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TEH PROJEKT HIDRO d.d.

RIJEKA – CROATIA

UNIDO

ASSISTANCE IN TREATMENT OF TANNERY EFFLUENTS
TAMIL NADU, INDIA
US/IND/90/244

FINAL REPORT
PHASE I

FINAL RECOMMENDATIONS FOR THE PROJECT IMPLEMENTATION

Prepared by the Subcontractor I: "TEH PROJEKT HIDRO"

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION VIENNA

October, 1993

EXPLANATORY NOTES

CD	Country Director
CTA	Chief Technical Advisor
TOR	Terms of Reference
BOD_5	5 days biological oxygen demand
COD	chemical oxygen demand
SS	suspended solids
TDS	total dissolved solids
DS	dry solids (matter)
PE	population equivalent
R/D	research & development
O&M(O/M)	operation & maintenance
ETP	effluent treatment plant
CETP	common effluent treatment plant
CEPTP	common (ind.) effluent pretreatment plant
MTP	municipal treatment plant
US$	United States Dollar, in August 1992 **US$ 1 = Rs 30,7**
Rs	Indian rupees

1 lakh = 100.000
1 crore = 10.000.000

TEH TEAM, TEAM or SC-I	TEH PROJEKT HIDRO team (Subcontractor I)
TNPCB	Tamil Nadu Pollution Control Board
TALCO	Tamil Nadu Leather Development Corporation
CLRI	Central Leather Research Institute
PTIETC	Pallavaram Tanners Industrial Effluent Treatment Co.
UEM	UTILITY EQUIPMENT & MANAGEMENT PVT.LTD - NEW DELHI
PKL	PRESIDENCY KID LEATHER Tannery

"TEH - PROJEKT HIDRO" TEAM:

Team Leader:	**Srdjan Selanec, chem. eng.**
Effluent Treatment Technologist:	**Mladen Bosnic, chem. eng.**
Civil Engineer:	**Petar Brusic, civil eng.**

Director:

Prof. Z. Drnjevic

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0. INTRODUCTION

0.1. SUMMARY OF THE PROJECT ACTIVITIES UNTIL NOW

During the period of August 12th - September 2nd 1992 the TEH-TEAM visited India to collect relevant data and to evaluate and discuss the recommended tannery effluent sewerage and treatment system concepts with CTA and representatives of the local consultants, TNPCB, TALCO, CLRI and PTIETC. Detailed arrangements and achievements of the Field Mission were reported in "Flash Report, Sept.1992".

After that a detailed analysis of the documents received, the evaluation of the current situation and recommendations for necessary activities and effluent treatment processes at all the four locations have been presented in the "Progress Report" (November '92).

According to the treatment processes recommended, the Subcontractor-I prepared detailed equipment specifications upon which UNIDO has contacted 50 potential suppliers and called for their proposals. More than 50 offers received were evaluated by the SC-I and detailed reports on the evaluation were elaborated in November '92 - all the details have been annexed latter to the "Draft Final Report-Phase I, May 1993".

The "Progress report" was once again discussed during the 2nd Field Mission when additional recommendations and priority lists for equipment purchase were made (Annex 1). According to this UNIDO (with assistance of the SC-I) has additionally clarified the details with the most suitable equipment suppliers.

In April '93, the 3rd Field Mission was undertaken in accordance with the "TOR for Subcontractor I" and specific instructions faxed from the BSO to the CTA and NPD on 12/03/93. The SC-I Team leader visited the project sites, held extensive meetings with the CTA, NPD and all the local counterparts (contractors, users and managements) relevant to the project. Although the discussions focused more on technical issues, the financial problems were addressed as well. The Record of the final decisions and conclusions was written and signed by all the participants (Annex 2).

The SC-I recommendations for continuation of the Project, based on the mission conclusions and the equipment offers received earlier, have been elaborated in the "Draft Final Report-Phase I, May 1993".

Synchronization of the work of local contractors, and equipment suppliers, selected by UNIDO was planned to be through SC-I exchanging and approving documents by mail. Since, till August '93 no progress in this was made (because of summer holidays and troubles with post), UNIDO (BSO) was of the opinion that SC-I and CTA should be fielded to the sites to appraise progress,

synchronize local inputs with arrival of equipment requisitioned by UNIDO and accelerate preparation of drawings. All the conclusions and recommendations of this (4th) Field Mission have been recorded (Annex 3) and copies presented to the all participants of the Project.
Representatives of the SC-I have visited supplier of the equipment requisitioned by UNIDO (ITALPROGETTI), immediately after the mission, and synchronized their drawings with the situation at the field. Finalized drawings were straightaway mailed to TNPCB and to UNIDO-Vienna by DHL courier.

0.2. RECOMMENDATIONS OF THE WORK PLAN FOR CONTINUATION OF THE PROJECT

The Subcontractor I final recommendations for continuation of the project, based on the mission conclusions (progress of the works) and the equipment specified, are elaborated in the following chapters.

In agreement with the comments in TOR, point 8.2 (last paragraph) and examination of the situation in the field we are of the opinion that it is now necessary to define also the Phase II Work Plan for the SC-I.
We are of the opinion that the services foreseen in the original TOR-Phase II would not be sufficient since:

- All the effluent treatment plants implemented are more sophisticated than originally anticipated.

- It is not realistic to expect that all four effluent treatment plants will be ready at the same time for control of the installed equipment and later on simultaneously for release in a test operation and "fine tuning".

- It will be very difficult to locate where Indian staff can be trained because it is impossible to find identical plants. Even on the somewhat similar plants (Italy) it is difficult to expect high quality training due to the fact that the employees are very busy and that they will be unwilling to contribute knowledge to potential competitors.

Our goal is to complete the Project in a satisfactory manner, therefore we are proposing the extension of activities which we see as absolutely necessary.

2.1. WORK PLAN AND TIME SCHEDULE

ACTIVITIES	M/M	PERIOD
1) Producing Final Report-Phase I and Draft Manuals	2,0	Oct.'93
2) **Fifth Field Mission** - upon UNIDO confirmation that all civil works are ready for equipment installation and that local equipment installation at all ETPs is at a very advanced stage. Evaluation of the on-site situation and equipment "dry testing". **UNIDO supplier (ITALPROGETTI) should send their technicians to install and test equipment!!!**	1,5	Jan/Feb '94
3) Preparation of **Commissioning Report** on the construction and installation works. (5 copies will be submitted to UNIDO)	0,5	March '94
4) **Sixth Field Mission** - upon UNIDO confirmation that all the systems have been operated by the main Contractors (UEM and ENKEM) for at least one month. Assisting and training of local staff, (together with main contractors) in: - Process operation and optimization, - monitoring and laboratory control, - determination of particular costs - managerial aspects	2,0	April/May'94
5) Preparation of **Operation Manuals and Draft Final Report** (5 copies of each will be submitted to UNIDO)	2,0	May-July '94
6) **Final Consultations in Vienna**	0,2	July '94
7) **Submission of the Final Reports to UNIDO** (10 copies)	1,0	August '94
TOTAL ENGAGEMENT:	**9,2**	**MAN/MONTHS**

1. PALLAVARAM

1.1. CONVEYANCE SYSTEM

1.1.0. PROGRESS OF THE WORKS

1) Supply and laying of the gravity pipelines have progressed up to the following extent:

No.	Unit/Item	Excavations	Concrete/Brick	Equipment
1	Pipelines	30 %	0 %	30 %
2	Manholes	50 %	50 %	0 %
3	Pump stations	80 %	25 %	0 %

2) Representatives of the SC-I have recommended that the Project Engineer should pay special attention at the implementation of the in-house treatments following the earlier recommendations for a set-up of screens and grit/grease chambers.

3) The designs for the pumping stations made by IIT should be scrutinized and changed preventing the settling in front the screens and enabling their manual cleaning. Screens should be constructed from the bottom up to the ground level under the inclination of 45°, with a platform (inclined) for drainage of screenings!

1.1.1. PLAN OF IMPLEMENTATION

No.	ACTIVITY	EXECUTOR	COMPLETION
1.	Revision of the detailed designs for pipelines and pumping stations, including civil-, mechanical- and electrical- engineering.	IIT & TNPCB	Oct. '93
2.	Supplying and laying of the pipelines.	KAMESHWARI/ PTIETC	end Dec. '93
3.	Supplying of the pumps and accessories (6 + 2 sets).	KISHOR	end Nov. '93
4.	Installation of the equipment and commissioning of the pumping stations.	PTIETC	end Dec. '93
5.	Trial runs	PTIETC UNIDO/SC-I	Jan./Feb. '93
6.	Inspection & trial with CETP	UNIDO/SC-I	Feb. '94

1.1.2. NECESSARY EQUIPMENT

Nos	EQUIPMENT	SUPPLIER	PRICE(USD)
6	Manually cleaned screens, openings 80 mm	PTIETC	
6	Manually cleaned screens, openings 50 mm	PTIETC	
6x2	Non-clog, submersible pumps with: - contra block system - prevention of reverse rotation - automatic coupling (without sump entering) - SS impeller - CI casing, abrasion and corrosion protected - control panel with indication lamps and recorder of working hours for each item. - HL & LL automatic switching - mechanical seal in oil chamber (as per tender).	KISHOR	114.000
?	Diesel generators. Types & nos to be selected as optimum among the following alternatives: 1) One for each pump station 2) Common set for the CETP and all the pump stations. 3) Use of existing capacities in tanneries adjacent to pump stations.	PTIETC	
?	Monitoring & control system to be selected between the following alternatives: 1) Individual, at each pump station 2) The central one at the CETP	PTIETC	

1.2. CETP

1.2.0. PROGRESS OF THE WORKS

After the financial scheme for local works was more or less clarified UNIDO has placed the Purchase Orders for the equipment recommended by the SC-I and fielded the CTA and SC-I team to the site to appraise progress, synchronize local inputs with arrival of UNIDO equipment and accelerate preparation of drawings. Progress of the works is summarized in the following table:

No.	Unit	CIVIL WORKS (%) Excav.	PCC	RCC	Brick	Finish.	EQUIPMENT(%)
0.	Collection well	90	0	0	0	0	0
1.	Screen	0	0	0	0	0	0
2.	Grit cham.	0	0	0	0	0	0
3.	Distribution I	0	0	0	0	0	0
4.	Equalization	100	90	85	0	0	0
5.	Flash mixing	0	0	0	0	0	0
6.	Distribution II	0	0	0	0	0	0
7.	Clariflocc.s	100	100	98	0	25	0
8.	Sludge sump I	100	100	100	0	0	0
9.	Aeration	50	0	0	0	0	0
10.	Distribution III	0	0	0	0	0	0
10.	Settling tanks	100	100	98	0	25	0
11.	Sludge sump II	0	0	0	0	0	0
12.	Thickener	100	100	98	0	25	0
13.	Drying beds	100	40	0	95	30	0
14.	Chem.house	100	20	20	30	0	0
15.	Main building	100	20	20	30	0	0
16.	Roads	0	0	0	0	0	0
17.	Drainage	0	0	0	0	0	0
18.	Water supply	0	0	0	0	0	0

NOTE: The General Lay-out and P&I Diagram of the ETP can be seen on the Drawings 1.and 2.

During the 4th Field Mission the SC-I team has scrutinized and discussed all the plans and drawings (available) with the Main Contractor (UEM) representatives and other members of the Project team. Conclusions and recommendations were recorded (see Annex 3) and copies presented to all the parties involved in the Project. The representatives of SC-I have visited Italy (ITALPROGETTI), after their return from India, to facilitate coordination between local works and foreign equipment installation. Detailed drawings and brochures of equipment to be installed were prepared during the visit and urgently sent to TNPCB and UNIDO by DHL courier. This equipment will be discussed more in the following chapters together with other equipment requisitioned by UNIDO from UEM.

Just before finalization of this report, SC-I received the set of detailed drawings from UEM but unfortunately the drawings concerning UNIDO equipment installation (fine screen set-up, sludge dewatering/chemical house and as built situation) are still missing. **Apart from this nothing was mentioned about a process water supplying system which we emphasized as one of most important problems, taking into consideration overall problems with water supply in Madras! Namely, during the 4th Mission it was agreed that UEM should calculate the necessary process water quantities and design an appropriate system for reuse of treated effluent.**

1.2.1. PLAN OF IMPLEMENTATION

No.	ACTIVITY	EXECUTOR	COMPLETION
1.	Detailed designs including: civil-, mechanical-, and electrical-engineering. One set will be sent to UNIDO-Vienna	UEM	tentative Dec. '93
2.	Completion of the main civil works	UEM	Nov.'93
3.	Equipment supply	UEM	Nov.'93
4.	Equipment supply	UNIDO	Nov.'93
5.	Equipment installation & testing	UEM/UNIDO	Dec.'93 - Feb.'94
6.	Commissioning, start-up, trials and preparation of the Operation Manuals	UEM/PTIETC	Feb.- Mar.'94
7.	Optimization and testing	UEM/PTIETC UNIDO-SC I	April/May '94
8.	Submission of the final Operation Manuals	Subcontr.I	July '94

1.2.2. NECESSARY EQUIPMENT
(in addition to already locally purchased)

A. Final Evaluation of the Offers Received

EXPLANATORY NOTES: * - estimated, N.A.- not applicable, N.S.- not specified, N.O.- not offered.

After the additional requests and consultations with the most acceptable bidders (selected during the Subcontractor I mission in Vienna, November '92) the following comparisons have been made:

Item 2	**SELF CLEANING SCREEN**			
Bidders:	ITALPROGETTI	UEM	HYDROPRESS	SERNAGIOTTO
Type:	Rotary	Rotary	Step	FS-2C
Openings:	3 mm	N.S.	3 mm	6 mm
Press:	Screw	N.O.	Conveyor	Compactor
Prices (USD):				
-screen:	22.500		42.913	32.594
-press:	3.500		15.969	
-spares:	1.260	N.S.	2.750	1.180
-transp:	1.500	N.O.	2.032	1.500*
-superv. of instal.	3.500	N.O.	7.000	3.500*
TOTAL:	**34.760 +**	**49.367**	**70.664**	**38.774**

Items 10a & 11	AERATION SYSTEM FOR BIOLOGICAL TREATMENT

SELECTION OF THE OPTIMUM AERATION SYSTEM

Three alternatives:
- A) fine-bubble, non-clog diffusers,
- B) surface aerators and
- C) ejectors,

have been compared from the following points of view:

	A	B	C
1. Total investment (approx.USD):	170.000	110.000	240.000
2. Energy costs (USD/10 years) :	511.000	645.400	1.020.000
* (MWh/10 years)	(*10220)	(*12908)	(*20.440)
3. Depreciation (USD/10 years) : (7%/year)	119.000	77.000	168.000
4. 1 + 2 + 3 (USD/10 years) :	800.000	832.400	1.428.000

The non-clog diffuser system is not only eventually the cheapest but can be recommended as new experience in tannery effluent treatment in the developing countries!
This is why only the offers concerning this system have been finally evaluated as follows:

Bidders:	ITALPROGETTI	UEM
Oxygen delivery:	280 kg/h/2tanks (58,3 g/h/m^3)	280 kg/h/2tanks
Oxygen transfer:	2,4 kg/kWh	N.S.
DIFFUSERS		
Piping:		
- emerged	galvanized steel	N.S.
- submerged	PVC	N.S.
Support:	polypropylene	N.S.
Valves & fittings:	galvanized steel	N.S.
Membrane:	synt.rubber EPDM	EPDM
Capacity:	4-10 Nm^3/h of air per diffuser	N.S.
No.of pieces:	2 x 750	2 x 600
Spares:	20 complete	for 2 years
	150 membranes	N.S.
Price (USD):	**98.500**	N.S.
AIR BLOWERS		
Type:	Rotary vane	
Capacity:	1.800 Nm^3/h at 5m	1000 CFM,8PSIG
Motor:	37kW, 380/440V, 50Hz, 2 poles, IP55	43.7 BHP
Accessories:	manometer, air filter, silencer, non-return and safety valves, shock absorbers.	Air filter, silencer Check,gate & air relief valves
Spares:	flexible coupling connections,air filters, belts	for 2 years, N.S.
No.of sets:	5	5
Price(USD):	**45.900**	N.S.
TOTAL PRICE:	**144.400 ****	**138.780**

NOTE: ** A special discount of 5% has been offered by ITALPROGETTI for an order higher than USD 200.000.

Items 16, 17, 17a 17b,17c	SLUDGE TREATMENT SYSTEM			
Bidders:	**ITALPROGETTI**	**KLEIN**	**UEM**	**SERNAGIOTTO**
Power consumpt.	20 W/kgDS	8 W/kgDS	**N.S.**	**N.S.**
PE consumpt.	2-4 g/kgDS	3-5g/kgDS	4-8p/tDS	3-5 g/kgDS
16 SLUDGE PUMPS				
Type:	Mohno	Mohno	Helical	Mohno
Capacity:	4-24m^3/h variable 2bar,5,5kW	3-15m^3/h 2,2 k **N.E.!!!**	15 m^3/h 3 HP 10 m	4-20m^3/h **N.S.**
Spares:	rotors, stators, coupl.pins, sleeves, O-rings, stiffing box	**N.O.!!!**	2 years **N.S.**	**N.S.**
No.of pieces:	2 sets	2	2	2
Price,USD:	**16.600**	**N.S.**	**10.150**	**10.536**
17 BELT PRESS				
Width:	2000 mm	2000 mm	1000 mm	2100 mm
Capacity:	400 kgDS/h	350 kgDS/h	250 kgDS/h	750 kgDS/h
Nos.:	1	1	2	1
Spares:	2 belts, 4 nozzles, set of lamps & switches,	2 belts, 4strippers, 2 cylinder, 2 effectors, 2 pressure valves	2 years **N.S.**	**N.S.**

Continued!

Bidders:	ITALPROGETTI	KLEIN	UEM	SERNAGIOTTO
Conveyer for dry sludge:	Belt acid proof 1,1 kW L = 3 m	N.O.	N.O.	N.O.
Price,USD:	**104.600**	**N.S.**	**N.S.**	**105.505**
17a PE UNIT			**N.S.**	
Type:	automatic, dry PE dissolving	automatic, dry PE dissolving		N.S.
Volume:	1700 l	2500 l		N.S.
Stirrers:	3 x 0,2kW	1,1 kW		N.S.
Spares:	N.A.	N.S.		N.S.
Nos.	1	1		1
Price,USD:	**15.000**	**N.S.**		**N.S.(in17)**
17b DOSING PUMP				
Type:	Helicoidal	Helicoidal		N.S.
Capacity:	0,3-3 m^3/h 2 bars 1,1 kW	0,37 kW ???		N.S.
Nos.:	1	1		N.S.
Spares:	2 rotors, 2 stators, 2 O-rings, 2 stuff box	N.S.		N.S.
Price,USD:	**3.520**	**N.S.**	**N.S**	**N.S.(in17)**

Continued!

Bidders:	ITALPROGETTI	KLEIN	UEM	SERNAGIOTTO
17c STATIC MIXER				
Nos.:	1	1	N.S.	N.S.
Price,USD:	600	N.S.	N.S.	N.S.
-transport:	4.000*	N.S.	N.S.	6.700
-supervision of instal.:	4.000*	N.O.!!	insl.	7.500*
PE:	for 2 months included	N.O.	N.O.	N.O.
TOTAL PRICE,USD:	142.880**	153.500	255.600	130.241

NOTE: ** Inclusive in this price, ITALPROGETTI has offered everything requested from UNIDO (plus dry sludge conveyer and polyelectrolyte), together with a detailed list of spares and accessories. Moreover a special discount of 5% has been offered for an order higher than USD 200.000.

Items 22, 23 & 24	PE AUTOMATIC PREPARATION AND DOSAGE SYSTEM		
Bidders:	**ALDOS**	**ITALPROGETTI**	**UEM**
22 PREPARAT. UNIT			**N.S.**
Capacity:	1000 l/h	1000 l/h	
Nos:	2	2	
Price, USD:	**27.970**	**30.000**	
23 DOSING PUMPS			**N.S.**
Capacity:	0-165 l/h	0-165 l/h	
Nos:	2	2	
Price,USD:	**2.457**	**3.800**	
24 DILUTION UNIT			**N.S.**
Nos:	2	2	
Price, USD:	**4.614**	**1.200**	
Spares,USD:	-	990	
TOTAL PRICE, USD:	**35.041**	**35.990**	**25.920**

NOTE: **UEM offer is not completely specified as requested.**

B. Final Recommendations Made to UNIDO

The evaluated equipment should be purchased in one of the following ways, to complete the already acquired equipment:

Alternative I : Everything from one supplier who had offered the best conditions for the whole scope of the UNIDO supply.

Alternative II : Aeration system from UEM, who had offered acceptable conditions for the purchase of American non-clog diffusers and is at the same time the main local contractor for the CETP. The rest could be purchased from Italprogetti.

Alternative III: Each item separately from the best bidder for this particular item.

Although, at first sight a separate purchase of each item seems cheaper, after taking into account all the conditions (transport, installation, start-up and discount) it is obvious that the purchase of all the items from one supplier presents the best economical (see the tables below) and probably the best technical solution.

Because of that we have recommended the purchase of all the items from ITALPROGETTI according to their final offer No. 96/93, of 05/03/93 and annex no 199 of 29/04/93 (see Table, Alternative I), since they have offered everything requested from UNIDO (plus dry sludge conveyer and polyelectrolyte for sludge dewatering), together with a detailed list of spares and accessories. Moreover a special discount of 5% has been offered for an order higher than USD 200.000.

At the same time such a complete engineering would simplify designing, erection, trial testing and training of the local staff.

Table 1.PURCHASE ALTERNATIVE I

Item	Nos	EQUIPMENT	SUPPLIER/ Offer No.	PRICE(USD)
2	1	Self cleaning rotary screen with screw compactor for solids and spare parts.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	29.760
10a &11	1set	Non-clog diffuser system for aeration tanks, together with blowers, spare parts and accessories.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	144.400
16 17 17a 17b 17c	1set	Sludge dewatering system consisting of: sludge feed pumps, belt press, PE-prepar. unit, PE dosing pumps, static mixer, dry sludge conveyer, chemicals for 2 months trial, spare parts for 2 years.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	134.880
22 23 24	1set	Automatic anionic PE prepar. unit with dosing pumps and dilution unit. Spares for 2 years.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	35.990
TOTAL PRICE				**345.030**

CALCULATION OF ADDITIONAL COSTS
(Based on original offers)

TRANSPORT: 2 containers Italy-Madras		* 8.000
COMMISSIONING & START UP (15 m/days)		
Fees	: 15 x 400 $/day	6.000
Lodging	: 15 x 100 $/day	1.500
Travel	:	2.000
TRIALS IN THE DESIGNED CONDITIONS (15 man/days)		
Fees	: 15 x 400 $/day	6.000
Lodging	: 15 x 100 $/day	1.500
Travel	:	2.000
DISCOUNT	**: 5% on equipment (345.030 x 0,05)**	**- 17.250**
GRAND TOTAL		**354.780**

DELIVERY: 120 DAYS FROM UNIDO ORDER !

Table 2.PURCHASE ALTERNATIVE II

Item	Nos	EQUIPMENT	SUPPLIER/ Offer No.	PRICE(USD)
2	1	Self cleaning rotary screen with screw compactor for solids and spare parts.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	29.760
10a &11	1set	Non-clog diffuser system UEM for aeration tanks, together with blowers, spare parts and accessories.	UEM Ref.offer: PR-92/022 28/04/93	138.780
16 17 17a 17b 17c	1set	Sludge dewatering system consisting of: sludge feed pumps, belt press, PE-prepar. unit, PE dosing pumps, static mixer, dry sludge conveyer, chemicals for 2 months trial, spare parts for 2 years.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	134.880
22 23 24	1set	Automatic anionic PE prepar. unit with dosing pumps and dilution unit. Spares for 2 years.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	35.990
TOTAL PRICE				**339.410**

CALCULATION OF ADDITIONAL COSTS
(Based on original offers)

TRANSPORT: 2 containers Italy-Madras	*8.000
1 container USA-Madras	6.000
COMMISSIONING & START UP (15 m/days)	
Fees : 10 x 400 $/day	4.000
Lodging : 10 x 100 $/day	1.000
Travel :	2.000
NOTE: UEM costs included in purchase price	
TRIALS IN THE DESIGNED CONDITIONS (15 man/days)	
Fees : 10 x 400 $/day	4.000
Lodging : 10 x 100 $/day	1.000
Travel :	2.000
NOTE: UEM costs included in purchase price	
DISCOUNT:5% on ITPROGETTI equipment (200.630x0,05)	**- 10.030**
GRAND TOTAL	**357.380**

DELIVERY: 120 DAYS FROM UNIDO ORDER !

Table 3PURCHASE ALTERNATIVE III

Item	Nos	EQUIPMENT	SUPPLIER/ Offer No.	PRICE(USD)
2	1	Self cleaning rotary screen with screw compactor for solids and spare parts.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	29.760
10a &11	1set	Non-clog diffuser system UEM for aeration tanks, together with blowers, spare parts and accessories.	UEM Ref.offer: PR-92/022 28/04/93	138.780
16 17 17a 17b 17c	1set	Sludge dewatering system consisting of: sludge feed pumps, belt press, PE-prepar. unit, PE dosing pumps, static mixer, dry sludge conveyer, chemicals for 2 months trial, spare parts for 2 years.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	134.880
22 23 24	1set	Automatic anionic PE prepar. unit with dosing pumps and dilution unit. Spares for 2 years.	UEM Ref.offers: PR-92/022 28/04/93	25.920
TOTAL PRICE				**329.340**

CALCULATION OF ADDITIONAL COSTS
(Based on original offers)

TRANSPORT:	2 containers Italy-Madras	*8.000
	1 container USA-Madras	6.000
COMMISSIONING & START UP (15 m/days)		
Fees	: 10 x 400 $/day	4.000
Lodging	: 10 x 100 $/day	1.000
Travel	:	2.000
NOTE: UEM costs included in purchase price		
TRIALS IN THE DESIGNED CONDITIONS (15 man/days)		
Fees	: 10 x 400 $/day	4.000
Lodging	: 10 x 100 $/day	1.000
Travel	:	2.000
NOTE: UEM costs included in purchase price		
DISCOUNT: 5% on ITPROGETTI equipment(164.640x0,00)		**- 00.000**
GRAND TOTAL		**357.340**

DELIVERY: 120 DAYS FROM UNIDO ORDER !

C. UNIDO Decision and Purchase

Respecting the local conditions of operation and maintenance UNIDO has placed Purchase Orders recommended in the Alternative II.

The final P & I Diagram, General Lay-out and HGL Diagram are presented in Drawings 1, 2 and 3.
Detailed description and drawings of the equipment purchased are presented in Annex 4.

2. RANIPET

2.0. PROGRESS OF THE WORKS

The CTA and SC-I team visited the site, in Aug.'93, to appraise the progress, synchronize local inputs with arrival of UNIDO equipment and accelerate preparation of drawings.
The progress of the works is summarized in the following table:

No.	Unit	CIVIL WORKS (%) Excav.	PCC	RCC	Brick	Finish.	EQUIPMENT(%)
0.	Conveying system	0	0	0	0	0	0
1.	Coarse screen						0
2.	Collection well	100	100	100	100	90	70
3	Fine Screen	0	0	0	0	0	0
4.	Equalization	100	100	100	100	95	0
5.	Flash mixing	100	100	100	100	95	90
6.	Prim.Clarif.	100	100	100	100	95	80
7.	Anaerobic lag.	100	90	90		60	
9.	Aeration	100	100	100	100	100	95
10.	Sec.Clarifier	100	100	100	100	95	95
11.	Thickener	0	0	0	0	0	0
12.	Drying beds	100	90	0	95	30	0
14.	Chem.house	100	90	90	90	80	80
15.	Roads	40	0	0	0	0	0
17.	Drainage	0	0	0	0	0	0
18.	Landscaping	30	0	0	0	0	0
19.	Water supply	0	0	0	0	0	0

2.1. PLAN OF IMPLEMENTATION

During the 3rd and 4th Field Missions, the following conclusions and recommendations for upgrading of the CETP (in addition to the already designed and mostly constructed system) have been finalized :

0) The Contractor for the conveying system has been selected and completion of works is expected end of March '94.
1) Manually cleaned coarse screen should be placed at the entrance to the receiving sump.
2) It should be advisable to construct the pressure inlet into the equalization tank above ground.
3) Automatic rotary screen should be placed at the entrance to the equalization tank.
4) Adequate ejector system should be installed to mix/aerate equalization tank (instead of the planned 2 x 25 HP aerators which cannot satisfy the actual needs).
5) Since the area for preparation/dosing of chemicals is rather congested it would be advisable to study the possibility to

prepare saturated solution/suspension of alum and lime in separate concrete tanks outside of the building and then to transport them by pumps to the dosing tanks on the first floor.

6) pH meter should be installed in the flash mixer (with indicator and alarm at the central panel).
7) A possibile saving can be made if only a channel with buffers is constructed between the flash mixing chamber and primary settling tanks instead of the flocculation chamber planned. A PE dosage system can be added later if proved necessary.
8) Electrically operated sludge valves with a timer for primary sludge evacuation could be usefull (inter-linked with the sludge evacuation pumps operation).
9) The existing anaerobic lagoon should be partitioned into two parts:
   - First, to be 2/3 of the existing volume and to remain anaerobic.
   - Second, to be 1/3 of the existing volume and aerated by high-speed floating aerators.

   This arrangement will enable a multi step anaerobic-aerobic or aerobic-polishing treatment (see diagrams in Annex 2).

   NOTE: This recommendation has been given after the SC-I rough comparison of the several possible alternatives from technological and economical aspects and discussion with the Project Team during the 4th Mission(see Annex 3).

10) Mechanical solid waste dewatering system should consist of:
   - hopper-bottom thickener,
   - thickened sludge pumps,
   - centrifuge,
   - PE preparation and dosage,
   - construction (foundation + elevated base) for centrifuge mounting,
   - roof over equipment.

11) Additional capacity of the transformer should be provided to take extra load caused by the CETP upgrading.

12) It is necessary to provide the possibility to flush chemical and sludge pipelines with water. For this even treated effluent can be used.

13) Concerning the possible UNIDO assistance it has been concluded to recommend the supply of equipment in the following order of priority (as per evaluation of the offers recapitulated in chapter 2.2.)

1. FINE SELF-CLEANING SCREEN to reduce possibility of settling in the equalization tank as well as to reduce overall ETP organic/susp.solids load.
USD 29.760

2. SLUDGE DEWATERING UNIT (with centrifuge) to reduce loading of drying beds and to improve dewatering even during rainy periods.
USD 104.000

4. FLOATING AERATORS in one third of the lagoon to improve flexibility and overall effect of the ETP.
USD 50.000

TOTAL ASSISTANCE REQUIRED: USD 183.760

14) TALCO will provide a statement that they together with tanners will bare all the additional costs necessary to ensure full operation of the above mentioned equipment (point 13) including:

0. Preparation of DETAILED CIVIL, MECHANICAL AND ELECTRICAL DESIGNS together with as-built drawings and operation manuals.

1. CIVIL WORKS
- Platform for the fine screen.
- Sludge hopper/thickener in front of the dewatering unit.
- Housing of the dewatering system.
- Partition of the lagoon.
- All the necessary drainages, channels, weirs, piping, valves and fittings.
- Process water supply, etc.

2. ELECTRICAL WORKS
- Transformer.
- MCC, local switch boards and instrumentation.
- Illumination.
- Cabling, earthing.
- Etc.

3. ALL THE OPERATION, MAINTENANCE AND DEPRECIATION COSTS

15) Although some problems like:
- insufficient detention in equalization tank,
- cleaning of the lagoons,
- non-adequate lagoon shape,
- odor emissions,

can still be anticipated, the Project Team is of the opinion that only after the trial period and fine tuning of the ETP would it be possible to decide upon a necessary follow-up

program and improvements based on monitoring parameters of the ETP performance.

If these recommendations are accepted, implementation could precede as follows:

No.	ACTIVITY	EXECUTOR	COMPLETION
1	Collection and conveying system (Contractor selected and works are in progress)	TALCO	March '94
2	CETP as designed by ENKEM	TALCO/ ENKEM	Dec.'93
3	Purchase of the equipment. Delivery of technical details	UNIDO/ TALCO	mid Nov.'93
4	UNIDO inspection	UNIDO/ SC-I	Jan/Feb.'94
5	Delivery and installation of UNIDO equipment	UNIDO	Feb.'94
6	Additional works for the CETP upgrading. (civil, electrical, mechanical)	TALCO	Feb. '94
7	Commissioning, start-up, trials and preparation of the Operation Manuals	TALCO/ENKEM	March '94
8	Optimization and testing	UEM/PTIETC UNIDO-SC I	April/May '94
10	Submission of the final Operation Manuals.	ENKEM	June '94

2.2. NECESSARY EQUIPMENT (in addition to that already purchased)

We feel that the above mentioned CETP upgrading could be very useful especially from the demonstration and research points of view, but at this time we can recommend that UNIDO considers only the purchase of the equipment for which the offers have been collected and evaluated!
The other items mentioned above (after the 3rd and 4th field missions) can be reconsidered additionally if possible and purchased in cooperation with TALCO.

A. Final Evaluation of the Offers Received

EXPLANATORY NOTES: * estimated, N.A. not applicable, N.S.not specified, N.O. not offered.

After the additional requests and consultations with the most acceptable bidders (selected during the Subcontractor I mission in Vienna, November '92) the following evaluations and recommendations for the UNIDO purchase have been made:

Item x	**SELF CLEANING SCREEN**			
Bidders:	ITALPROGETTI	UEM	HYDROPRESS	SERNAGIOTTO
Type:	Rotary	Rotary	Step	FS-2C
Openings:	3 mm	N.S.	3 mm	6 mm
Press:	Screw	N.O.	Conveyor	Compactor
Prices (USD):				
-screen:	22.500		42.913	32.594
-press:	3.500		15.969	
-spares:	1.260	N.S.	2.750	1.180
-transp.:	1.500	N.O.	2.032	1.500*
-superv. of instal.	3.500	N.O.	7.000	3.500*
TOTAL:	**34.760**	**49.367**	**70.664**	**38.774**

RECOMMENDATION:
Purchase to be made from ITALPROGETTI according to their final offer No. 96/93, of 05/03/93!

Item 1a EJECTORS FOR EQUALIZATION TANK

Tank dimensions: 42 x 20 x 3,75 (Max W.D.= 3,0 m)
Tank volume : 2.520 m
Mixing power requested: 30 - 40 W/m^3

Bidders:	**ITALPROGETTI**	**ENKEM**
Characteristics:	13,5 kW, 380/440 V 15 kgO_2/h	20 HP KISHOR
Materials,		
Pump:	tungsten carbide seals	SS 304
Tubes:	AISI 304	SS 304
Nozzles:	plastic	SS 304
Wiring:	**N.O.!**	**included**
Control panels:	**N.S.**	**included**
No of sets:	**6**	**5**
Price (USD):	**72.000**	**60.000**
Spares:	2 upper face seals 2 lower mech. face seals 6 O-rings 3 impeller nuts 12 rubber seals 12 Venturi nozzles 1 set accessories	Whatever necessary in 1 year
Price (USD)	**6.950**	**included**
Transport:	**4.000***	**included**
Installation:	**5.000***	**included**
TOTAL PRICE (USD):	**87.950**	**60.000**

RECOMMENDATION:

Purchase to be made from ENKEM according to their final offer No. 380/93, of 15/03/93!

Item 1b FLOATING AERATORS FOR THE AERATED PART OF THE LAGOON

Lagoon dimensions: 118 x 33 x 3,5 m (2,5 m WD)
Lagoon volume : 9.700 m^3
Aeration/mixing power requested: 7-8 W/m^3

Bidders:	**ENKEM**
Characteristics:	20 HP 1440 rpm IP-55 protection Enclosed fan cooled
Materials,	
Impeller:	Stainless steel
Shaft:	Stainless steel
Float:	FRP polyurethan filled
Diffuser:	FRP
Mooring ropes:	Included
Spares:	Included for 1 year operation
Installation:	Included
Cables & control panels:	N.O. !!!
Nos.:	5
TOTAL PRICE:	**50.000 (Ex.works Madras)**

RECOMMENDATION:

Purchase to be made from ENKEM according to their final offer No. 380/93, of 15/03/93, since they are the only bidder who has offered this particular item!

Items 4 5, 6, 9, 10, 11 **SLUDGE DEWATERING SYSTEM**

Bidders:	**PENNWALT**	**ENKEM/HUMBOLT**
Power consumpt.	**N.S.**	50 Wh/kgDS
PE consumpt.	2 g/kgDS	2 g/kgDS
4 SLUDGE PUMPS	**N.O.!!!**	
Type:		Helical/screw
Capacity:		10 m^3/h 5 HP 960 rpm
Spares:		included for 1 year
No.of pieces:		2
Price,USD:	**N.O.!!!**	**14.000**
5 & 6 DECANTER SOLID BOWL CENTRIFUGE		
Type:	PM 30000	Co-current
Capacity:	500 kgDS/h 10 m^3/h	500 kgDS/h 10 m3/h
Nos.:	1set	1 set
Spares:	**N.O.!!**	included for 1 year
Price,USD:	**62.680**	**80.000**

Continued!

Bidders:	PENNWALT	ENKEM/HUMBOLT
9,10,11 PE UNIT		
Tank:	4.000 l	1000 l,HDPE
Agitator:	3 HP, 120 rpm	slow speed
Static mixer:	1 no	1 no
Metering pumps:	100-1000 l/h, 3 HP, 2 kg/cm^2	2 no N.S.
Spares:	N.O.!!!	included for 1 year
Price,USD:	10.510	10.000
Transport:	N.O.!	included
Commissioning & start-up:	N.O.!	included
Delivery:	9 months	8 months
TOTAL PRICE,USD:	73.190	104.000

RECOMMENDATION:

The purchase of the Items 4,5,6,9,10,11 should be made from ENKEM according to their final offer No. ENK/308/93 of 15/03/93, since they have offered all the items requested, together with spare parts and accessories as well as with installation and commissioning.

B. Recommendation to UNIDO

We believe that there are no significant technical obstacles for the Ranipet project to be successfully implemented by TALCO (in cooperation with ENKEM) and assisted by UNIDO.
Financial problems presented far higher risks, since although there is a general desire to upgrade the system in the way recommended, there was concern that tanners may not be able to accept the resulting increase of investment and running costs.
During the 3rd Mission, it has been suggested that TALCO should prepare basic designs and cost estimations (total investment and running) based on the above mentioned recommendations and present them to tanners.
During the 4th Mission, the Project Team was informed that tanners agree with the above mentioned recommendations and that UNIDO is kindly requested to purchase a part or all of the equipment in the following order of priority:

Item	Nos	EQUIPMENT	SUPPLIER/ Offer No.	PRICE(USD)
x	1	Self cleaning rotary screen with screw compactor for solids and spare parts.	ITALPROGETTI Ref.offers: 96/93,05/03/93 199,29/04/93	29.760
1b	5	Floating aerators for the aerated part of the lagoon, with all the wiring and control panels as well as spare parts and accessories.	ENKEM ENK/380/93 15/03/93	50.000
4,5, 6,9, 10,11	1set	Sludge dewatering centrifuge together with sludge feeding pumps, PE preparation and dosage system, as well as spare parts.	ENKEM ENK/380/93 15/03/93	104.000
1a	5	Ejectors for equalization tank, with all the wiring and control panels as well as spare parts and accessories.	ENKEM ENK/380/93 15/03/93	60.000
TOTAL PRICE				**243.760**

CALCULATION OF ADDITIONAL COSTS
(Based on original offers)

TRANSPORT: 1 container Italy-Madras		* 4.000
(the rest is included in the ENKEM price)		
COMMISSIONING & START UP (5 m/days for screen):		
Fees	: 5 x 400 $/day	2.000
Lodging	: 5 x 100 $/day	500
Travel	:	2.000

NOTE: ENKEM costs for 15 days included in purchase price

TRIALS IN THE DESIGNED CONDITIONS (15 man/days):
ENKEM costs included in purchase price

DISCOUNT : Already taken into account

TOTAL (Additional Costs)	**8.500**
GRAND TOTAL	**252.260**

DELIVERY: 120 DAYS FROM UNIDO ORDER !

3. PRESIDENCY KID LEATHER

The plans to implement the ETP in accordance with the recommendations made in the "Progress Report" were made during the 2nd & 3rd Field Missions. The CTA (with the help of ENKEM) have presented the PKL management with the plans and costs necessary to upgrade the ETP and they have agreemed to participate in the project.
UNIDO has placed (after the 3rd Field Mission) an order to "Micro Controls - Madras" for the monitoring equipment specified earlier.
The PKL accepted the plans during the 4th Field Mission, signed the contract with ENKEM and reconstruction of the ETP has been agreed to upon the following principles:

1. RESPONSIBILITIES OF ENKEM:

1.1. System of coarse and finer manually cleaned screens with platforms for waste evacuation and drainage.
Approx.:Rps 25.000

1.2. Rearrangement of the existing inlet to the primary settling tank (from the collection well) enabling flow measurement and adjustment.
Approx.:Rps 20.000

1.3. Supply and installation of 500 l-coagulator/flocculator on the bridge above the primary settling tank.
Approx.:Rps 50.000

1.4. Supply and installation of PE preparation dosage system, consisting of: 500 l-preparation tank with agitator, 500 l-dosing tank and dosing pump.
Approx.:Rps 100.000

1.5. Improvement of the existing inlets into both settling tanks.
Approx.:Rps 15.000

1.6. Supply of one portable DO-meter for outdoor measuring.
Approx.:Rps 50.000

1.7. Construction of an additional 100 m2 of drying beds and reconstruction of the existing surplus tanks into the serial polishing tanks. The existing tanks should be cleaned of sludge and debris by PKL!
Approx.:Rps 45.000

1.8. Construction of a floor and shed above the chemical dosage equipment and an instrumentation panel.
Approx.:Rps 45.000

TOTAL INVESTMENT EXPECTED FROM PKL: Rps 350.000

2. RESPONSIBILITY OF "MICRO CONTROLS"

2.1. One pH-meter should be installed into the central cylinder of the primary settling tank (approach from the bridge).

2.2. The other end-control pH-meter should be installed in

the treated effluent polishing pond.

2.3. The flow meter should be installed on the inlet into the primary settling tank, after the by-pass.

2.4. The back-washing of the drying beds from the collection well should be prevented by adjusting switch levels of the pumps. The planned additional drying beds should be placed at a higher level.

NOTE: The Process Diagram and General Lay-out of the ETP system are presented in Drawings 4 and 5.

After visiting the PKL it is obvious that their staff (at present) are unable to run the plant properly. The Project Team thus strongly recommends TNPCB to take better control of the ETP and especially with the help of CLRI and consultants (ENKEM) to fully inform the PKL management about all the technical and economical problems connected with effluent treatment. If such a plant is not constantly operated (24 h per a day) and regularly maintained, practically no effect can be expected and all costs involved are wasted.
PKL should be aware that it is necessary to ensure:

- operation even during power failure (generator),
- regular chemical dosage,
- trained staff.

Furthermore, we are of the opinion that TNPCP should study the problem of final effluent disposal (or reuse) and reclamation of the land presently filled with discharged effluent and prepare technical recommendations for solving these problems.
The ETP upgrading could be implemented as follows:

No.	ACTIVITY	EXECUTOR	COMPLETION
1	Basic designs of the ETP upgrading, and cost estimations.	ENKEM	Oct. '93
2	ETP commissioning & start-up and preparation of the Operation Manuals	ENKEM/ MICRO CONTR.	Jan. '94
3	UNIDO inspection	UNIDO/S-I	Jan. '94
4	Trials	ENKEM/MC UNIDO/ SC-I	Jan./March'94 April/May '94
5	Submission of the final Operation Manuals	Subcontr.I	June '94

4. MEERA HUSSAIN

During the 4th field mission the recommendation was finalized to implement the effluent treatment system consisting of:

- manually cleaned screen,
- equalizing tank / 2 outdoor and one indoor existing tanks to be reconstructed into a single one (80 m^3), mixed with one submerged ejector,
- pumps for equalization will have intake directly from the equalization tank,
- two containers for manual preparation and dosage of chemicals, installed in the pumping station.
- static settling tank,
- existing sludge drying beds (2 x 10 x 10 m^2),
- anaerobic lagoon (500 - 600 m^3, detention:6-10 days),
- aerated, degasifying tank (50 m^3),
- naturally aerated oxidation ponds (4 x 262 = 1050 m^3, detention time to be approx. 17 days).

The ponds will be periodically (alternately) cleaned after leaving the sludge to dry up naturally. To hasten sludge drying, supernatant will be decanted by a transportable diesel pump.
In the future, it would be possible to increase the volume of the ponds, since there is enough land available (5000 m^2).
The Process Diagram and General Lay-out of the system as well as arrangement of the oxidation ponds are presented in Drawings 6, 7 and 8.

After the 3rd field mission the SC-I had recommended that ENKEM should be selected to implement all the civil-, mechanical- and electrical works, since they were the most competitive bidder for electro-mechanical works (UNIDO purchase) and have already made an acceptable estimation and offer for civil works (300.000 Rps).
Purchase according to the following table was recommended:

Item	Nos	EQUIPMENT	SUPPLIER	PRICE(USD)
1	1	Coarse manually cleaned screen	ENKEM, Ref. ENK/711/93 21/04/93	700
2	1	Ejector for equalization tank (3 HP)	ENKEM ENK/252/93 22/02/93 & ENK/664/93 8/04/93(Rps130.000)	4.350
3	2	Non-clog, horizontal, centrifugal pumps (6 m^3/h, 7 m, 1,5 HP)	ENKEM ENK/252/93 22/02/93	2.350 (Rps 70.000)
4	1	Static settling tank made of fibre reinforced plastic (Dia.= 2,5 m)	ENK/664/93 08/04/93	8.700 (Rps260.000)
5	1	Floating aerator for the equalization tank (3,0 HP)	ENKEM ENK/252/93 22/02/93	2.000 (Rps 60.000)
6	2	HDPE tanks with valves and mixers for manual operation	ENK/711/93 21/04/93	1.000
7	1	Movable, diesel pump with suction and discharge hoses (20 m^3/h, 5 m)	ENK/664/93 08/04/93	1.200 (Rps 35.000)
8	1set	MCC and cabling (within ETP)	ENK/664/93 08/04/93 (Rps190.000)	6.350
9	1set	Piping valves and fittings	ENK/664/93 08/04/93 (Rps 85.000)	2.830
10	1set	Spare parts listed under pt.7	ENK/664/93 08/04/93 (Rps 51.400)	1.700
TOTAL PRICE				**31.180**

CALCULATION OF ADDITIONAL COSTS
(Based on original offers)

TRANSPORT (ENK/252/93, 22/02/93):	135
	(Rps 4.000)
DETAILED DESIGNS (ENK/664/93, 08/04/93):	2.350
	(Rps 70.000)
COMMISSIONING & START UP (ENK/664/93, 08/04/93):	2.000
	(Rps 60.000)
TRIALS OF VARIOUS TECHNOLOGIES OVER 4 MONTHS (ENK/711/93, 21/04/93)	5.000

DISCOUNT : 7 % on ejector price (ENK/664/93, 08/04/93)

GRAND TOTAL	**40.665**

During the visits of BSO, Mr. Buljan and the CTA and later on the CTA and SC-I, all the financial, environmental and legal points were clarified. The UNIDO has placed the purchase order to ENKEM and MEERA HUSSAIN management has engaged them as a consultant and constructor of the ETP system.
The works started on 16/09/1993, therefore the implementation can be expected according to the following plan:

No.	ACTIVITY	EXECUTOR	COMPLETION
1	ETP detailed designs	ENKEM	Sept. '93
2	UNIDO inspection	UNIDO/ SC-I	Jan.'94
3	ETP commissioning & start-up and preparation of the Operation Manuals	ENKEM	Jan.'94
4.	Trials	ENKEM UNIDO/ S-I	April/May '94
5.	Submission of the final Operation Manuals	Subcontr.I	July '94

ANNEXES 1.

