.3 mm. This distance should be checked at six points on the circumference because the drum may become slightly untrue after some time's operation.

The bearings of the spiked roller should be greased with cold-resistant grease through the grease points in the end covers. Use a grease gun.

The Gearbox:

The worm gears used in the machine are made from the best materials and have good wearing qualities. In case of excessive wear, both the worm shaft and the worm rim should be replaced.

Check the end play of the worm shafts, approx. 0.2 to 0.4 mm is recommended.

The oil level should be kept in the upper half of the glass. We recommend using "S.A.E. 140" from "Vacuum Oil", "SHELL", "ESSO", or "BP".

The Water Distributing System:

Clean the water distributing pipe (45) at regular intervals. Unscrew both end sleeves and rinse out the pipe after cleaning the holes.

Especially during the initial operation it is important that the distributing pipe is checked and impurities are removed.

The V-Belt Drive:

The belts must be checked at regular intervals and tightened if necessary. It is also important to keep dirt, water, and oil off the belts and the motor etc.



Operation

D 1

73-015-I

Index.

Start and Stop.....	Page D 2
Operation with Silo with Automatic Removal of Ice	Page D 2
Normal Operation, Special conditions at start....	Page D 2
Formation of Ice in Passage to Silo.....	Page D 3
Lubrication.....	Page D 3
Setting of the Roller.....	Page D 4
Refrigeration System.....	Page D 4
Water Distributing System.....	Page D 5
Spare Parts.....	Page D 5



## Operation

73-015-0011/0021/0041/0051  
-0015/0025

D 2/1

### Start and Stop:

It is assumed that the plant has been installed and adjusted correctly and that you have been instructed as to the proper attendance so that you are fully familiar with the plant when it is handed over to you.

#### A) Starting the Machine.

- 1) Check that the machine is free of ice. If the machine is frozen up, thaw it by circulating the water over the freezing cylinder without refrigeration until the ice has been melted.
- 2) Start the motor of the flake ice machine.
- 3) Start the compressor.
- 4) Open the suction stop valve very slowly.
- 5) Open the liquid valve.
- 6) After about four minutes' operation the drum should have been cooled and the circulation pump can be started. The stop valve in the make-up water line is now opened.

#### B) - Stopping the Machine

- 1) Close the liquid valve.
- 2) Close the suction valve and stop the compressor.
- 3) The water pump is switched off whilst the motor of the flake ice machine is kept in operation for approx. 5 minutes so that all the ice is removed from the wall of the drum and all water has disappeared from the machine.
- 4) Switch off the motor of the flake ice machine.

#### Operation with Silo with Automatic Removal of the Ice:

At plants where the ice is removed automatically from the silo it is of particular importance that the machine is operated correctly and production stops are reduced to a minimum. A great number of plants are now being arranged for fully automatic operation, but conditions will vary to a considerable extent for the single plants and so a very thorough planning should be made in such cases.

## Operation

D 2/2

73-015-I

### Normal Operation:

In the initial stages of operation the machine should be watched rather closely in order to remedy possible trouble. Later on, no special attention should be required although it is recommended to inspect the machine three to four times each day. Remember that in order to give uninterrupted performance during a long period, the machine must receive the proper attendance and maintenance.

### Special Conditions at Start:

If before start the water in the circulation tank is rather warm, the result will be that it is difficult for the roller to break the frozen ice layer loose as the roller spikes will hit the same place on the circumference for each rotation.

In order to avoid this, the water in the circulation tank will have to be cooled to about 2 to 4°C before starting operation. This can be done by running at an evaporating pressure in the cylinder corresponding to 0°C and circulating the water from the circulation tank over the cylinder until the water temperature is about 2 to 4°C. An evaporator pressure corresponding to 0°C can be obtained either by capacity-controlling the compressor or by throttling the suction stop valve of the compressor. When the water has been cooled down, the water supply is turned off again, and the compressor is put to work at full capacity (if the suction stop valve has been throttled, open it fully). When the evaporator pressure in the cylinder has been brought down to the normal operating temperature, the water is turned on again.