. REPORT ON THE 2nd FIELD MISSION

RECORD OF FINAL DECISIONS ON ACTIVITIES
NECESSARY TO PROCEED IMPLEMENTATION OF
THE TWO CETPs FOR PALLAVARAM AND RANIPET CLUSTERS
AND TWO ETPs FOR INDIVIDUAL TANNERIES

PROJECT TEAM:

1. P.M. Belliappa, Chairman TNPCB
2. R.K. Jayaseelan, Project Officer
3. Dr.S. Rajamani, CLRI
4. P. Subramani, M/s ENKEM ENG.
5. P. Brusic, TEH-PROJEKT (Subcontractor I)
6. S. Selanec, TEH-PROJEKT (Subcontractor I, Team Leader)

After analyzing the Subcontractor's Progress Report and extensive discussions lead in Madras (Dec. 08 - 19, 1992) the following conclusions were made:

1. PALLAVARAM

1.1. CONVEYING SYSTEM

1) Acceptable map (1 : 3000) in metric system has been produced by PTIETC. Apart from previously planned, one additional tannery connection has already been introduced!?

2) The Conveying System Tender has been evaluated with the following conclusions:

2.1) Two alternatives have been offered:

Tender	Sewerage Rs	Pumping Rs	TOTAL Rs
1. ALTERNATIVE (HDPE gravity and PVC pressure main)			
[illegible]	14.707.703	1.517.000	16.224.703
[illegible] HDPE	13.594.833	5.547.140	19.141.973
[illegible]	13.529.297	5.761.795	19.291.592
2. ALTERNATIVE (HDPE both, gravity and pressure main)			
[illegible]	17.934.717	1.517.000	19.451.717
[illegible] HDPE	15.807.473	5.547.140	21.354.633
[illegible]	16.272.097	6.762.375	23.034.471

2.1) RECOMMENDATIONS:

1) Since one of the three bidders mentioned above (fourth was disqualified earlier because his offer was not complete) has offered not adequate pumps, clarification about that should be required from him, as well as additional demands,as follows, should be placed to all the bidders:

1) Screens (manually cleaned, openings: 50-80 mm) should be provided.
2) Pipe diameters should be:

- gravity : ≥ 150 mm
- pressure: ≥ 50 mm

3) Alternative II to be selected if financially acceptable.
4) The pumps should have:

- contra block system
- prevention of reverse rotation
- automatic coupling (without sump entering)
- SS impeller
- CI casing, abrasion and corrosion protected
- control panel with indication lamps and recorder of working hours for each item.
- HL & LL automatic switching
- mechanical seal in oil chamber

3) The lowest bidder, of technically equals, should be selected.

4) The differences between the investment costs estimated by the Subcontractor I (IEH) and those estimated locally (with the IIA) are caused by the following:

IEH calculated with:
- full 25.041 m of network (local experts only 20.267 m omitting 2000 m of discharging channel and 3000 m of secondary network).
- SS pumps (locally only SS impellers).
- Screens and flow measurement at each pumping station.

1.2. CETP

0) Soil tests on the CETP have been performed in two holes under: the collection well, equal.tank, aeration tank and sec.clarifier) showing more than acceptable resistance beneath 1 m of earth and organic material is crushed rock material of 2-3 kg/cm² bearability.

1) It would not be possible to purchase, additionally more than 1400 m² of land, meaning that further expansion of the sludge drying beds would not be possible.

2) The use of anaerobic effluent treatment step had been definitely abandoned even as a temporary research facility, so the new CETP lay out has been prepared, introducing aerobic biological treatment as only method.

3) The dimensions of the aerobic tanks had been calculated, and three basic alternatives offered to the bidders:

a) two tanks 40 x 20 x 3 m SWD, aerated with fixed slow speed surface aerators.
b) two tanks 40 x 15 x 4 m SWD, aerated with submerged air diffusers.
c) two tanks 40 x 18 x 3.5 m SWD, aerated with ejectors.

The tanks should be able to operate parallel or in series. The bidders can offer combination of the aeration systems recommended.

4) The secondary sludge should be recycled (and excess sludge evacuated) from the single, common pumping station with three pumps of 100 m³/h capacity.

5) Strong concern was voiced about sludge dewatering, since no space for the sludge drying beds expansion is available. It has been concluded that eventually two belt filter presses should be necessary, to cover full needs (especially in rain periods).

6) To avoid spreading of aerosols over the nearby residential area, aeration/mixing of the equalization tank with submerged ejectors has been recommended.

7) Priority list of equipment to be purchased by UNIDO has been recommended as follows:

a) Full fledged mechanical sludge dewatering system including: one belt filter press, feeding pumps and pol.electrolyte preparation dosing system.

b) Self-cleaning screen (or sieve) with openings 4 mm.

c) Aeration system for aeration tanks (optimum to be selected between the alternatives recommended).

d) If financially feasible one more belt filter press should be purchased.

8) All the Indian bidders have been informed (in writing) about all the changes recommended as well as about some additional demands specified during the discussions and evaluation of technical part of their offers and asked to complete their offers accordingly. At the common meeting (Dec.18th.1992) they have been informed about the following procedure planned:

- Successful bidder will be selected during the December 1992 and named Main Contractor.

- Two weeks after the nomination the Main Contractor should send to UNIDO-Vienna, a list of equipment which is going to be used (with the all technical characteristics; to be confirmed by the Subcontractor I.

- The Subcontractor I will assist UNIDO to finalize tendering process for equipment recommended, and send all the technical details about equipment as soon as selected (by UNIDO) to the Main Contractor.

- Two weeks after receiving technical details from UNIDO the Main Contractor will complete basic designs including:

  - Lay-outs and cross sections of the civil objects.
  - Hydraulic profile of the CETP.
  - Equipment specifications.

and send them back to UNIDO-Vienna.

- The Subcontractor I will elaborate all the comments and possible additional recommendation in the FINAL REPORT OF THE PHASE I, to be used during the CETP implementation.

- In the mean time (during process and equipment evaluations) the Main Contractor should start with works which do not depend on the above mentioned activities.

9) Regarding the Subcontractor I concern about the cost underestimation, running costs have been re-estimated by the CTA coming to the same Amount as Subcontractor I. Investment costs should be re-evaluated in accordance with the recommended changes of the process and construction materials to be used.

2. RANIPET

Progress of the CETP erection has been inspected at the field and the following decisions made:

1) A pipeline by-pass of the anaerobic lagoon should be made to enable: sludge evacuation from the lagoon as well as to enable (if necessary) inverted effluent treatment process consisting of a high loaded aeration step followed by facultative polishing lagoon.

2) Equalization tank constructed seems over-dimensioned (retention time: 15 h), but what is more important mixing power planed is too low (14 W/m³). It is recommended to introduce mixing by ejectors or surface aerators of the adequate capacity (30 w/m³).

3) At the outlet from the anaerobic lagoon a compartment for pre-aeration and sulfide striping should be provided (V = approx..1000 m³), aerated by high speed floating aerators (N = approx.40 kW). The aerators planned for equalization could be used!

4) Sludge hopper (static thickener) should be provided as buffer in front of the sludge centrifuge station planned. Approx. dimensions:

- Wide·length: 8 x 8 m
- Side depth : 2 m
- Bottom inclination: 40 - 50°
- Total depth: 4,3 m

5) Priority list of equipment to be purchased by UNIDO has been recommended as follows:

a) Sludge bowl decanter centrifuge, together with feed pumps and polyelectrol.e preparation/dosage system. (Subcontractor 1 has contacted local producers and defined with them terms of offering, asking for the response soon as possible.)

b) Ejectors or surface aerators (depending of more acceptable offer) for the equalization tank mixing and aeration (instead of the floating surface aerators purchased, which should be used for the purpose described under 2).

6) The Subcontractor 1 will assist UNIDO in finalizing procurement process for equipment recommended, and will send all the technical details about equipment (once selected by UNIDO) to the Main Contractor (ENHIL).

3. PRESIDENCY MID

a) Monitoring equipment should be purchased as per Project REPORT - TECH, Nov.1992.

b) The following provisions should be implemented locally :

- Modification of 2 nos. existing tanks into sand filters.
- Increase in area of sludge drying beds.
- Irrigation of the nearby fields and testing of the effect on various crops.
- Shed for chemical storage and dosage.

c) If financially possible UNIDO should supply polyelectrolyte preparation tank and dosing pump.

4. MEERA HUSSAIN

a) Since additionally more stringent effluent standards are demanded because of the nearby water supply zone, the new effluent treatment process diagram has been produced (see enclosure) consisting of the following:

a) Existing tanks to be reconstructed in equalization tank (60 m^3), mixed with 3 HP submerged ejector.
b) 5-6 m^3/h equalization pumps placed in the existing station.
c) HDPE static settling tank: dia.2,5 m; side depth 1.5 m; bottom slope 45-60°.
d) Anaerobic lagoon: 230 m^2, 3 m SWD.
e) Degasifying unit: 50 m^3, aerated with 7 HP high speed surface aerator.
f) Oxidation pond: 600 m^2, 1 m SWD.
g) Separation of soaking liquors, and solar evaporation on the existing pans.
h) Eventually simple lime, alum and polyelectrolyte dosage can be introduced.

b) Although required standards probably would not be reached the project team is of the opinion that the scheme recommended would improve existing situation up to technically and economically acceptable level.

c) It is strongly recommended to UNIDO to assist in the purchase of the equipment specified, moreover since all of it can be locally purchased for reasonable prices.

Madras, [illegible]

ANNEXES 2.

RECORD OF THE FINAL DECISIONS DURING THE 3rd FIELD MISSION

RECORD OF FINAL DECISIONS ON ACTIVITIES NECESSARY TO PROCEED IMPLEMENTATION OF THE TWO CETPs FOR PALLAVARAM AND RANIPET CLUSTERS AND TWO ETPs FOR INDIVIDUAL TANNERIES

PROJECT TEAM:

1. P.M. Belliappa, Chairman TNPCB
2. R.K. Jayaseelan, Project Officer TNPCB
3. Dr.S. Rajamani, CLRI
4. Dr.Z.Kotasek, CTA UNIDO
4. S. Selanec, TEH-PROJEKT (UNIDO Subcontractor I, Team Leader)

After analyzing progress of the projects in Pallavaram and Ranipet, as well as after extensive discussions lead in Madras and at the locations of the Project (13-19, April 1992) the following conclusions were made by the Project Team and other participants listed below:

1. PALLAVARAM

1.1. CONVEYING SYSTEM

Participants:

M.S.PANDIAN,	EMSONS ENTERPRISES member tannery - Director PTIETC
Mr.EKAMBARAM,	TANWELL LEATHERS member tannery - Director PTIETC
M.SETHURAMAN,	COIMBATORE CHROME TANNING Co. member tannery - Director PTIETC
M.D.S. MANIE,	KAMESWARI ENTERPRISES (in charge of supply of HDPE pipes)

i) Considering the financial position of the PTIETC and to complete the works in time, with a due consideration on legal issues raised on the offers by the bidders, the PTIETC decided to:

   a) undertake the implementation itself, with a technical assistance of the 7 engineers deputed to the Project by the TNPCB.
   b) engage Indian Institute for Technology (IIT)-Madras to prepare detailed designs in accordance with ENKEM basic design and suggestions made by the Subcontractor I.
   c) engage KAMESHWARI ENTERPRISES to supply HDPE pipes for gravity lines (laying will be performed by the PTIETC itself). Decision on the type of pressure pipelines will be made in 7 days according to the design.
   d) Engage FISHER manufacturer to supply necessary non-clog submersible pumps and accessories.

Installation and commissioning will be performed by the PIU(I) itself.

c) All the necessary accompanying civil works will be implemented by the PIU(I) itself.

3) It should include the following new detailed designs:

a) Arrangements for manually cleaned screens ahead of each pumping station.

b) Detailed design of electric engineering as well as monitoring and control of the system. Special attention should be paid to selection of optimum among the following alternatives:

1. DIESEL GENERATORS

1.1. for each individual pump station,
1.2. one generator for all the pump stations and CETP,
1.3. usage of the existing generators in tanneries adjacent to pump stations.

2. CONTROL AND MONITORING

1.1. from single point at the CETP,
1.2. individual, at each pump station.

3) PIU/TNPCB will send all parts (civil, mechanical and electrical) of detailed designs to UNIDO till the end of May '93.

4) Supply and laying of the gravity pipelines is already in progress and will be completed, together with pressure pipelines and civil construction of the pumping stations, till the end of August '93.

5) The set of necessary pumps (6 x 2 nos.) has been ordered for the total amount of Rps 3,500,000 and will be delivered in 3 months period. Installation is expected to be completed till the end of September '93.

1.2. CETP

Participants:

S.K.AGRAVAL, UEM - Project Manager
NARESH VERMA, UEM - General Manager (Marketing)

1) UTILITY EQUIPMENT & MANAGEMENT PVT.LTD. (UEM) - New Delhi, has been selected as the main contractor to prepare detailed designs, supply and install all the necessary electrical and mechanical equipment except those planed to be supplied by UNIDO (fine screen, chemic PE dosing system, aeration system and sludge dewatering system) as well as to undertake all the civil works, commission the plant and operate it over the trial period (see AGREEMENT BETWEEN "UEM" AND "PTIETC").

2) The already completed parts of basic designs (see the list below and Enclosures) and AGREEMENT BETWEEN PTIETC AND UEM have been presented to the Project Team during discussions and following conclusions and recommendations were made at the spot:

2.0. Effluent collecting sump together with coarse screen in front it are responsibility of PTIETC, who will construct them.

2.1. Level switches should be installed for all the pumps and ejectors.

2.2. It would be useful to construct equalization and aeration tanks in a block (to save space) if possible (some construction constrains have been emphasized). UEM will elaborate when receive technical data about aeration system from UNIDO.

PROPOSED ALTERNATIVES:

a) Separate equal.tank from aeration tanks. Distance between the walls - 4 m.

b) Common wall between the equal.tank and aeration tank. Aeration tank will have sloped bottom; 3,5 m depth near the equal.tank sloping to 4,9 m depth at the distance 3,5 m from the common wall. (See enclosure 6.).

UEM agreed to implement whatever alternative chosen within the price contracted.

2.3. Simple (manual) preparation and dosage of catalyst ($MnSO_4$) should be designed and implemented by UEM.

2.4. Proper inlet and outlet arrangements from equalization should be designed and implemented by UEM, as agreed during discussion.

2.5. UEM did not offer anionic PE dosage system and UNIDO is requested to do it.

2.6. Proper linkage between operation of equalization pumps, flash mixer and chemical dosage should be designed and implemented by UEM.

2.7. Arrangements for parallel and serial operation of the aeration tanks should be designed and implemented by UEM.

2.8. Possibilities to transport secondary sludge to: aeration tanks, equal.tank, thickener, trucks and/or drying beds should be designed and implemented by UEM.

2.9. Inter-link arrangement between the operation of primary sludge evacuation valves (electric motor + timer) and pumps should be designed and implemented by UEM.

2.10. UEM is supplying 2 nos. of centrifugal pumps for thickened sludge (US$ 2.500). UNIDO should recommended if they are necessary, since UNIDO should supply eccentric pumps together with belt press.

LIST OF DOCUMENTS RECEIVED:

a) P&I diagram (Enclosure 1),
b) Hydraulic gradient line diagram (Enclosure 2),
c) General lay-out plan (Enclosure 3),
d) Chemical- house architectural details
e) Main control-building; arch.details and elevations/sections,
f) Bar Chart (Enclosure 4),
g) Detailed Specification of Various Components (Enclosure 5),
h) Recommendation of side-by-side construction (common wall) of equal. and aeration tanks (Enclosure 6),.

3) As per UEM is still in the process of equipment purchase, details will be send to UNIDO till the end of May '93.

4) In the same period UNIDO is expected to decide about their participation and send details of their equipment to UEM's Pilot.

5) Finalized set of detailed design (civil, mechanical and electrical engineering) will be send to UNIDO two weeks after receiving equipment details from UNIDO (tentatively mid June '93).

6) UEM expressed interest to submit offers for equipment expected to be supplied by UNIDO, so Mr.Selanec informed them about the details necessary. If interested they will submit their offer till the end of April '93.
Tentative offer/information for non-clog aeration system has been delivered on 15/04/'93.

7) Since financial scheme still is not fully defined a meeting (between TNPCB, PTIETC, representatives of the Pallavaram tanners and UNIDO,CTA) is set for 21/04/93 - to present the scheme to all the parties.
At the same meeting it is necessary to inform the tanners about the banking costs and get their agreement to bear them together with already estimated running (operation + depreciation) costs.
Copies of the financial scheme, cash flow plan and the Pallavaram tanners agreement, shall be mailed to UNIDO and CTA by Project Manager, within 7 days.

8) UEM has presented the bar chart of their responsibilities in completion of works, which should serve UNIDO to plan their further activities (see Enclosure 4).

2. RANIPET

Participants:

Mr.F.A.S.RAMANALHAN, Managing Director, TALCO
Mr.BALAKRISHNAN, Project Engineer, TALCO
Mr.R.SUNDARAMANI, TALCO
Mr.SUBRAMANI, ENKEM, Main Contractor

1) The representatives of TALCO have received the FINAL DECISIONS made on 19/12/92 only one week ago when the CTA gave them a copy, and are complaining that they were not able to react accordingly.

2) The list of the works completed has been submitted to the UNIDO representatives together with a plan of completion of works (Enclosure 5).

3) TALCO agreed to investigate the possibilities to participate in terms of civil works and electrical engineering necessary to support equipment UNIDO intend to supply to upgrade the effluent treatment system. Participation in the first three items (4.1.-4.3) was already agreed in principle, but the fourth item has to be discussed on the basis of detailed estimation of investment and running costs which TALCO is going to prepare.

4) It has been agreed that upgrading would be welcomed in the following order of priorities:

4.1. Mechanical sludge dewatering system, as proposed earlier.
4.2. Adequate upgrading of the mixing/aeration system in the equalization tank.
4.3. Rotary fine screen at the entrance to the equalization tank.
4.4. Partition of the existing anaerobic lagoon in two parts; one (2/3 of volume) to be left as anaerobic and the other (1/3 of volume) to be transformed in the lagoon aerated with 8 nos of 15 HP-floating aerators.

5) A meeting with the Ranipet tanners will be organized by TALCO to get their consensus on the estimated investment and running cost, and written agreement will be mailed to UNIDO and UNIDO Vienna within 20 days.

6) TALCO will design all the necessary processes and undertake civil works, electrical and mechanical engineering as well as piping and cabling (in addition to UNIDO participation) necessary for operation.
Immediately after receiving technical details from UNIDO, TALCO will commence designing and mail finalized set to UNIDO within one month period.

7) Adequate arrangements will be designed to enable:

- cleaning of the lagoons,
- anaerobic-aerobic and/or aerobic-polishing operation of the treatment process,
- secondary sludge recycling,
- excess secondary sludge transport to the equalization tank and/or to the drying beds and/or to the mechanical dewatering,
- separation of primary and secondary sludges.

8) TALCO has prepared flow diagrams of the proposed alternatives (see Enclosure 8), description of works as well as calculations of sludge production in anaerobic lagoons and calculations of O_2-transfer necessary in aerated lagoon in the case of anaerobic lagoon by-passing.

3. MEERA HUSSAIN

Participants:

P.M.ZAKIR HUSSAIN, owner/partner
C.M.ZAFARULLAH, Secretary S.INDIA TANNERS/DEALERS ASSOC.
Mr.SUBRAMANI, ENKEM

1) The tannery management has agreed to participate in construction of the ETP proposed, bearing the costs additional to the UNIDO supply. Their necessary participation has been estimated by ENKEM at approximately Rps 300.000. Written agreement will be mailed to UNIDO within 15 days.
(see note on FINALIZATION OF TREATMENT TECHNOLOGY, Z.Kotasek, 14/04/93)

2) Manual preparation and dosage of chemicals into the equalization tank will be designed.

3) Arrangements to operate the process as anaerobic/aerobic or aerobic/anaerobic will be provided.

4) Following discussion, ENKEM was asked to prepare annex to the offer already sent to UNIDO, specifying some additionally defined works necessary to satisfy complete demands of the project (this annex will be hand-carried to UNIDO by Mr.Selanec).

4. PRESIDENCY KID

Participants:

Mr.VENKATRAMANAN, MICRO-CONTROLS
Mr.SUBRAMANI, ENKEM (ETP design)

1) MICRO CONTROLS have submitted offer to UNIDO as requested.

2) ENKEM will prepare estimation and offer for the ETP upgrading (additional to the UNIDO supply) as proposed earlier and CTA would try to get agreement of the tannery management to finance it. Written agreement will be mailed to UNIDO within 15 days.

Madras, 19/04/93

Copies submitted to:

1) [illegible]
2) [illegible]
3) CLRI
4) [illegible]
5) [illegible]
6) [illegible]
7) "MEERA HUSSAIN"
8) "PRESIDENCY KID"
9) " MICRO CONTROLS"
10) UNIDO Vienna, Mr.J.Bolton
11) UNIDO CTA, Dr.Kotasek
12) UNIDO Subcontractor [illegible]

Enclosures: [illegible]

ANNEXES 3.

RECORD OF THE FINAL DECISIONS DURING THE 4th FIELD MISSION

RECORD OF FINAL DECISIONS ON ACTIVITIES NECESSARY TO PROCEED IMPLEMENTATION OF THE TWO CETPs FOR PALLAVARAM AND RANIPET CLUSTERS AND TWO ETPs FOR INDIVIDUAL TANNERIES

PROJECT TEAM:

1. R.VARADHARAJULU, Chairman TNPCB
2. R.K. Jayaseelan, Project Officer TNPCB
3. Dr.S. Rajamani, CLRI
4. Dr.Z.Kotasek, CTA UNIDO
5. S. Selanec, TEH-PROJEKT (UNIDO Subcontractor I, Team Leader)
6. M. Bosnic, TEH-PROJEKT (UNIDO Subcontractor I, Team Leader)

After analyzing progress of the projects for all the ETPs, as well as after extensive discussions lead in Madras and at the locations of the Project (between Aug.29th-Sept.8th) the following remarks and conclusions were made by the Project Team and other participants listed below:

A. PALLAVARAM

A.1. CONVEYING SYSTEM

1) Supply and laying of the gravity pipelines have progressed up to the following extend:

No.	Unit/Item	Excavations	Concrete/Brick	Equipment
1	Pipelines	30 %	0 %	30 %
2	Manholes	50 %	50 %	0 %
3	Pump stations	80 %	25 %	0 %

2) Representatives of the SC-I have recommended that the Project Engineer should pay attention at the implementation of the in-house treatments following the earlier recommendations for a set-up of screens and grit/grease chambers.

3) The designs for the pumping stations made by IIT should be scrutinized and changed preventing the settling in front the screens and enabling their manual cleaning. Screens should be constructed from the bottom up to the ground level under the inclination of 45°, with a platform (inclined) for drainage of screenings!!!

A.2. CETP

Participants:

K.R.R. CHANDRAN, UEM - Project Manager
NARESH VERMA, UEM - General Manager (Marketing)
S.C.GUPTA, HY-TECH CONTROLS Instrumentation eng.(UEM subcontractor)
M.MUKUNDAN - Manag.equipment desing, S&S Ind.& Enterprises (UEM subcontractor)

0) PROGRESS REPORT ON THE WORKS

No.	Unit	CIVIL WORKS (%) Excav.	PCC	RCC	Brick	Finish.	EQUIPMENT(%)
0.	Collection well	90	0	0	0	0	0
1.	Screen	0	0	0	0	0	0
2.	Grit cham.	0	0	0	0	0	0
3.	Distribution I	0	0	0	0	0	0
4.	Equalization	100	90	85	0	0	0
5.	Flash mixing	0	0	0	0	0	0
6.	Distribution II	0	0	0	0	0	0
7.	Clariflocc.s	100	100	98	0	25	0
8.	Sludge sump I	100	100	100	0	0	0
9.	Aeration	50	0	0	0	0	0
10.	Distribution III	0	0	0	0	0	0
10.	Settling tanks	100	100	98	0	25	0
11.	Sludge sump II	0	0	0	0	0	0
12.	Thickener	100	100	98	0	25	0
13.	Drying beds	100	40	0	95	30	0
14.	Chem.house	100	20	20	30	0	0
15.	Main building	100	20	20	30	0	0
16.	Roads	0	0	0	0	0	0
17.	Drainage	0	0	0	0	0	0
18.	Water supply	0	0	0	0	0	0

1) The designs for the effluent collecting sump together with coarse screen in front it made by IIT should be scrutinized and changed preventing the settling in front the screens and enabling their manual cleaning.

2) The following general remarks were made in addition to those made before during the 3th SC-I Field Mission (see the Record from April '93):
2.1. It would be advisable to construct the coarse screen, movable parts of the grit chamber as well as V-shape

weirs in the clariflocculators and settling tanks of stainless steel or other corrosion resistent materials.

2.2. UEM should present the system for Mn-salts dosage into the equalization tanks.

2.3. pH control is necessary in the flocculation/distribution chamber (pos.6).

2.4. The pipes for chemical dosage should be laid on bridge (tray) above the ground constantly inclined towards the discharge points (to prevent scaling and settling).

2.5. The planned system of instrumentation presented by the UEM specialist can be approved as adequate for the CETP.

2.6. The clarifiers and settling tanks should be equipped not only with sludge scrapers but with scum skimmers too.

2.7. The proposed activated sludge recirculation system will enable only the parallel/serial operation of the aeration tanks but not the 2-step full scale activated sludge system (with intermediate settling).

2.8. Since enough fresh water at the site is not available it has been recommended to use treated effluent for:
a) floor washing
b) sludge pipes flushing
c) screen washing
d) press belt washing
e) preparation of Al- and lime solution/suspension
f) chemical pipes flushing.
The sufficient pressure of wash water will be provided by adequate pump but water for the positions c)-f) should be purified through sand filter.
UEM will prepare recommendation and offer for the necessary system and send it to PTITC till 15/09/93.
The system could be considered as pilot for tertiary effluent treatment.

2.9. THE ETP STAFF SHOULD BE PREVENTED TO ENTER UNDERGROUND CHAMBERS (pump stations, distribution chambers and similar) DURING THE NORMAL OPERATION AND MAINTENANCE BECAUSE OF POTENTIAL PRESENCE OF TOXIC GASES, SO ALL THE VALVE OPERATION SHOULD BE ENABLED FROM SURFACE.

2.10. It was not possible to scrutinize or comment the proposed system without detailed drawings and specifications. So, UEM has presented (07/09/93) the following detailed drawings:

1) Revised hydraulic gradient line diagram,
2) Revised P&I diagram,
3) Non-revised piping details (7 nos.),
4) Non-revised cabling and earthing lay-out (2 nos.),
5) Final version of aeration (piping) system (7 nos),
6) Construction drawings for grit chamber, clariflocculator, secondary clarifier, thickener, skimmer and agitators (8 nos.).

NOT PRESENTED:

7) Final drawings for UNIDO equipment installation which should be based on the ITALPROGETTI drawings submitted to UEM at the beginning of the mission. All the drawings will be submitted directly to SC-I and UNIDO Vienna till 28/09/93.
8) Final arrangements inside the MAIN BUILDING and CHEMICAL HOUSE together with DG & transformer set-ups should be prepared in cooperation with the CTA till 28/09/93.
8) Details of the distribution chambers, flow measurement channel, roads and internal drainage.

2.11. Discussing the drawings received the following remarks have been made:

1) GRIT CHAMBER - it seams that the direction of the scraper revolution is marked wrongly.

2) CLARIFLOCCULATORS AND SETTLING TANKS - Scum skimmers should be included in the constructions. Revolution speed of the scrapers, skimmers and flocculator paddles should be designed in accordance with usual standards.

3) THICKENER - equipment should be designed in accordance with usual standards (sludge combing rods, water decanting etc.).

3) The Team has separately scrutinized details and drawings of the equipment ordered by UNIDO.The following remarks were made:

3.1. FINE ROTARY SCREEN

The drawings provided by ITALPROGETTI are sufficient for UEM to design and implement the required set-up:
- platform (height dependant of the grit chamber inlet)
- wash water supply (3/4", 3-4 bars)
- overflow and wash water drainage back into the collection well.

3.2. PE PREPARATION/DOSING UNIT

a) Both units should be installed in such a way that one of them can always serve as stand-by either for effluent flocculation or for sludge dewatering.
b) UEM should design and implement:

1) Corrugated, easy-washable floor under and around the unit to prevent ground to be slippery from PE spilling.
2) Fresh water supply for PE preparation, dilution and washings (3/4"-1", 3-4 bars).
3) PE dosing (valves to enable dosing pumps dismantling, non-return (counter-pressure 0,5 bar) valves to protect siphoning of PE solution when pumps are not operating, fresh water supply for PE dilution (10 times, connection in front of static mixer).

3.3. AERATION

The alternative with removable diffusers and walkways across the tanks (recommended by UEM) is accepted.
The location and housing of blowers should be designed and implemented by UEM together with necessary piping, valves and fittings.
Aeration tanks SWD is 4,0 m, total depth 4,5 m.

3.4. SLUDGE DEWATERING

1) Thickened sludge should be transported to the drying beds by gravity, entering from the ETP-fence side and distributed into each bed at several points.. Water should be drained at the road side, separately from each bed enabling bed performance control. The drying bed walls should be rised up to min. 1,30 m heigth.

2) Sludge to be mechanically dewatered should be drawn off by the mohno-pumps supplied by UNIDO, from the gravitation pipeline (mentioned above) so the sludge pumps ordered from UEM would not be necessary. The money contracted for them should be used for other purposes like water supply.

3) The set-up recommended by ITALPROGETTI will be modified (designed) by UEM during this field mission in accordance with:
   - civil works already completed,
   - sludge transport mode (roads, dimension of vehicles etc.).

B. RANIPET

Participants:

Mr.BALAKRISHNAN, Project Engineer, TALCO
Mr.R.SUNDARAMANI, TALCO
Mr.SUBRAMANI, ENKEM, Main Contractor

B-1. CONVEYING SYSTEM

The Contractor has been finally selected and completion is expected to be March '94.

B-2. CETP

1) The SC-I representatives have presented the recapitulation of detailed calculations of additional investment and operation costs made for all the alternatives of biological process which have been discussed theoretically during the previous missions, as follows:

I. Alternative originally designed,

II. 1st step: Activated sludge
2nd step: Existing lagoon

III. 1st step: Anaerobic lagoon (30.000 m^3)
2nd step: Aerated lagoon (9.000 m^3)
3th step: Existing activated sludge

IV. 1st step: Aerated lagoon (9.000 m^3)
2nd step: Existing activated sludge
3th step: Polishing lagoon (12.000 m^3, h=1 m)

Comparison between the alternatives was based on necessary additional equipment and civil works as well as on the additional power consumption :

ALTERNATIVE	CIVIL W.& EQUIPMENT	POWER (kWh/y)
I	Additional aeration of aeration tank (28 kW)	136.000
II	Additional aeration of the aeration tank (190 kW)	1.332.000
III	Partition of the lagoon. Aeration of 1/3 of the lagoon (63 kW).	442.000
IV	Partition of the lagoon. Aeration of 1/3 of the lagoon (110 kW). Additional aeration of the tank (78 kW).	1.320.000

It has been concluded that:

- The Alternatives II & IV are not financially feasible.
- The Alternative I although the cheapest in operation would not enable cleaning of the lagoon.
- The Alternative III is recommended since it enables flexibility of 3-step treatment as well as seasonal cleaning of the lagoons.

2) After visiting the site it can be concluded that a great deal of works completed seamed to be implemented in satisfactory manner. The following remarks were made:

2.1. Coarse screen should be installed in front of the collecting sump.

2.2. It should be advisable to construct the pressure inlet into the equalization tank above ground.

2.3. Since the area for preparation/dosing of chemical is rather congested it would be advisable to study the possibility to prepare saturated solution/suspension of alum and lime in separate concrete tanks out of the building and then to transport them by pumps to the dosing tanks at the first floor.

2.4 There is some possibility of saving if just a channel with buffers is constructed between the flash mixing chamber and primary settling tanks instead of flocculation chamber planned. PE dosage system can be add later if proved necessary.

2.5. It is necessary to provide possibility to flush chemical and sludge pipelines with water. For this even treated effluent can be used.

3) Concerning the possible UNIDO assistance it has been concluded to recommend supply of equipment in the following order of priority (as per evaluation of the offers recapitulated in the chapter 2.3. of the SC-I DRAFT FINAL REPORT, May 1993):

3.1. FINE SELF-CLEANING SCREEN to reduce possibility of settling in the equalization tank as well as to reduce overall ETP organic/susp.solids load.
USD 29.760

3.2. SLUDGE DEWATERING UNIT (with centrifuge) to reduce loading of drying beds and to improve dewatering even during rainy periods.
USD 104.000

3.4. FLOATING AERATORS in one third of the lagoon to improve flexibility and overall effect of the ETP.
USD 50.000

TOTAL ASSISTANCE REQUIRED: USD 183.760

4) TALCO is providing the statement that it will bare all the additional costs necessary to ensure full operation of the above mentioned equipment (point 3) including:

4.0. DETAILED CIVIL, MECHANICAL, AND ELECTRICAL, DESIGNS together with as-built drawings and operation manuals.

4.1. CIVIL WORKS

- Platform for the fine screen.
- Sludge hopper/thickener in front of the dewatering unit.
- Housing of the dewatering system.
- Partition of the lagoon.
- All the necessary drainages, channels, weirs, piping, valves and fittings.
- Process water supply.
- Etc.

4.2. ELECTRICAL WORKS

- Transformer.
- MCC, local switch boards and instrumentation.
- Illumination.
- Cabling, earthing.
- Etc.

4.3. ALL THE OPERATION, MAINTENANCE AND DEPRECIATION COSTS

5. Although some problems like:
   - insufficient detention in equalization tank,
   - lagoons cleaning,
   - non-adequate lagoon shape,
   - odor emissions,

   can be still anticipated, the Project Team is of the opinion that only after the trial period and fine tuning of the ETP would be possible to decide upon necessary follow-up program and improvements based on monitoring parameters of the ETP performance.

C. MEERA HUSSAIN TANNERY

1. The excavation and removal of the old sludge from the ETP site is already in process and would be completed in the time agreed enabling ENKEM to commence civil engineering works.
2. ENKEM has presented the detailed drawings of process, settling tank, anaerobic lagoon, degasifying tank and polishing ponds. Set-up should be provided to operate it in anaerobic/aerobic or reversed process.
3. After visiting the site and getting consent from the TNPCB, the Project Team is recommending ENKEM to construct system consisting of four simple sealed earth ponds instead of two concrete planned. This system should have min. 2 times more capacity than the two ponds planned and should operate in series or parallel enabling better purification effect as well as easier cleaning. Filling, internal connection and discharge arrangement will enable any lagoon to be isolated from the system and sludge from it to be naturally dried and evacuated. Process sketch has been prepared.
4. Additionally it was agreed to break not only partition of the equalizing tank but the partition between it and pumping station increasing its capacity (ca 30%). The equalizing pumps will have intake directly from the equalization and can be placed on the platform above it (inside the pumping house).
5. Chemical preparation and dosage arrangements should be placed within the pumping station too.
6. The space within the tannery building has been provided for small laboratory. partitions, furniture and equipment should be provided.
6. All the costs necessary to design, implement and put the ETP in full operation have been covered by the contracts ENKEM has with UNIDO and MHT.

D. PRESIDENCY KID TANNERY

1. The Project Team has visited Dr.ZACKRIA SAIT, PKL Joint Managing Director who required justification of the works to be contracted from PKL side. After discussion it has been agreed that PKL will cover the costs of approx. Rps 350.000.
2. The following works together with putting the ETP in full operation should be covered by the above mentioned sum:

   2.1. System of coarse and finer manually cleaned screens with platforms for waste evacuation and drainage.
   Approx. Rps 25.000

   2.2. Rearrangement of the existing inlet to the primary settling tank (from the collection well) enabling flow measurement and adjustment.
   Approx.:Rps 20.000

   2.3. Supply and installation of 500 l-coagulator/flocculator on the bridge above the primary settling tank.
   Approx.:Rps 50.000

   2.4. Supply and installation of PE preparation dosage system, consisting of: 500 l-preparation tank with agitator, 500 l-dosing tank and dosing pump.
   Approx.:Rps 100.000

   2.5. Improvement of the existing inlets into the both settling tanks.
   Approx.:Rps 15.000

   2.6. Supply of one portable DO-meter for out-door measuring.
   Approx.:Rps 50.000

   2.7. Construction of additional 100 m2 of drying beds and reconstruction of the existing surplus tanks into the serial polishing tanks. The existing tanks should be cleaned of sludge and debris by PKL!
   Approx.:Rps 45.000

   2.8. Construction of floor and shed above chemical dosage equipment and instrumentation panel.
   Approx.:Rps 45.000

   TOTAL INVESTMENT EXPECTED FROM PKL: Rps 350.000

3. Regarding installation of the monitoring equipment, contracted with MICRO CONTROLS the following is requested:

   3.1. One pH-meter should be installed into the central cylinder of the primary settling tank (approach from the bridge).

   3.2. The other, end-control pH-meter should be installed in treated effluent polishing pond.

   3.3. The flow meter should be installed on the inlet into the primary settling tank, after the by-pass.

   3.4. The back-washing of the drying beds from the collection well should be prevented by adjusting on/of levels of

the pumps. The planned additional drying beds should be placed at higher level.

4. After visiting the PKL it is obvious that PKL staff (at present) is not able to run the plant properly. The Project Team thus strongly recommends TNPCB to take better control of the ETP and especially with a help of CLRI and consultants (ENKEM) to fully inform the PKL management about all the technical and economical problems connected with effluent treatment. If such a plant is not constantly operated (24 h per a day) and regularly maintained, practically no effect can be expected and all costs involved are wasted.
PKL should be aware that it is necessary to ensure:
- operation even during the power failure (generator),
- regular chemical dosage,
- trained staff.
Further on we are of the opinion that TNPCP should study the problem of final effluent disposal (or reuse) and reclamation of the land presently filled with discharged effluent and prepare technical recommendations for solving the problems.

NOTE: Copies of original documents and drawings collected during the mission have been submitted to the SC-I.

Madras, 08/09/93

Copies submitted to:

1) TNPCB
2) TALCO
3) CLRI
4) PTIETC
5) UEM
6) ENKEM
7) "MEERA HUSSAIN"
8) "PRESIDENCY KID"
9) " MICRO CONTROLS"
10) UNIDO Vienna, Mr.J.Buljan
11) UNIDO CTA, Dr.Kotasek
12) UNIDO Subcontractor I

4.DESCRIPTION OF THE EQUIPMENT PURCHASED FOR PALLAVARAM, BY UNIDO

4.1. ROTARY SCREEN (Item 2)

ITALPROGETTI
engineering

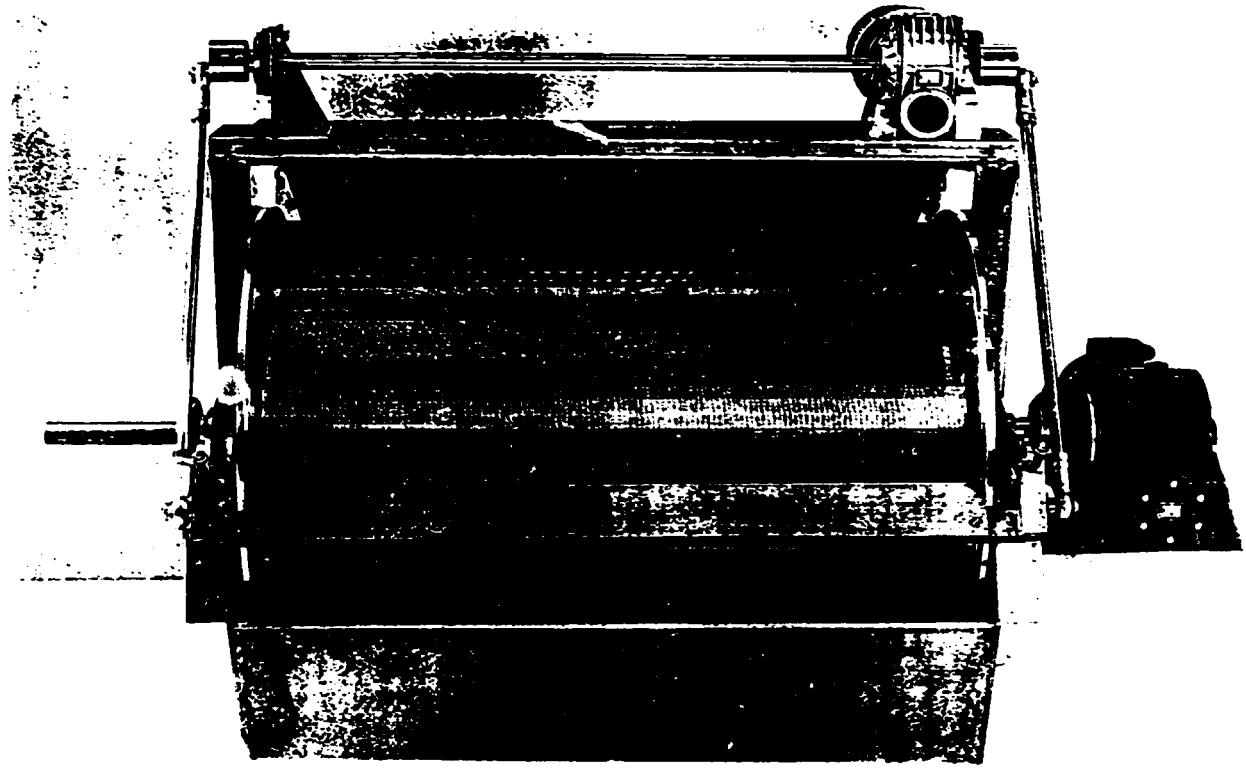


Fig. 1

GRIGLIATORI AUTOPULENTI
SELF CLEANING SCREENERS

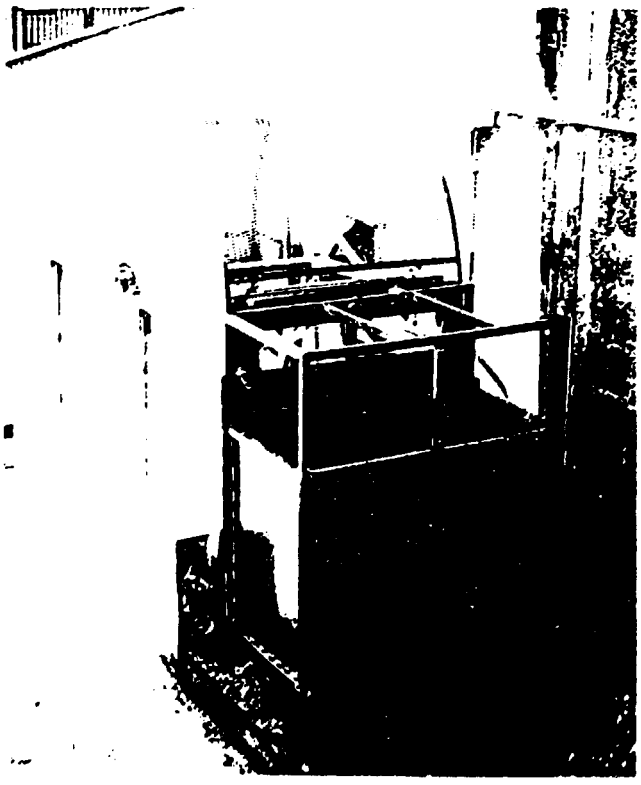


Fig. 2 A

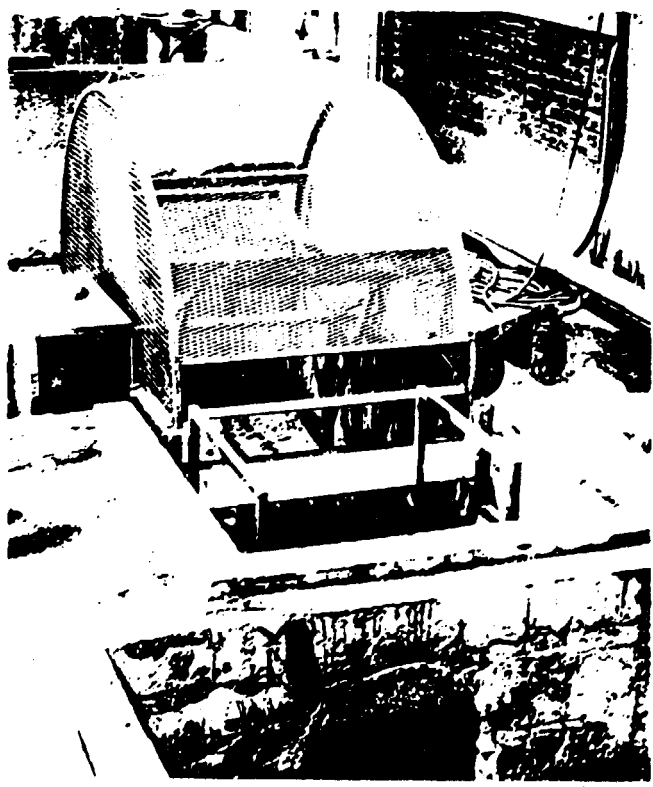


Fig. 2 B

GRIGLIATORE AUTOPULENTE MOD. KONICA (FIG. 1)
SELF CLEANING SCREENER MOD. KONICA (FIG. 1)

DESCRIZIONE

La parte principale della macchina in oggetto è un cilindro ruotante costruito con barre di profilo a sezione trapezia. La conicità del profilo trapezio è rivolta verso l'interno del tamburo stesso. (vedi Fig. 5)
Il liquido da filtrare passa attraverso la superficie esterna del tamburo e va verso l'interno. Il liquido, prima di essere scaricato attraversa la parte inferiore e crea una importante azione autopulente del cilindro.
I solidi con dimensione superiore ai 500 ÷ 2000 micron vengono trasportati sulla superficie del cilindro e poi vengono scaricati nella zona anteriore della macchina.
Una lama mobile rimuove i solidi che rimangono sulla superficie del tamburo.
Un sistema di by-pass consente di far lavorare la macchina a portata variabile. All'interno del tamburo filtrante è montata una rampa di ugelli ad alta pressione che provvedono al lavaggio del tamburo filtrante.Gli ugelli possono essere alimentati anche con acqua di rete a 3 - 4 bar; Il consumo di acqua pulita per ogni ciclo di lavaggio è di circa 150÷200 litri, in media vengono fatti 1 - 2 cicli di lavaggio al giorno.
La griglia è equipaggiata con quadro elettrico a norme C.E.I.

VANTAGGI

L'utilizzo del grigliatore per la separazione dei solidi in sospensione nelle acque di scarico industriali offre i seguenti vantaggi:
- possibilità di filtrare liquidi molto carichi con luci libere di filtrazione dell'ordine di 500 ÷ 2000 micron

TECHNICAL DESCRIPTION

The principal part of the screener is formed of a rotating horizontal drum built with bars trapezoidal shaped, the taper of trapezoid profile is turning over toward the inside of the drum (see fig. 5). The liquid to be filtered, proceeds through the external surface of the drum and goes toward the inner. Liquid before to be discharged goes through the bottom of drum making a severe self-cleaning action
Solids with dimensions more than microns (tab. 1) are transported over surface of the drum and after discharged in front of the machine. A moving blade removes all solids remaining over the surface of the drum.
A by-pass system allows the screener to work with variable capacity Inside of the drum is mounted a bank of sprying nozzles, high pressure working, that provides to wash the drum. Sprying nozzles must be feeded with network water 3 ÷ 4 BAR too.
Consumption of cleaned water, every washing cycle, is around 150 ÷ 200 litres, on an average are carried out one or two washing cycles per day.
The screener is supplied equipped with electric board according to C.E.I code

ADVANTAGES

The use of the screener Konica for the separation of suspended solids in industrial waste water, gives a lot of benefits :
- possibility to screen very loaded liquids with very small size of the free passing of the helicoid 500 - 2000 micron.

- riduzione dei parametri inquinanti con conseguente aumento del rendimento del processo di depurazione
- ammortamento rapido dell'investimento
- manutenzioni limitate e programmabili
- ottima affidabilità
- versatilità di impiego, la macchina può essere utilizzata per il recupero di sottoprodotti come ad esempio il pelo delle pelli in conceria

- decrease of the pollution parameters with consequent increasing of the rendement of the waste water treatment plant.
- very rapid amortization of the investment.
- easy, and programmable maintenance.
- very high reliability of the "Konica"
- the machine can be used, for all the industrial and civil waste water, can be used also for other use like the hair recovery in the leather industry

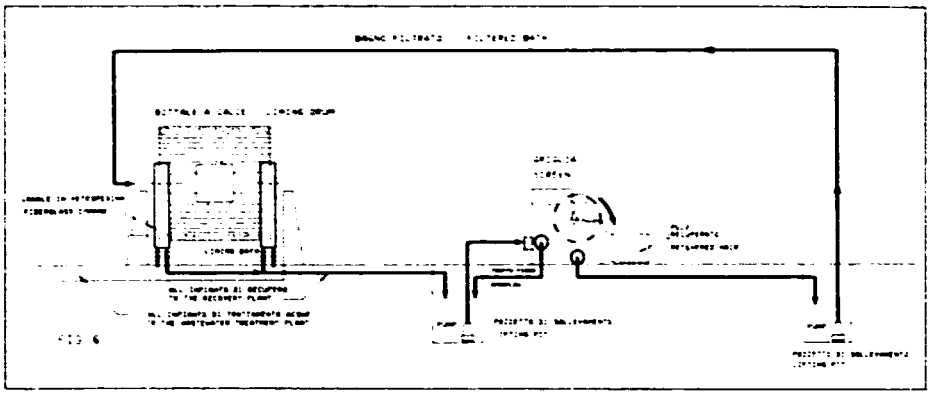


Fig. 1: vista generale di una griglia Mod Konica 600-900 con ° = 750; è visibile anche il sistema di pulizia del tamburo
Fig. 3: sistema di pulizia
Fig. 4: principio di funzionamento
Fig. 5: sezione del tamburo filtrante

Fig. 1 Show a screener mod. K 600 - 900 with filtration passing of 750 micron. It's possible to see the cleaning equipment of the drum.
Fig. 3 Cleaning equipment
Fig. 4 How screener works
Fig. 5 Section of the filtering drum

Fig. 6 mostra lo schema di funzionamento di un impianto per il recupero pelo dai bagni di calcinaio. La quantita e la qualità di pelo recuperabile sono funzione del tipo di calcinaio. La percentuale di pelo recuperato più alta si ha nel caso di calcinai con pelo inertizzato o con depilazione enzimatica. È molto importante l'uso di Konica anche in caso di calcinaio distruttivo con impianti di recupero dei bagni.
Secondo la nostra esperienza, Konica e indubbiamente la griglia più versatile e affidabile pe questo tipo di impieghi

Fig. 6 Show the working principle of an hair recovery plant from liming bath. Quality and quantity of the recovered hair depend on the kind of the lime. The bigger percentage of the recovered hair is obtained by hair inertization or by henzimatic lime. It's very important the work of Konica also in case of destructive lime with recovery of liming bath.
According to our experience, no doubt that Konica screen is the most versatile and reliable for this kind of work.

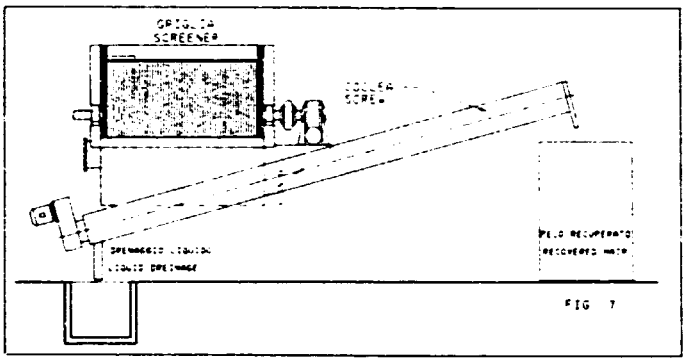
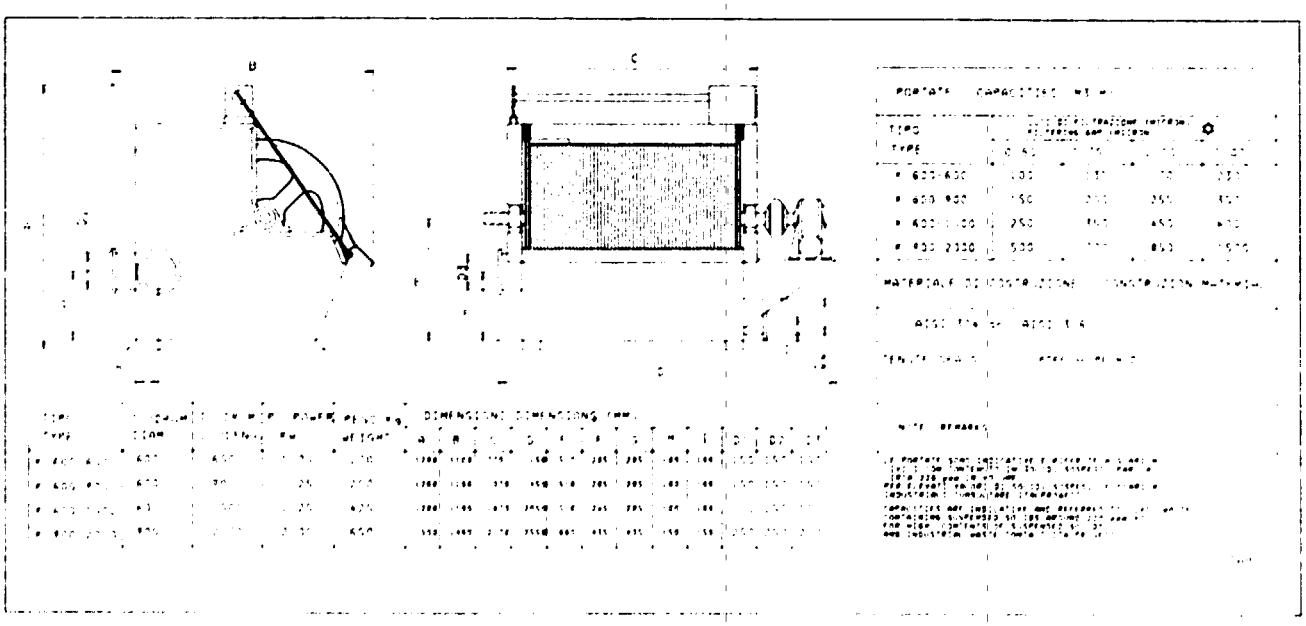


Fig. 7: schema di installazione di una coclea per il trasporto e la distribuzione del materiale grigliato; è molto utile nel caso del recupero pelo in conceria.
Fig. 7 Installation scheme of a screw conveyor for transport and water content reduction; it is very useful for hair recovery in tannery

CARATTERISTICHE TECNICHE / TECHNICAL FEATURES



GRIGLIA AUTOPULENTE MOD. GSR (FIG. 2)
SELF CLEANING SCREEN MOD. GSR (FIG. 2)

Il grigliatore autopulente Mod. GSR a spazzole ruotanti illustrato in Fig. 2 consente di rimuovere corpi solidi fino a dimensioni minime di 3 millimetri dalle acque di scarico industriali o da reflui civili. Interamente costruito in acciaio inossidabile (AISI 304 o AISI 316 su richiesta), è stato progettato per ottenere la massima versatilità di impiego, può essere infatti installato a valle di un sollevamento primario (fig. 8 e fig. 2/a) oppure posizionato direttamente nella canaletta di scarico (fig. 9 e fig. 2/b). Le dimensioni contenute consentono un facile adattamento a canalette già esistenti. Il grigliatore di concezione molto semplice e robusta è costituito da un pannello filtrante in lamiera forata, dalle fiancate di contenimento e dal sistema di pulizia; una crocera supporta tre spazzole pulitrici. Il comando della crocera avviene tramite un motoriduttore accoppiato a mezzo di un giunto elastico.

Le spazzole di pulizia hanno altezza regolabile; una lama posta in corrispondenza dello scivolo di scarico, provvede a pulire le spazzole dai solidi che possono accumularsi su di esse.

Appositamente realizzato per la grigliatura di scarichi industriali e conciari, il grigliatore è in grado di funzionare anche in presenza di solidi grossolani e filamentosi quali filacci di pelle o pezzi di carniccio.

This self cleaning screen with rotating brushes, Mod. GSR removes the solids up to a minimum size of 1 mm. from industrial as well as urban effluents.

Entirely built with stainless steel (AISI 304 or AISI 316): the screen has been planned for getting the maximum versability; it can be installed after a lifting station (Fig. 8) or placed directly into the discharge channel (Fig. 9 and 10).

For its reduced size the screen is easily adaptable to existing channels.

The machine consists of a drilled sheet panel, two lateral walls and the cleaning system ; it is composed by a cleaning cross that supports three cleaning brushes. The shaft is moved by a speed reduction gearbox coupled by elastic joint.

Three radial spokes are welded to the shaft and each of them supports an adjustable brush.

A cleaning blade provides to remove solids that can accumulate on the brushes.

Particularly studied to be used with industrial and civil effluents, the screen is able to work properly also if filamentous or coarse solids like fleshings or pieces of skin are present.

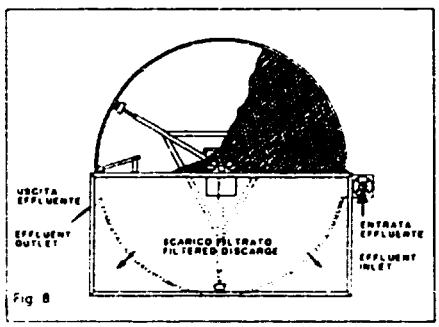


Fig 8

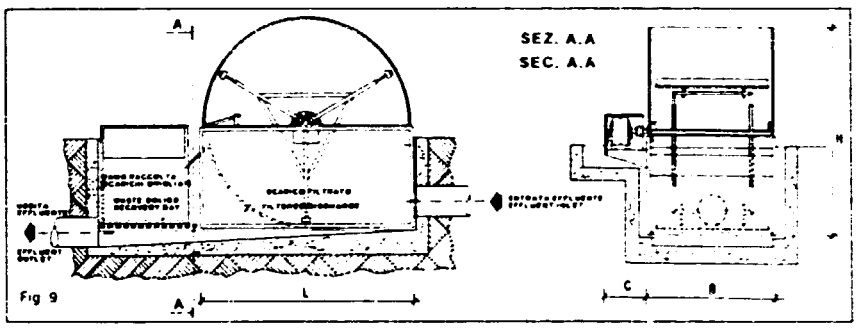


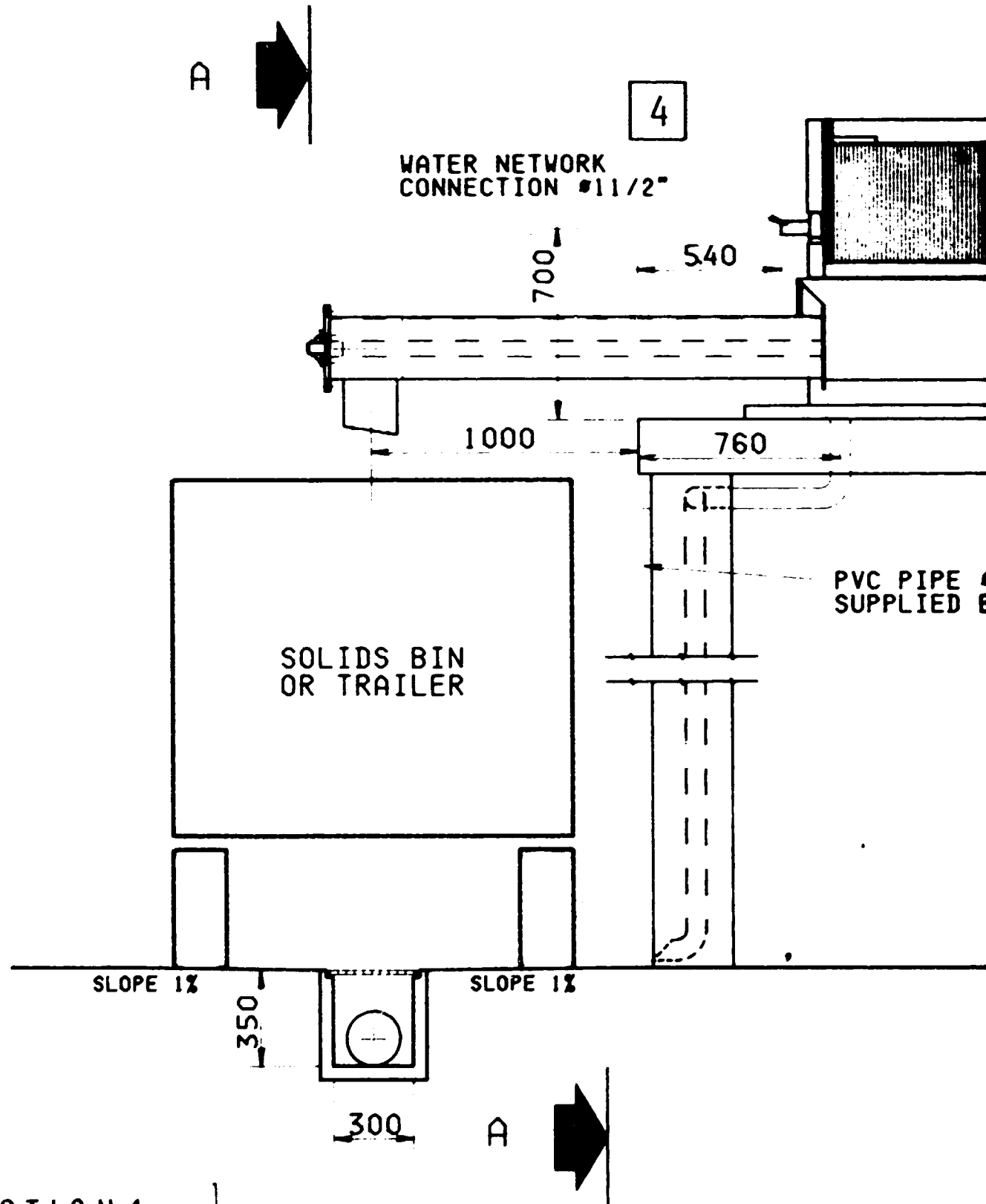
Fig 9

CARATTERISTICHE TECNICHE / TECHNICAL FEATURES

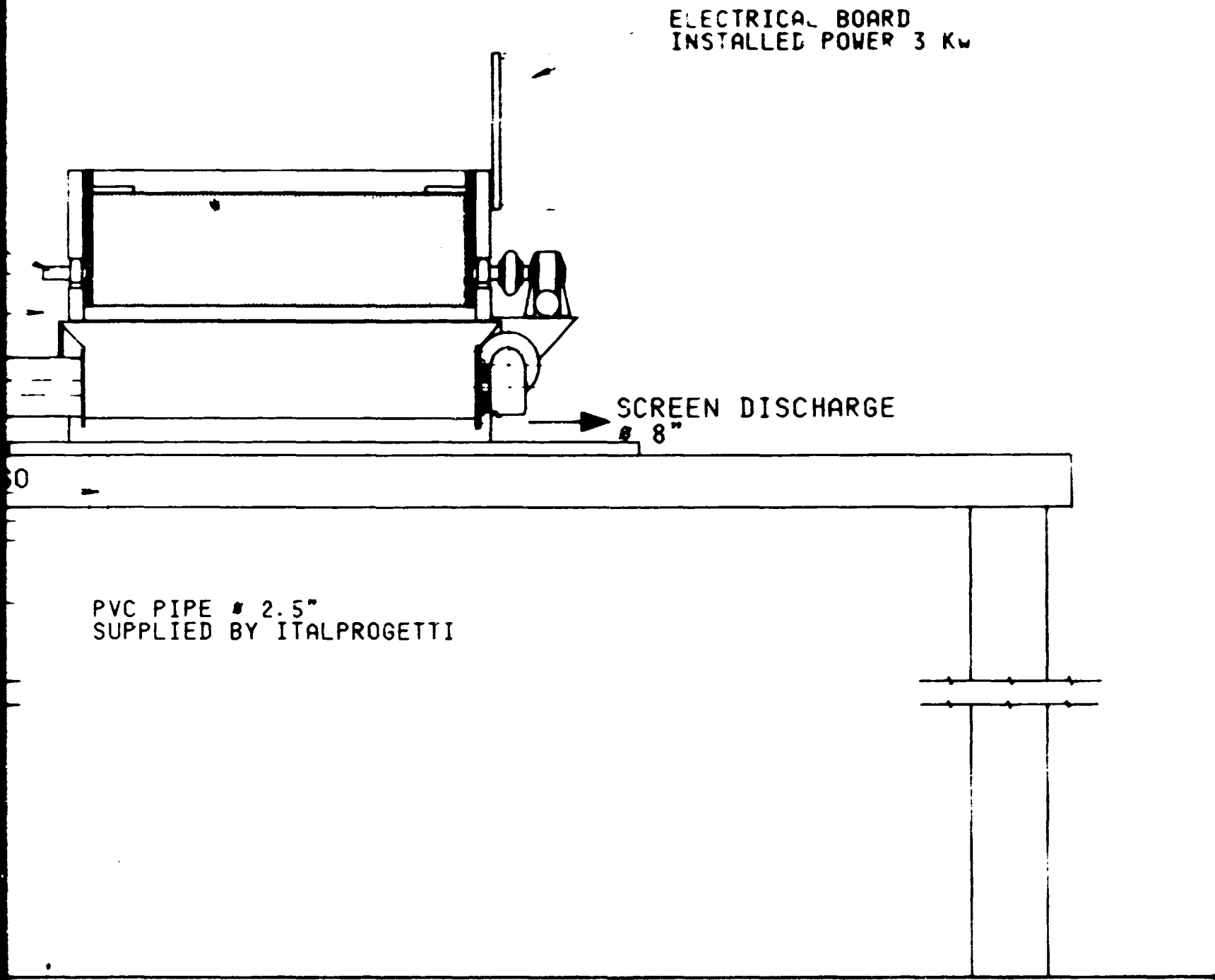
DIAMETRO FORI FILTRANTI FILTERING DIAMETER HOLE	PORTATA/DELIVERY		DIMENSIONI/DIMENSION				PESO/WEIGHT		POTENZA INSTALL. INSTALL POWER	MATERIALI DI COSTRUZIONE CONSTRUCTION MATERIALS			NOTE
	VERS POMPA PUMP VERSION	VERS CANALETTA RACEWAY VERS.	L	B	C	H	VERS. POMPA PUMP VERSION	VERS CANALETTA RACEWAY VERS.		PANN FILTRANTE FILTERING PANEL	SPAZZOLE BRUSHES	CARCASSA SHELL	
3 mm	50 mc/h	50 mc/h	1850	1100	300	1800	200 kg	180 kg	1.1 kw	AISI304	PP+NYLON	AISI304	
4 mm	90 mc/h	90 mc/h	1850	1100	300	1800	200 kg	180 kg	1.1 kw	AISI304	PP+NYLON	AISI304	
5 mm	120mc/h	120mc/h	1850	1100	300	1800	200 kg	180 kg	1.1 kw	AISI304	PP+NYLON	AISI304	
8 mm	160mc/h	160mc/h	1850	1100	300	1800	200 kg	180 kg	1.1 kw	AISI304	PP+NYLON	AISI304	
10 mm	200mc/h	200mc/h	1850	1100	300	1800	200 kg	180 kg	1.1 kw	AISI304	PP+NYLON	AISI304	

Tab 2

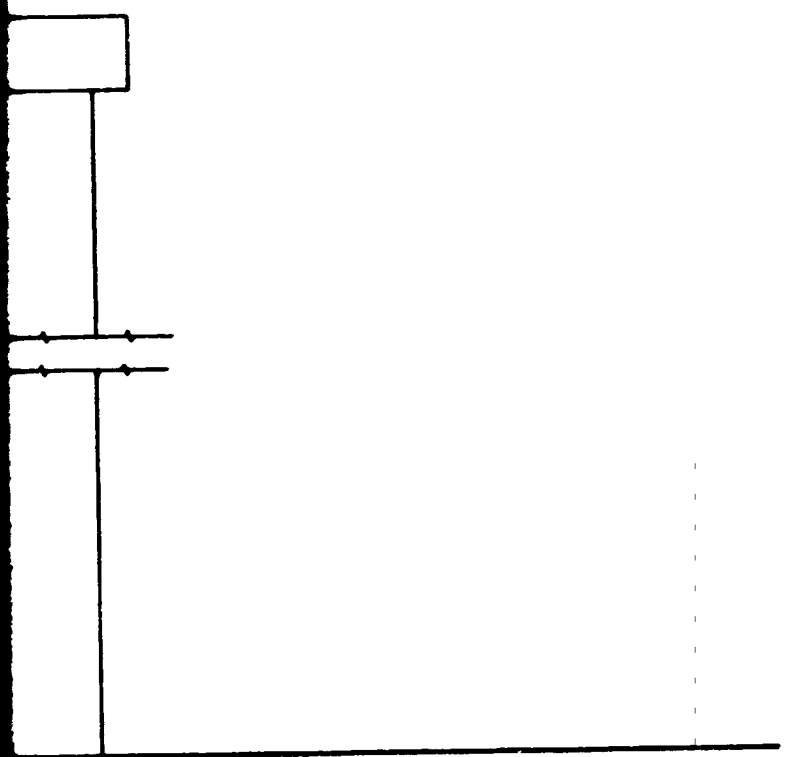
ITALPROGETTI
engineering
LUNGARNO PACINOTTI 59/A - 56020 SAN ROMANO (PISA) - ITALIA


A
4
WATER NETWORK
CONNECTION Ø1 1/2"
700
540
1000
760
PVC PIPE
SUPPLIED
SOLIDS BIN
OR TRAILER
SLOPE 1%
SLOPE 1%
350
300
A

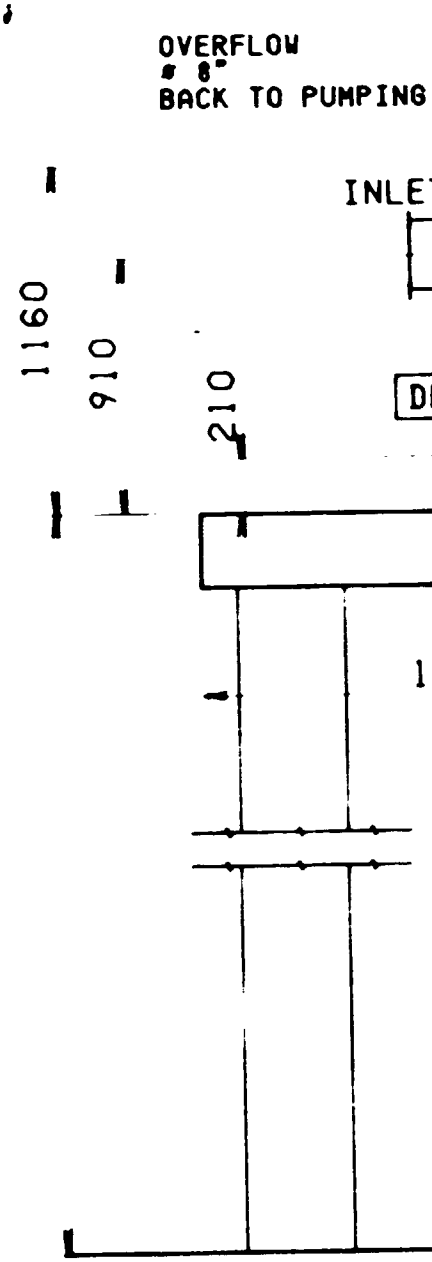
SECTION 1


ELECTRICAL BOARD
INSTALLED POWER 3 Kw
SCREEN DISCHARGE
ø 8"
PVC PIPE ø 2.5"
SUPPLIED BY ITALPROGETTI

SECTION 2



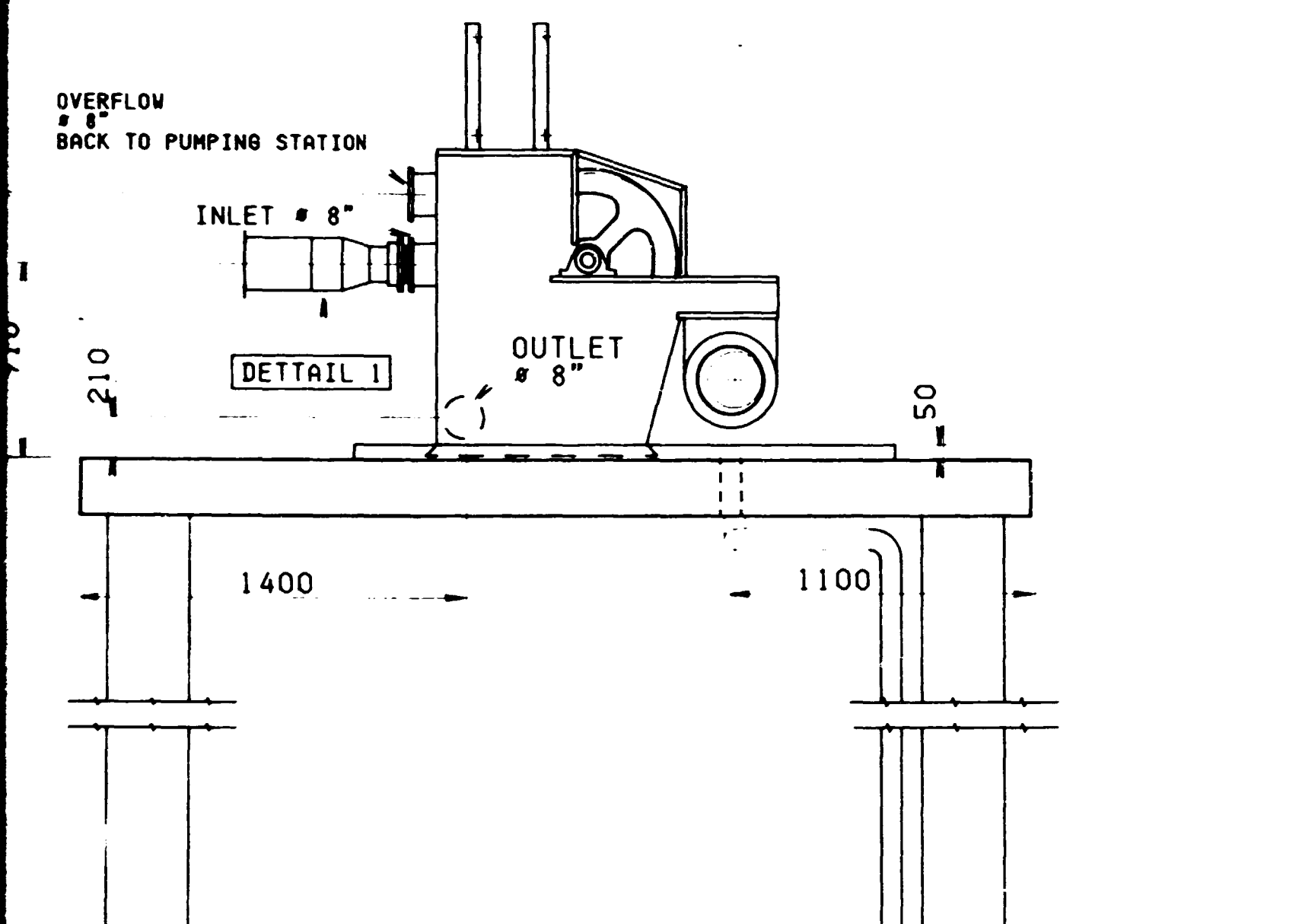
SECTION 3



ACCORDING INLET
TO GRIT CHAMBER

VIEW

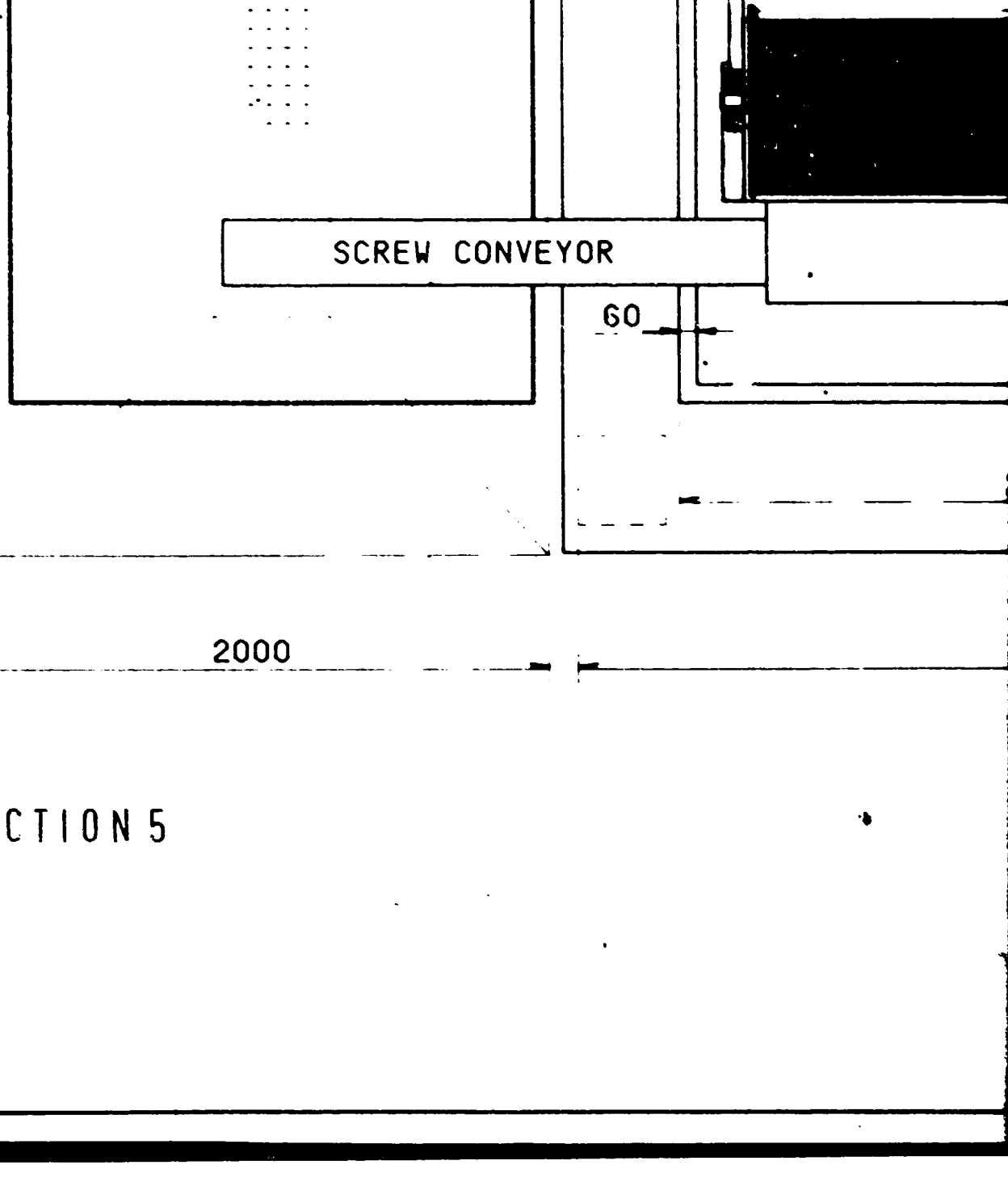
WASHING WA



VIEW FROM A-A

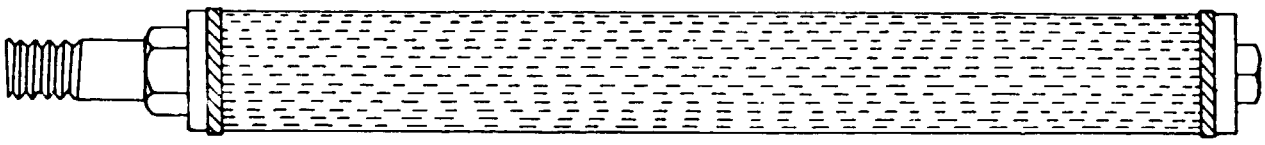
SECTION 4

SHING WATER CONNECTION SCHEME

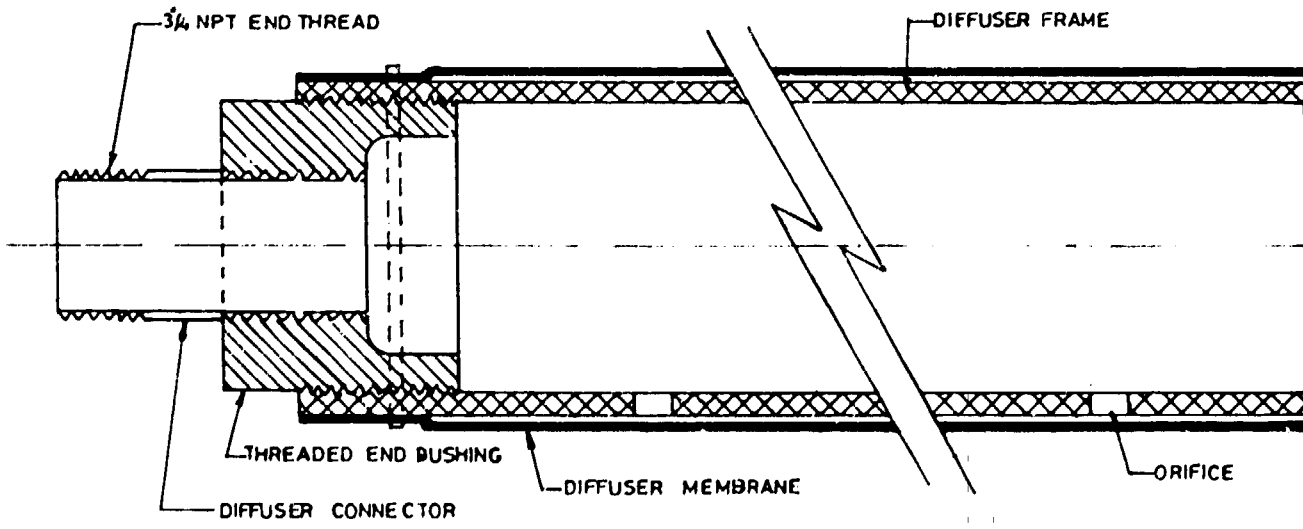


SECTION 5

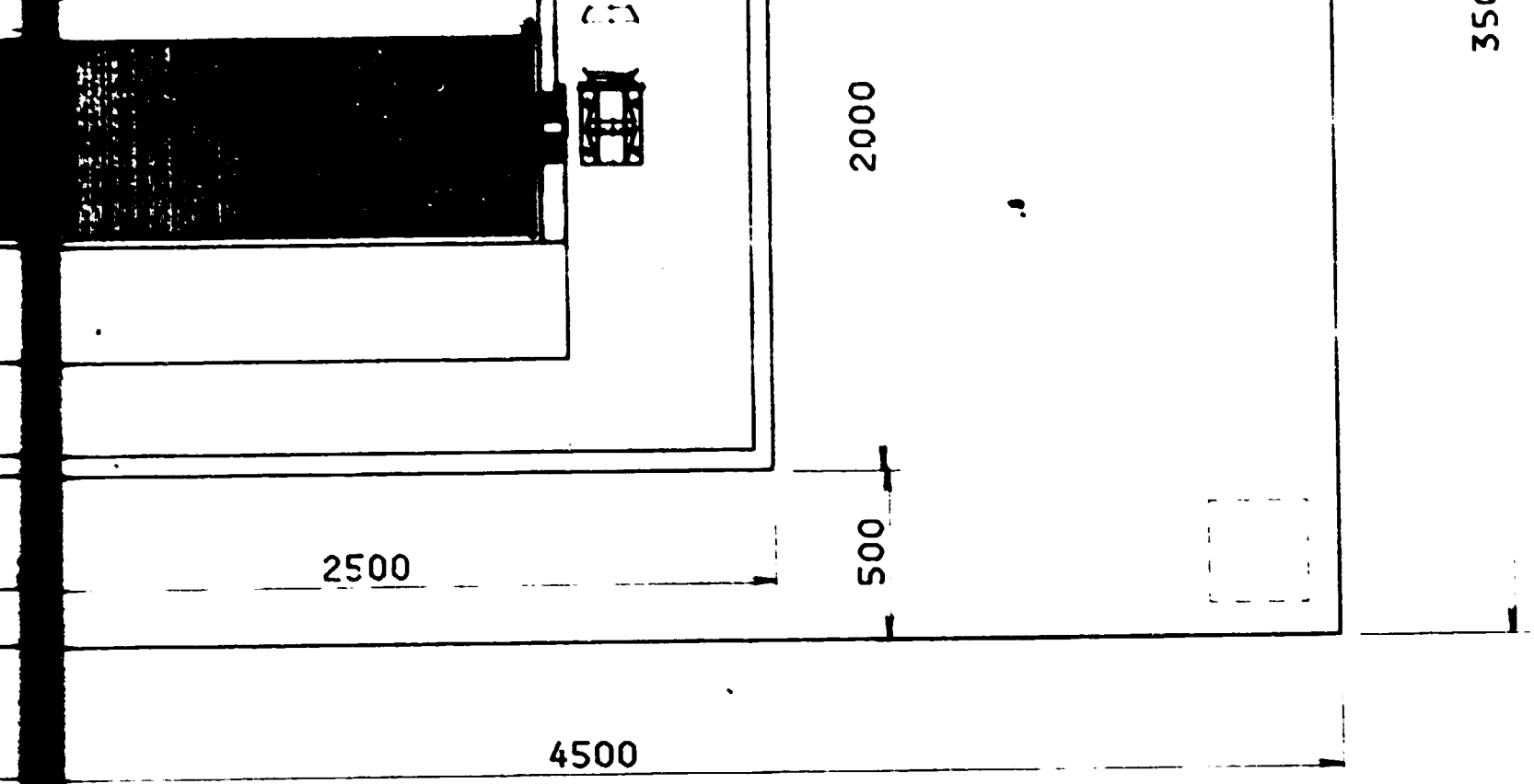
UEM



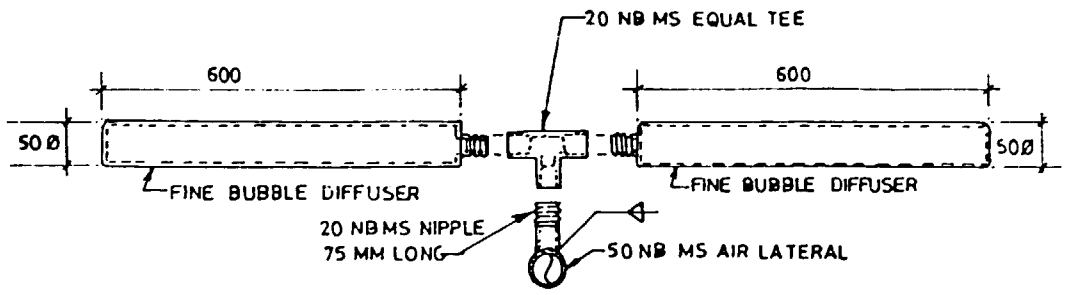
SIDE VIEW



CUT AWAY VIEW

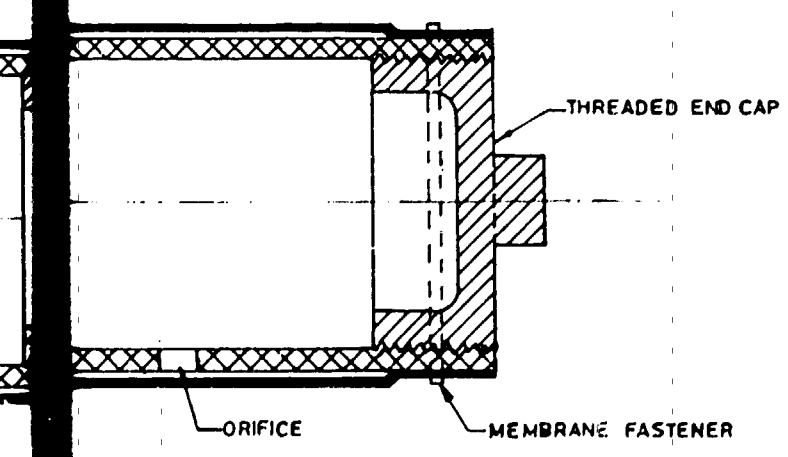


SECTION 6



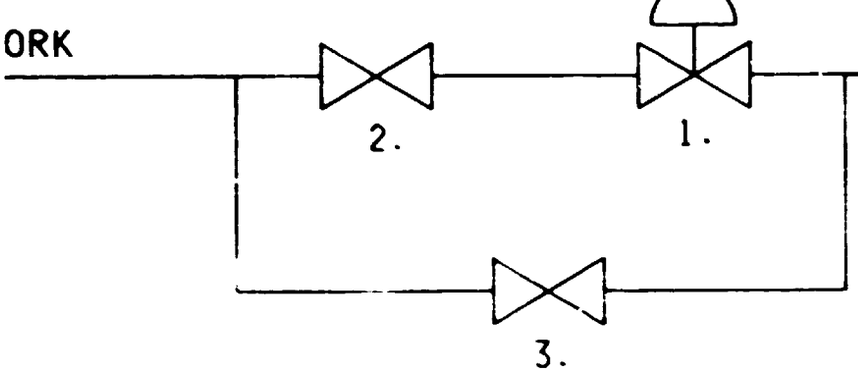
TYPICAL DIFFUSER/AIR LATERAL CONNECTION

ER FRAME



WATER FROM NETWORK

PIPE ø1.5"

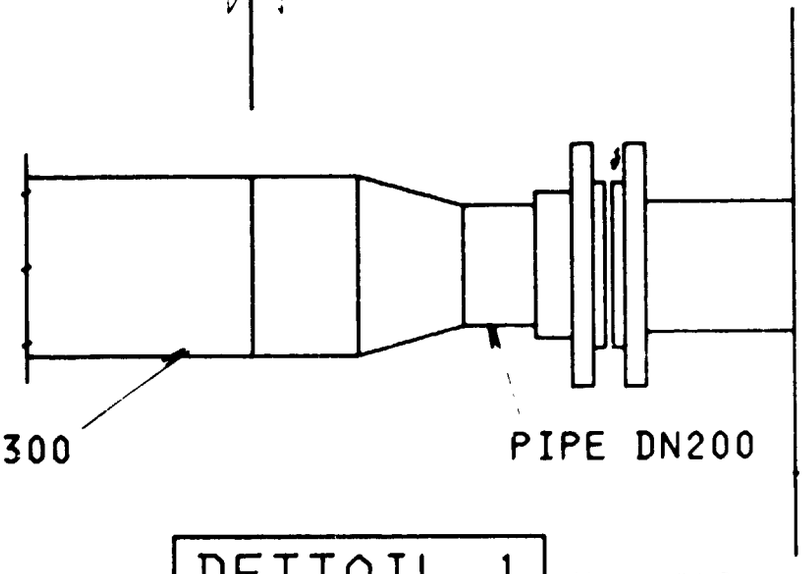


3500

SECTION 7

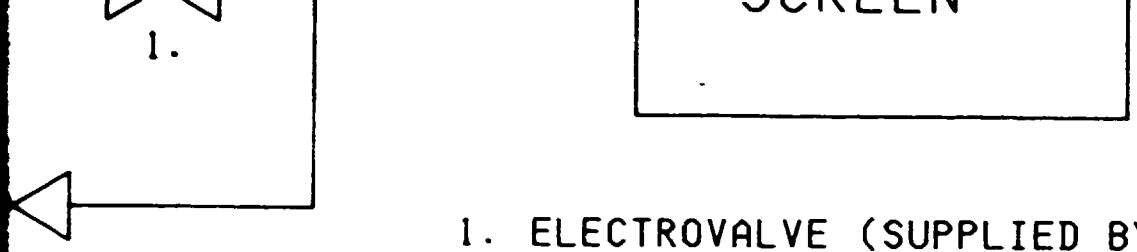
BY CLIENT

BY ITALPROGETTI



DETTAIL 1

VALID FOR INLET OUTLET AND OVERFLOW.



1. ELECTROVALVE (SUPPLIED BY ITALPROGETTI)
2. MANUAL VALVE (SUPPLIED BY CLIENT)
3. MANUAL VALVE (SUPPLIED BY CLIENT)

REMARKS

1. OVERFLOW MUST RETURN TO PUMPING STATION BY GRAVITY
2. KONICA SCREEN IS FIXED TO PLATFORM BY EXPANSION BOLTS
3. TOTAL WEIGHT OF KONICA SCREEN 1050 KG (Screw conveyor included)
4. WATER CONSUMPTION: 8 mc/h, 2 Bar Min two washing cycles for hour, one minute for each cycle

SECTION 8

NOTE

OPERATION OF THE SCREEN MUST BE INTERELATED WITH OPERATION OF THE MAIN PUMPS (3 NOS IN COLLECTION TANK)

EEN

ET

ITALPROGETTI
engineering
SAN ROMANO (PI) ITALY TEL. 0571 450477
TELEX 501827 TELEFAX 0571 450301

Cliente:
PALLAVARAM TANNERY
INDIA

Sost. il 29-01-93 Sost. da 26-08-93

Oggetto: KONICA SCREEN INSTALLATION

Particolare: .

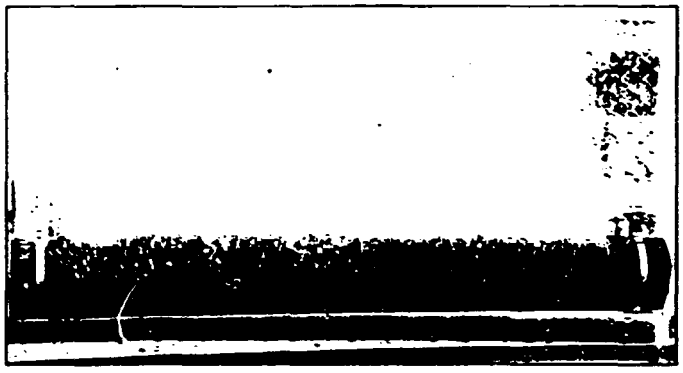
	Firma	Data	Scala	F.to	Disegno N.	Mod.
Disegnato	F. RIDOLFI	26-09-93	1:20	A1	GEN-KSC-93000	2
Controllato						
Visto						

4.2. NON-CLOG DIFFUSOR SYSTEM (Item 10a)

AERTEC™

AERATION TECHNOLOGIES, INC.

DIFFUSER MEMBRANE KITS



AERMAX™ Model S-225 Diffuser

AERMAX™ **M**embrane **D**iffusers are in use by the thousands world-wide. Whether you need a complete new diffuser assembly or just a new membrane, **AERMAX**™ is for you.

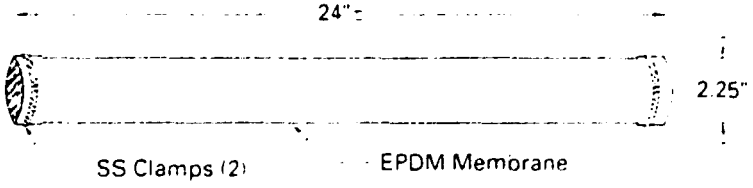
Extensive research into perforating high-tech elastomers has lead to an extremely ***durable, efficient*** and ***economical*** device that meets design specifications and provides a technological edge over other commercially available products.

MEMBRANE REPLACEMENT KITS

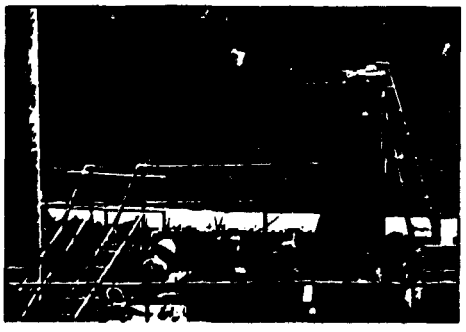
Retrofitting Parkson/Wyss, and other tubular flexible membrane diffusers with our easy-to-install membrane replacement kit ***improves*** durability and efficiency. **AERMAX**™ replacement membranes are available in several diameters, lengths, and end configurations. Four different perforation patterns provide a wide range for selection of oxygen transfer efficiency and headloss characteristics to satisfy your specific need.

The kit includes all the components needed to remedy broken or worn sheaths and membranes:

- new EPDM membrane
- new clamps in stainless steel
- simple to use instructions
- clamp tool available



AERATION TECHNOLOGY – Leading Edge Capabilities



At **AERTEC**™ aeration is all we do – our name says it all – engineered solutions involving development, evaluation, design, manufacture, installation and service.

We are dedicated to furnishing the latest and best available oxygen transfer and mixing technology. From conception through installation and start-up, we provide it all.

MEMBRANE REPLACEMENT KITS

Retrofitting Parkson/Wyss, and other tubular flexible membrane diffusers with our easy-to-install membrane replacement kit ***improves*** durability and efficiency. **AERMAX**™ replacement membranes are available in several diameters, lengths, and end configurations. Four different perforation patterns provide a wide range for selection of oxygen transfer efficiency and headloss characteristics to satisfy your specific need.