73-015- 0001/0011/0021/0031  
0003/0015/0025

Formation of Ice in Passage to Silo:

Under exceptional circumstances condensation water and melting water may form an ice layer in the passage to the silo, and in some cases this ice layer may cause trouble in the operation. If so, it should be removed, keeping in mind that the more ice is found in the opening, the faster will new ice be formed. It is impossible to give particulars as to how often this ice should be removed as it will vary not only from plant to plant, but also from season to season.

Lubrication:

It is rather easy to check the oil level as the oil level indicator is provided with a glass tube. The oil level should never be allowed to drop below the lower edge of the glass when the machine is idle.

The oil in the gearbox should be "S.A.E- 140" and will have to be changed once a year. Only use oil from "Vacuum Oil", "SHELL", "ESSO", or "BP".

The flake ice machine will need very little attendance and should only be greased in three places every third month, viz.:-

The bearing (59) at the bottom of the machine is greased with cold-resistant grease through the nipple (58). It is necessary to grease through so that grease will appear at the top of the bearing.

The bearings of the spiked roller must be greased with the same type of grease. The grease nipples are located in the top and bottom covers.

The motors operating the machine and the circulation pump should be lubricated in accordance with the general instructions.

The float valve of the water circulation unit must be lubricated at regular intervals, otherwise the float may get stuck.

73-015-0011/0021  
0015/0025

Setting the Roller

Before leaving the factory, the machine was adjusted carefully, and the spiked roller was set for a distance of 0.3 mm between the cylinder wall and the ppoints of the spikes.

It is recommended to check from time to time whether the ice comes off the cylinder wall all the way round, or whether the spikes scratch on the cylinder wall.

After some time, the drum may expand a little so that it becomes slightly untrue, and it will then be necessary to re-adjust the distance to the cylinder wall by means of the eccentric bushes. The distance should be checked at six points on the circumference and not only at top, but also at the bottom.

When the machine has been in use for about six months, expansion of the cylinder will not take place any more, and it should now only be necessary to check the distance between drum and spikes once a year, i.e. during the annual inspection.

Refrigeration System

The refrigeration system is of a design which will make attention almost unnecessary. In order to avoid the risk of damage to roller and cylinder due to changes in dimensions at excessive temperature differences between these components, the suction line should be connected with a low pressure cut-out preventing the suction pressure from dropping below -25°C.

The machine is equipped with a special heat exchanger with oil return line to the suction line.

Setting of Hand Regulating Valve between Solenoid Valve and Surge Drum (Drwg. 73-010-0157)

At the starting up of the flake ice machine, the hand regulating valve (5) is closed almost fully. At this position of the hand regulating valve, the solenoid valve (3) should be constantly open. Continue opening the hand regulating valve gradually until the opening time of the solenoid valve is approx. 70 to 80%.

73-015-II

Water Distributing System:

The connection to the water supply is located in the top cover of the machine. Under certain circumstances, considerable quantities of dirt may enter the machine together with the water, or scals may be formed in the pipes, and for these reasons it will be necessary to clean the water distributing pipe. After removing the sleeves at the ends of the pipe it can be flushed through.

If required, the distributing pipe can be removed fully for cleaning. The nuts (46) and the lock nuts (47) are loosened, and the distributing pipe is lifted out through the inspection cover (122). However, it should only be necessary to remove the distributing pipe in quite special cases and only when the pipe has been clogged completely.

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Calcareous Water:

If the water to be frozen is highly calcareous, the freezing cylinder of the ice crystal machine may gradually assume a grey colour, and at the same time difficulties in breaking off the ice may occur. The reasons for this is that the lime is constantly frozen out of the ice formed with the result that the calcareous concentration will continue to increase until a calcareous deposit takes place on the cylinder surface, acting as a insulating layer.

This deposit can be removed by adding a few c.c. of sulpho detergent to the water in the circulation tank and letting the water circulate without freezing it into ice, afterwards changing the water in the circulation tank.

It will only be possible to obtain the maximum capacity if the surface of the freezing cylinder is clean.

Spare Parts:

Only use original spare parts, which can be purchased through our agents or direct from

BRØDRENE GRAM A/S, VOJENS, DENMARK.

To ensure that the correct spare parts are supplied, it will be absolutely necessary to indicate the serial No. of the machine (shown on the nameplate) when ordering.