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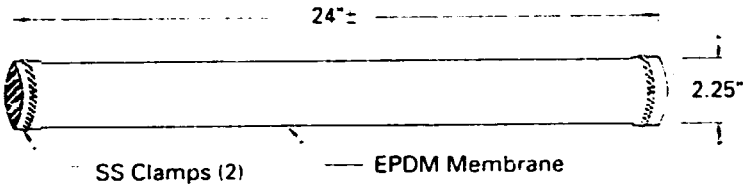
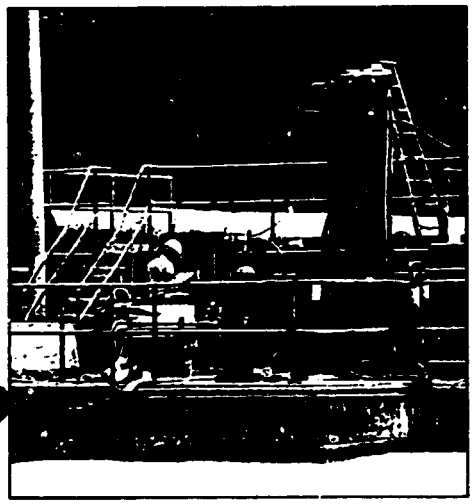


AERATION TECHNOLOGY – Leading Edge Capabilities



Full Depth Column Alpha Testing

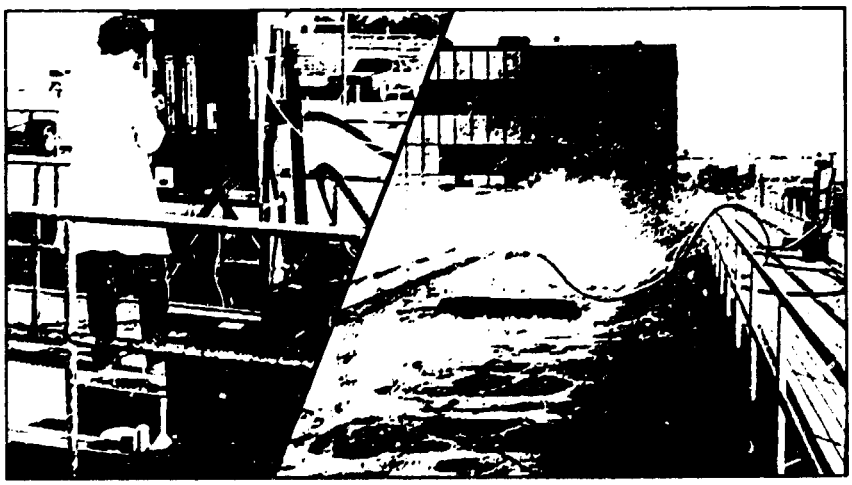
At **AERTEC**™ aeration is all we do – our name says it all – engineered solutions involving development, evaluation, design, manufacturing, installation and service.

We are dedicated to furnishing the latest and best available oxygen transfer and mixing technology. From conception through installation and start-up, we provide it all.

Our goal is to develop engineered ***solutions*** for your aeration needs – not just to offer equipment.

AERTEC™ offers state-of-the-art technology for full scale alpha testing of diffusers, and ***in situ*** off-gas testing of operating systems.

Aeration system performance and evaluation services are available.



Field Off-Gas Testing

AERTEC
AERATION TECHNOLOGIES, INC.

Fig. 123-04-93-D

AERMAX™ MEMBRANE TUBE DIFFUSER SPECIFICATION
(Wide Band Fine Pore Diffuser)
MODEL P-225

GENERAL

Diffusers shall be AERMAX™ perforated membrane tube type as manufactured by Aeration Technologies, Inc. (AERTEC). The diffuser shall be hollow cylindrical shape with integral air duct and plenum design to insure completely uniform distribution of air over the entire operating range of air flows The diffuser shall be furnished totally assembled by the manufacturer, ready for installation.

The nominal diffuser length shall be 24 inches as measured from outside ends of the diffuser frame excluding threaded end connector for attaching the diffuser to the air distribution pipe. The nominal diameter of the diffuser shall be 2.5 inches.

DIFFUSER ASSEMBLY

Each diffuser shall consist of the following:

- one 3/4-inch NPT threaded stainless steel diffuser connector
- one HDPE diffuser frame
- one EPDM diffuser membrane
- two stainless steel membrane fasteners
- one PVC threaded end bushing
- one ABS threaded end cap

DIFFUSER MEMBRANE

The diffuser membrane shall consist of EPDM rubber compound 40K6 extruded into a one piece flexible tube with the following characteristics:

Parameters	Standard	Value/Unit
Elongation at Break	ASTM D412	600%
Tensile Strength	ASTM D412	1,450 psi
Tear Growth Resistance	ASTM D624	100 lbs./in. (against grain)
Tear Growth Resistance	ASTM D624	110 lbs./in. (with grain)
Hardness	ASTM D2240	40 ±5

The tubing shall be perforated with precision die punch slits that open under pressure.

The surface of the membrane shall be reasonably smooth to prevent biological growth build-up, no increase in headloss, and to provide for easy cleaning. Non-rubber membranes that do not exhibit elastic characteristics are not acceptable. Plasticized PVC and polypropylene sheaths are not acceptable. Membranes manufactured using a longitudinal seam are not acceptable.

The membrane shall be 2.7-in. nominal diameter by 0.07-in. nominal thickness with an overall length of 26 inches. Perforated length on diffuser membrane shall be 22 inches.

Membranes shall have a 0.5-in. non-perforated strip at the top of the diffuser to reduce bubble coalescence. A 0.75-in. non-perforated section shall be provided at the bottom of the diffuser to act as the positive backflow prevention valve.

The total active surface area of the diffuser membrane shall be 160 square inches. Demonstration of full utilization of perforated area shall be provided to the Engineer upon request. Incomplete utilization of perforated surface area under design conditions shall not be acceptable.

MEMBRANE FASTENER

The diffuser membrane shall be fastened with circular crimped 304 stainless steel ring fasteners at each end of the diffuser The fastener shall guarantee a 360° seal through use of a tongue and groove design that leaves no steps, gaps or unbridged parts on the inner circumference. The fastener shall have a built-in spring action which permits the fastener to "breathe" without loosening, and shall not require retightening. Fasteners using worm gears, screws, or other components which could tear the membrane, leave gaps or require retightening shall not be acceptable.

AERTEC
AERATION TECHNOLOGIES, INC.

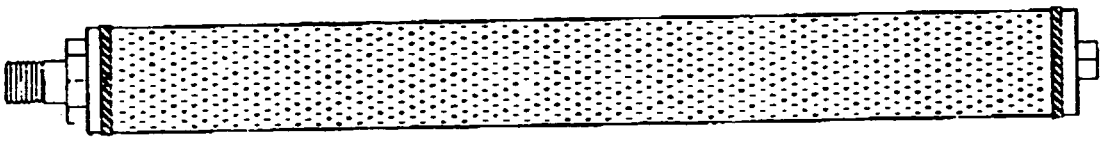
Fig. 123-03-93-A

AERMAX™ MEMBRANE TUBE DIFFUSER
(Wide Band Fine Pore Diffuser)

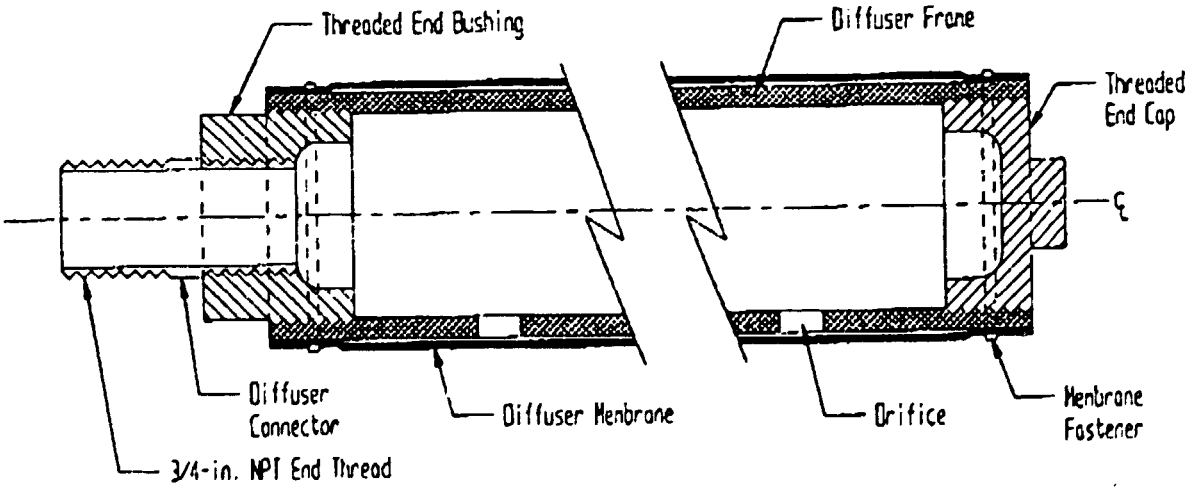
MODEL P-225

FEATURES

- stainless steel end connector
- rugged HDPE cylindrical frame
- strong EPDM membrane
- optional sizes and components available



SIDE VIEW



CUT AWAY VIEW

AERTEC
AERATION TECHNOLOGIES, INC.

Fig. 123-04-93-B

AERMAX™ MEMBRANE TUBE DIFFUSER PRODUCT INFORMATION

MODEL P-225

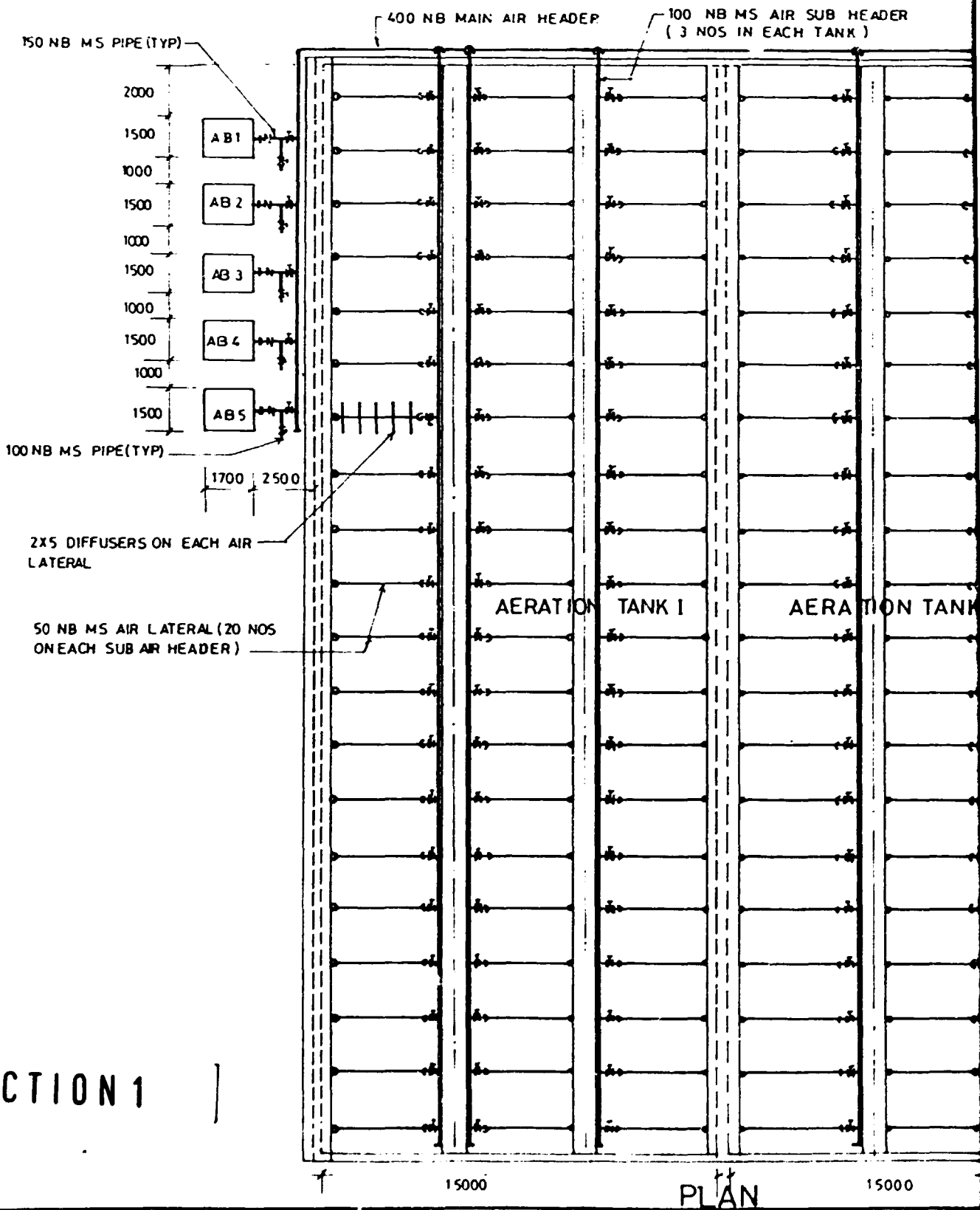
Design and Operation Specifications

- Airflow Range - 0.5 to over 10 SCFM
- Headloss Range - 7 to 32 inches H_2O
- SOTE at 15-ft. Depth - 20 to 35 percent
- Five Year Mechanical Guarantee
- Component and Material Options Below
- Standard Diffuser Data:
  - Length 27-in. nominal
  - Diameter 2.5-in. nominal
  - Weight 2.0 lb. nominal
- Custom lengths and sizes available

Diffuser Assembly Component Selection

Component	Design Features	Materials of Construction	Options
Diffuser Membrane	Tough, flexible thick wall membrane available in four standard uniform perforations for maximum oxygen transfer and minimum headloss	EPDM rubber extruded membrane	Special perforation and materials available
Membrane Fastener	Permanent or reusable fasteners constructed of high strength corrosion resistant materials for positive, quick, and easy membrane fastening	100% 304 stainless steel construction	Special fasteners available
Diffuser Connector	High strength machined fitting with standard 3/4-in. NPT air header connector cannot break or corrode	304 stainless steel	Special thread or material available
Threaded End Bushing	Machined for exact fit of diffuser connector to ensure maximum strength and tightness	PVC	None
Diffuser Frame	Rugged high strength thick walled industrial plastic is suitable for all wastewater environments	HDPE, UV stabilized	None
Threaded End Cap	Removable for easy maintenance of diffuser	ABS	None

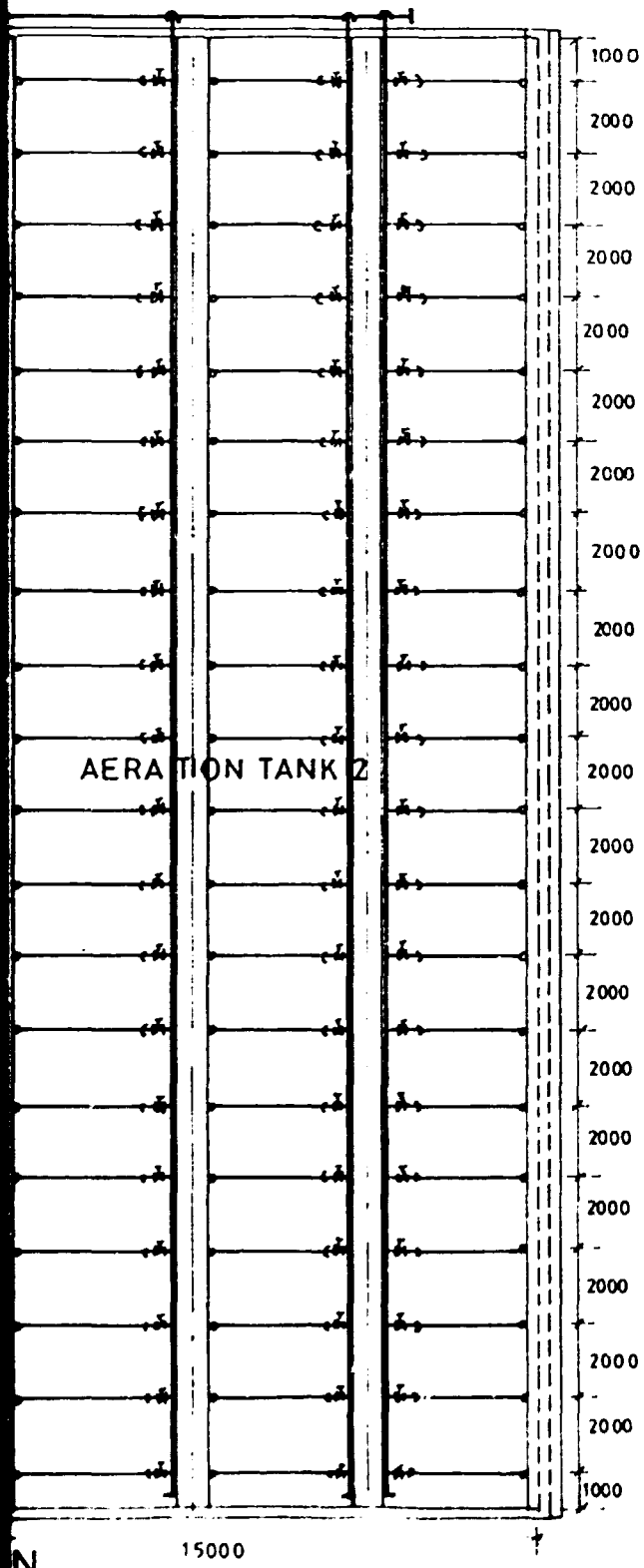
UEM

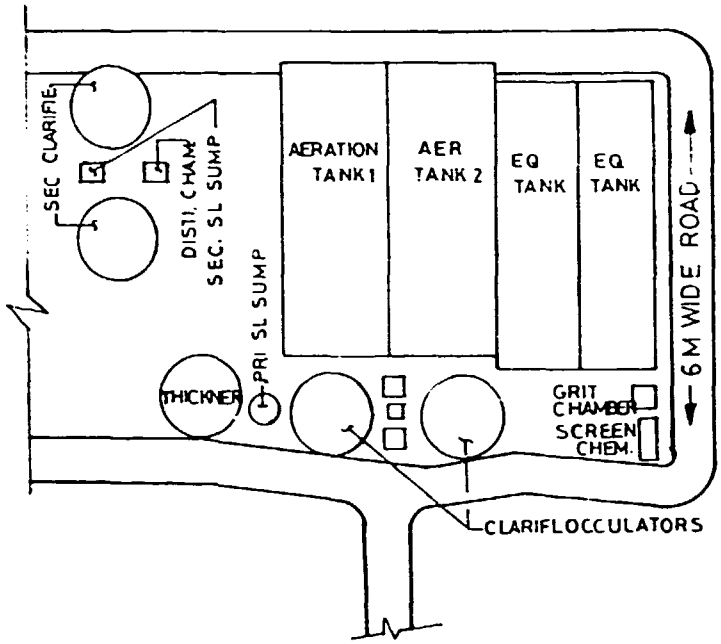


SECTION 1

UEM Inc. FLORIDA . USA.	PTIET _ MADRAS	AERATION PIPING

MS AIR SUB HEADER
IN EACH TANK)





KEY PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED OTHER WISE
2. ALL PIPES ARE MS MEDIUM CLASS AND SHALL BE EPOXY COATED ON OUTER FACE.
3. ALL VALVES ARE WAFER TYPE BUTTERFLY VALVES
4. FOR MORE DETAILS REFER DRG NOS UEM|93|PTE|036 SHEET 2 TO 7

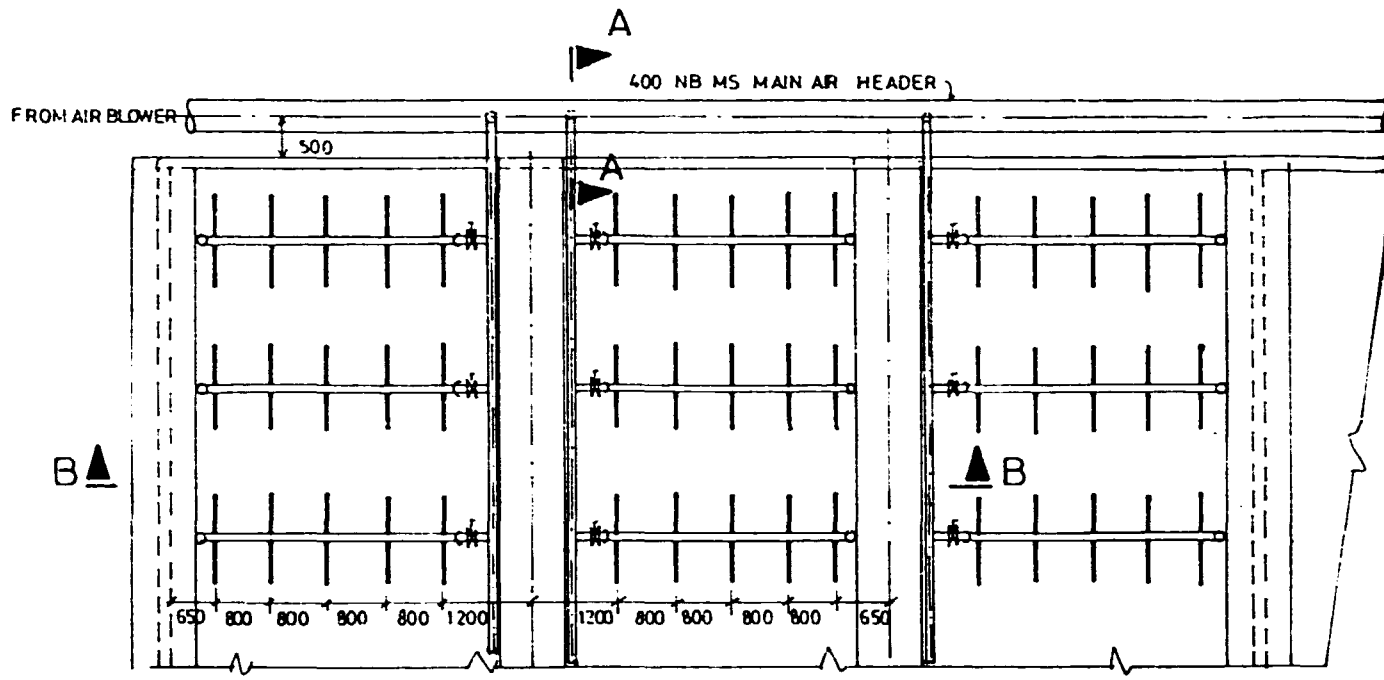
SECTION 2

N

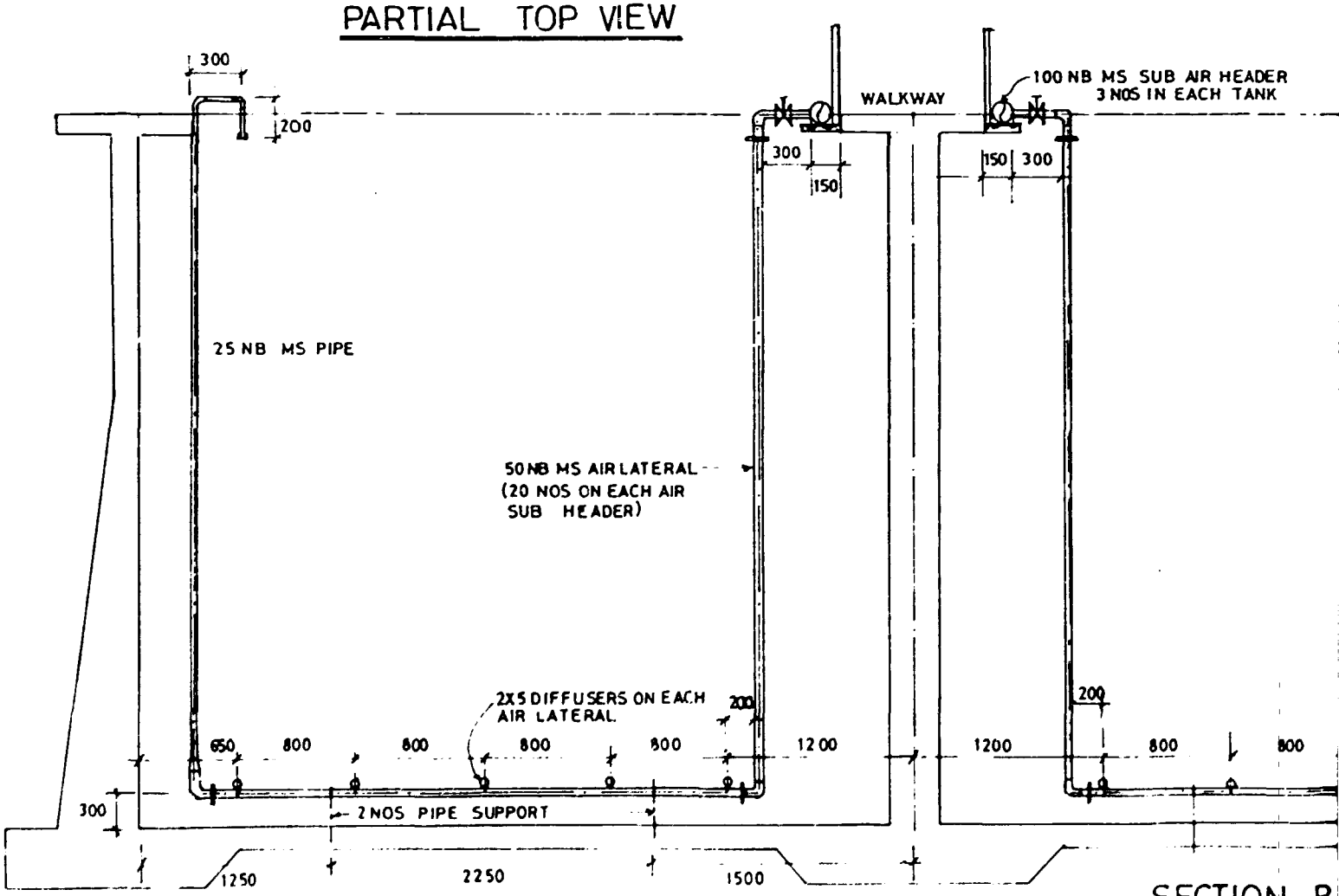
RATION PIPING. SHEET 1	DRG NO. UEM|93|PTE|036. SH. 1	DRN BY	27 7 93
	PROJ NO	CKD BY	
	REVISION	APPD BY	

UEM

SECTION 1

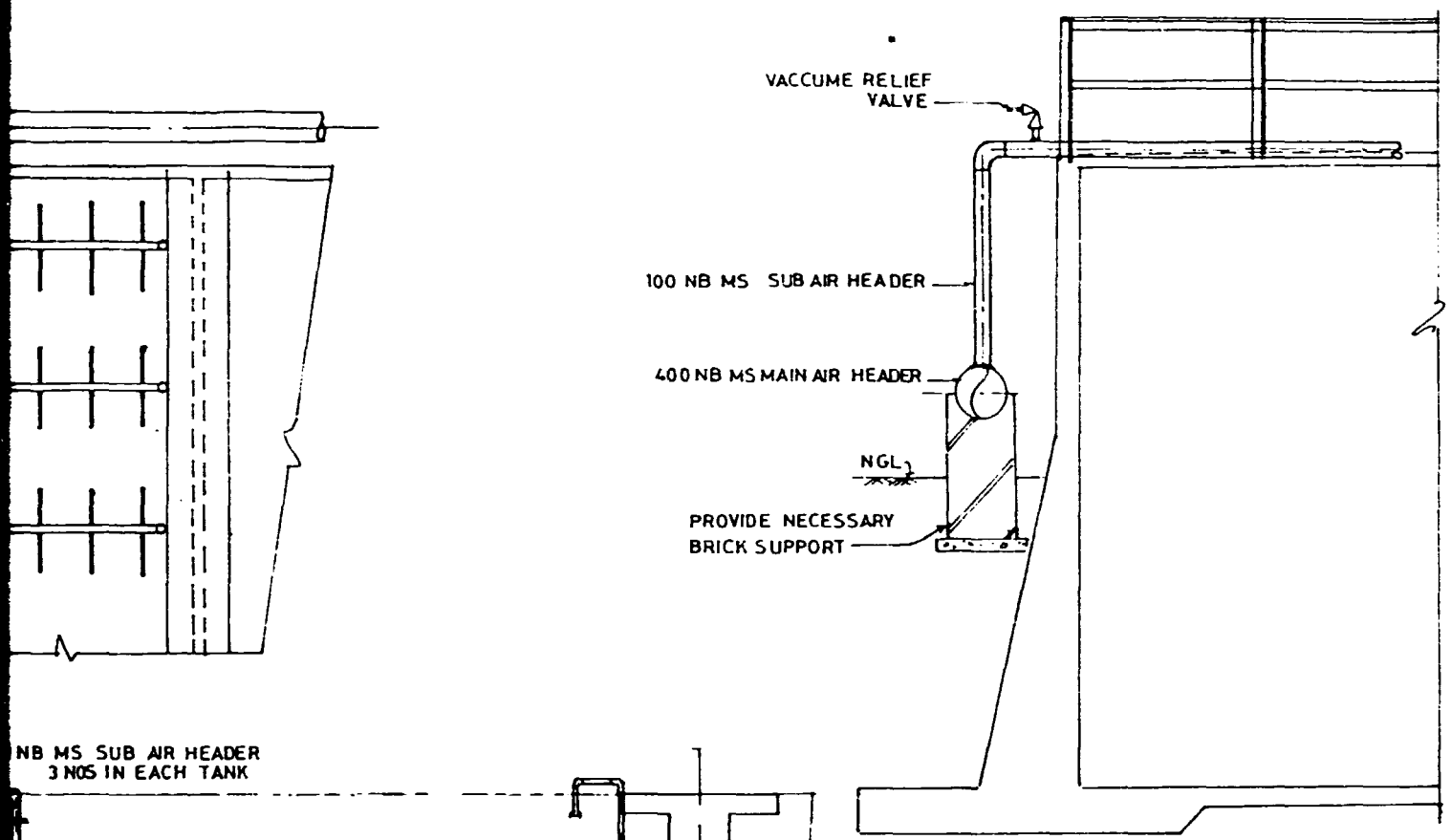


PARTIAL TOP VIEW

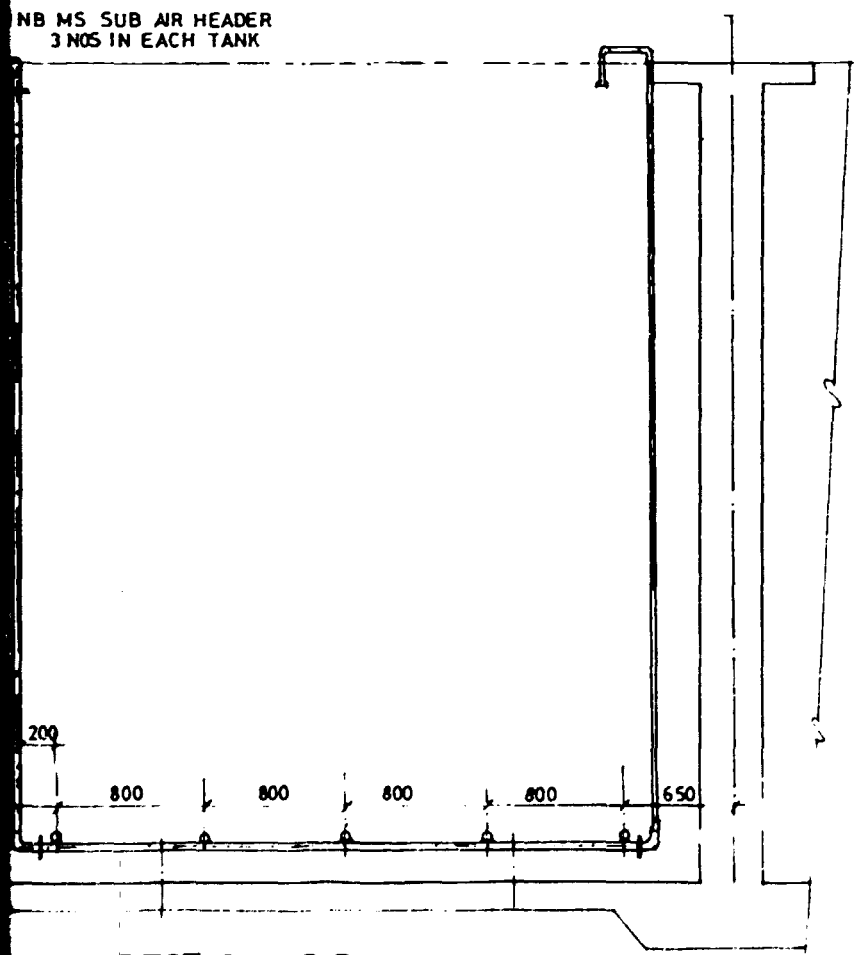


SECTION - B

UEM Inc. FLORIDA . USA.	PTIET . MADRAS	AERATION PIPING S



SECTION_AA



SECTION_BB

NOTES:

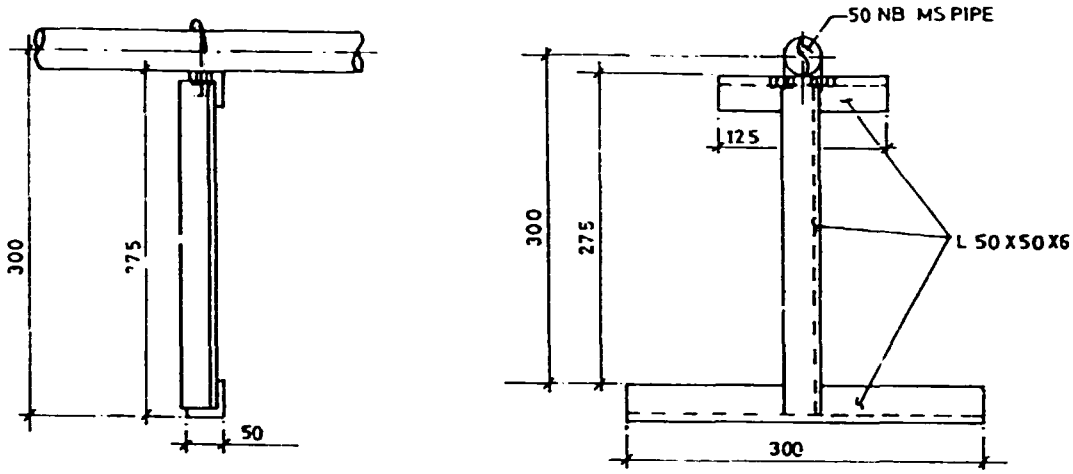
1. ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED OTHERWISE.
2. FOR MORE DETAILS REFER DRAWING NOS UEM|93|PTE|036 SHEET 1 & 3 TO 6.

SECTION 2

ERATION PIPING_SHEET.2	DRG NO. UEM|93|PTE|036.SH.2	DRN BY
	PROJ. NO UEM|9303	CKD BY
	REVISION	APPD BY

4.4. SLUDGE PUMPS (Item 16)

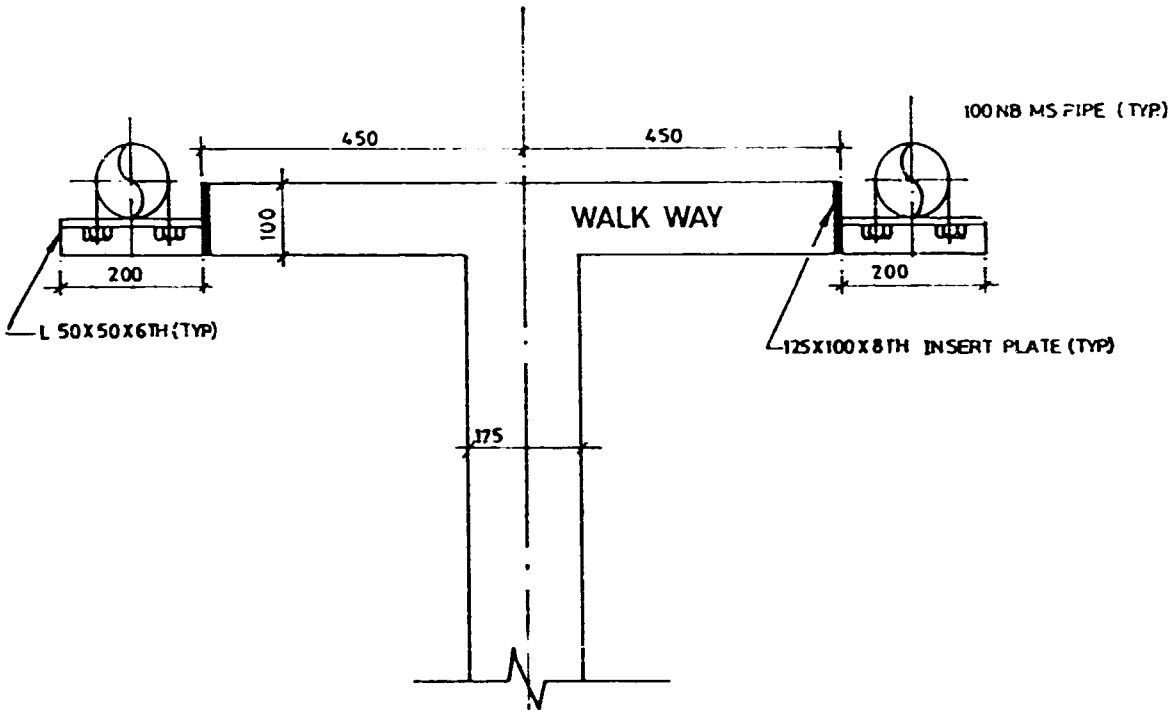
UEM



ELEVATION

SIDE VIEW

DET. OF LATERAL PIPE



SUPPORT FOR SUB AIR HEADERS

AERATION PIPING SHEET NO-5	DRG NO UEM/93/PTE/036 SHEET-5	DRN BY R C Prajapati	29-07-
	PROJ NO UEM/9303	CHD BY	
	REVISION	APPD BY	

...ZIC NE POMPA

CALCUL ET DESIGNATION DE LA POMPE MONOVIS
CALCULATION AND CHOICE OF THE SCREW PUMP
BERECHNUNG UND WAHL DER SCHRAUBENPUMPE

...a scelta

...pes monovis
...mps
...m

MATERIALI

Camere aspir. e mandata / **Parti rotanti**

A Acc. Inox 304 / Acc. Inox 304
B Acc. Inox 316 / Acc. Inox 316
I Ghisa G26 / Acc. Cr 420

Statori e manicotti

A Gomma Nitrilica alimentare Perbunan
B Gomma Dutral
C Gomma Neoprene
D Gomma Viton
E Gomma Hypalon
F Gomma Perbunan bianco
G Gomma naturale

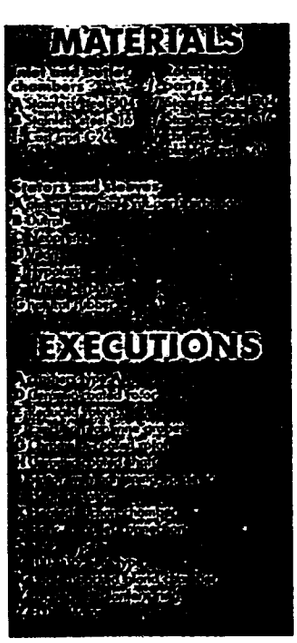
MATERIAUX

Chambres d'aspir. et de refoul.-ment / **Parties tournantes**

A Acier inox. 304
B Acier inox. 316
I Fonte G26

Stators et manchon

A
B
C Perbunan
D Viton
E Hypalon
F Perbunan blanc
G



WERKSTOFFE

Einlaß- und Auslaßkammer / **Drehteile**

A rostfreier Stahl 304
B rostfreier Stahl 316
I Gußeisen Gr 26

Stateren und Muffen

A Nahrungsmittelqualität
B Dutral
C Neoprene
D Viton
E Hypalon
F Weißes Perbunan
G Naturkautschuk

ESECUZIONI

A Aspiratori tipo A
D Statore con riporto ceramico
E Statore ridotto
F Esecuzione per uva
G Statore con riporto in Cromo
H Albero trasm. con riporto ceramico
I Statore riscaldato
J Statore a compens. d'usura
K Camera di aspirazione riscaldata
L Bocca mandata a flangia
S Statore tipo S
T 100 - T99 Tipo tenuta
X Camera treccia raffreddata
Y Tenuta con sbarramento
Z Motore ADPE

EXECUTIONS

A Aspirateur type A
D Stator avec revêtement céramique
E Stator réduit
F Exécution pour raisin
G Stator avec revêtement chromé
H Arbre de transmission avec revêtement céramique
I Stator chauffé
J Stator avec rattrapage d'usure
K Chambre d'aspiration chauffée
L Refoulement à bride
S Stator type S
T 100 - T99 type de garniture
X Chambre presse-étoupe refroidie
Y Presse étoupe à barrage de garniture
Z Moteur Antideflagrant

AUSFÜHRUNGEN

A Rührer Typ A
D Rotor mit Keramikbeschichtung
E Verkleinerter Rotor
F Ausführung für Weintrauben
G Rotor mit Chromauflage
H Antriebswelle mit Keramikauflage
I geheizter Stator
J Stator mit Verschleißausgleichung
K Geheizte Ansaugkammer
L Auslaßanschluß mit Flansche
S STATORSTYP
T 100 - T99 Dichtungstyp
X Gekühlte Stopfbuchskammer
Y Packungsstopfbuchse mit Wellenschutzhülse und innenliegendem Sperrkammerring
Z Ex-geschützter Motor

DESIGNAZIONE POMPE
DESIGNATION DES POMPES
PUMPS DENOMINATIONS
PUMPENBEZEICHNUNG

1 2 3 / 4 · 5

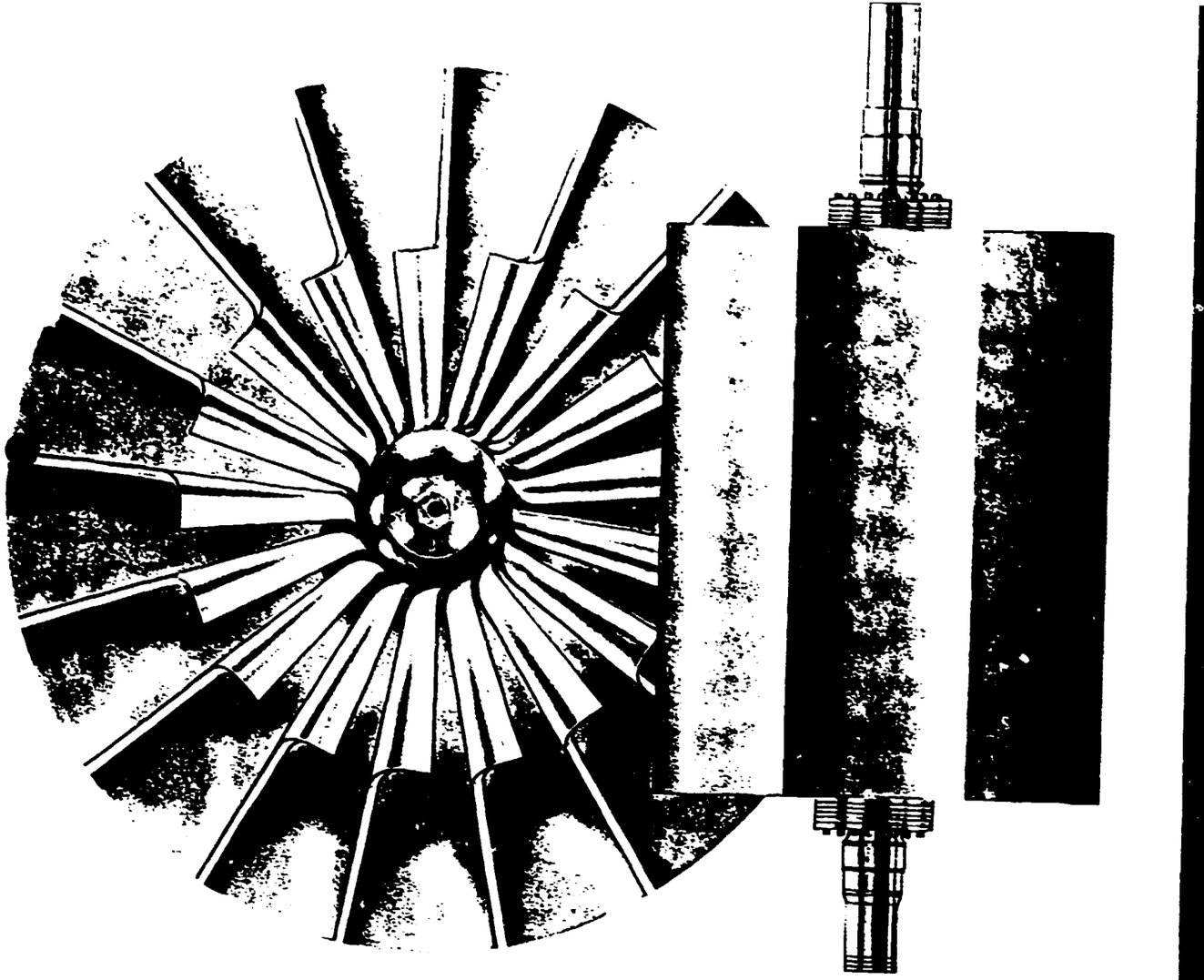
1 **SERIE**
SERIE
SERIAL
SERIE

2 **VERSIONE**
VERSION
VERSION
VERSION

...2p · n

...THEORETISCHEN

...r CSF-Schrauben-
...Drezahl direkt



PRESTAZIONI

PERFORMANCES
PERFORMANCES
BETREIBSLEISTUNGEN

1 stadio max 6 bar
Single stage max 6 bar
Einstufig max 6 bar

2 stadi max 12 bar
2 stages max 12 bar
Double stage max 12 bar
Zweistufig max 12 bar

1 stadio "S" max 10 bar
1 stage type "S" max 10 bar
Single stage "S" max 10 bar
Einstufig "S" max 10 bar

2 stadi "S" max 22 bar
2 stage type "S" max 22 bar
Double stage "S" max 22 bar
Zweistufig "S" max 22 bar

Valori riferiti all'acqua a 20°C I.m
Values referred to water at 20°C on test vessel
Data referred to water at 20°C on test vessel
Werte bezogene auf Wasser 20°C im M

h Prevalenza bar
Q Portata m³/h
Na Potenza HP
n Velocità giri

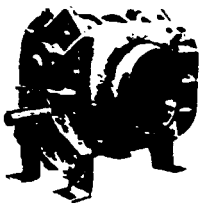
h Hauteur bar
Q débit m³/h
Pas puissance HP
n Tours/min

h Pression bar
Q débit m³/h
Pas puissance HP
n Tours/min

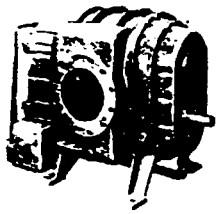
h Förderhöhe bar
Q Fördermenge m³/h
Pas Leistung PS
n U/min

Modello Type Typ	Stadi Stages Stufen	Versione Version Version	Versione Version Version	h	n 200		n 300		n 400		n 500		n 600		n 700		n 800		n 900		n 1000		n 1100	
					Q	Na	Q	Na	Q	Na	Q	Na	Q	Na	Q	Na	Q	Na	Q	Na	Q	Na	Q	Na
40	1	MAN	MAE	1					0,6	0,35	0,8	0,35	1	0,35	1,2	0,4	1,4	0,45	1,6	0,5	1,8	0,55	2,6	0,8
				3					0,3	0,35	0,5	0,35	0,7	0,4	0,9	0,45	1,1	0,5	1,3	0,55	1,5	0,6	2,3	0,85
				6									0,2	0,45	0,4	0,5	0,6	0,55	0,8	0,6	1	0,65	1,8	0,9
	2	MAN	MAE	9							0,3	0,6	0,5	0,7	0,7	0,8	0,9	0,9	1,1	1	1,3	1,1	2,1	1,5
				12									0,3	0,9	0,5	1	0,7	1,1	0,9	1,3	1,1	1,4	1,9	1,8
50	1	MAN - MIN MCN	MAE - MIE MCE	2	0,4	0,5	1,3	0,6	2,0	0,6	2,6	0,7	3,2	1	3,8	1,2	4,3	1,2	4,8	1,4	5,4	1,6	7,8	2,1
				4	0,3	0,5	0,9	0,5	1,8	1	2,4	0,9	3	1,2	3,5	1,3	4,1	1,4	4,6	1,6	5,2	1,8	7,4	2,4
				6	0,2	0,5	0,9	0,5	1,1	1,6	1,1	2,2	1,2	2,8	1,5	3,3	1,6	3,9	1,7	4,4	2	4,9	2,3	7	3,2
	2	MAN - MIN MCN	MAE - MIE MCE	9	0,7	1,1	0,9	1,2	1,6	1,6	2,1	2	2,8	2,4	3,5	2,7	4,2	2,8	4,9	3,1	5,5	3,3	7,6	4,1
				12	–	–	0,4	1,3	1,2	1,8	1,4	2,2	2	2,6	2,8	2,8	3,3	3,1	4	3,7	4,7	4,1	7	5,7
65	1	MAN - MIN MCN - MCRN MC2RN	MAE - MIE MCE - MCRE	2	0,5	0,9	0,8	1,1	5	1,4	6,4	1,5	7,6	1,7	8,7	2	9,7	2,3	11,3	2,6				
				4	0,3	0,5	0,8	1,2	4,5	1,6	5,9	1,9	7,3	2,2	8,4	2,4	9,4	2,5	10,8	3,2				
				6	0,2	0,5	0,8	1,7	4	2,1	5	2,6	6,5	2,8	7,5	3,2	8,5	3,4	9,5	4,1				
	2	MAN - MIN MCN - MCRN MC2RN	MAE - MIE MCE - MCRE	9	1,0	2,8	2,6	3,3	4,1	3,7	5,1	4,2	7,3	4,9	8,8	6	10,2	6,5	11,4	8				
				12	0,3	3	1,6	3,4	3,6	3,9	5,5	4,6	7	5,7	8,5	7,3	9,5	8,5	10,3	10				
	2S	MAN - MIN MCN - MCRN MC2RN	MAE - MIE MCE - MCRE	15	2,0	3	3,3	3,7	4,8	5	6,2	6,4	7,6	6,9	9	11,1	10,3	13						
				18	1,7	3,3	3	4,1	4,5	5,5	5,8	7,5	7	10	8,5	12,5	10	15,5						
				27	1,3	3,6	2,6	4,6	4,1	6,1	5,3	8,4	6,3	11,2	7,8	14	9,3	18						
	1	MAN - MIN MCN - MCRN MC2RN	MAE - MIE MCE - MCRE	3	0,8	1,7	1,6	2,2	2,5	2,9	3,2	3,7	3,5	4,5	3,8	5,2	4,2	5,8	4,6	6,4	5,1				
				6	0,5	1,7	1,6	2,5	2,5	3,3	3,2	4,3	3,8	5,2	4,5	6,2	5,2	7,2	5,8	8,2				
				9	0,3	1,7	1,6	2,5	2,5	3,5	3,2	4,3	3,8	5,2	4,5	6,2	5,2	7,2	5,8	8,2				

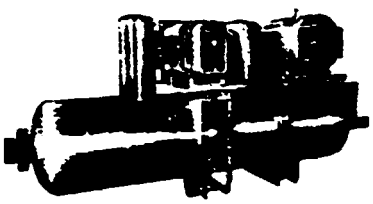
Roots Blowers



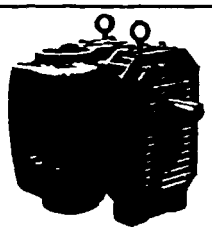
Whispair® Max Rotary Blowers
- *pressures to 10 psig*
- *vacuums to 14" Hg*
- *capacities from 2 to 800 cfm*



Type RAS-J and RGS-J Whispair® Rotary Blowers and Gas Pumps
- *pressures to 20 psig*
- *vacuums to 16" Hg*
- *capacities from 4,000 to 48,000 cfm*

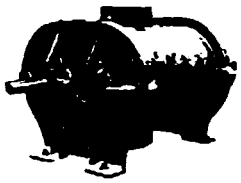


Type RCS-J Whispair® Rotary Blowers
- *available in packages as shown or blower only*
- *pressures to 18 psig*
- *vacuums to 16" Hg*
- *capacities from 530 to 5330 cfm*

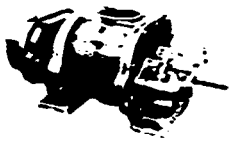


Type DPJ Whispair® Rotary Blower
- *pressures to 30 psig*
- *capacities from 75 to 450 cfm*

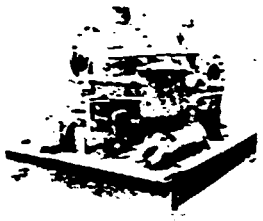
Type DVJ Whispair® Vacuum Blowers
- *vacuums to 22" Hg*
- *capacities from 80 to 5,100 cfm*
- *no sealing water required*



Type AF Rotary Blowers
- *pressures to 10 psig*
- *vacuums to 12" Hg*
- *capacities from 4 to 950 cfm*



Type XA Rotary Gas Pumps
- *pressures to 8 psig*
- *capacities from 10 to 950 cfm*



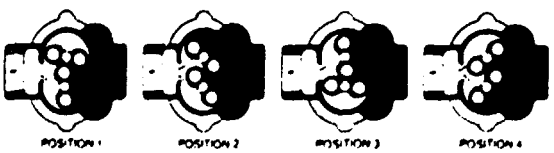
Type LAL Spiraxial® Compressors
- *pressures to 30 psig differential (maximum discharge 40 psig)*
- *capacities from 850 to 6,600 cfm*
- *vacuums to 20" Hg*

Development of the Whispair blower design by the Roots Operations allows faster gear tip speeds than conventional rotary blowers while providing lower operating noise levels. To achieve equivalent sound levels, conventional rotary blowers must be slowed to approximately two-thirds the gear tip speed of the Roots Whispair blower.