We hope that the instructions given in the above will be useful to you, but if you should face unexpected problems, please do not hesitate to approach us for further information.

BRØDRENE GRAM A/S



Spare Parts List  
73-015-0011/0021

R 1

SPARE PARTS LIST.

Common Spare Parts List	73-015-I	Pages R 2 & R 3
Special Spare Parts List Fresh water F-12/22	73-015- 0011/0021	Page R 4

When ordering spare parts, please remember to indicate the serial No. of the flake ice machine, item No., and, if possible, part No.

EXAMPLE: Machine No. 73-015-0011-108  
Item 40, part No. 73-015-1081

Spare Parts List 73-015-II

R2

In common for all types of IKL-10 machines.

For item Nos., please see drwg. No. 73-015-0100

Qty.	Description	Item	Part No.
1	Shaft for roller	8	73-015-1019
2	Disc for ball bearing	9	73-015-1041
4	Ball bearing 25/62 dia x 17 SKF-6305 2RS	10	51-012-0056
2	Seal ring 25/40 x 8 type BA	11	55-029-0030
2	Gasket for cover	14	73-015-1021
1	Screen for roller	17	73-015-1039
1	Permagum dia. 6	18	55-120-0003
2	Eccentric bush	23	73-010-0825
2	Clasp nut	24	73-015-1325
1	Scraper, lower	29	73-010-0894
1	Water drain plate	38	73-015-1038
3	Distributing pipe	45	73-015-1030
3	Union, straight, 1" +GF+ No. 340	46	46-048-2006
6	Lock nut 1" +GF+ No. 310	47	46-045-2006
1	Lubricating nipple 1/4" thread	56	58-079-0003
1	Ball bearing 95/170 dia. x 32 SKF 6219	58	51-007-0020
1	Gasket for bearing cover	61	73-010-0833
1	Seal ring 110/140 dia. x 13, type BA	62	55-029-0080
1	Gasket for cover	67	73-015-1046
2	Oil sight glass	69	58-087-0003
1	Pipe plug, 3/4" thread	70	73-010-0864
1	Aluminium ring 35/27 x 3	71	55-065-7021
2	Aluminium ring 20/14 dia x 2	72	55-065-7039
2	Seal ring 130/160 x 12, type BA	75	55-031-0011
1	Spherical ball bearing 130/200 dia x 52, SKF-23026	76	51-004-0002
1	Wormwheel rim, 2-thread	79	73-010-0838
1	Gasket for cover	82	73-010-0840
1	Plug, 1/2" thread	84	73-010-0841
1	Worm, 2-thread	86	73-010-0843
2	Ball bearing 30/62 dia. x 16 SKF-6206	87	51-007-0007
1	Axial bearing 30/60 dia. x 21 SKF-51306	88	51-023-0002
1	Circlip 30 U	90	42-313-1027



Spare Parts List 73-015-II

R 3

In Common for all types of IKL-10 machines.

Item Nos., please see drwg. No. 73-015-0100.

Qty.	Name	Item	Part No.
1	Gasket 62/88 dia. x 0.8	92	73-010-0847
1	Shaft nut SKF KM 6	94	42-151-1007
1	Lock washer SKF KB 6	95	42-183-0007
1	Gasket for housing	98	73-010-0845
1	Plug $\frac{1}{4}$ " thread	100	73-010-0863
1	Aluminium ring 22/16.5 dia.x1.5	101	55-065-7013
1	Wormwheel, 2-thread	103	73-010-0849
1	Ball bearing 25/47 diax12 SKF6005	104	51-002-0006
1	Gasket for cover	106	73-010-0851
1	Pipe plug $\frac{3}{8}$ " thread +GF+ No.291	108	46-042-2003
1	Worm, 2-thread	111	73-010-0852
2	Ball bearing 20/47 diax14 SKF6204	112	51-007-0005
2	Circlip 20 U	113	42-313-1017
1	Gasket for cover	115	73-010-0854
1	Seal ring 20/32 diax7, type BA	117	55-029-0010
2	Inspection door	122	73-015-1301
1	Nut for main shaft	125	73-010-0842
1	Inlet pipe	127	73-015-1051
1	Lock washer	128	73-015-1052
1	Gasket	129	73-015-1053
1	Seal ring 32/50 diax10, type BA	134	55-029-0050
1	Seal ring 32/55 diax10, type BA	135	55-029-0055
1	V-belt section A No. 28	149	57-003-0010
1	Water scraper	160	73-015-1095
1	Spring	169	78-261-0590
1	Pawl	170	73-010-1013

IKL-10, Fresh Water, R-22

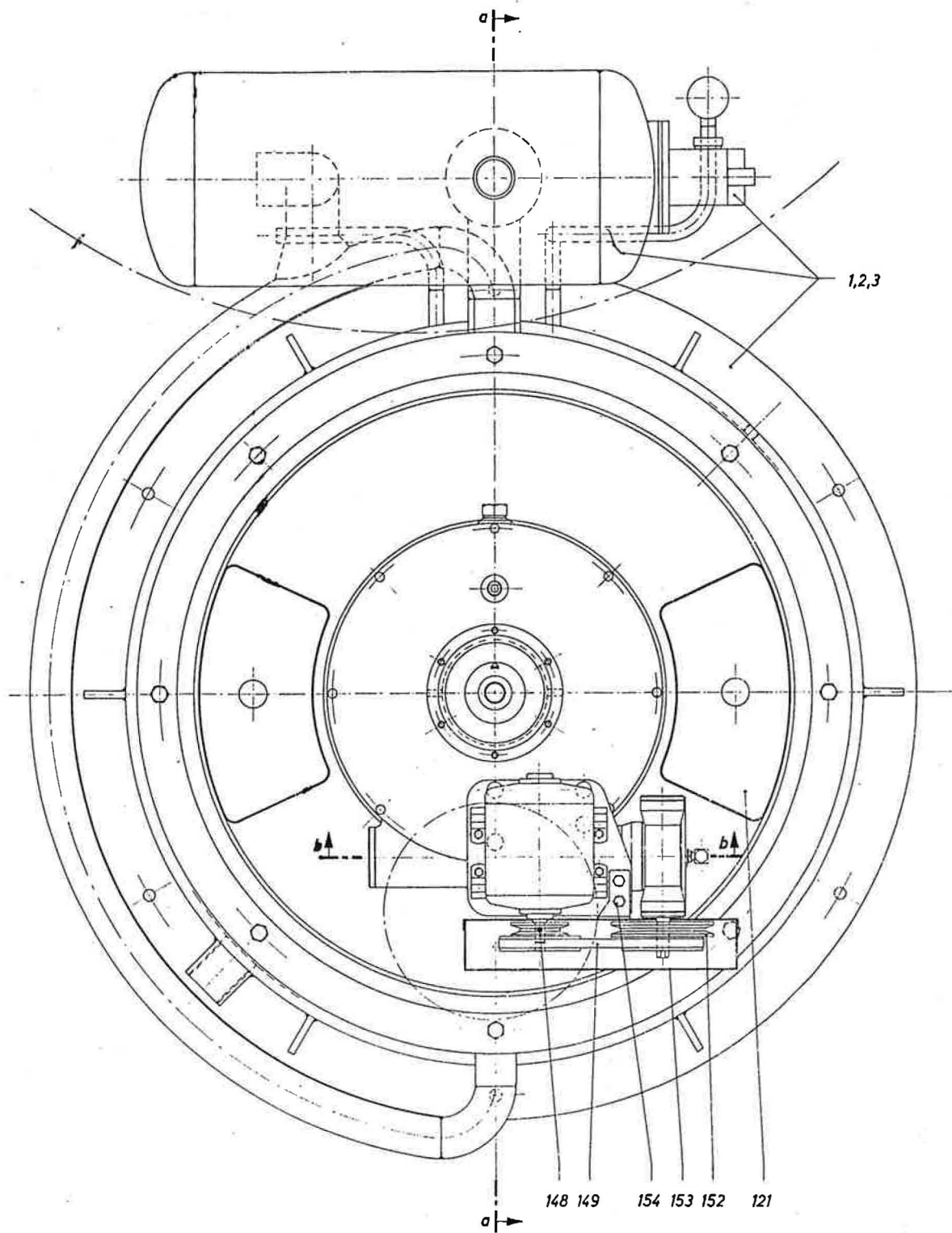
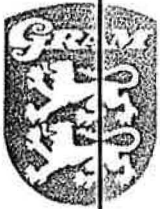
For item nos., see drawing 73-015-0001