As shown by the operating principle schematic, Roots Whispair blowers operate on the same basic principle as all rotary blowers. However, through the use of an exclusive wrap-around discharge plenum and proprietary jets, internal pressure pulsations are reduced, resulting in lower operating noise levels.

Whispair® Blower Operating Principle

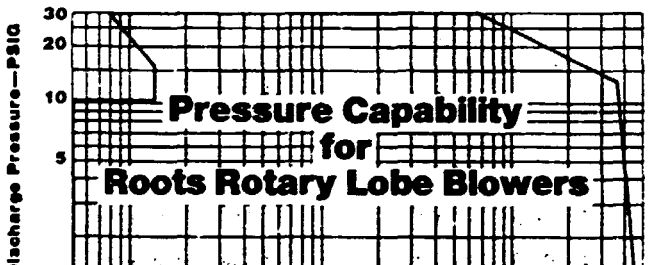
Incoming air is trapped by the impellers and moved through the cylinder to the discharge plenum. As the impeller rotates, air from the discharge plenum is fed back into the cylinder through the Whispair jet equalizing the internal pressure with the discharge pressure. As the impeller completes its cycle the air is discharged at essentially the same pressure as that in the discharge line reducing pulsations and operating noise.

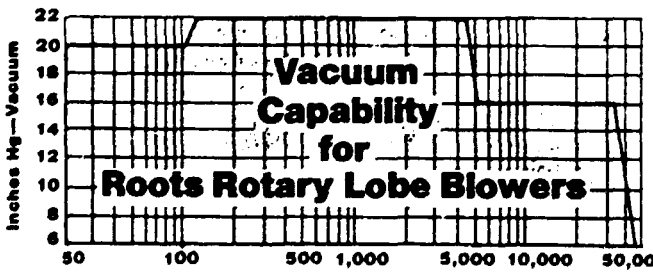


Type DVJ Whispair vacuum blowers provide vacuum levels to 22" Hg and require no sealing water. In applications where the availability of water is limited, type DVJ vacuum blowers can provide significant benefits.

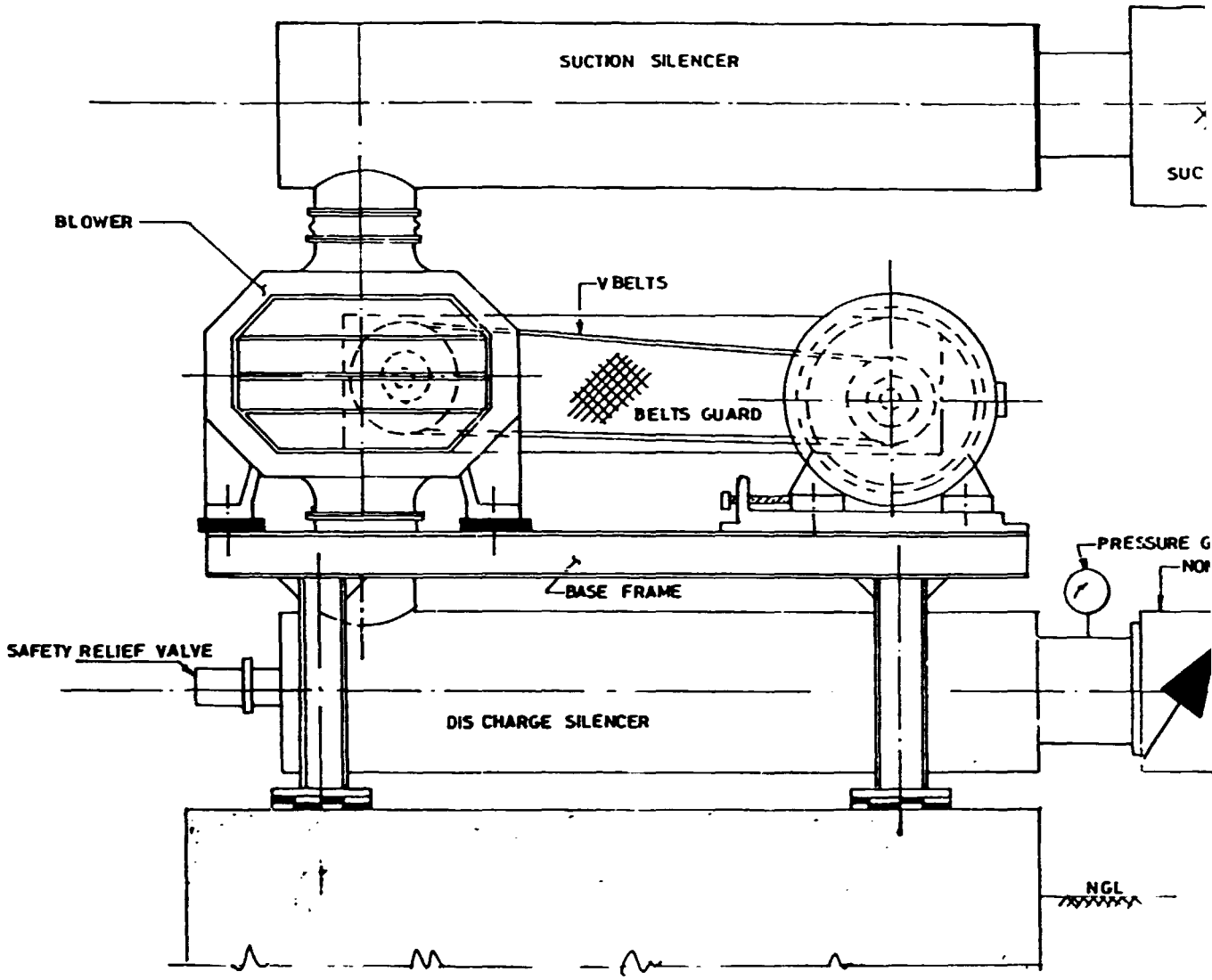
Type LAL rotary positive, dry screw compressors provide higher discharge pressures and compression ratios (3:1 compression ratio) than most rotary blowers at equivalent rates of horsepower consumption.

Featuring inherently high efficiency and reliability, Roots Spiraxial compressors have been selected as the standard low pressure ballast blower for modern U.S. Navy submarines.





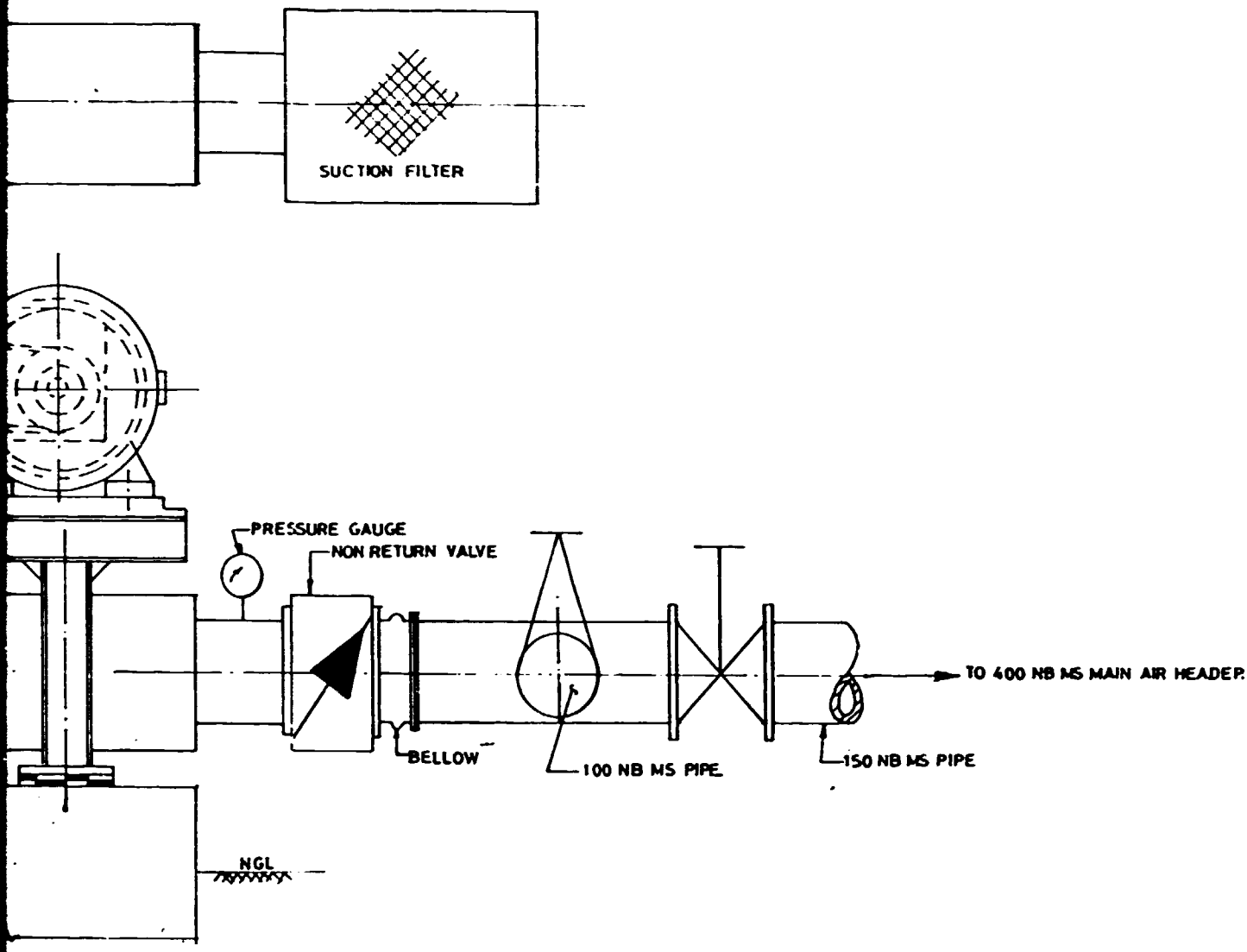
UEM



DET. OF AIR BLOWER

1)

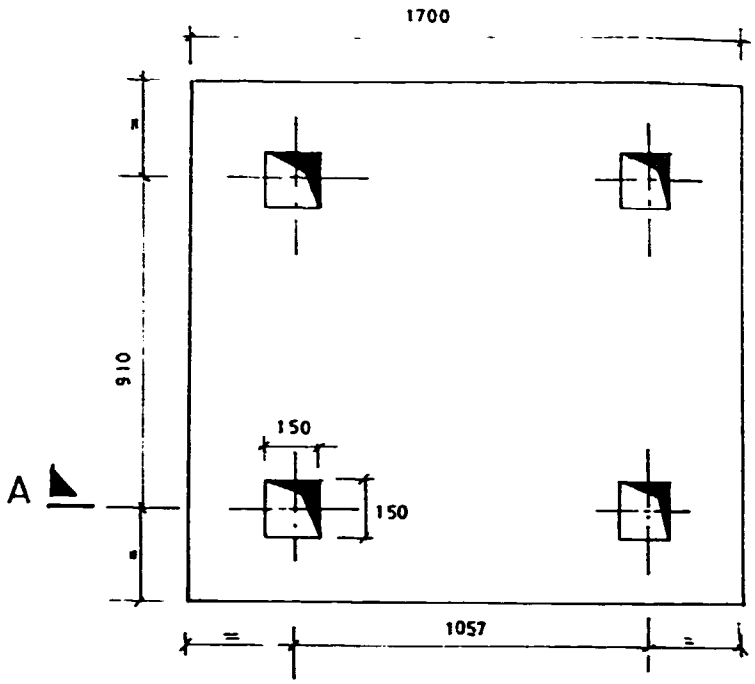
U E M Inc FLORIDA U.S.A.	PTIET MADRAS	AERATION PIPING SHEET NO.-



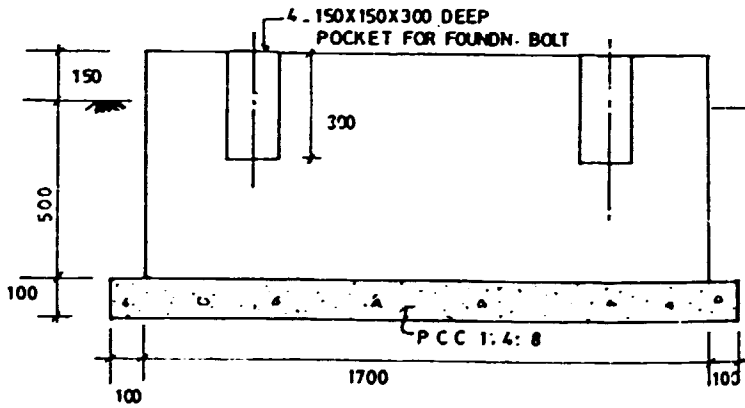
ERATION PIPING SHEET NO.- 3	DRG NO UEM/93/PTE/036 SHEET NO-3	DRN BY R.C. Brajapati	27-03-93
	PROJ NO UEM/9303	CHD BY	
	REVISION	APPD BY	

UEM

DETAIL OF AIRBL



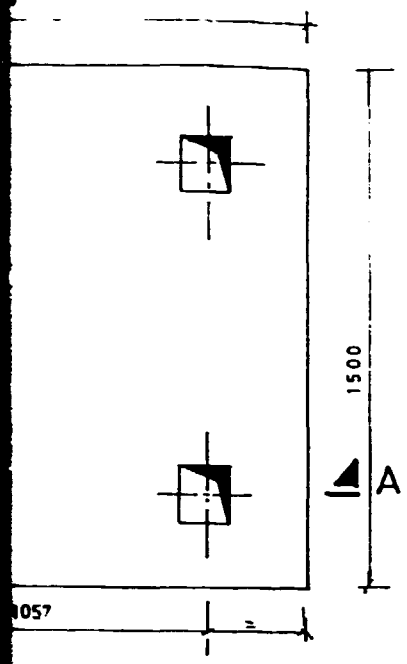
PLAN

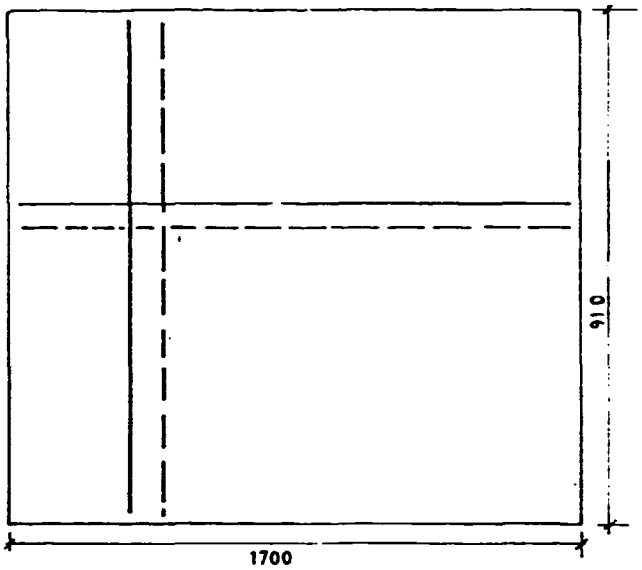


SECTION AA

UEM INC. FLORIDA . USA.	PTIET . MADRAS	AERATION PIPING SHEET 6.

DETAIL OF AIR BLOWER FOUNDATION

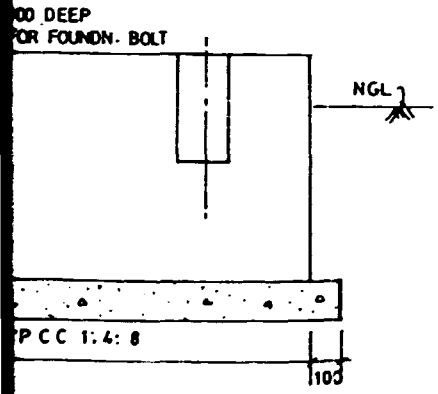


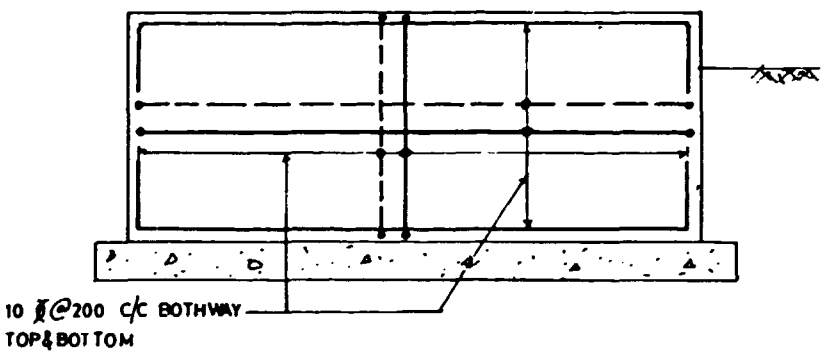


PLAN

(R.C.C. DETAIL)

AN



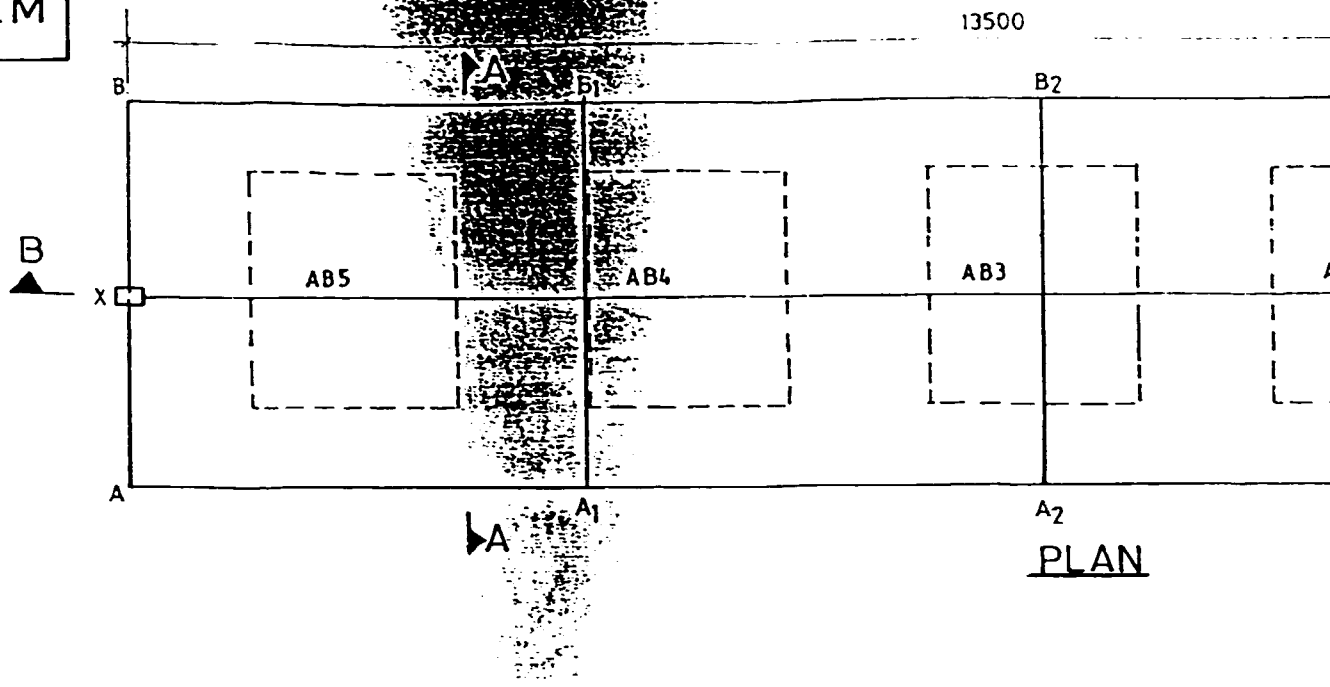


SECTION . BB

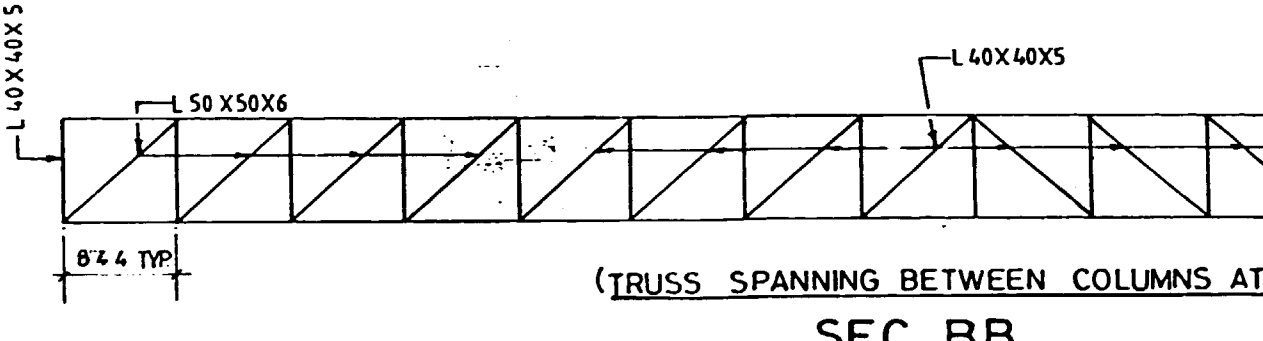
N_AA

PING_SHEET 6.	DRG NO. UEM|93|PTE|036 SHEET. 6	DRN BY	
	PROJ. NO. UEM|9303	CKD BY	
	REVISION	APPD BY.	

UEM

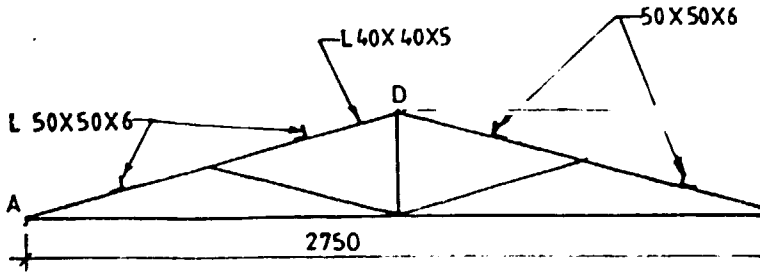


PLAN



(TRUSS SPANNING BETWEEN COLUMNS AT

SEC. BB

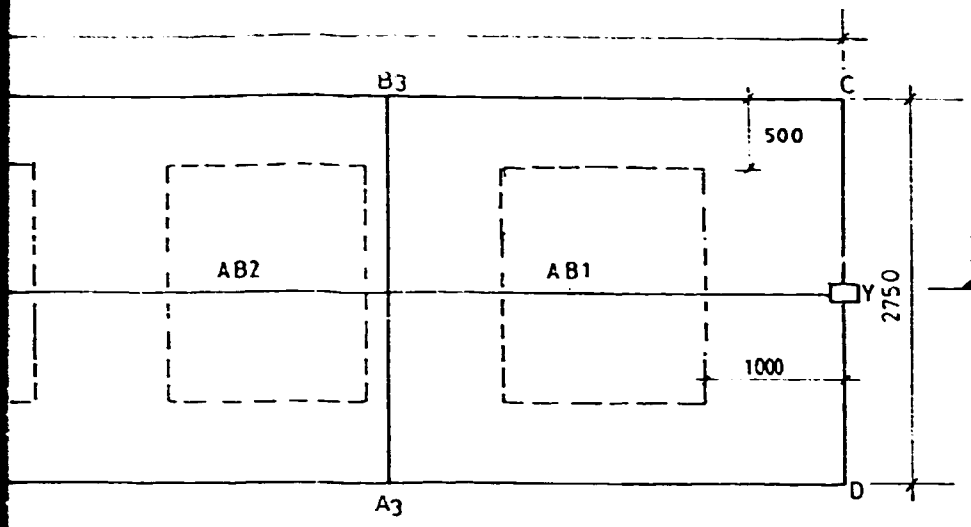


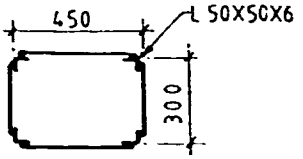
(TYPICAL CROSS TRUSS AT AB, A_1B_1, A_2B_2, A_3B_3

SEC-AA

DET. OF BLOWER SHED

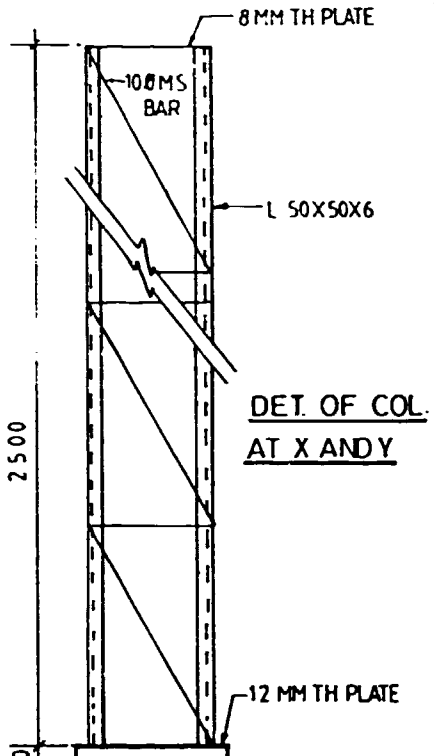
U E M Inc FLORIDA U.S.A.	PTIET MADRAS	AERATION P SI





PLAN

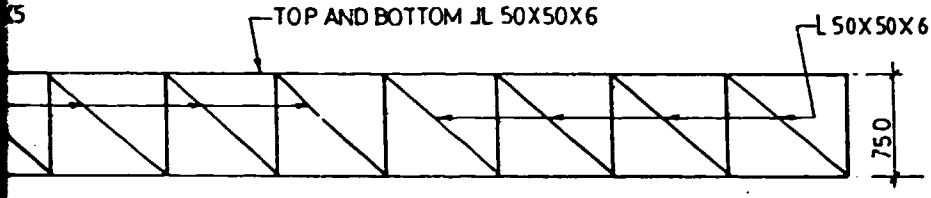
B



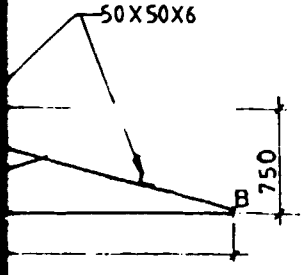
DET. OF COL. AT X AND Y

DET. OF COLUMN FOUNDATION

N



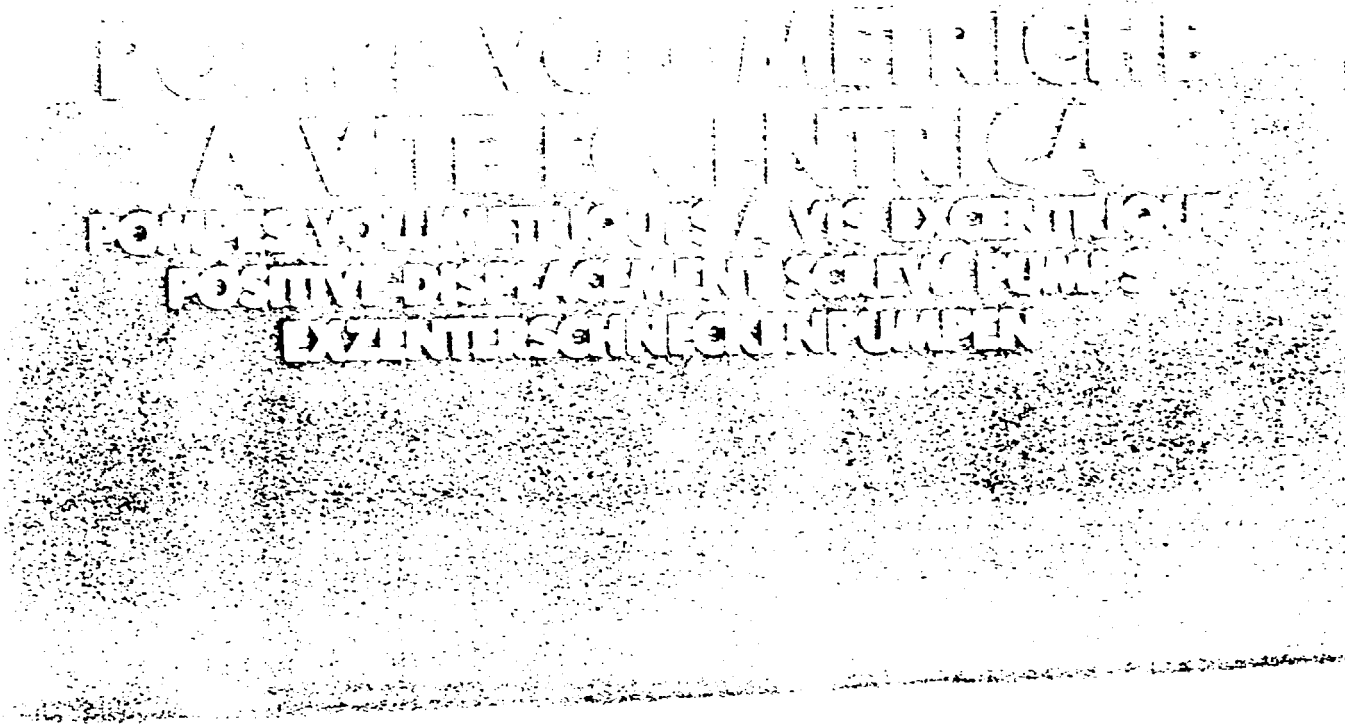
COLUMNS AT X AND Y)



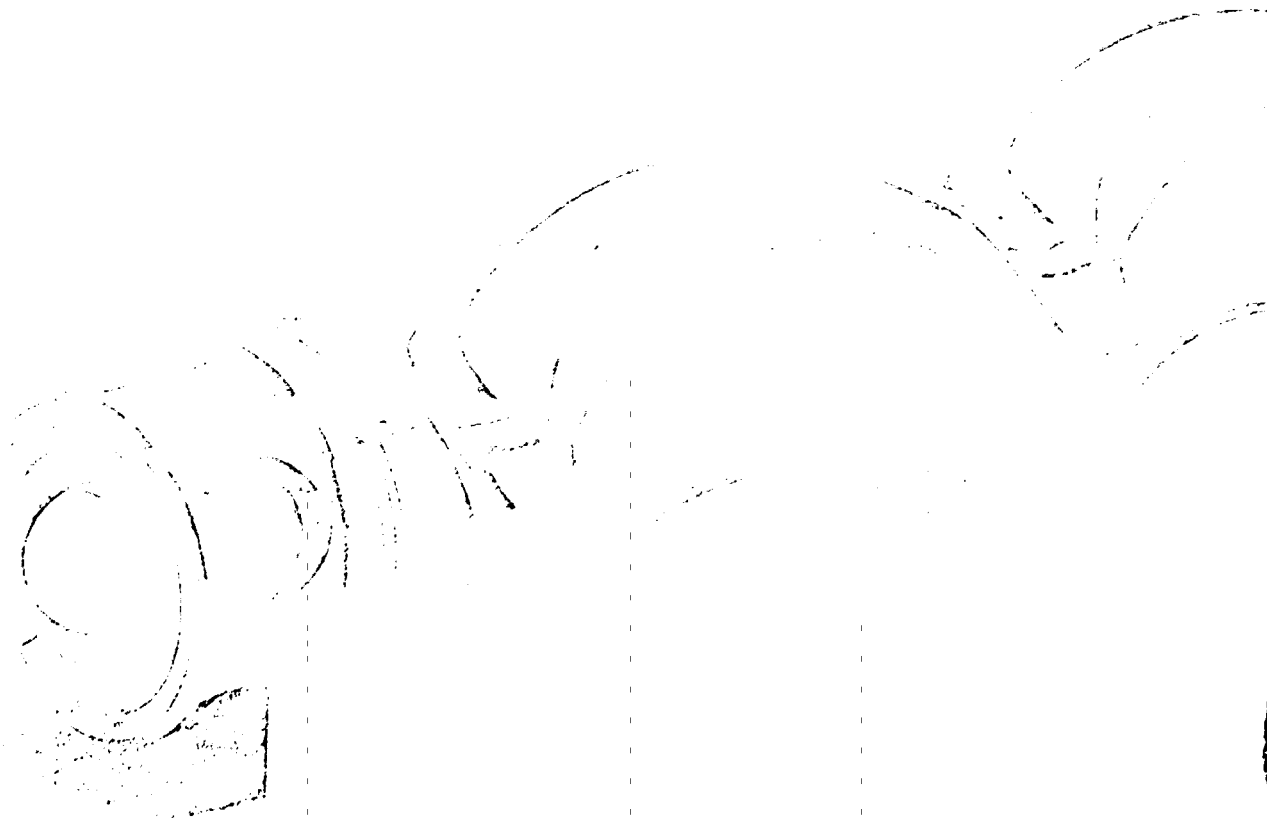
1, A_2B_2, A_3B_3 AND DC)

SHED

RATION PIPING SHEET NO 7	DRG NO UEM/93/PTE/036 SHEET NO. 7	DRN BY R C Prajapati	5.08.93
	PROJ NO UEM/9303	CKD BY	
	REVISION.	APPD BY	



non centrifuga, non lamina non maltratta il prodotto



La monovite è una pompa autoadescante volumetrica ad un solo asse rotante. Rotore in acciaio e statore in gomma sono gli elementi principali per il pompaggio. Il rotore è una vite a sezione circolare ad un solo principio con passo molto ampio. Lo statore in gomma è vulcanizzato all'interno di un tubo in acciaio; ha un'anima cava a forma di vite a due principi, con sezione circolare come quella del rotore e passo pari al doppio del passo del rotore.
Il rotore ruotando all'interno dello statore è costretto a compiere un movimento ipocicloidale; durante tale movimento le cavità individuate fra rotore e statore compiono un movimento elicoidale e trasportano il fluido incamerato dalla sezione di aspirazione verso la sezione di mandata.

The screw pump is a positive-displacement self-priming pump with one single rotating shaft.
The steel rotor and the rubber stator are the main pumping elements. The rotor is a circular section single-threaded screw with a very wide pitch. The rubber stator is vulcanized inside a steel pipe; it has got a hollow core shaped as a double-threaded screw, with circular section like the rotor one and with a pitch which is the double of the one of the rotor.
The rotor turning inside the stator, is forced to perform a hypocycloidal movement; during such movement, the recesses between rotor and stator perform a helicoidal movement and convey the product from suction to outlet.

La pompe monovis est une pompe autoamorçante volumetrique avec un seul arbre tournant. Le rotor en acier et le stator en cautchouc sont les élements principaux pour le pompage. Le rotor est une vis à section circulaire à filetage simple avec un pas très large. Le stator en cautchouch est vulcanisé à l'interieur d'un tube d'acier; il a une âme en forme de vis à filetage double par rapport à celui du rotor. En tournant à l'intérieur du stator, le rotor est obligé à accomplir un mouvement hypocycloïdal; pendant ce mouvement le cavités entre stator et rotor accomplissent un mouvement helicoïdal, ainsi charriant le fluide de l'aspiration au réfoulement.

Die Schraubenpumpe ist eine selbstansaugende Exzenterschneckenpumpe mit einer einzigen Drehwelle. Rotor aus Stahl und Stator aus Gummi sind die Hauptteile für das Pumpen. Der Rotor ist eine eingängige Schraube mit kreisförmiger Querschnitt und großer Gewindesteigung. Der Stator aus Gummi ist vulkanisiert innerhalb eines Stahlrohres; er hat einen Hohlkern in Form einer zweigängigen Schraube mit Doppelgewindesteigung in Vergleich zu der Rotorsteigung.
Beim Drehen innerhalb des Stators, ist der Rotor gezwungen, eine hypozykloidenförmigen Bewegung auszuführen; während dieser Bewegung führen die Hohlräume zwischen Rotor und Stator eine schraubenförmige Bewegung aus, und so fördern sie das Produkt vom Einlaß zum Auslaß.

CARATTERISTICHE GENER

TEMPERATURA
La tempertura massima del fluido è determinata dal tipo di elastomero dello statore
Dipende inoltre dalla natura del fluido e dalle condizioni di funzionamento della pompa

ASPIRAZIONE
La pompa a vite è autoaspirante anche a regime di giri bassi e per fluidi come acqua alla Temp 20°C , peso specifico = 1 e viscosità 1°E è in grado di aspirare una colonna di 7 mt

MANDATA
La pompa lavora secondo il principio delle pompe volumetriche, cioè con spinta positiva trasportando una quantità costante di fluido, uniformemente senza pulsazioni

FLUIDI POMPABILI
Con questo tipo di pompa (compatibilmente con la resistenza chimica e meccanica dell'elastomero dello statore) si è in grado di pompare qualsiasi tipo di fluido e pasta non tixotropica fino a viscosità di 150/200.000 c.p.s e con pompe serie MC fino a viscosità di 800.000 c.p.s. Possono essere pompati fluidi con sostanze solide in sospensione senza pregiudicare il buon funzionamento della pompa.

AVVIAMENTO E REGOLAZIONI
Per una buona salvaguardia dello statore della pompa occorre effettuare il riempimento della pompa col fluido da pompare ed assicurarsi che le valvole di intercettazione sulle tubazioni di aspirazione e mandata siano totalmente aperte.
Per regolare la portata del fluido occorre intervenire sul numero di giri della pompa se questa è accoppiata a variatore continuo di velocità, oppure applicare un by-pass con valvola regolabile, fra bocca di mandata e bocca di aspirazione.

RACCOMANDAZIONI
1) Non fare mai funzionare a secco la pompa; si rischia di bruciare l'elastomero dello statore.
2) Non regolare mai la portata strozzando la valvola di mandata in quanto, essendo una pompa positiva, si andrebbe ad aumentare notevolmente lo sforzo sull'asse rotore con conseguente danno per gli organi di trasmissione ed il motore, se non protetti da teleruttore per sovraccarichi.

DATI NECESSARI PER LA SCELTA APPROPRIATA DI UNA POMPA

1) Tipo di installazione ad uso dell'impianto a cui è destinata.
2) Prevalenza in aspirazione (altezza geodetica negativa o battente).
3) Natura fisico chimica del fluido da pompare.
4) Viscosità - peso specifico - temperatura del fluido da pompare.
5) Prevalenza totale (altezza geodetica più perdite di carico).
6) Diametro delle tubazioni, loro sviluppo, valvole di intercettazione, curve, ecc. per determinare le perdite di carico.
7) Dati elettrici tensione e frequenza di alimetazione motore.
8) Tipo di accoppiamento Motore - Pompa (diretto con motoriduttore con Motovariatore - pompe ad asse nudo).
9) Portata in litri/min.

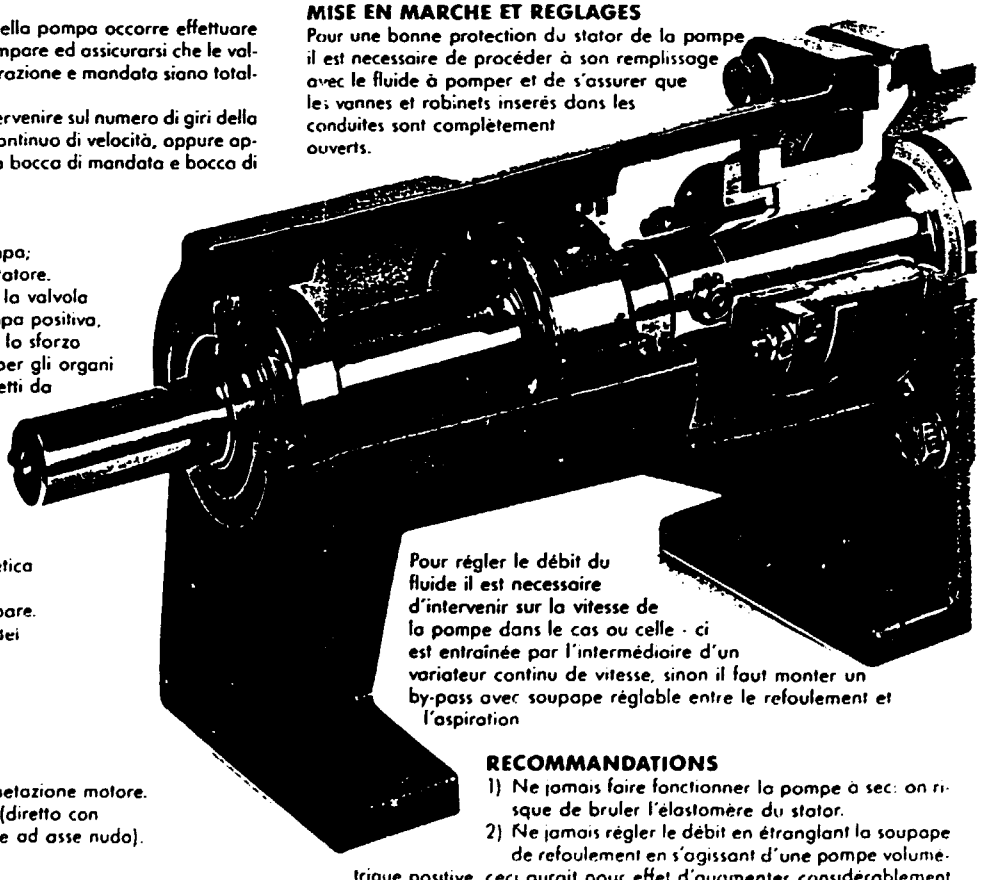
TEMPERATURE
La température maximale admissible pour le fluide a pomper depend du type d'elastomère utilisé pour le stator
Elle dépend aussi du fluide a pomper et des conditions de service de la pompe

ASPIRATION
La pompe à vis est auto-amorçante même au ralenti et avec fluides comme l'eau à 20°C, poids specifique 1 et viscosite 1°E, la capacite d'aspiration est de 7 mètres

REFOULEMENT
La pompe travaille selon le principe des pompes volumetriques, c'est a dire avec poussée positive, et transporte une quantite constante de fluide uniformement et sans pulsations.

FLUIDES POMPABLES
Avec ce type de pompe (conformement a la resistance chimique et mecanique de l'élastomere du stator) il est possible de pomper n'importe quel fluide a pâte non thixotropique jusqu'à une viscosité de 150/200.000 cps, et dans des cas exceptionnels, avec la série MC, jusqu'à une viscosité de 800.000 cps.
On peut pomper sans préjudice pour le bon fonctionnement de la pompe des fluides contenants des matières solides en suspension.

MISE EN MARCHE ET REGLAGES
Pour une bonne protection du stator de la pompe il est necessaire de procéder à son remplissage avec le fluide à pomper et de s'assurer que les vannes et robinets inserés dans les conduites sont complètement ouverts.



Pour régler le débit du fluide il est necessaire d'intervenir sur la vitesse de la pompe dans le cas ou celle - ci est entraînée par l'intermédiaire d'un variateur continu de vitesse, sinon il faut monter un by-pass avec soupape réglable entre le refoulement et l'aspiration

RECOMMANDATIONS
1) Ne jamais faire fonctionner la pompe à sec: on risque de bruler l'élastomère du stator.
2) Ne jamais régler le débit en étranglant la soupape de refoulement en s'agissant d'une pompe volumétrique positive, ceci aurait pour effet d'augmenter considérablement l'effort sur l'axe du rotor, ce qui endommagerait les organes de transmission et le moteur, s'ils ne sont pas dotés d'un système de protection contre les surcharges.

DONNES NECESSAIRES POUR LE CHOIX APPROPRIE D'UNE POMPE
1) Type d'installation et d'usage auquels elle est destinée.
2) Hauteur manometrique d'aspiration positive ou negative.
3) Nature physique chimique du fluide a pomper.
4) Viscosite - poids spécifique - temperature du fluide a pomper.
5) Hauteur manometrique totale (hauteur geodetique plus pertes de charge)
6) Diametre des tuyauteries, leur développement, soupapes d'interception, courbes, etc... pour déterminer les pertes de charge.
7) Données electriques, tension et fréquence d'alimentation moteur.
8) Type d'accouplement moteur - pompe (direct avec moto-réducteur - avec moto-variateur - pompe a arbre nu)
9) Débit en litres/min.

ENERALI

CARACTERISTIQUES GENERALES
GENERAL FEATURES
TECHNISCHE EIGENSCHAFTEN

TEMPERATURES
The max. admissible temperature of the liquid to be pumped depends on the elastomer used for the stator. It also depends on the nature of the liquid and on the pump operating conditions.

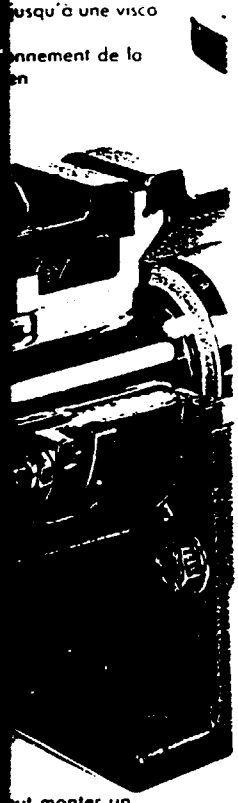
SUCTION
The CSF screw pump is self-priming even at low speed and in case of liquids such as water, at 20°C, specific weight = 1 and viscosity 1°E, it is able to suck a 7 m column.

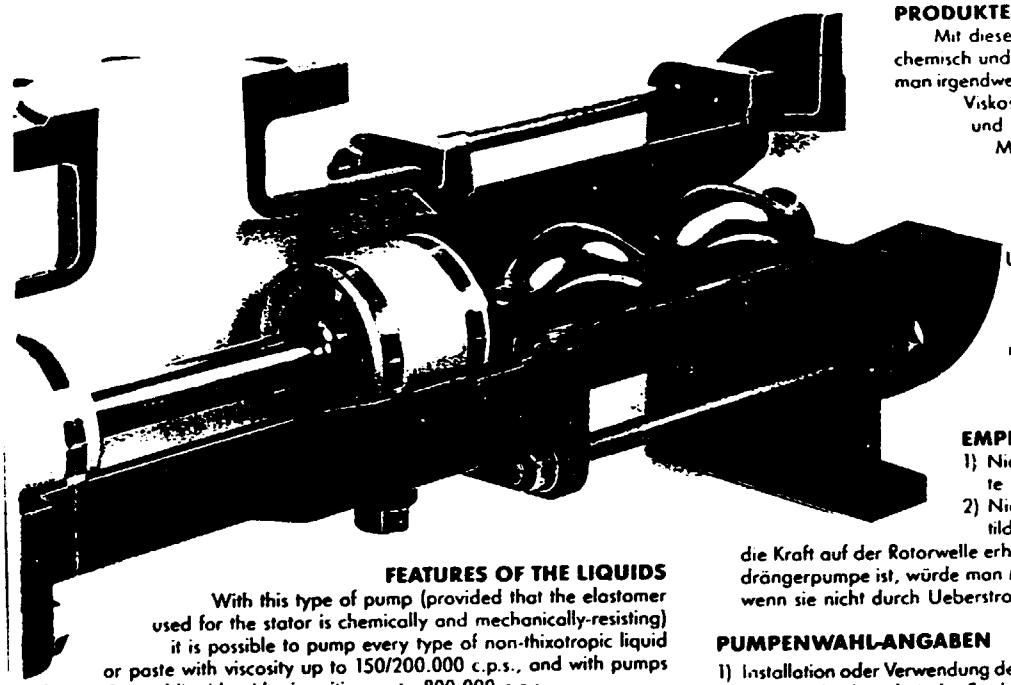
OUTLET
The pump works on the principle of volumetric pumps, that is with positive displacement and moving a constant amount of liquid, uniformly and without pulsations.

TEMPERATUR
Die max. zulässige Temperatur wird vom Stators-Elastomerstyp bestimmt. Es hängt auch von der Produktbeschaffenheit und von der Pumpenbetriebsbedingungen ab.

SAUGEN
Die Schraubenpumpe ist selbstansaugend auch mit niedriger Drehzahl und mit Produkte - wie z.B. Wasser, 20°C, spezifisches Gewicht 1 und Viskosität 1°E - kann sie 7 m. Wassersäule ansaugen.

FÖRDERLEISTUNG
Die Pumpe funktioniert nach dem Prinzip der Verdranderpumpen, d.h. mit Zwanglauf und sie fordert eine konstante Produktsmenge gleichmässig und ohne Pulsschlage.





PRODUKTE
Mit diesen Pumpen (soweit der Statorselastomer chemisch und mechanisch widerstanddfahig ist) kann man irgendwelches Fluidum oder Unthixatroppaste mit Viskosität bis zum 150/200.000 cps pumpen, und mit der MC-Serie bis zum 800.000 cps. Man kann auch Fluida mit Schwebestoffe pumpen, ohne damit der guten Betrieb der Pumpe zu beeintrachtigen.

FEATURES OF THE LIQUIDS
With this type of pump (provided that the elastomer used for the stator is chemically and mechanically-resisting) it is possible to pump every type of non-thixotropic liquid or paste with viscosity up to 150/200.000 c.p.s., and with pumps of the MC serial liquids with viscosities up to 800.000 c.p.s.
It is possible to pump liquids with solid suspended particles without undermining the good working of the pump.

STARTING AND ADJUSTMENTS
In order to avoid any damage to the pump stators, it is necessary to fill the pump with the liquid to be pumped and to make sure that the inlet/outlet on-off valves are wholly open.
To adjust the liquid delivery, if the pump is coupled to a variable speed unit, adjust the pump speed. If not, install a by-pass with control valve, between inlet and outlet connections.

ANLAUF UND EINSTELLUNG
Um den Pumpenstator zu schutzen, muß man auf die Pumpendrehzahl wirken, wenn diese mit einem stufenlosen Getriebe gekuppelt ist; sonst muß man einen Nebenweg mit verstellbarem Ventil zwischen Einlaß- und Auslaßanschlüße anmontieren.

WARNINGS
1) Never let the pump run dry; you risk to burn the stator elastomer.
2) Never regulate delivery by partially closing the outlet valve; in fact, being a positive pump, this would only mean a considerable load increase on the stator shaft, with consequent damage to transmission and motor, if they are not protected by an overload switch.

EMPFEHLUNGEN
1) Nie die Pumpe leerlaufen lassen; sonst konnte man den Statorselastomer ausbrennen.
2) Nie die Fördermenge durch die Auslaßventildrosselung einregulieren; sonst würde man die Kraft auf der Rotorwelle erhohen und seitdem diese Pumpe eine Verdrängerpumpe ist, würde man Motor und Antriebsglieder beschadigen wenn sie nicht durch Ueberstromfernschalter geschützt werden.

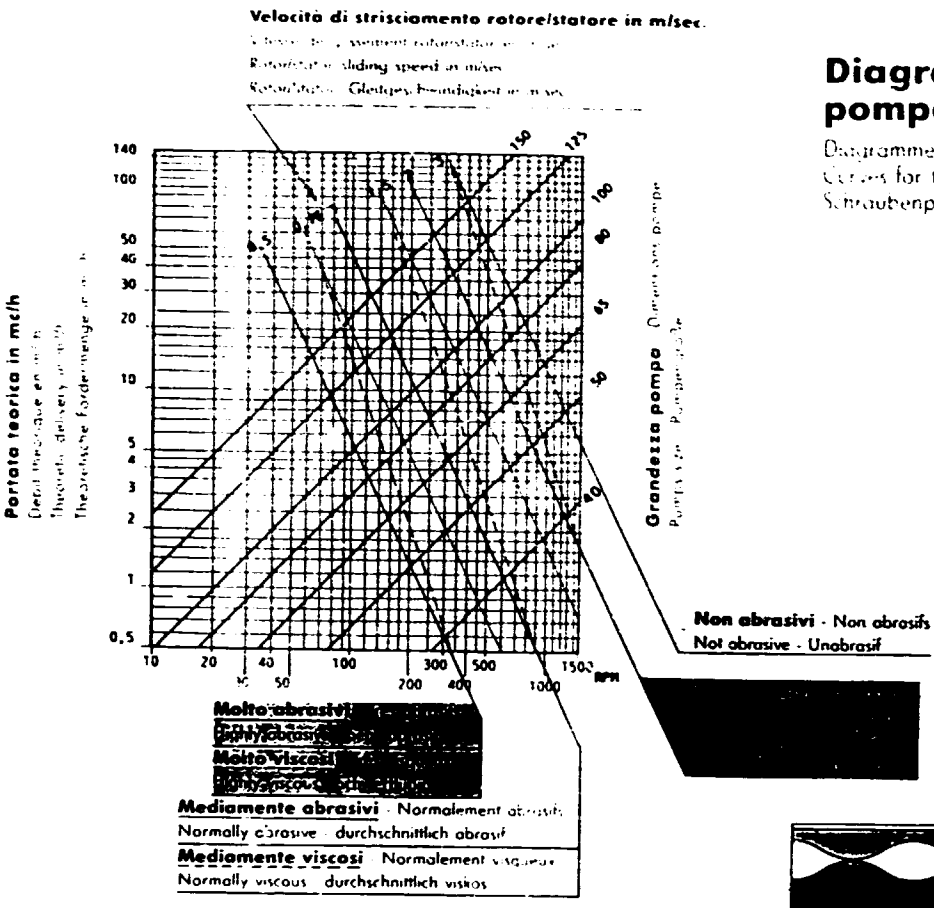
DATA NECESSARY TO THE CORRECT CHOICE OF A PUMP
1) Installation type and use where it is meant to.
2) Suction head (positive or negative).
3) Phisico-chemical nature of the product to be pumped.
4) Viscosity, specific weight, temperature of the product to be pumped
5) Total head (geodetic height + pressure losses).
6) Pipes diameter, development, on-off valves, bends etc., to calculate pressure losses.
7) Motor tension and frequency.
8) Motorization, if any (direct coupling, geared motor, variable speed unit, bare shaft pump).
9) Delivery in Litres/min.

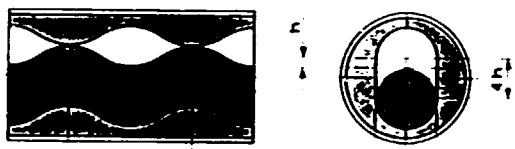
PUMPENWAHL-ANGABEN
1) Installation oder Verwendung der Anlage, wo die Pumpe anmontiert wird
2) Förderhöhe (geodätische Förderhöhe, negative oder positive)
3) Physikochemische Beschaffenheit des Produktes.
4) Viskosität - spezifisches Gewicht - Temperatur des Produktes.
5) Gesamtförderhöhe (geodätische Förderhöhe plus Strömungsverlust).
6) Rohrleitungendurchmesser, ihre Abwicklung, Absperrventile, Krummer u.s.w.; um den Strömungsverlust kalkulieren zu können.
7) Elektrische Angaben: Antriebsspannung - und Frequenz.
8) Motor/Pumpe-Kupplung (direkte - mit Reduktionsgetriebe - mit stufenlosem Getriebe - Pumpe ohne Motorisierung).
9) Fördermenge in l/min.

CALCOLO E DESIGNAZIC

Diagramma per la scelta pompe monovite

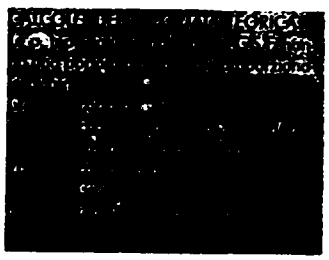
Diagramme pour le choix des pompes monovis
Curves for the choice of screw pumps
Schraubenpumpenwahl Diagramm





CALCOLO DELLA PORTATA TEORICA
CALCUL DU DEBIT THEORIQUE
THEORETIC DELIVERY CALCULATIONS
BERECHNUNG DER THEORETISCHEN FÖRDERMENGE

$$Q = d \cdot 4h \cdot 2p \cdot n$$



CALCUL DU DEBIT THEORIQUE

Les pompes volumetriques a vis C S F. ont un debit directement proportionnel a la vitesse de rotation.

- Q = Debit en litres/minute
- h = Excentricite du rotor en dm
- p = Pas du rotor en dm (2p = pas du stator)
- n = Nombre de tours par minute
- d = Diametre du rotor en dm

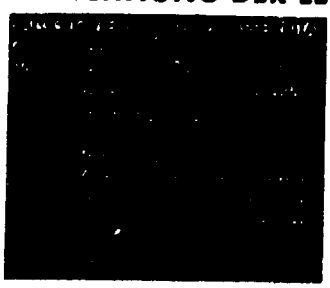
BERECHNUNG DER THEORETISCHEN FÖRDERMENGE

Die Fördermenge der CSF-Schraubenpumpen ist der Drezahl direkt proportional.

- Q = Fördermenge in l/min.
- h = Rotorsexzentrizität in dm.
- p = Rotorssteigung in dm.
- 2p = Statorssteigung
- n = Umdrehugen/min.
- d = Rotorsdurchmesser in dm.

CALCOLO DELLA POTENZA ASSORBITA
CALCUL DE LA PUISSANCE ABSORBEE
ABSORBED POWER CALCULATION
BERECHNUNG DER LEISTUNGSAUFNAHME

$$Na = \frac{Q \cdot H \cdot \gamma}{4500 \cdot \eta}$$



CALCUL DE LA PUISSANCE ABSORBEE

- Q = Debit en litres par minute
- Na = Puissance absorbee en CV
- H = Hauteur manometrique totale en metres de colonne de liquide
- γ = Poids specifique du liquide en kg/dm³
- η = Rendement total (donne par le produit du rendement volumetrique par le rendement mecanique)

BERECHNUNG DER LEISTUNGSAUFNAHME

- Q = Fördermenge in l/min
- Na = Leistungsaufnahme in PS
- H = Gesamtförderhöhe in m. ~~Wassersäule~~
- γ = spezifisches Gewicht des Produktes in kg/dm³
- η = Gesamtwirkungsgrad (d.h. Produkt des volumetrischen Wirkungsgrad mit dem mechanischen Wirkungsgrad)

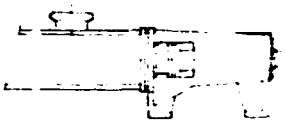
VERSIONI - ESECUZIONI

VERSIONS - EXECUTIONS — VERSIONS - EXECUTIONS — VERSIONEN - AUSFÜHRUNGEN

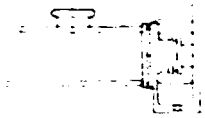
Sistema di tenuta - giunto - versione - serie
Système de garniture - joint - version - série
Seal system - joint - version - serial
SI-System - Dichtung - Kupplung - Version - Serie

Normale · Standard · Standard · Standard
A richiesta · Sur demande · Upon request · Auf Wunsch
Non possibile · Impossible · Impossible · Unmöglich

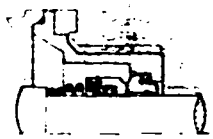
Supportazione indipendente / **Indépendant** / **With independent support** / **Unabhängige Halterung** — Versione / Version / Version / Version **N**



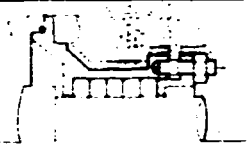
Supportazione flangiata / **Avec flange** / **With flange** / **Halterung mit Flanschen** **E**



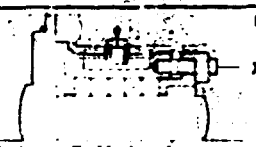
Sistemi di tenuta
Garnitures
Sealings
Dichtungen



Meccanica a seconda dei vari prodotti
Garniture mécanique conforme aux diverses produits
Mechanical seal according to products
Mechanische Dichtung gemäß der Produkten



A baderna
À presse-étoupe
Packed gland
Stopfbüchse

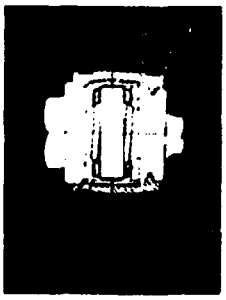


Esecuzione XT
Exécution XT
Execution XT
XT-Ausführung

A baderna raffreddata
Presse-étoupe refroidi
Cooled packed gland
Abgekühlte Stopfbüchse

Esecuzione Y
Exécution Y
Execution Y
Y-Ausführung

À baderna
Presse-étoupe
Packed gland
Stopfbüchse



Grandezza Dimens. Size Größe	SERIE	VERSIONE E (Meccanica · A baderna · XT · Y)	VERSIONE N (Meccanica · A baderna · XT · Y)
40	MA cod. CED: ZMA	I I I I	Δ I · O I · Δ I · Δ I
50		I I I I	Δ I · O I · Δ I · Δ I
65		A A A A	Δ A · O A · Δ A · Δ A
80		A A A A	Δ A · O A · Δ A · Δ A
100		A A A A	Δ A · O A · Δ A · Δ A
125	Alimentare · Alimentaire · Alimentary · Für Nahrungsmitteln	A A A A	Δ A · O A · Δ A · Δ A
50	MI cod. CED: ZMI	I I I I	Δ I · O I · Δ I · Δ I
65		A A A A	Δ A · O A · Δ A · Δ A
80		A A A A	Δ A · O A · Δ A · Δ A
100		A A A A	Δ A · O A · Δ A · Δ A
125	Industriale · Industrielle · Industrial · Für Industrie	A A A A	Δ A · O A · Δ A · Δ A
150			Δ A · O A · Δ A · Δ A
50	MC cod. CED: ZMC	I I I I	Δ I · O I · Δ I · Δ I
65		A A A A	Δ A · O A · Δ A · Δ A
80		A A A A	Δ A · O A · Δ A · Δ A
100		A A A A	Δ A · O A · Δ A · Δ A
125	Con tramoggia a coclea · Avec trémie et vis sans fin de pré-alimentation · With hopper and pre-feeding screw · Mit Trichter und Förderschnecke	A A A A	Δ A · O A · Δ A · Δ A
150			Δ A · O A · Δ A · Δ A
65	MCR cod. CED: ZMR	A A A A	Δ A · O A · Δ A · Δ A
80		A A A A	Δ A · O A · Δ A · Δ A
100		A A A A	Δ A · O A · Δ A · Δ A
125	Con tramoggia coclea e frangiore · Avec trémie, vis sans fin de pré-alimentation et concasseur · With hopper, pre-feeding screw and vane crusher · Mit Trichter, Förderschnecke und Rührer	A A A A	Δ A · O A · Δ A · Δ A
150			Δ A · O A · Δ A · Δ A
65	MC2R cod. CED: ZMR2		Δ A · O A · Δ A · Δ A
80			Δ A · O A · Δ A · Δ A
100			Δ A · O A · Δ A · Δ A
125	Con tramoggia coclea e 2 alimentatori a pale · Avec trémie, vis sans fin de pré-alimentation et 2 alimentateur à pales · With hopper, pre-feeding screw and 2 vane feeders · Mit Trichter, Förderschnecke und 2 Flügelrührer		Δ A · O A · Δ A · Δ A
150			Δ A · O A · Δ A · Δ A

CAMPI D'IMPIEGO

CHAMPS D'EMPLOI
USES
VERWENDUNGSBEREICHE

INDUSTRIE ALIMENTARI

- Concentrati vari
- Marmellate confetture
- Creme varie
- Panna
- Estratti di verdure
- Estratti di carne
- Succhi vari
- Formaggi fusi
- Miele - Uova - Glassa - Strutto
- Paste dolciarie
- Paste di pesce
- Latte e derivati
- Omogeneizzati
- Salse varie
- Grassi vegetali
- Oli e sanse
- Melasse
- Soluzioni gelatinose
- Paste di cioccolato - Mostarde - Pectina - Senape
- Alimentazione pastorizzati
- Alimentazione presse

INDUSTRIES ALIMENTAIRES

- Concentres
- Marmelades - Confitures
- Cremes
- Creme - Miel - Oeufs - Glace
- Extraits de legumes
- Extraits de viandes
- Jus
- Fromages fondus
- Pâtes de confiserie
- Pâtes de poisson
- Lait et derives
- Omogeneisses
- Sauces
- Gras vegetaux
- Saindoux - Melasses
- Huile et marcs
- Solutions gelatineuses
- Pâtes de chocolat et [illegible]
- Glucose
- Moutardes de fruits
- Pectines
- Moutardes
- Alimentation pasteurisateurs
- Alimentation presses

INDUSTRIE DELLE BEVANDE

- Mosti e concentrati
- Vini ed alcoli
- Birra e malto
- Alimentazione filtri
- Essenze - Aromi
- Acque minerali
- Sciroppi - Lieviti
- Alimentazione riempitrici
- Latte di calce

INDUSTRIES DES BOISSONS

Moûts et concentres

- Vins et alcools
- Bière et malt
- Alimentation filtres
- Essences - Arômes
- Eaux minerales
- Sirops - Levures
- Alimentation remplisseuses
- Lait de chaux

INDUSTRIA FARMACEUTICA E COSMETICA

- Creme varie
- Paste dentifricie
- Saponi - Shampoo - Detersivi
- Bagno schiuma
- Soluzioni vitamine
- Emulsioni e dispersioni
- Paste lavamani

INDUSTRIE PHARMACEUTIQUE ET COSMETIQUE

- Cremes
- Pâtes dentifrices
- Savons - Detersifs
- Bain de mousse
- Schampooings
- Solution vitamines
- Emulsions et dispersions
- Pâtes lave mains

INDUSTRIA CHIMICA - GPAFICA - ESTRATTIVA -TESSILE

- Essenze - Resine - Collanti
- Paste PVC - Cere - Appretti - Allume
- Anticrittogamici
- Vernici e colori
- Inchiostri da stampa
- Fertilizzanti
- Acidi
- Liscive
- Destrine
- Paste di carte
- Soluzioni di amido
- Cellulosa
- Petroli - Oli
- Morchie
- Latte di calce
- Acqua di anilina

INDUSTRIE CHIMIQUE - GRAPHIQUE - EXTRACTIVE - TEXTILE

- Essences - Resines - Collants
- Pâtes PVC - Cires - Apprets - Acides
- Alun - Cellulose - Combrous
- Anticryptogamiques
- Vernis et couleurs
- Encres d'imprimeries
- Fertilisants
- Lessives
- Destrines
- Pâtes a papier
- Solutions d'amidon
- Pétroles-huiles
- Lait de chaux
- Eau d'aniline

INDUSTRA CERAMICHE EDILI ED AFFINI

- Barbottina
- Paste per colate
- Prodotti argillosi
- Fanghi vari
- Malte varie
- Latte di cemento
- Pontiglio di cristalli
- Acque varie di scarico
- Miscele - Amianto - Cemento

INDUSTRIE CERAMIQUE, DU BÂTIMENT ET SIMILAIRES

- Barbotine
- Pâtes pour coulees
- Produits argilleux
- Boues
- Mortiers
- Lait de ciment
- Bouille de cristaux
- Eaux diverses d'ecoulement
- Melange amiante - ciment

IMPIANTI DEPURAZIONE E TRATTAMENTO ACQUE

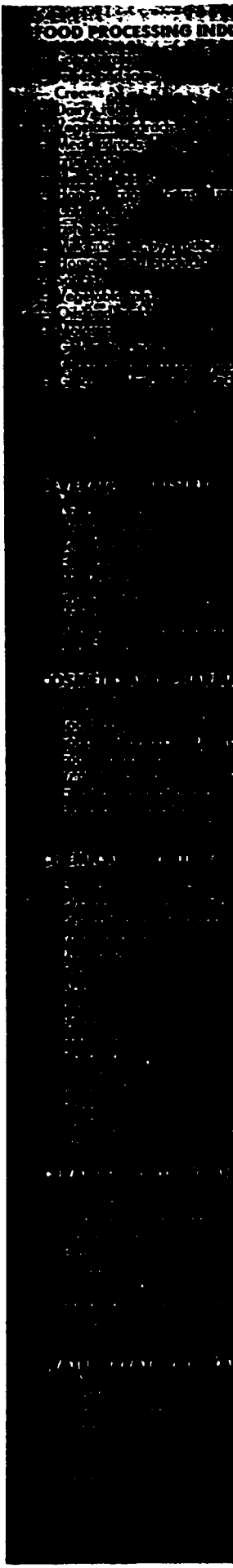
- Acque luride di scarico
- Fanghi vari
- Limo di mare
- Scarico pozzi neri
- Liscive
- Residui vari di lavorazione in sospensione ad acque o fanghi
- Scarti di macello
- Scarti di lavorazione pesce
- Scarichi organici
- Scarichi di concerie

INSTALLATION DEPURATION ET TRAITEMENT DES EAUX

- Eaux sales de decharge
- Boues
- Vase de mer
- Decharge de puits
- Lessives
- Residus varies de travail en suspension a l'eau et a la boue
- Dechets de boucheries et abattoirs
- Dechets de travail du poisson
- Dechets organiques
- Dechets de tannerie

DI

EREICHE



- TEXTILE

RES

EAUX

LEBENSMITTELINDUSTRIE

- Konzentrate und Mark
- Marmelade und Konfiture
- Creme
- Rahm
- Gemüseextrakt
- Fleisch-Extrakt
- Säfte
- Zerlassene Kase
- Honig, Eier, Glasur, Schmalz
- Mehlspeise
- Fischenpaste
- Milch und Nebenprodukte
- Homogenate
- Soßen
- Planzenfett
- Oele und Oeltrester
- Melasse
- Gallerartige Lösungen
- Schokoladen- und Kakaopasten
- Glukose, Sußspeise, Pektin, Senf
- Pasteurizatorenzuführ
- Pressenzuführ

GETRÄNKEINDUSTRIE

- Moste und Konzentrate
- Weine und Alkohole
- Bier und Malz
- Filterzuführ
- Essenze und Aromen
- Mineralwassern
- Sirupe und Hefe
- Abfüllmaschinenzuführ
- Kalkanstrich

PHARMAZEUTISCHE UND KOSMETISCHE INDUSTRIEN

- Cremes
- Zahnpasten
- Seifen, Schampums und Reinigungsmitteln
- Schaumbad
- Vitaminlösungen
- Emulsionen und Dispersionen
- Handreinigungspasten

CHEMIE-, GRAPHIK-, BERGBAU- UND TEXTILINDUSTRIE

- Essenzen, Harze und Kleber
- PVC-Pasten, Wachse, Appreturmitteln und Alaum
- Pflanzenschutzmitteln
- Farben und Lacke
- Druckfarben
- Dünger
- Säuren
- Laugen
- Dextrin
- Papierstoffe
- Amylumlösung
- Zellulose
- Erdöle und Oele
- Schlämme
- Kleber
- Phenylaminwasser

TONWAREN- UND BAUINDUSTRIEN UND AEHNLICHE

- Bindungen
- Giessenpasten
- Tonige Produkte
- Drecke
- Mörtel
- Kalkanstrich
- Kristallkotes
- Fabrikabwasser
- Asbest, Zement und Gemische

WASSERAUFBEREITUNGS- UND BEHANDLUNGS- ANLAGEN

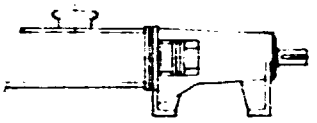
- Schwarzwasser
- Drecke
- Schluff
- Sentgrubenabfluss
- Laugen
- Wasser- und Dreckenbehandlungsrückstände
- Schlachthäuserabfälle, organische Mülles
- Gerbereiabfälle

MOTORIZZAZIONI

MOTORIZATIONS
MOTORIZATIONS
MOTORISIERUNGEN

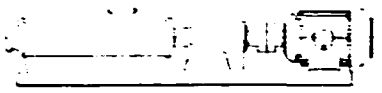
PER POMPE VERSIONE
POMPES VERSION
PUMPS VERSION
PUMPEN VERSION

N



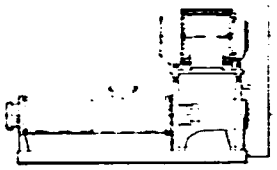
MAN - MIN - MCN - MCRN - MC2RN

FB



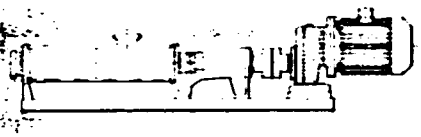
Motore diretto - Base fissa
Moteur direct, base fixe
Direct motor and fixed base
Direktmotor mit fester Grundplatte

FD



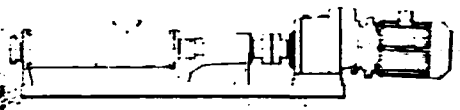
Motore e pulegge - Base fissa
Moteur, poulies et base fixe
Motor, pulleys and fixed base
Motor, Scheiben und feste Grundplatte

FE



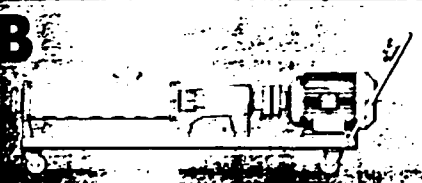
Motore riduttore - Base fissa
Moteur, réducteur et base fixe
Motor, reduction box and fixed base
Motor, Reduktionsgetriebe und feste Grundplatte

FF



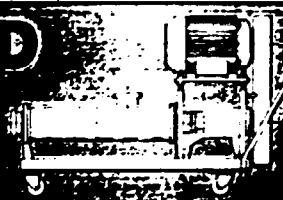
Motore variatore - Base fissa
Moteur, variateur de vitesse et base fixe
Motor, variable speed unit and fixed base
Motor, stufenloses Getriebe und feste Grundplatte

F1B



Motore diretto - Carrello
Moteur direct et chariot
Direct motor and trolley
Direktmotor und Wagen

F1D

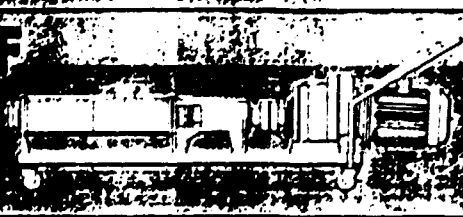


Motore e pulegge - Carrello
Moteur, poulies et chariot
Motor, pulleys and trolley
Motor, Scheiben und Wagen

F1E

Motore riduttore - Carrello
Moteur, réducteur et chariot
Motor, reduction box and trolley
Motor, Reduktionsgetriebe und Wagen

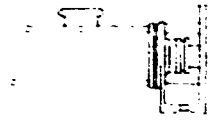
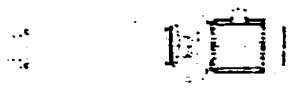
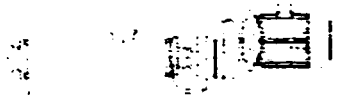
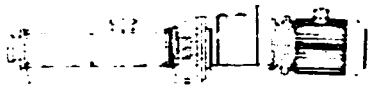
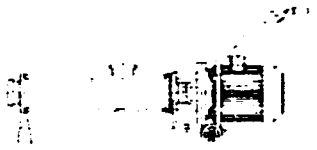
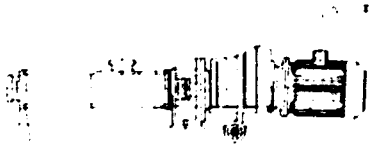
F1F



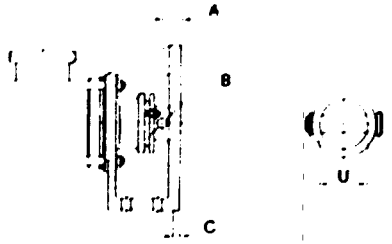
Motore variatore - Carrello
Moteur, variateur de vitesse et chariot
Motor, variable speed unit and trolley
Motor, stufenloses Getriebe und Wagen

MOTORIZZAZIONI

MOTORIZATIONS
MOTORIZATIONS
MOTORISIERUNGEN

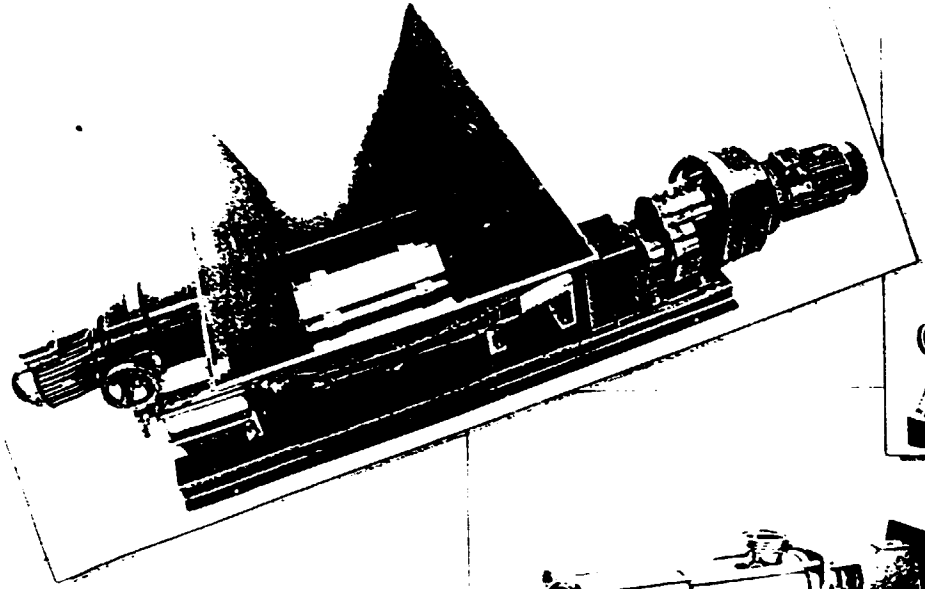
E		**MAE - MIE - MCE - MCRE**
FB		**Motore diretto - Base fissa** Moteur direct, base fixe Direct motor and fixed base Direktmotor mit fester Grundplatte
FE		**Motore riduttore - Base fissa** Moteur, réducteur et base fixe Motor, reduction box and fixed base Motor, Reduktionsgetriebe und feste Grundplatte
FF		**Motore variatore - Base fissa** Moteur, variateur de vitesse et base fixe Motor, variable speed and fixed base Motor, stufenloses Getriebe und feste Grundplatte
F1B		**Motore diretto - Carrello** Moteur direct et chariot Direct motor and trolley Direktmotor und Wagen
F1E		**Motore riduttore - Carrello** Moteur, réducteur et chariot Motor, reduction box and trolley Motor, Reduktionsgetriebe und Wagen
F1F		**Motore variatore - Carrello** Moteur, variateur de vitesse et chariot Motor, variable speed unit and trolley Motor, stufenloses Getriebe und Wagen

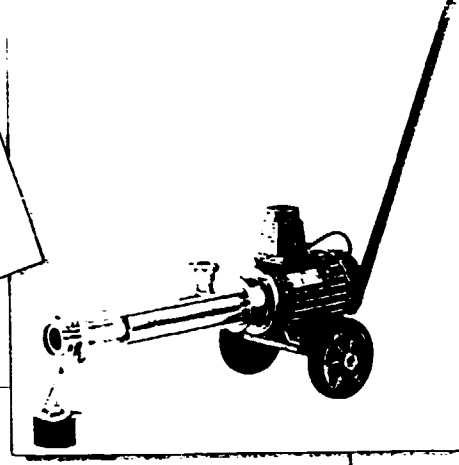
ALBERO POMPA VERSIONE E - DIMENSIONI DI ACCOPPIAMENTO

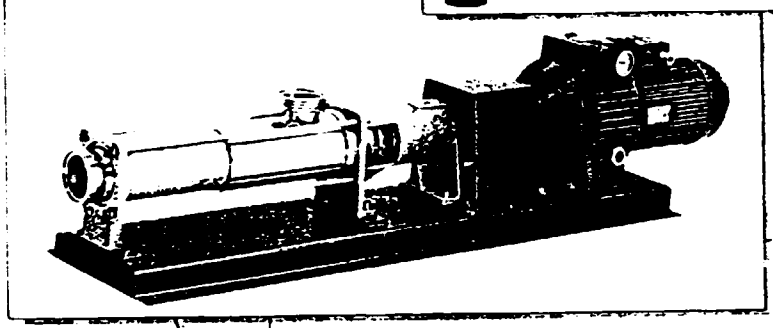


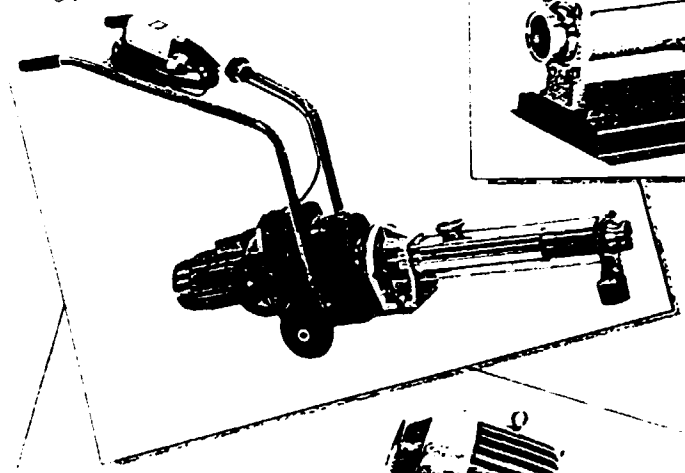
	TIPO					
	M 40	M 50	M 65	M 80	M 100	M 125
A	20	25	25	26	30	32
B H7	8	10	14	16	16	18
C		10	10	10	10	10
U H7	19	24	32	35	42	55

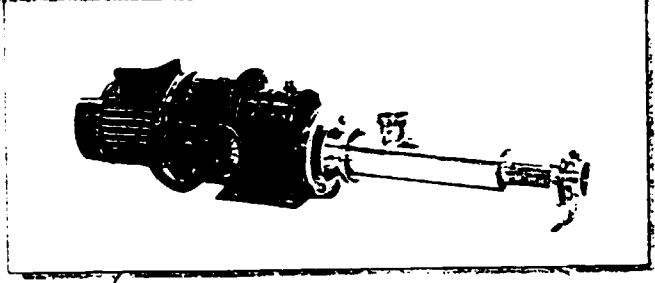
ACC

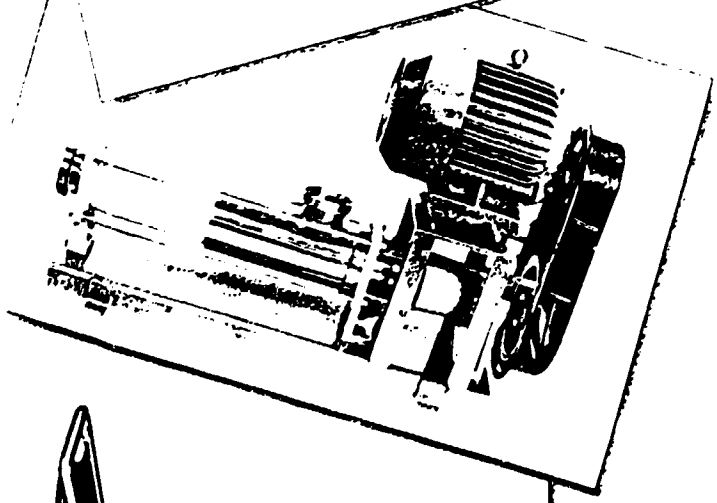


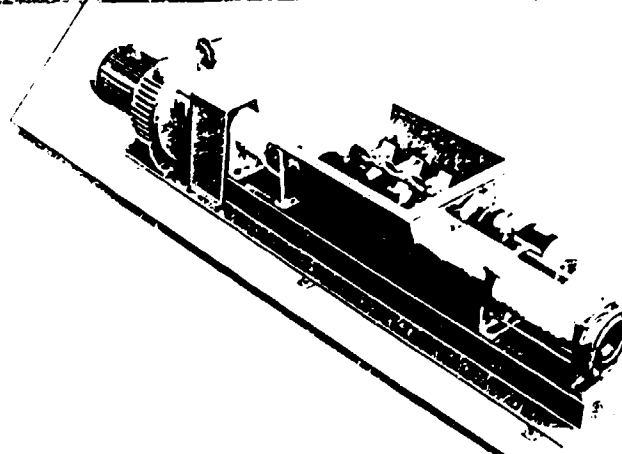


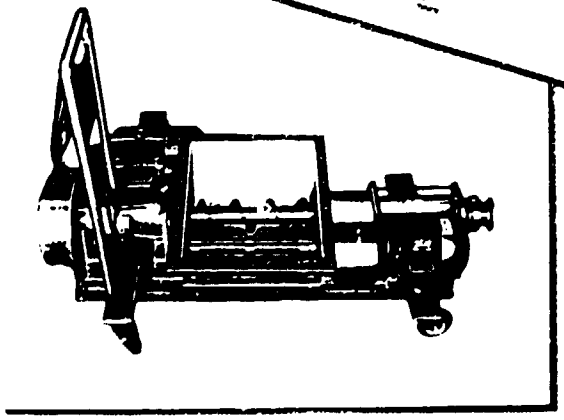




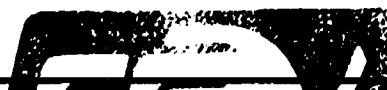








CATALOGO
CATALOGUE
CATALOG
KATALOG



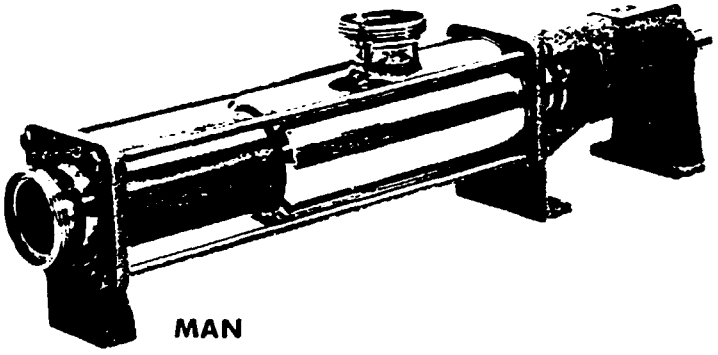
POMPE VOLUMETRICHE A VITE ECCENTRICA

SERIE
SERIE
SERIES
SERIE

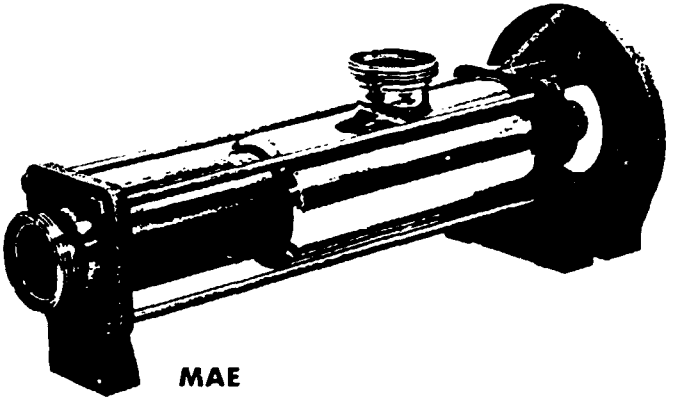
MA

ALIMENTARE
ALIMENTAIRE
ALIMENTARY
FÜR NAHRUNGSMITTELN

Cod. CED: ZMA



MAN



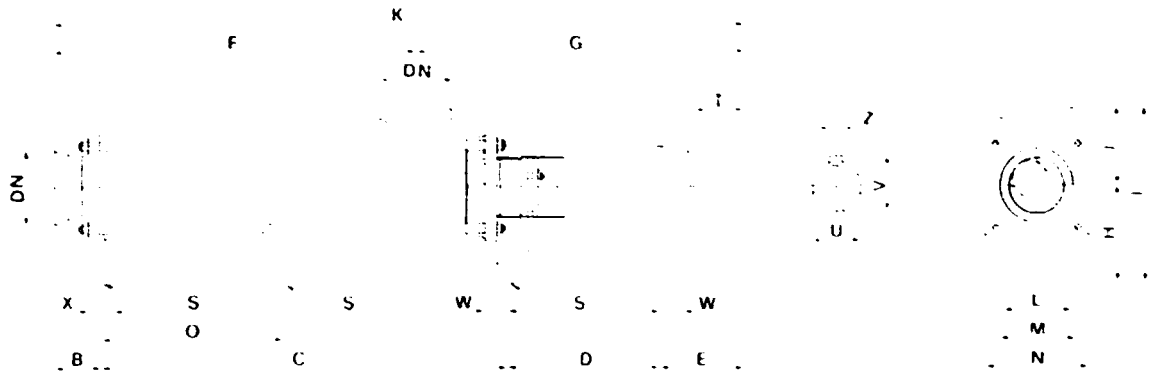
MAE

Pompes série alimentaire avec large chambre d'aspiration sans aucun point de sta-

SERIE
SERIE
SERIES
SERIE

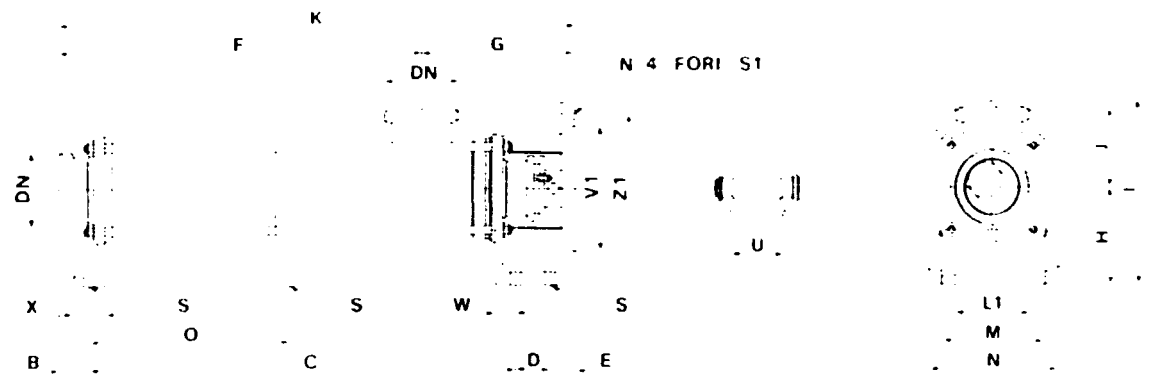
MAN

SUPPORTAZIONE INDIPENDENTE
INDEPENDANT
WITH INDEPENDENT SUPPORT
UNABHANGIGE HALTERUNG



MAE

SUPPORTAZIONE FLANGIATA
[illegible]



DN
DN
DN
DN

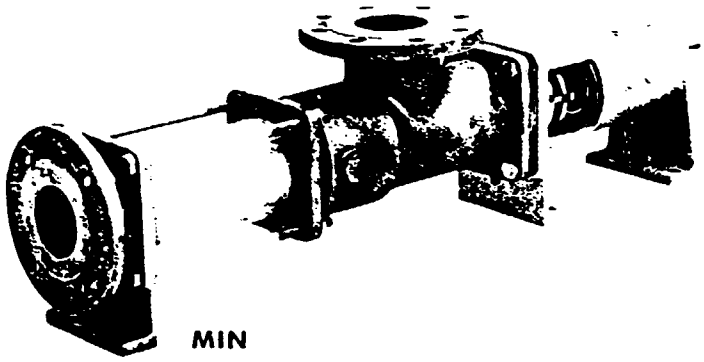
TIPO	B	C	D	E	F	G	R	H	J	I	L	L1	M	N	O	DN	S	T	U	V	Z	V1	Z1	X	A	P
MAN 40-1	15	430	—	166	334	276	610	90	78	168	82	60	60	82	—	40	10	40	14	17	5			40	40	9
MAN 40-2	15	530	–	166	434	276	710	90	78	168	82	60	60	82	—	40	10	40	14	17	5			40	40	11
MAN 50-1	70	513	153	81	450	367	817	100	70	170	70	—	85	110	—	50	12	50	25	28	8			38	27	22
MAN 50-2	70	663	153	81	600	367	967	100	70	170	70	—	85	110	—	50	12	50	25	28	8			38	27	27
MAN 65-1	63	556	204	103	438	488	926	125	100	225	90	—	108	138	—	65	14	65	28	31	8			38	25	35
MAN 65-2	63	756	204	103	638	488	1126	125	100	225	90	—	108	138	363	65	14	65	28	31	8			38	25	42
MAN 80-1	72	610	225	123	536	494	1030	140	110	250	100	—	115	155	—	80	14	75	35	38,5	10			38	34	49
MAN 80-2	72	860	225	123	786	494	1280	140	110	250	100	—	115	155	471	80	14	75	35	38,5	10			38	34	60
MAN 100-1	53	848	274	142	648	669	1317	160	148	308	—	145	145	185	—	100	18	90	42	46,5	12			60	35	84
MAN 100-2	53	1154	274	142	954	669	1623	160	148	308	—	145	145	185	606	100	18	90	42	46,5	12			60	35	120
MAN 125-1	47	1079	318	167	806	805	1611	180	164	344	—	170	170	215	—	100	18	110	55	58,5	16			65	40	150
MAN 125-2	47	1479	318	167	1206	805	2011	180	164	344	—	170	170	215	798	100	18	110	55	58,5	16			65	40	190
MAE 40-1	15				334	131	465		78		75						10		19							
MAE 40-2	15				434	131	565		78		75						10		19							
MAE 50-1	70	542		46	450	198	648	100	70	200	70		110	150			12		24							
MAE 50-2	70	692		46	600	198	798	100	70	200	70		110	150			12		24							
MAE 65-1	63	573		56	438	264	702	125	100	250	90		138	180			14		28							
MAE 65-2	63	773		56	638	264	902	125	100	250	90		138	180	363		14		28							
MAE 80-1	72	643		60	536	331	867	140	110	295	100		150	198			14		35							
MAE 80-2	72	893		60	786	331	1117	140	110	295	100		150	198	471		14		35							
MAE 100-1	53	851	55	75	648	365	1013	160	148	370		145	145	240			18		42							
MAE 100-2	53	1158	55	75	954	365	1319	160	148	370		145	145	240	606		18		42							
MAE 125-1	47	1079	67	80	806	437	1243	180	164	370		170	170	280			18		55							
MAE 125-2	47	1479	67	80	1206	437	1643	180	164	370		170	170	280	798		18		55							

SERIE
SERIE
SERIES
SERIE

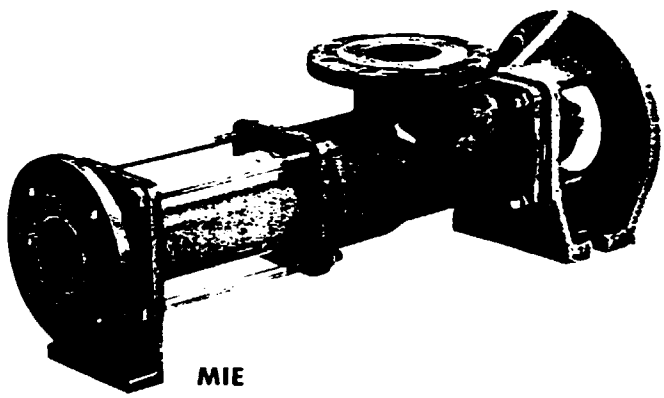
MI

INDUSTRIALE
INDUSTRIELLE
INDUSTRIAL
FÜR INDUSTRIE

Cod. CED: ZMI



MIN



MIE

Pompa serie industriale, di costruzione robusta adatta agli impieghi più gravosi. La camera di aspirazione e portatenuta e la bocca di mandata, ricavate da fusione, possono essere in acciaio inox o in ghisa. Le parti rotanti sono in acciaio inox. Le bocche di aspirazione e scarico sono a flangia secondo norme UNI 2223PN16. Lo statore in gomma è direttamente vulcanizzato sul tubo di acciaio [illegible] la sua rotazione durante il pompaggio.