Qty.	Name	Item	Part No.
1	Roller with spikes	7	73-015-1017
1	Cam for roller	26	73-015-1043
1	Scraper, upper	28	73-015-1044

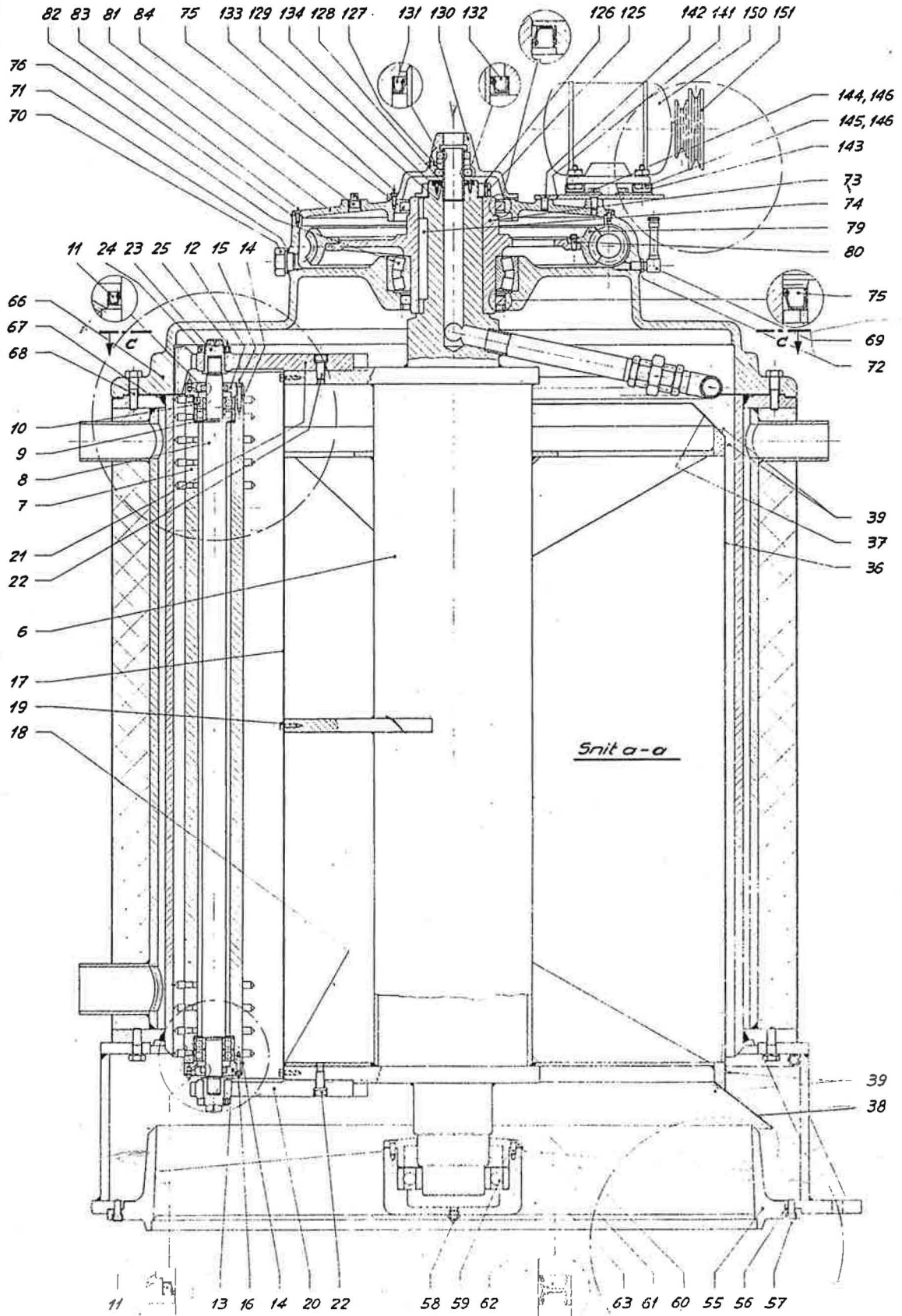
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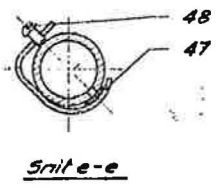