Il particolare montaggio telescopico permette il rapido smontaggio di tutta la pompa senza dover intervenire sul supporto o motorizzazione, rendendo particolarmente agevole l'ispezione di tutte le parti per pulizia o manutenzione. La serie MIE con pompa direttamente accoppiata alla motorizzazione, permette di ottenere, nelle condizioni di esercizio particolarmente gravose, un montaggio razionale che contenga al minimo gli ingombri ed i costi, mantenendo lo stesso pratico sistema di montaggio e le stesse caratteristiche della parte pompante della serie MIN.

Pompes serie industrielle, de construction forte, indiquees pour les emplois les plus durs. Les chambres d'aspiration et porte garniture et le goulot de refoulement, fondus, peuvent être en acier inoxidable. Les goulots d'aspiration et de refoulement sont avec bride conforme aux normes UNI 2223PN16. Le stator en caoutchouc a été vulcanisé directement sur un tube d'acier, afin d'en eviter la rotation differenciee pendant le pompage. Le particulier montage telescopique permet le demontage rapide de toute la pompe, sans necessite d'intervenir ni sur le support ni sur la motorisation, ainsi facilitant l'inspection de toutes les parties pour le nettoyage et/ou l'entretien.

La serie MIE (avec la pompe accouplee directement a la motorisation), dans des conditions de travail pas particulierement dures, permet d'obtenir un montage rationnel, qui limite dimensions et coûts, tout en gardant les mêmes avantages et les mêmes donnees de la partie pompante de la serie MIN.

Pumpen für Industrie von kräftiger Ausführungsart, geeignet für die beschwerlichsten Gebräuche.

Die Einlaß-und Dichtungskammern und der Auslaßanschluß, geschmolzen, können aus rostfreiem Stahl oder Gusseisen hergestellt werden. Alle Drehteile sind aus rostfreiem Stahl [illegible]

Ein-und Auslaßanschlüße mit Flansch gemäß UNI2223PN16-Normen. Der Stator aus Gummi ist auf einem Stahlrohr vulkanisiert worden, um seine unterschiedene Umdrehung während des Pumpen zu vermeiden.

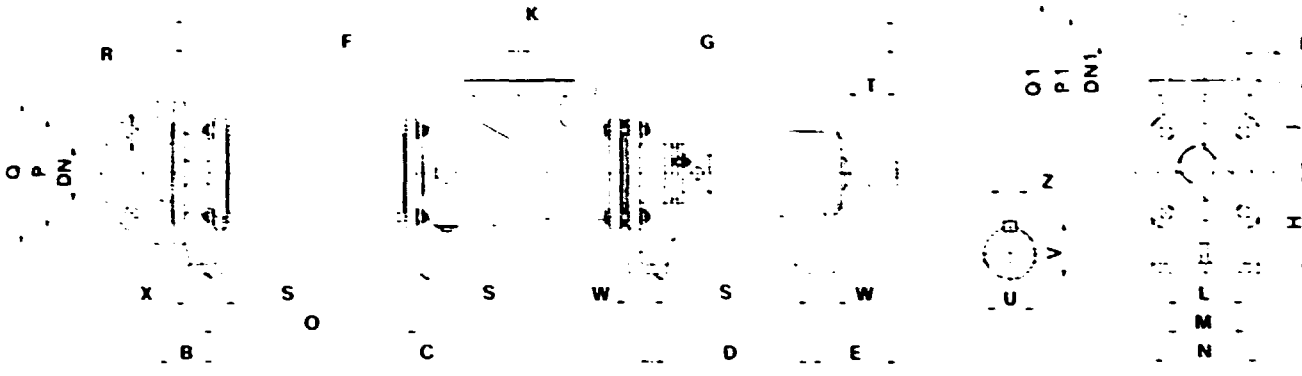
Die spezielle teleskopische Ausführung erlaubt die rasche Demontierung der ganzen Pumpe, ohne auf der Auflage und der Motorisierung wirken zu sollen; und das macht leichter die Beaufsichtigung aller Teile für die Reinigung und/oder die Wartung. Die MIE-Serie (mit der Pumpe direkt an die Motorisierung angekuppelt) bedeutet, unter nicht zu beschwerlichen Arbeitsbedingungen, einen rationellen Zusammenbau, der Aussenmassen und Kosten einschränkt; dennoch bewahrt sie dieselbe Zweckdienlichkeit und dieselben Eingenschaften der MIN-Serie.

TIPO	B	C	D	E
[illegible]	53	65	53	[illegible]
[illegible]	53	67	53	[illegible]
[illegible]	44	67	55	[illegible]
[illegible]	44	67	55	[illegible]
[illegible]	41	65	[illegible]	[illegible]
[illegible]	41	67	[illegible]	[illegible]
[illegible]	53	65	[illegible]	[illegible]
[illegible]	53	67	[illegible]	[illegible]
[illegible]	44	67	[illegible]	[illegible]
[illegible]	44	67	[illegible]	[illegible]
[illegible]	41	65	[illegible]	[illegible]
[illegible]	41	67	[illegible]	[illegible]
[illegible]	53	65	[illegible]	[illegible]
[illegible]	53	67	[illegible]	[illegible]
[illegible]	47	107	[illegible]	[illegible]
[illegible]	47	107	[illegible]	[illegible]
MIE 50-1	53	55	[illegible]	46
MIE 50-2	53	67	[illegible]	46
MIE 65 1	44	67	[illegible]	55
MIE 65 2	44	67	[illegible]	55
MIE 80 1	41	65	[illegible]	60
MIE 80 2	41	67	[illegible]	60
MIE 100 1	53	85	55	75
MIE 100 2	53	115	55	75
MIE 125 1	47	105	67	80
MIE 125 2	47	147	67	80

SERIE
SERIE
SERIES
SERIE

MIN

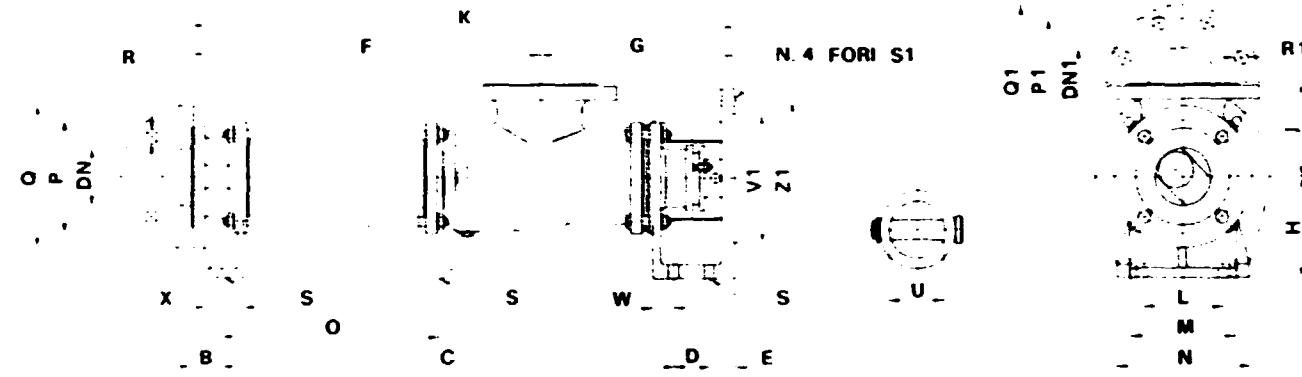
SUPPORTAZIONE INDIPENDENTE
INDEPENDANT
WITH INDEPENDENT SUPPORT
UNABHANGIGE HALTERUNG



SERIE
SERIE
SERIES
SERIE

MIE

SUPPORTAZIONE FLANGIATA
AVEC FLANGE
WITH FLANGE
HALTERUNG MIT FLANSCHEN



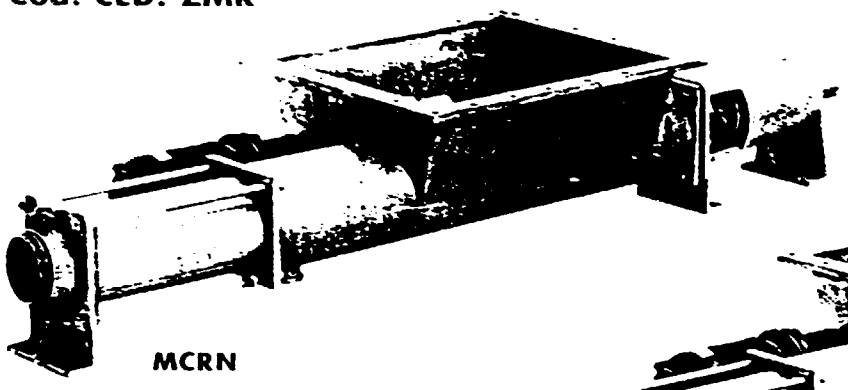
TIPO	B	C	D	E	F	G	K	H	J	I	L	M	N	O	DN	P	Q	R	n fori	DN1	P1	Q1	R1	n fori	S	T	U	V	Z	V1	Z1	S1	x	W	Peso Kg
MIE 50-1	53	557	--	46	462	206	668	100	93	193	85	110	150	--	50	125	165	18	4	50	125	165	18	4	12		24			130	165	13	40	46	
MIE 50-2	53	707	--	46	612	206	818	100	93	193	85	110	150	--	50	125	165	18	4	50	125	165	18	4	12		24			130	165	13	40	46	
MIE 65-1	44	601	--	55	438	267	705	125	120	245	108	140	180	--	65	145	185	18	4	80	160	200	18	8	14		32			180	215	14	45	56	
MIE 65-2	44	801	--	55	638	267	905	125	120	245	108	140	180	392	65	145	185	18	4	80	160	200	18	8	14		32			180	215	14	45	56	
MIE 80-1	41	653	--	60	481	277	757	140	130	270	115	150	190	--	80	160	200	18	8	100	180	220	18	8	14		35			180	215	14	56	58	
MIE 80-2	41	903	--	60	731	277	1007	140	130	270	115	150	190	498	80	160	200	18	8	100	180	220	18	8	14		35			180	215	14	56	58	
MIE 100-1	53	852	55	75	653	365	1018	160	145	305	145	190	240	--	100	180	220	18	8	125	210	250	18	8	18		42			230	265	16	60	71	
MIE 100-2	53	1154	55	75	959	365	1324	160	145	305	145	190	240	604	100	180	220	18	8	125	210	250	18	8	18		42			230	265	16	60	71	
MIE 125-1	47	1075	67	80	806	437	1243	180	170	350	170	230	280	--	125	210	250	18	8	150	240	285	22	8	18		55			230 250	265 300	18	65	80	
MIE 125-2	47	1475	67	80	1206	437	1643	180	170	350	170	230	280	798	125	210	250	18	8	150	240	285	22	8	18		55			230 250	265 300	18	65	80	

SERIE
SERIE
SERIES
SERIE

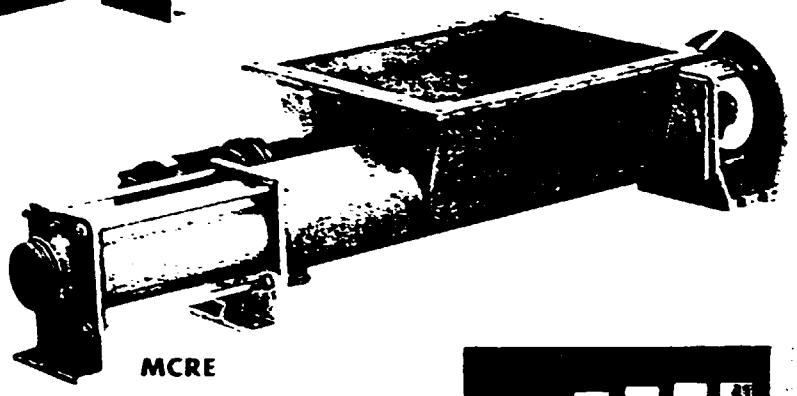
MCR

CON TRAMOGGIA, COCLEA E FRANGITORE
AVEC TREMIE, VIS SANS FIN DE PRE-ALIMENTATION ET CONCASSEUR
WITH HOPPER, PRE FEEDING SCREW AND VANE CRUSHER
MIT TRICHTER, FÖRDERSCHNECKE UND RÜHRER

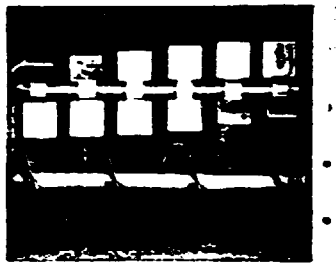
Cod. CED: ZMR



MCRN



MCRE



Versione con tramoggia dotata di coclea di prealimentazione e frangitore rompiponte a pale, adatto per prodotti a blocchi o che tendono a formare ponte sulla coclea. la tramoggia è in acciaio inossidabile.
Il frangiatore a pale trascinato da motoriduttore di velocità con motore elettrico indipendente, frantuma il prodotto da pompare, rompendo gli eventuali blocchi formatisi e lo spinge sulla coclea di prealimentazione.
La bocca di mandata, da forgiato, può essere dotata di raccordo DIN 11851 o di flangia UNI 2223PN16.
Lo statore in gomma è direttamente vulcanizzato su tubo di acciaio per evitare una sua rotazione differenziata durante il pompaggio. Il particolare montaggio telescopico permette un rapido smontaggio di tutta la pompa senza dover intervenire sulla parte supporto e motorizzazione rendendo particolarmente agevole l'ispezione di tutte le parti per pulizia e/o manutenzione. La serie MCRE, con pompa direttamente accoppiata alla motorizzazione, permette di ottenere, nelle condizioni di esercizio non particolarmente gravose, un montaggio razionale che contiene al minimo gli ingombri ed i costi, pur conservando la stessa praticità di smontaggio e le stesse caratteristiche della parte pompante dela serie MCRN.
Un coperchio di chiusura, con raccordo, permette di utilizzare la pompa anche negli impieghi caratteristici della serie MA.

Pompes avec tremie, vis sans fin de pre-alimentation et melangeur concasseur a pales, indiquees pour produits en blocs ou qui ont la tendance a s'arreter sur la vis.
La tremie est en acier inoxidable. Le melangeur concasseur a pales, entraine par motoreducteur de vitesse avec moteur independant, brise le produit en cassant les blocs eventuels, et il le pousse dans la vis sans fin de pre-alimentation. Le goulot de refoulement, forge, peut être equippe avec raccord DIN 11851 ou bride UNI 2223PN16. Le stator en caoutchouc a ete vulcanise directement sur un tube d'acier, afin d'en eviter la rotation differenciee pendant le pompage.
Le particulier montage telescopique permet le demontage rapide de toute la pompe, sans necessite d'intervenir ni sur le support ni sur la motorisation, ainsi facilitant l'inspection de toutes les parties pour le nettoyage et/ou l'entretien.
La serie MCRE (avec la pompe accouplee directement a la motorisation), dans des conditions de travail pas particulierement dures, permet d'obtenir un montage rationnel, qui limite dimensions et couts, tout en gardant les mêmes avantages et les mêmes donees de la partie pompante de la serie MCRN.
Un couvercle de fermeture, avec raccord, permet d'utiliser la pompe aussi pour les emplois typiques de la serie MA.

Pumpen mit Trichter, Förderschnecke und Flügelrührer, geeignet für Produkte in Blöcken, die sich auf der Förderschnecke verklemmen. Der Trichter ist aus rostfreiem Stahl. Der Flügelrührer wird vom unabhängigen Elektromotor mit Reduktionsgetriebe angetrieben; er zerkleinert das Produkt, bricht die eventuellen Blocken und treibt es in die Förderschnecke. Der Auslaßanschluß, geschmiedet, kann einen DIN11851-Anschluß oder einen UNI2223PN16-Flansch sein.
Der Stator aus Gummi ist auf einem Stahlrohr vulkanisiert worden, um seine unterschiedene Umdrehung während des Pumpen zu vermeiden.
Die spezielle teleskopischen Ausführung erlaubt die rasche Abmontierung der ganzen Pumpe, ohne auf der Auflage und der Motorisierung wirken zu sollen; und das macht leichter die Beaufsichtigung aller Teile für die Reinigung und/oder die Wartung.
Die MCRE-Serie (mit Pumpe direkt and die Motorisierung angekuppelt) bedeutet, unter nicht zu beschwerlichen Arbeitsbedingungen, einen rationellen Zusammebau, der Aussenmassen und Kosten einschränkt; dennoch bewahrt sie dieselbe Zweckdienlichkeit und dieselben Eigenschften der MCRN-Serie.
Ein Abschlußdeckel, mit Anschluß, erlaubt die Verwendung der Pumpe auch für die Anwendungen typischen der MA-Serie.

Caratteristiche frangitore
Caractéristiques concasseur
Vane - crusher details
Rührerangabe

SERIE	MCR65	MCR80	MCR100	MCR125	MCR150
HP	1.5	1.5	1.5	2	2

TIPO	A	A1	(*) B	(*) C	D	E	(*) F	G	(*) K	H
MCRN 65-1	425	565	44 63	886 963	204	103	433 429	378	122 122	
MCRN 65-2	425	565	44 63	1086 1083	204	103	633 629	378	143 143	
MCRN 80-1	486	580	41 72	1003 970	225	123	490 488	416	138 139	
MCRN 80-2	486	580	41 72	1253 1220	225	123	740 738	416	164 164	
MCRN 100-1	586	564	53	1263	274	142	620	546	178	
MCRN 100-2	586	564	53	1589	274	142	926	546	205	
MCRN 125-1	756	642	47	1653	318	167	801	628	215	
MCRN 125-2	756	642	47	2063	318	167	1201	628	256	
MCRN 150-1S	780	782	65	1886	300	175	1025	650	243	
MCRE 65-1	425	565	44 63	914 891		55	433 429	155	1011 1009	125
MCRE 65-2	425	565	44 63	1114 1091		55	633 629	155	1211 1209	125
MCRE 80-1	486	580	41 72	1028 995		60	490 488	153	1129 1127	140
MCRE 80-2	486	580	41 72	1278 1245		60	740 738	153	1379 1377	140
MCRE 100-1	586	564	53	1265	55	75	620	242	1448	160
MCRE 100-2	586	564	53	1571	55	75	926	242	1754	160
MCRE 125-1	756	642	47	1623	67	80	801	260	181	180
MCRE 125-2	756	642	47	2023	67	80	1201	260	221	180

SERIE
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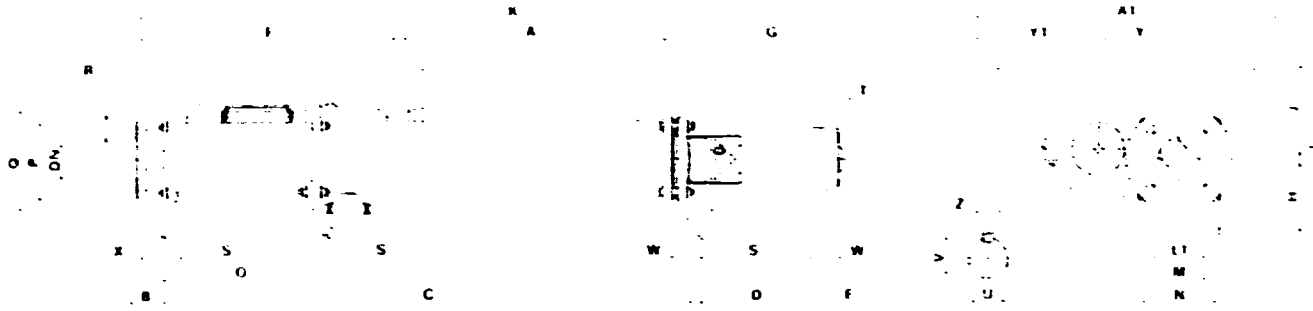
MCRN

SUPPORTAZIONE INDIPENDENTE
INDEPENDANT
WITH INDEPENDENT SUPPORT
UNABHANGIGE HALTERUNG



SERIE
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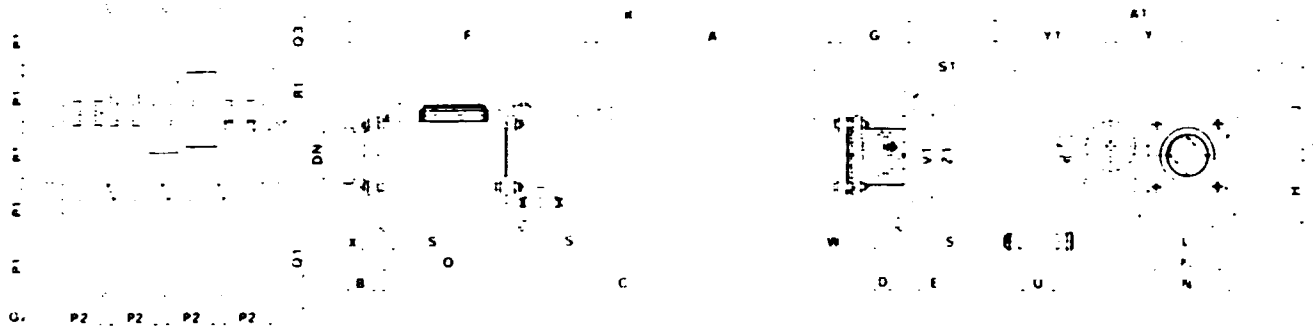
SERIE

MCRE

SUPPORTAZIONE FLANGIATA
AVEC FLANGE
WITH FLANGE
HALTERUNG MIT FLANSCHEN



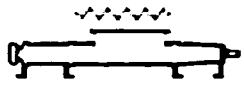
(*) La prima quota si riferisce a una pompa con bocca di scarico con flangia UNI 2223 PN16; la seconda a una pompa con bocca di scarico con raccordo DIN 11851 femmino.

(*) La première chiffre se réfère à une pompe avec flange UNI 2223 PN16 au réfoulement; la deuxième à une pompe avec raccord femelle DIN 11851 au réfoulement.

(*) The first ciffer refers a pump with UNI 2223 PN16 flange at the out; the second one to a pump with DIN 11851 female fitting at the outlet.

(*) Die erste Ziffer bezieht sich auf eine Pumpe mit UNI 2223 PN16- Flanschenauslaß - anschluß; die Zweite auf eine Pumpe mit DIN 11851 Auslaßanschluß.

	D	E	(*) F	G	(*) K	H	J	I	(*) L	(*) L1	M	N	O	(*) DN	P	Q	R	n fori	P1	P2	Q1	Q2	Q3	R1	n fori	S	T	U	V	Z	V1	Z1	S1	(*) X	Y	Y1	W	Peso Kg
	204	103	433 429	378	1213 1209	125	165	290	90	108 —	140	180	392 363	65	145	185	18	4	105	130	43	17,5	20	13	16	14		32			180	215	14	45 38	150	227	25	83
	204	103	633 629	378	1413 1409	125	165	290	90	108 —	140	180	392 363	65	145	185	18	4	105	130	43	17,5	20	13	16	14		32			180	215	14	45 38	150	227	25	100
	225	123	460 488	416	1329 1327	140	180	320	100	115 —	150	190	248 221	80	160	200	18	8	110	113	43	17	15	13	18	14		35			180	215	14	56 38	150	228	34	116
	225	123	740 738	416	1579 1577	140	180	320	100	115 —	150	190	498 471	80	160	200	18	8	110	113	43	17	15	13	18	14		35			180	215	14	56 38	150	228	34	127
	274	142	820	548						145	190			100	180	220	18	8	106	110	43	18	16	13	20	18		49			230	265	16	60	185	195	35	176
	274	142	1026	548						145	190			100	180	220	18	8	106	110	43	18	16	13	20	18		49			230	265	16	60	185	195	35	201
	310	167	801	628						170	230			125 100	210	250	18	8	120	102	53	21	21	16	24	18		55			230 250 300	265 300	18	65	210	220	40	244
	310	167	1201	628						170	230			125 100	210	250	18	8	120	102	53	21	21	16	24	18		55			230 250 300	265 300	18	65	210	220	40	284
	300	175	1025	660						200	280			150 125	240	285	22	8	120	102	53	21	23	18	30	22		110	65	68,5	316				265	282	286	60	366
14 21		55	433 429	155	1013 1009	125	165	290	90	108 —	140	180	392 363	65	145	185	18	4	105	130	43	17,5	20	13	16	14		32			180	215	14	45 38	150	227	56	49
14 21		55	633 629	155	1213 1209	125	165	290	90	108 —	140	180	392 363	65	145	185	18	4	105	130	43	17,5	20	13	16	14		32			180	215	14	45 38	150	227	56	—
25 35	—	60	490 488	153	1129 1127	140	180	320	100	115 —	150	190	248 221	80	160	200	18	8	110	113	43	17	15	13	18	14		35			180	215	14	56 38	150	228	56	—
25 35	—	60	740 738	153	1379 1377	140	180	320	100	115 —	150	190	498 471	80	160	200	18	8	110	113	43	17	15	13	18	14		35			180	215	14	56 38	150	228	56	—
36	55	75	620	242	1448	160	200	360	—	145	190	240	300	100	180	220	18	8	106	110	43	18	16	13	20	18		49			230	265	16	60	185	195	73	—
71	55	75	926	242	1754	160	200	360	—	145	190	240	804	100	180	220	18	8	106	110	43	18	16	13	20	18		42			230	265	16	60	185	195	73	—
73	67	80	801	260	1817	180	200	360	—	170	230	280	397	125 100	210	250	18	8	120	102	53	21	21	16	24	18		55			230 250 300	265 300	18	65	210	220	80	—
73	67	80	1201	260	2217	180	200	360	—	170	230	280	797	125 100	210 —	250	18	8	120	102	53	21	21	16	24	18		55			230 250 300	265 300	18	65	210	220	80	—



SERIE
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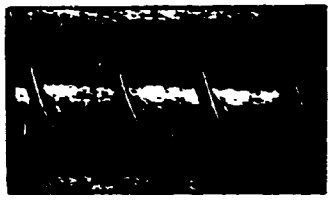
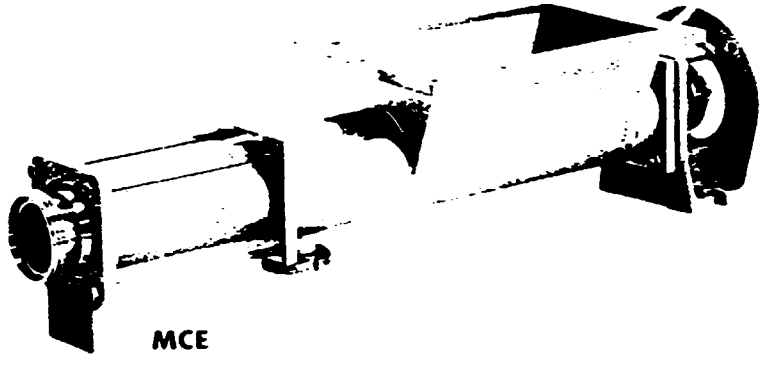
MC

CON TRAMOGGIA E COCLEA
AVEC TREMIE ET VIS SANS FIN DE PRE-ALIMENTATION
WITH HOPPER AND PRE-FEEDING SCREW
MIT TRICHTER UND FÖRDERSCHNECKE

Cod. CED: ZMC



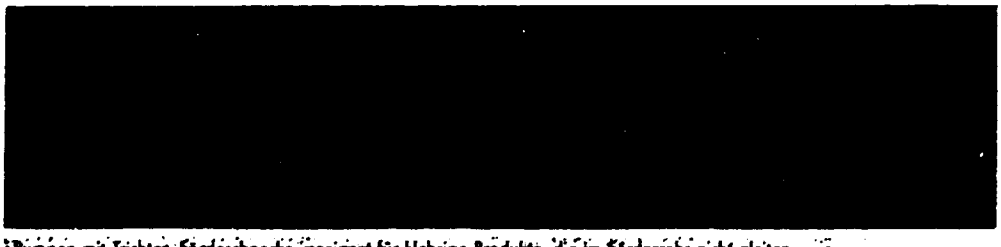
MCN



MCE

Versione con tramoggia dotata di coclea di prealimentazione adatta a prodotti viscosi e che non scorrono nel tubo di alimentazione.
La tramoggia, in acciaio inossidabile, è coassiale con la pompa. Nella parte superiore è dotata di una flangia rettangolare alla quale può essere applicato un convogliatore di qualsiasi tipo.
La bocca di mandata, da forgiato, può essere con raccordo DIN 11851 o con flangia UNI 2223PN16.
Lo statore in gomma è direttamente vulcanizzato su tubo di acciaio per evitare una sua rotazione differenziata durante il pompaggio.
Il particolare montaggio telescopico permette un rapido smontaggio di tutta la pompa senza dover intervenire sulla parte supporto e motorizzazione rendendo particolarmente agevole l'ispezione di tutte le parti per pulizia e/o manutenzione.
La serie MCE, con pompa direttamente accoppiata alla motorizzazione, permette di ottenere, nelle condizioni di esercizio non particolarmente gravose, un montaggio razionale che contiene al minimo gli ingombri ed i costi, pur conservando la stessa praticità di smontaggio e le stesse caratteristiche della parte pompante della serie MCN.
Un coperchio di chiusura, con raccordo, permette di utilizzare la pompa anche negli impieghi caratteristici della serie MA.

Pompes avec tremie et vis sans fin de pre-alimentation, indiquees pour produits visqueux qui ne coulent pas dans le tuyau d'alimentation. La tremie, en acier inoxidable, est coaxiale à la pompe.
Dans la partie superieure elle est equippee avec une bride rectangulaire, a laquelle on peut appliquer un transporteur de n'importe quel type.
Le goulot de refoulement, forge, peut être avec raccord DIN 11851 ou avec bride UNI 2223PN16.
Le stator en caoutchouc a ete vulcanise directement sur un tube d'acier, afin d'en eviter la rotation differenciee pendant le pompage. Le particulier montage telescopique permet le demontage rapide de toute la pompe, sans necessite d'intervenir ni sur le support ni sur la motorisation, ainsi facilitant l'inspection de toutes les parties pour le nettoyage et/ou l'entretien.
La serie MCE (avec la pompe accouplee directement a la motorisation), dans des conditions de travail pas particulierement dures, permet d'obtenir un montage rationnel, qui limite dimensions et coûts, tout en gardant les mêmes avantages et les mêmes données de la partie pompante de la serie MCN. Un couvercle de fermeture, avec raccord, permet d'utiliser la pompe aussi pour les emplois typiques de la série MA.



Pumpen mit Trichter, Förderschnecke, geeignet für klebrige Produkte, die im Förderrohr nicht gleiten.
Der Trichter, aus rostfreiem Stahl, ist mit der Pumpe koaxial. Oberhalb ist er mit einem viereckigen Flansch ausgerüstet, wo man irgendwelchen Förderer anmontieren kann.
Den Auslaßanschluß, geschmiedet, kann einen DIN11851-Anschluß oder einen UNI2223PN16-Flansch sein.
Der Stator aus Gummi ist auf einem Stahlrohr vulkanisiert worden, um seine unterschiedene Umdrehung während des Pumpen zu vermeiden.
Die spezielle teleskopischen Ausführung erlaubt die rasche Abmontierung der ganzen Pumpe, ohne auf der Auflage und der Motorisierung wirken zu sollen; und das macht leichter die Beaufsichtigung aller Teile für die Reinigung und/oder die Wartung.
Die MCE-Serie (mit der Pumpe direkt an die Motorisierung angekuppelt) bedeutet, unter nicht zu beschwerlichen Arbeitsbedingungen, einer rationellen Zusammenbau, der Aussenmassen und Kosten einschränkt; dennoch bewahrt sie dieselbe Zweckdienlichkeit und dieselben Eigenschaften der MCN-Serie.
Ein Abschlußdeckel, mit Anschluß, erlaubt die Verwendung der Pumpe auch für die Anwendungen typischen der MA-Serie.

TIPO	A	A1	(1) B	(1) C	D	E	(1) L
MCN 50-1	365	250	53 70	741 713	153	[illegible]	[illegible]
MCN 50-2	365	250	53 70	891 863	153	[illegible]	[illegible]
MCN 65-1	420	280	44 63	886 863	204	[illegible]	[illegible]
MCN 65-2	420	280	44 63	1086 1063	204	[illegible]	[illegible]
MCN 80	[illegible]	[illegible]	41 72	1003 970	[illegible]	[illegible]	[illegible]
MCN [illegible]	[illegible]	[illegible]	41 72	1253 1220	[illegible]	[illegible]	[illegible]
MCE 50-1	365	250	53 70	760 737		46	
MCE 50-2	365	250	53 70	910 887		46	
MCE 65-1	420	280	44 63	914 891		55	
MCE 65-2	420	280	44 63	1114 1091		55	
MCE 80-1	480	320	41 72	1078 995		60	
MCE 80-2	480	320	41 72	1278 1245		60	
MCE 100-1	580	340	53	1266	55	75	
MCE 100-2	580	340	53	1571	55	75	
MCE 125-1	750	420	47	1623	67	80	
MCE 125-2	750	420	47	2023	67	90	

SERIE
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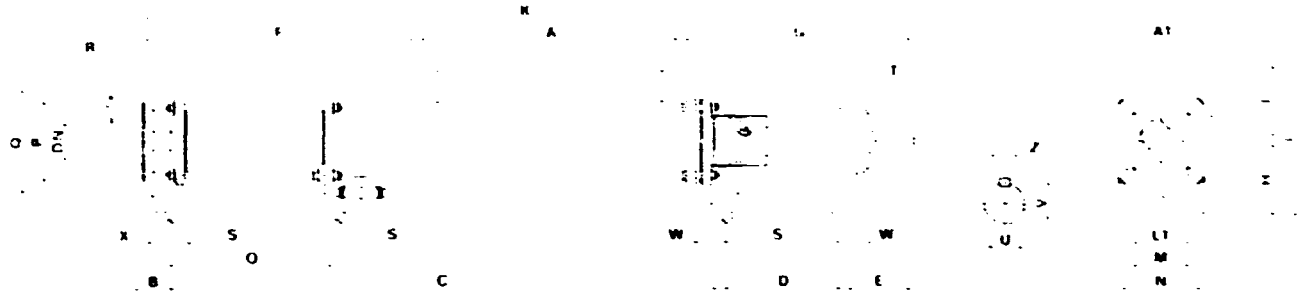
MCN

SUPPORTAZIONE INDIPENDENTE
INDEPENDANT
WITH INDEPENDENT SUPPORT
UNABHÄNGIGE HALTERUNG



SERIE
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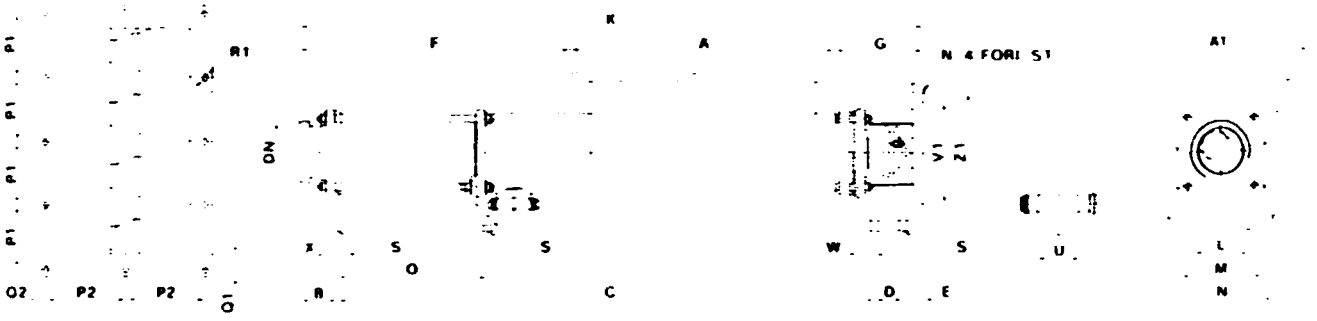
MCE

SUPPORTAZIONE FLANGIATA
AVEC FLANGE
WITH FLANGE
HALTERUNG MIT FLANSCHEN



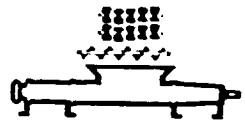
(*) **La prima quota si riferisce a una pompa con bocca di scarico con flangia UNI 2223 PN16; la seconda a una pompa con bocca di scarico con raccordo DIN 11851 femmina.**

(*) **La première chiffre se réfère à une pompe avec flange UNI 2223 PN16 au refoulement; la deuxième à une pompe avec raccord femelle DIN 11851 au refoulement.**

(*) **The first ciffer refers a pump with UNI 2223 PN16 flange at the out; the second one to a pump with DIN 11851 female fitting at the outlet.**

(*) **Die erste Ziffer bezieht sich auf eine Pumpe mit UNI 2223 PN16- Flanschenauslaß - ander schluß; die Zweite auf eine Pumpe mit DIN 11851 Auslaßanschluß**

(*) B	(*) C	D	E	(*) F	G	K	H	J	I	(*) L	(*) L1	M	N	O	(*) ON	P	Q	R	n fori	P1	P2	Q1	Q2	n R1	fori	S	T	U	V	Z	V1	Z1	(*) S1	a	W	Peso Kg
53	741	153		358		1028	100	125	225	—	85	85	110	143	50	125	165	18	4	89	57,5	32	10	11	18	12	50	25	28	8				40	27	31
70	713			348		1017				70				113																			38		
53	891	153		509		1178	100	125	225	—	85	85	110	293	50	125	165	18	4	89	57,5	32	10	11	18	12	50	25	28	8				40	27	36
70	863			498		1167				70				263																			38		
44	888	204		636		1337	125	125	250	—	108	108	138	192	65	145	185	18	4	130	116	40	15	13	10	14	65	28	32	10				45	25	48
63	1063			632		1309				90				167																			38		
44	1086	204		636		1437	125	125	250	—	108	108	138	382	65	145	185	18	4	130	116	40	15	13	10	14	65	28	32	10				45	25	58
63	1063			632		1409				90				363																			38		
41	1000	204		493		1279	140	140	280	—	115	115	156	248	80	160	200	18	8	113	146	40	14	13	12	14	75	35	32	10				56	34	66
72	970			491		1277				100				221																			38		
41	1253	204		743		1379	140	140	280	—	115	115	156	498	80	160	200	18	8	113	146	40	14	13	12	14	75	35	32	10				56	34	74
72	1220			741		1377				100				471																			38		
53	1266	204		623		1448	160	160	320	—	145	145	186	300	100	180	220	18	8	110	103	40	15	13	16	18	80	40	40	12				60	35	116
53	1571	204		929		1754	160	160	320	—	145	190	240	604	100	180	220	18	8	110	103	40	15	13	16	18	80	40	40	12				60	35	142
47	1623	204		804		1817	180	180	360	—	170	230	280	737	125	210	250	18	8	102	96	50	18	18	22	18	90	50	50	14				65	40	161
47	2021	204		1204		2217	180	180	360		170	230	280	737	125	210	250	18	8	102	96	50	18	18	22	18	90	50	50	14				65	40	161
53	760	—	46	358	135	859	100	125	225	—	85	110	150	143	50	125	165	18	4	69	57,5	32	10	11	18	12		24			130	165	13	40	46	29
70	737			348		848				70				113																			38		
53	910	—	46	509	136	1009	100	125	225	—	85	110	150	293	50	125	165	18	4	69	57,5	32	10	11	18	12		24			130	165	13	40	46	37
70	887			498		999				70				263																			38		
44	914	—	55	436	157	1013	125	125	250	—	108	140	180	192	65	145	185	18	4	130	116	40	15	13	10	14		32			180	215	14	45	56	47
63	891			432		1409				90				167																			38		
44	1114	—	55	636	157	1113	125	125	250	—	108	140	180	397	65	145	185	18	4	130	116	40	15	13	10	14		32			180	215	14	45		
63	1091			632		1109				90				363																			38		
41	1028	—	60	493	156	1179	140	140	280	—	115	150	190	248	80	160	200	18	8	113	146	40	14	13	12	14		32			180	215	14	56		
72	995			491		1127				100				221																			38		
41	1278	—	60	743	156	1379	140	140	280	—	115	150	190	498	80	160	200	18	8	113	146	40	14	13	12	14		32			180	215	14	56		
72	1245			741		1377				100				471																			38		
53	1266	55	75	623	245	1448	160	160	320	—	145	190	240	300	100	180	220	18	8	110	103	40	15	13	16	18		40			230	265	16	60	71	97
53	1571	55	75	929	245	1754	160	160	320	—	145	190	240	604	100	180	220	18	8	110	103	40	15	13	16	18		40			230	265	16	60	71	123
47	1623	67	80	804	263	1817	180	180	360	—	170	230	280	737	125	210	250	18	8	102	96	50	18	18	22	18		50			230	265	18	65	86	152
47	2021	67	80	1204	263	2217	180	180	360		170	230	280	737	125	210	250	18	8	102	96	50	18	18	22	18		50			230	265	18	65	86	152



SERIE
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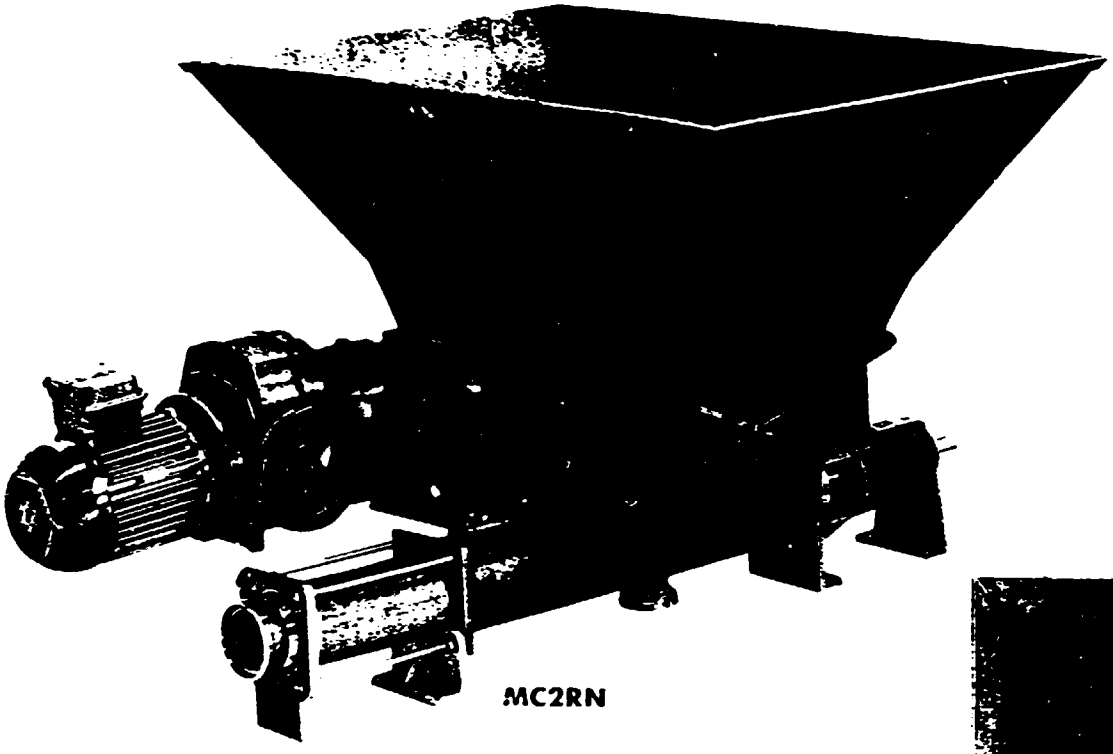
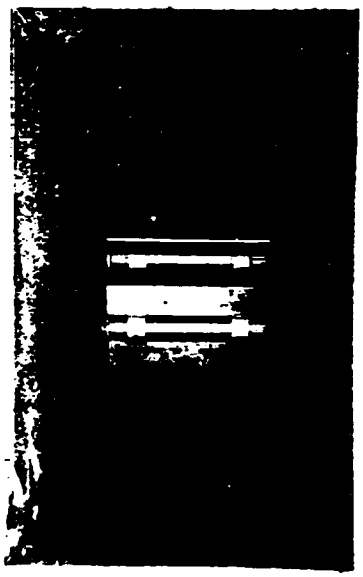
MC2R

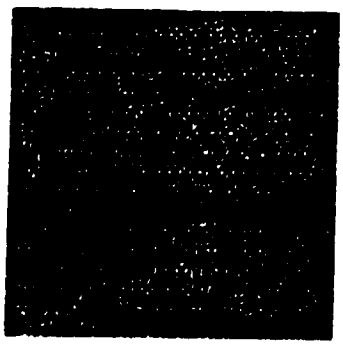
CON TRAMOGGIA, COCLEA E 2 ALIMENTATORI A PALE
AVEC TREMIE, VIS SANS FIN DE PRE-ALIMENTATION ET 2 ALIMENTATEUR A PALES
WITH HOPPER, PRE-FEEDING SCREW AND 2 VANE FEEDERS
MIT TRICHTER, FÖRDERSCHNECKE UND 2 FLÜGEL FORDERER

Cod. CED: ZMR2

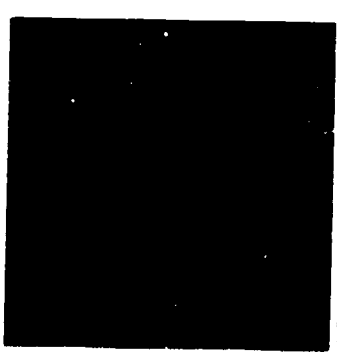


MC2RN





Pompes avec tremie, vis sans fin de pré-alimentation et 2 mélangeurs alimentateurs à pales, qui facilitent le pompage des produits plus visqueux.
Les 2 alimentateurs poussent le produit dans la vis sans fin de pré-alimentation afin d'éviter que, par faute de sa viscosité considerable, le produit s'arrête sur la vis même, en en gênant l'alimentation.
L'entrainage des alimentateurs est fait au moyen d'un moteur électrique indépendant avec réducteur où variateur de vitesse.
Le goulot de réfoulement peut être equippé avec raccord DIN 11851 où bride UNI 2223PN16



Pumpen mit Trichter, Förderschnecke und 2 Flügelförderern zum Pumpen von schwerflüssigen Produkten leichter machen.
Die 2 Flügelförderer treiben das Produkt in die Förderschnecke, um zu vermeiden, daß es sich wegen seiner Viskosität auf der Förderschnecke festklemmt. Die Flügelförderer werden vom unabhängigen Elektromotor mit Reduktionsgetriebe oder variablem Getriebe
Der
DIN11851
PN16-Flansch

A PALE
NTATEUR A PALES
EDERS
DERER

SERIE
SERIE
SERIES
SERIE

MC2RN

SUPPORTAZIONE INDIPENDENTE
INDEPENDANT
WITH INDEPENDENT SUPPORT
UNABHÄNGIGE HALTERUNG

(1) La prima quota si riferisce ad alimentatori trascinati da motoriduttore, la seconda ad alimentatori trascinati da motovariatore.