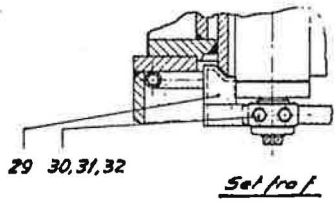
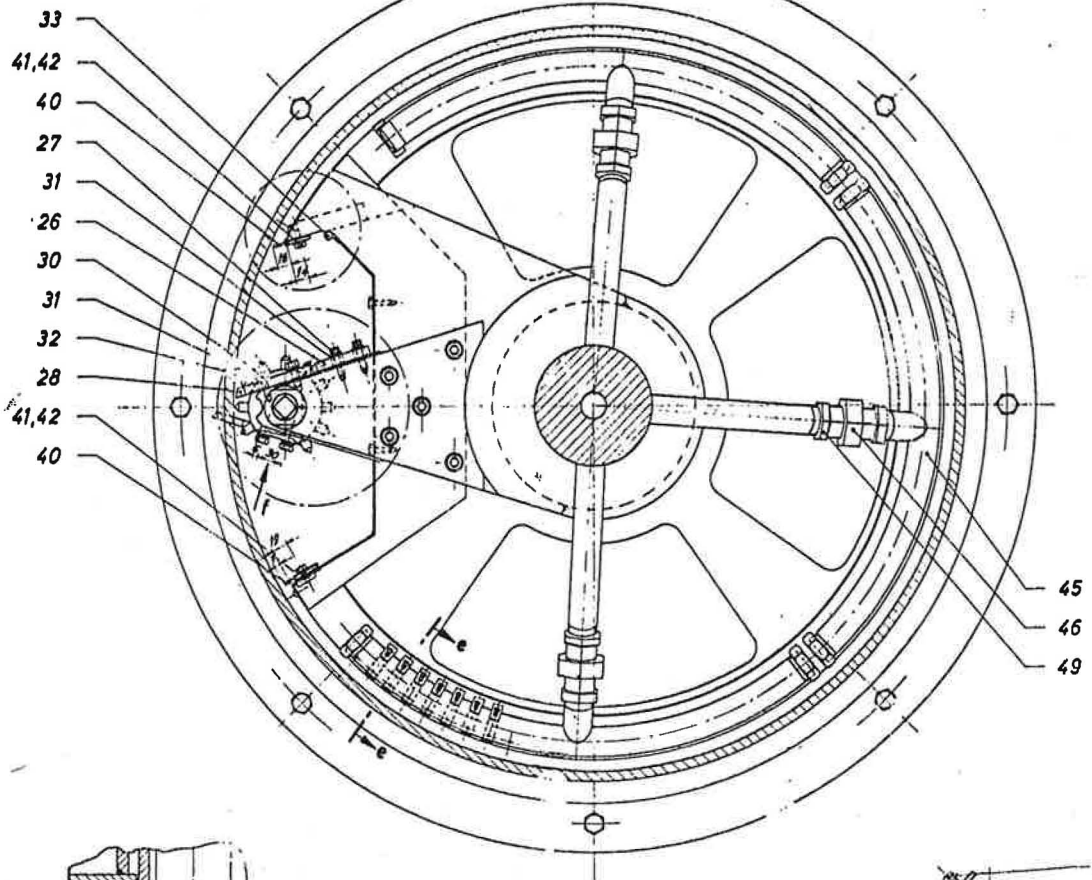
73-010-0157

Qty.	Name	Item	Part No.
1	Solenoid valve EVJD-15 .....Volt, ..... c/s	3	41-010-
1	Hand regulating valve 1/2"	5	72-480-0004
1	Level control RT-280A	8	41-073-0050



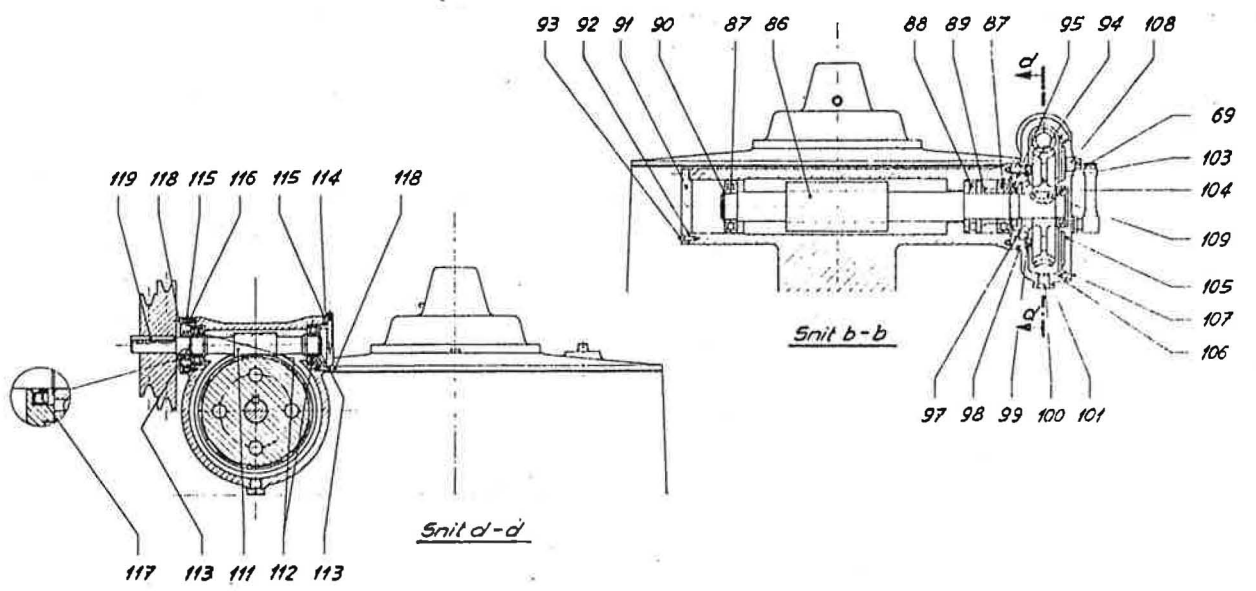
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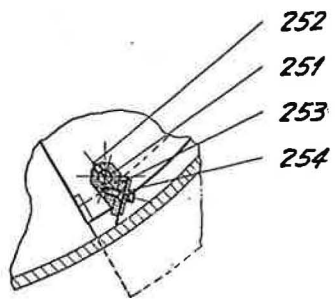




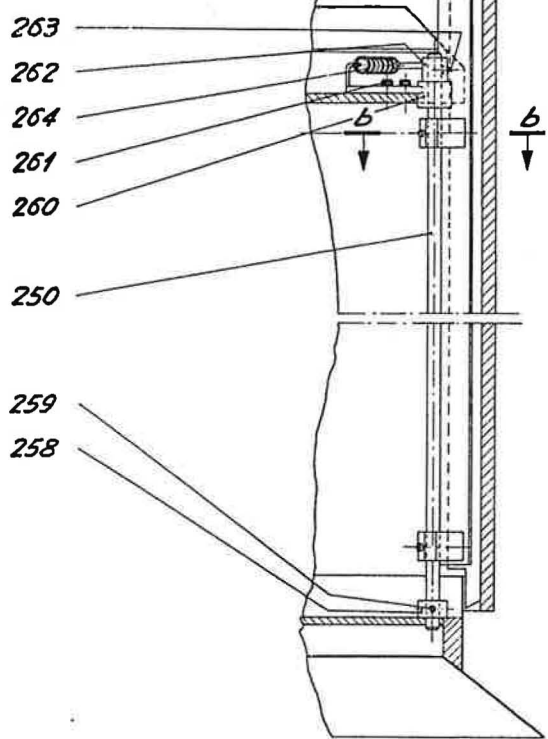
Snit c-c

Snit e-e





Snit b-b



Snit a-a