(1) La première chiffre se réfère à l'entrainage des alimentateurs au moyen de motoreducteur; la deuxième à l'entrainage des alimentateurs au moyen de motovariateur.

(1) The first cipher refers to the feeders motoring by means of reduction box; the second one to the feeders motoring by means of variable speed unit.

(1) Die erste Ziffer bezieht sich auf den Zuführerbetrieb durch Getriebe; die Zweite bezieht sich auf den Zuführerbetrieb durch stufenloses Getriebe.

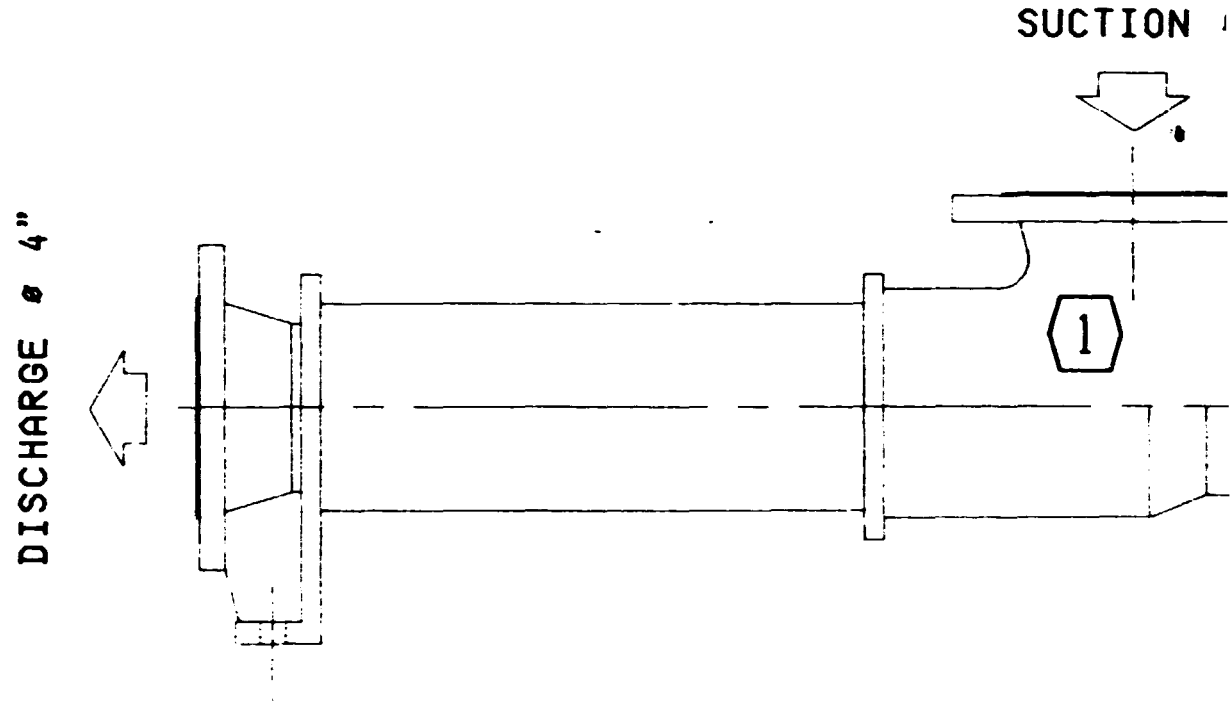
(*) La prima quota si riferisce a una pompa con bocca di scarico con flangia UNI 2223 PN16; la seconda a una pompa con bocca di scarico con raccordo DIN 11851 femmina.

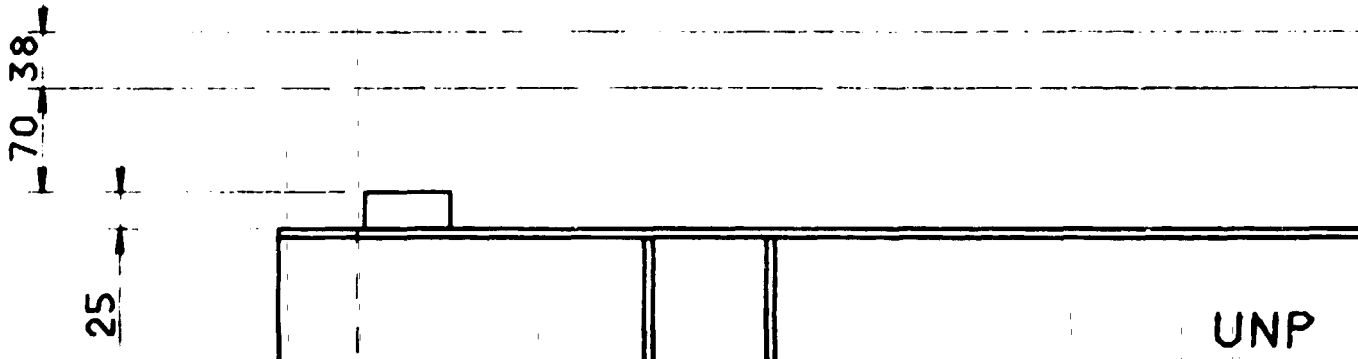
(*) La premiere chiffre se refère a une pompe avec flange UNI 2223 PN16 au refoulement, la deuxième a une pompe avec raccord femelle DIN 11851 au refoulement.

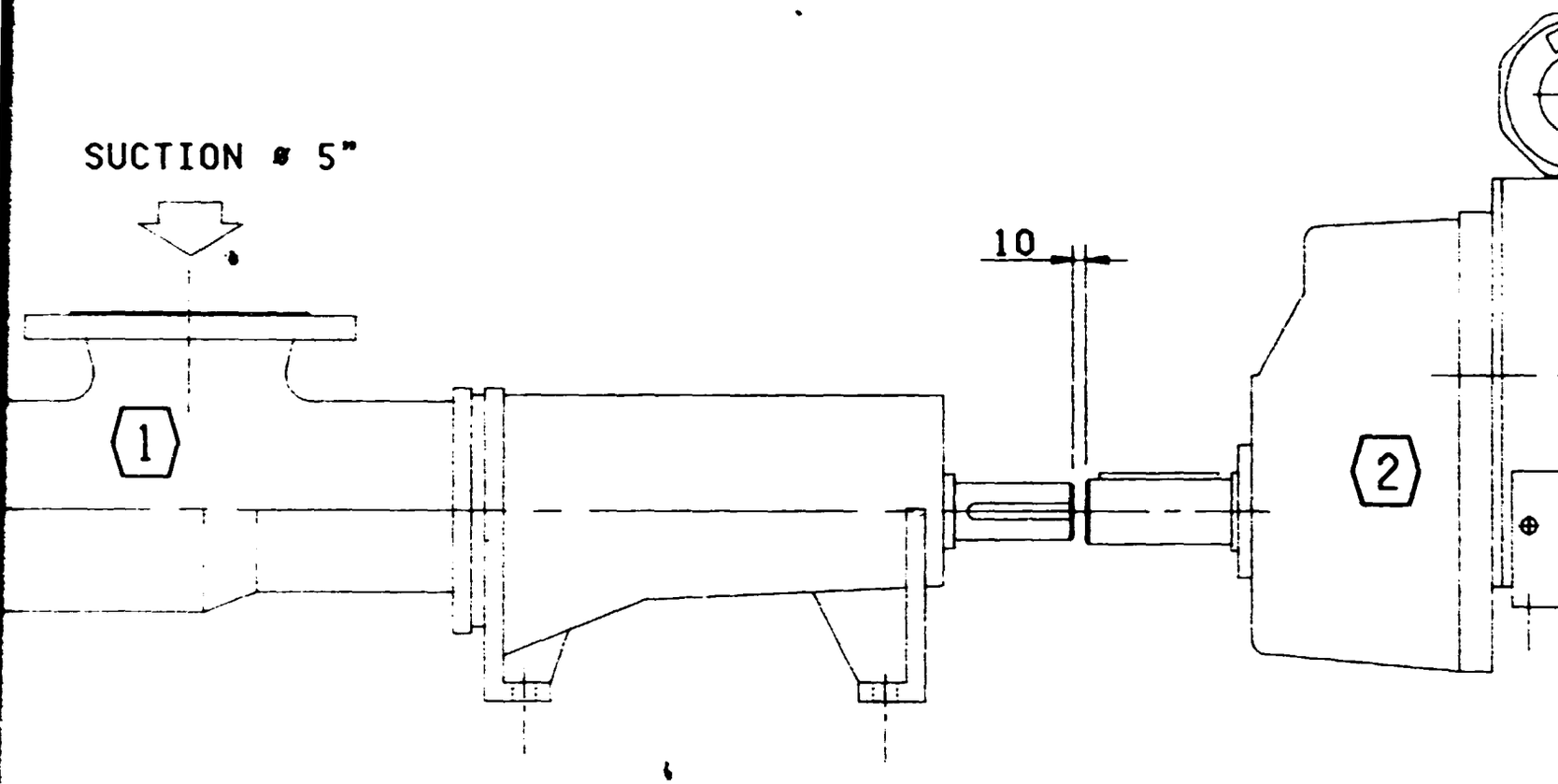
(*) The first ciffer refers a pump with UNI 2223 PN16 flange at the out; the second one to a pump with DIN 11851 female fitting at the outlet

(*) Die erste Ziffer bezieht sich auf eine Pumpe mit UNI 2223 PN16- Flanschenauslaß - anschluß; die Zweite auf eine Pumpe mit DIN 11851-Auslaßanschluß.

PO	A	A1	(*) B	(*) C	D	E	(*) K	(1) F	G	(1) K1	H	J	I	(*) L	(*) L1	M	N	O	(*) ON	P	Q	R	n giri	S	T	U	V	Z	(*) x	W
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1237 1233	[illegible] 590	248	1207 1524	[illegible]	[illegible]	[illegible]	50	1108 [illegible]	108	[illegible]	190 167	[illegible]	245	165	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	344 63	1086 1063	[illegible]	[illegible]	[illegible] 1233	273 590	[illegible]	1207 1524	[illegible]	[illegible]	[illegible]	[illegible]	208 [illegible]	[illegible]	[illegible]	392 [illegible]	[illegible]	[illegible]	165	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	165 [illegible]	[illegible]
[illegible]	[illegible]	1160	[illegible] 272	1003 970	[illegible]	[illegible]	1382 1380	[illegible]	[illegible]	1306 1622	[illegible]	[illegible]	[illegible]	[illegible] 100	115 [illegible]	115	[illegible]	248 221	[illegible]	160	200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1160	[illegible]	1253 1220	[illegible]	[illegible]	1642 1230	[illegible]	[illegible]	1306 1622	[illegible]	[illegible]	[illegible]	[illegible] 100	115 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1536 1852	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1536 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1777 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	125 100	210	250	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1777 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	125 100	[illegible]	250	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

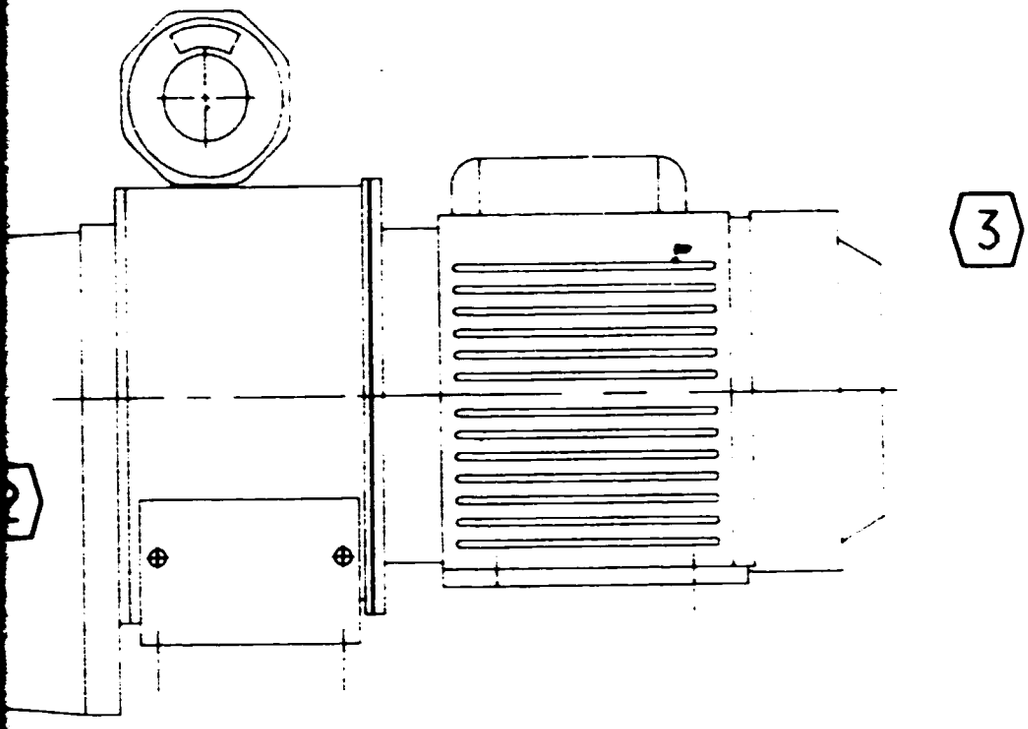

SUCTION
DISCHARGE ø 4"
1


38
70
25
UNP



SECTION 2

UNP 120



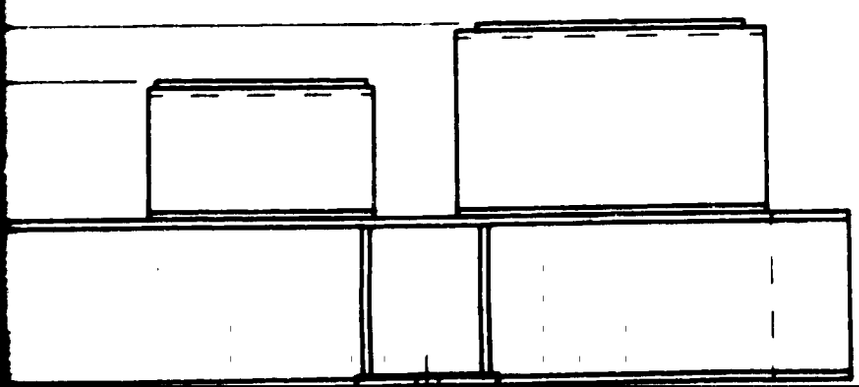
RE

1

CA

SECTION 3

2



3

SECTION 4

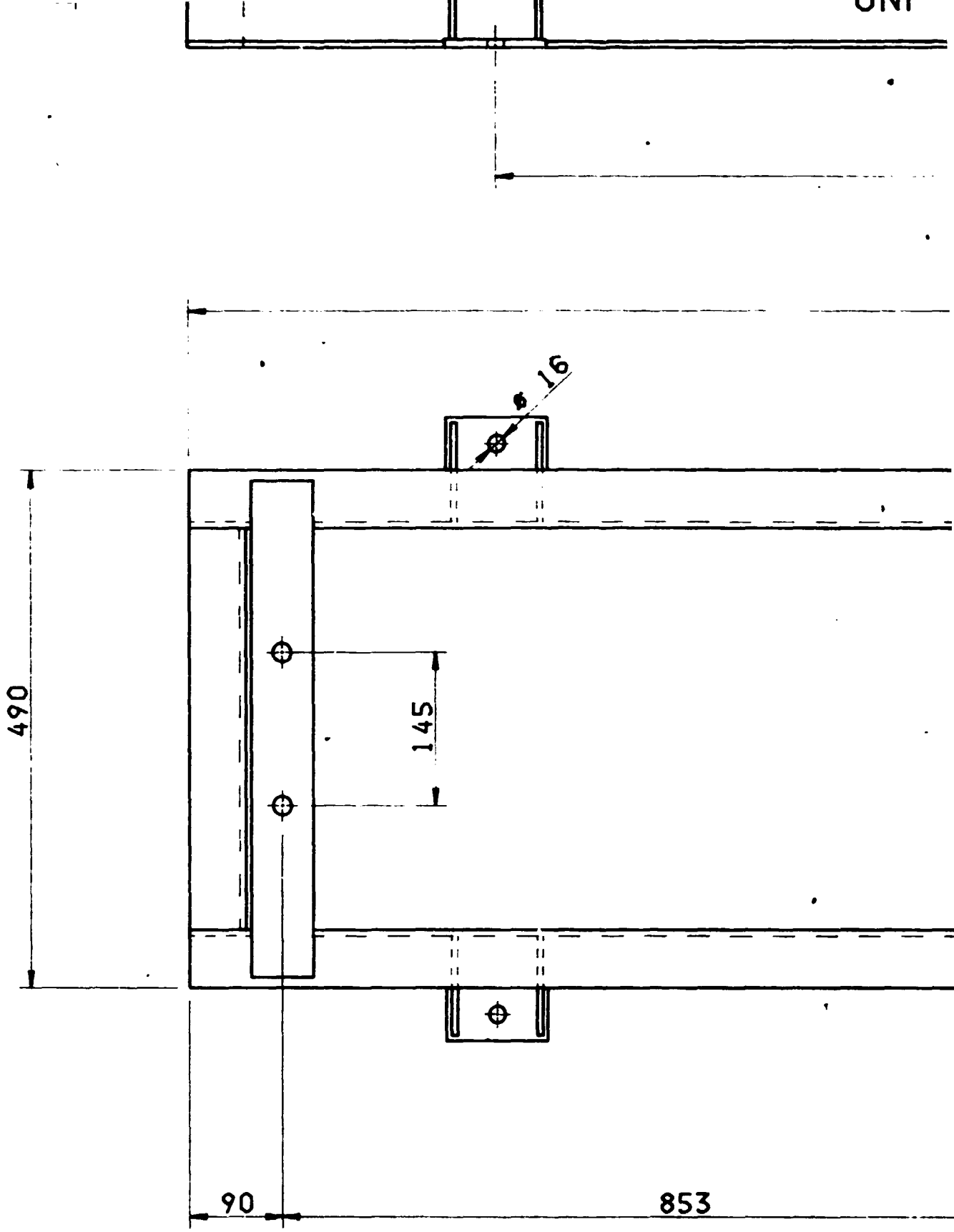
REMARKS

1 . SLUDGE FEEDING PUMP
BODY : CAST IRON G26
ROTOR : ALLOY STEEL HARD CROMIUM PLATED
STATOR: SYNTHETIC RUBBER COATED
SEAL : PACKED TEFLON GLAND

CAPACITY : FROM 4 M3/H TO 24 M3/H AT 2 Bar HEAD

2 . GEAR BOX SPEED VARIATOR
MINIMUM SPEED: n=100 r.p.m.
MAX. SPEED : n=526 r.p.m.

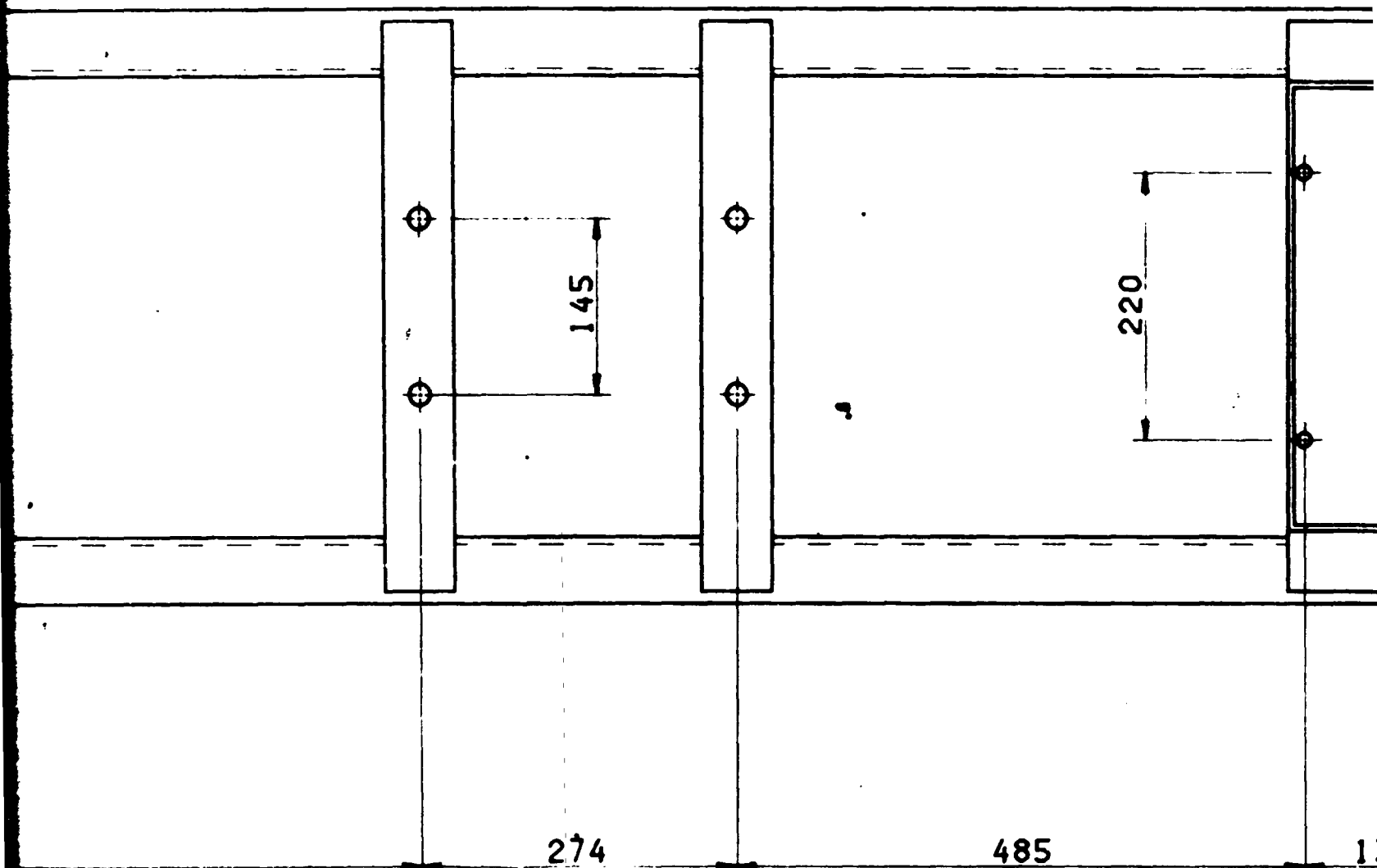
3 . ELECTRICAL MOTOR
5.5 Kw 440V./50 Hz
4 POLES B3-B5



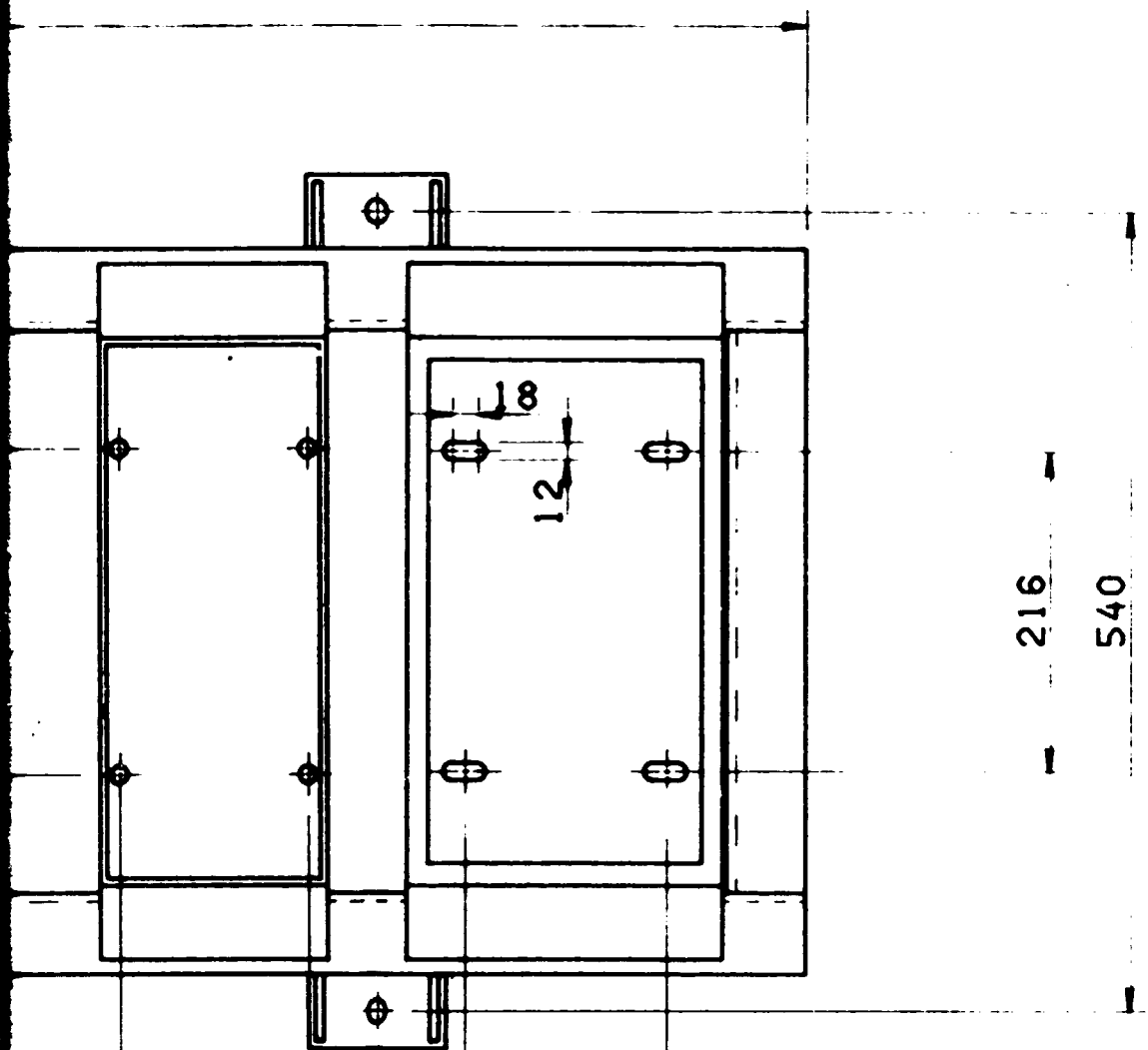
SECTION 5

1580

2180



SECTION 6



SECTION 7

POMP
RIDU
MOTO

ALBE
ALBE

IT

SAN RO
1

Ogg
EFFL

Part

POMPA : MIN 100/1 CSF

RIDUTTORE : VB 10R i=1.9 BONF.

MOTORE ELE. : Kw 5.5 440V/50Hz
4 POLI B3/B5

ALBERO POMPA : ø 42

ALBERO RIDUTT. : ø 48

SECTION 8

ITALPROGETTI
engineering
SAN ROMANO (PI) ITALY TEL. 0571 450477
TELEX 501827 TELEFAX 0571 450301

Cliente:
PALLAVARAM TANNERY
INDIA

Sost. il _____ Sost. dal _____

Oggetto: .
EFFLUENT WATER TREATMENT PLANT

Particolare: BASE FRAME OF HELIC. POMP

	Firma	Data	Scala	F.to	Disegno N.	Mod.
Disegn.	F. RIDOLFI	04-10-93	1:5	A1	WTP0730-93M00	0
Contr.						
Visto						

4.5. BELT FILTER PRESS (Item 17)

ITALPROGETTI
engineering

LINEA FPN FILTRI A NASTRO

FPN/A2
FPN/S
FPN/A
FPN/P

BELT PRESSES

FILTRE A BANDE

SIEBBANDPRESSE

FILTRO A NASTRO PER LA DEPURAZIONE

FPN/N2

FPN/C

BELT PRESSES FOR LIQUID/SOLID SEPARATION

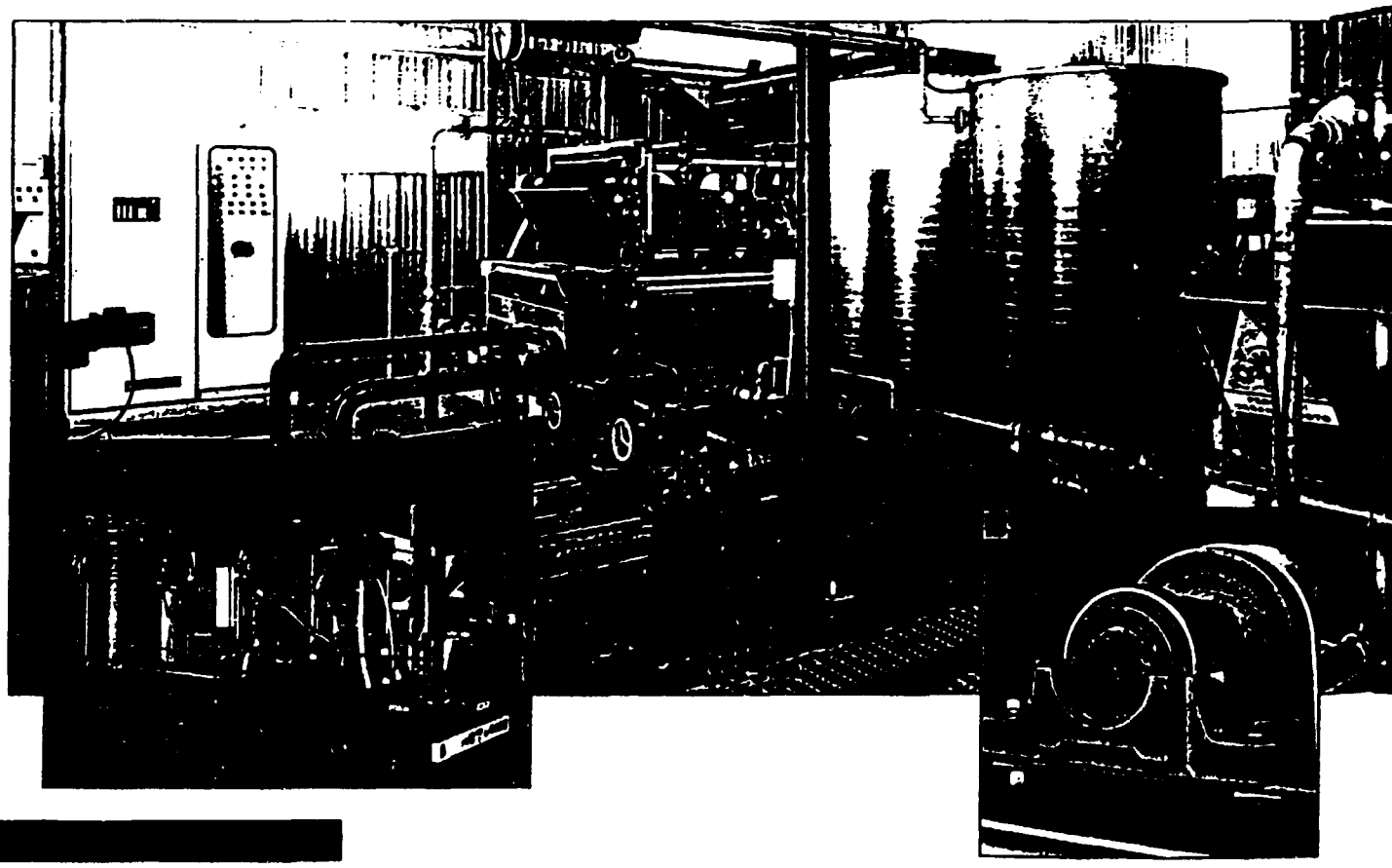
FILTRE A BANDE POUR LA DEPURATION

Il filtro a nastro è il sistema di filtrazione che permette la disidratazione del fango in continuo negli impianti di depurazione. È utilizzato soprattutto negli impianti di depurazione municipali ma viene applicato con successo anche su fanghi di origine industriale. Il funzionamento del filtro a nastro prevede la floculazione del fango con un polielettrolita. Successive zone di filtrazione incrementano la pressione di lavoro sul prodotto progressivamente fino all'espulsione del panello. **Il filtro a nastro (FPN-C)** utilizzato sui fanghi prodotti dal lavaggio degli inerti si differenzia dal modello standard per i cuscinetti particolarmente rinforzati del tipo con rulli a botte, per la struttura di sostegno dei nastri filtranti oltre che ai nastri stessi che sono particolarmente resistenti all'azione abrasiva di sabbie e composti inerti in genere.

The belt press *is a filtration machine designed for continuous sludge dewatering. It is usually utilized in municipalities although it is also successfully used for industrial applications. A polyelectrolite is added to the sludge to create flocculation. Once on the belt press, the flocculated sludge begins the dewatering process through the gravity drainage zone, low pressure area, tangential pressing area and high pressure area.* **The belt press (FPN-C)** *is generally used to dewater the sludge produced by the washing of aggregates. It is slightly different from the standard model in that it is equipped with reinforced barrel roller bearings, with a supporting frame for the filtering cloths, and with anti-abrasive belts resistant to any types of sands and aggregates.*

Le filtre à bande représente le système de filtration qui permet la déshydratation de boues en continu dans les installations d'épuration. Il est employé surtout dans les installations d'épuration municipales toutefois il est appliqué avec succès même sur boues d'origine industrielle. Le fonctionnement du filtre à bande prévoit la floculation des boues avec un polyélectrolyte. Les zones suivantes de filtration augmentent la pression de travail sur le produit progressivement jusqu'à l'expulsion du gâteau. **Le filtre à bande (FPN-C)** employé sur boues produits par le lavage des inertes se différencie du modèle standard par les coussinets particulièrement renforcés du type avec rouleaux à tonneau, par la structure de soutien des bandes filtrantes outre que par les mêmes bandes qui sont particulièrement résistantes à l'action abrasive de sables et combinés inertes en général.

Die Siebbandpresse *arbeitet die kontinuierliche Klaer-schlammentwaesserung. Sie wird vor allem in den Kommunalkläranlagen verwendet, aber wird auch erfolgreich mit Industrialschlaemme eingesetzt. Die Arbeitsweise der Siebbandpresse sieht die Schlammflockung mittels Polyelektrolyt vor der Einfuehrung per Schwerkraft auf die Filterflaeche voraus. Darauffolgende Filtnerungszonen erhoehen fortschreitend den Arbeitsdruck auf dem Produkt bis zur Presskuchenabnahme. Die bei Zuschlagswaschungsschlaemme eingesetzte* **Siebbandpresse (FPN-C)** *unterscheidet sich vom Standardmodell durch die besonders verstaerkten Tonnenrollenlager, durch das Stuetzgeruest der Filterbaender und durch die besonders sand- und zuschlagsreibungsfesten Filterbaender.*



ES FOR
VSOLID
ATION

LTRE A
OUR LA
ATION

SIEBBANDPRESSE FUER DIE KLAERUNG

sse erlaubt

waesserung
in den
lagen
nd auch

me
beitsweise
se sieht die
mittels
der
Schwerkraft
he voraus

erhoehen

dem Produkt
enabnahme
swaschungs-
setzte
(FPN-C)
n vom
urch die
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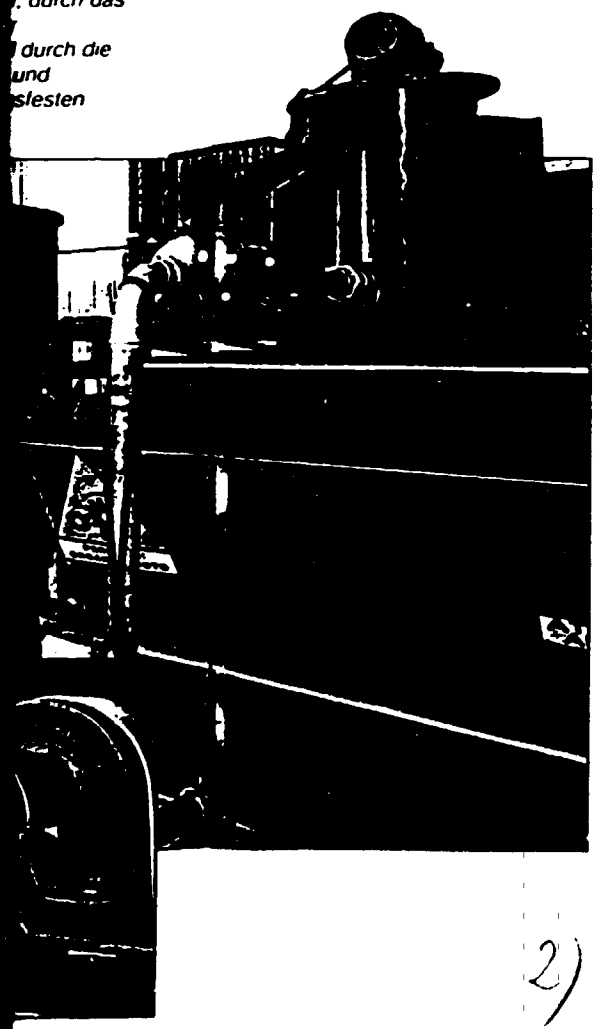
. durch das

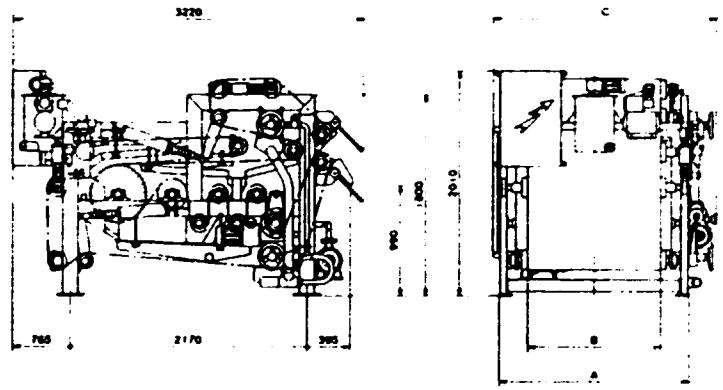
durch die
und
slesten



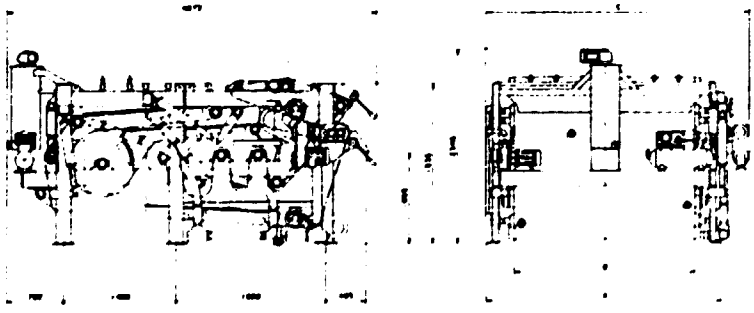
MODELLO/MODEL MODELE/MODELL		1200 N2	1700 N2	[illegible]	2700 N
Dimensioni A	mm	1710	2210	2850	3350
B	mm	1200	1700	2200	2700
C	mm	2016	2516	3200	3700
Attacchi	DN	65	65	80	80
Superficie filtrante	Tot m	11.55	16.52	28.78	35.43
Potenze installate					
- compressore aria	kW	0.75	0.75	1.5	1.5
- avanzamento nastro	kW	1.1	1.5	2.2	3
- pompa lavaggio	kW	3	4	4	5.5
- bariletto flocculatore	kW	0.25	0.25	0.37	0.37
Peso	Kg	2520	3150	6200	6900
Dimensions A	mm	1710	2210	2850	3350
B	mm	1200	1700	2200	2700
C	mm	2016	2516	3200	3700
Connections	DN	65	65	80	80
Filtering area	Tot m	11.55	16.52	28.78	35.43
Installed power					
- air compressor	kW	0.75	0.75	1.5	1.5
- belt advancement	kW	1.1	1.5	2.2	3
- washing pump	kW	3	4	4	5.5
- mixing tank	kW	0.25	0.25	0.37	0.37
Weight	Kg	2520	3150	6200	6900
Dimensions A	mm	1710	2210	2850	3350
B	mm	1200	1700	2200	2700
C	mm	2016	2516	3200	3700
Attaques	DN	65	65	80	80
Surface filtrante	Tot m	11.55	16.52	28.78	35.43
Puissances installees					
- compresseur air	kW	0.75	0.75	1.5	1.5
- avancement bandes	kW	1.1	1.5	2.2	3
- pompe lavage	kW	3	4	4	5.5
- reservoir de floculation	kW	0.25	0.25	0.37	0.37
Poids	Kg	2520	3150	6200	6900
Ausmasse A	mm	1710	2210	2850	3350
B	mm	1200	1700	2200	2700
C	mm	2016	2516	3200	3700
Anschlusse	DN	65	65	80	80
Filteroberflache	Tot m²	11.55	16.52	28.78	35.43
Installierte Leistung					
- Luftkompressor	kW	0.75	0.75	1.5	1.5
- Bandvorschub	kW	1.1	1.5	2.2	3
- Waschpumpe	kW	3	4	4	5.5
- Flockungsbehalter	kW	0.25	0.25	0.37	0.37
Gewicht	Kg	2520	3150	6200	6900

Le dimensioni del modello FPN/C sono identiche a quelle degli altri modelli.

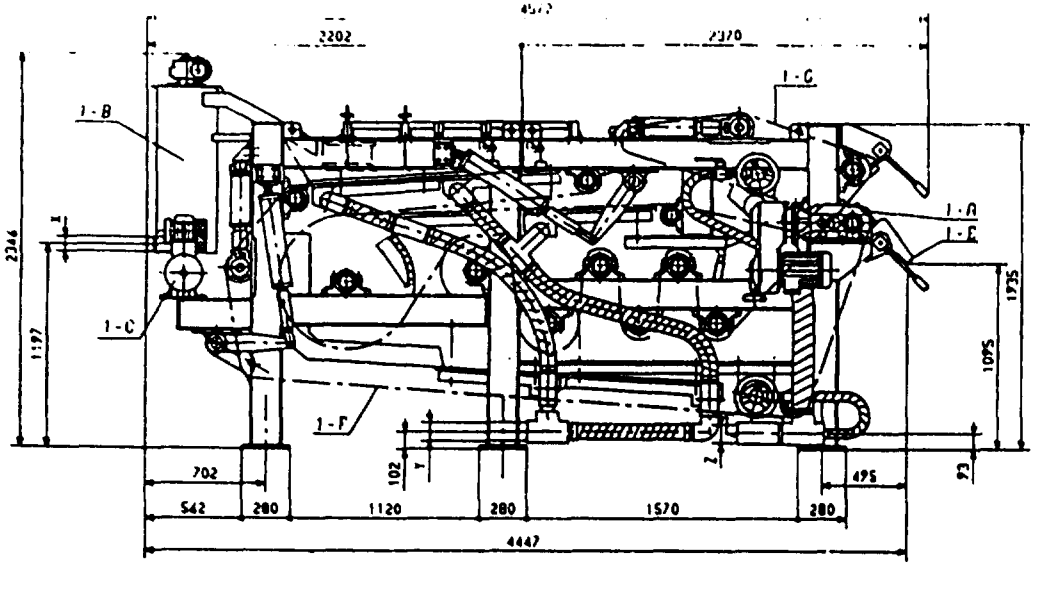
FPN 1200 N2 - FPN 1700 N2

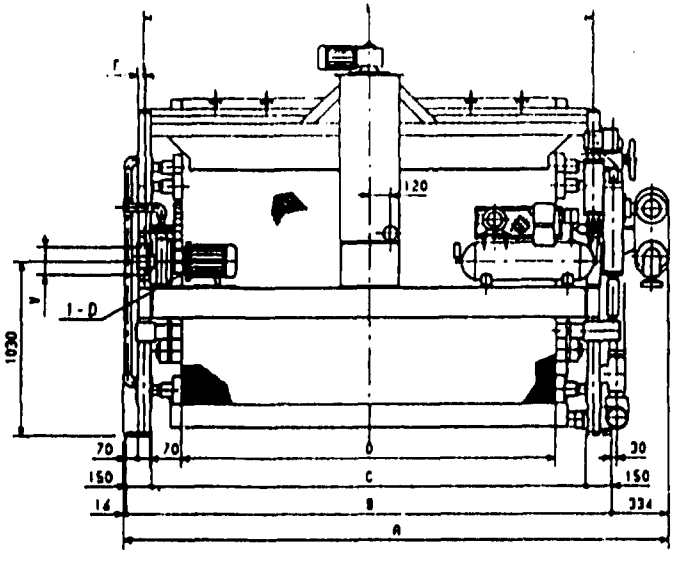


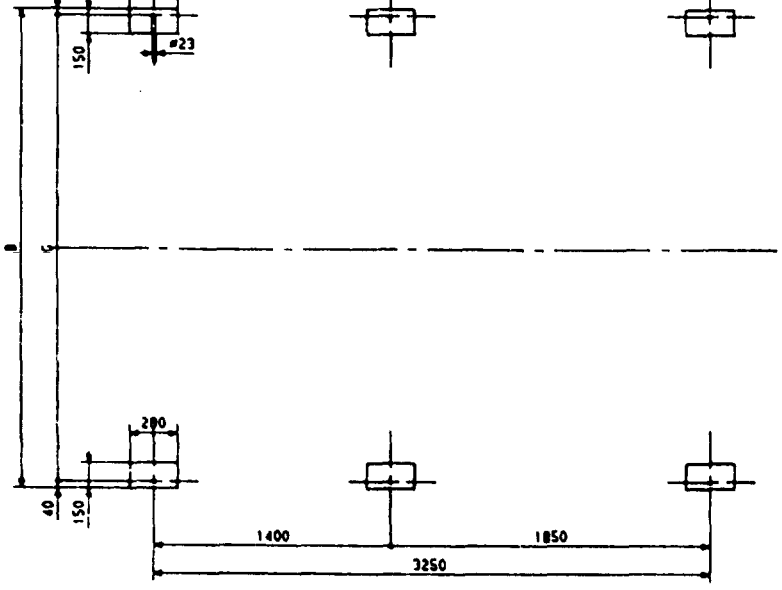
FPN 2200 N - FPN 2700 N



2)







DIMENSIONI - DIMENSIONS	FILTRO TIPO - FILTER MODEL		2200	2700
	A	mm	3200	3700
	B	"	2850	3350
	C	"	2550	3050
	D	"	2200	2700
	E	"	2640	3140
	F	"	45	45
	G	"	2770	3270

ATTACCHI - CONNECTIONS				
Ingresso fango - Sludge inlet	X	ø 2" G	ø 2" G
Scarico tel.filtr.-Filtrate final out.	Y	ø 110	ø 110
Scarico lav.nastri-Belt washing outlet	Z	ø 110	ø 110
Ingresso lav.nastri-Belt washing inlet	V	DN50PN10	DN65PN10

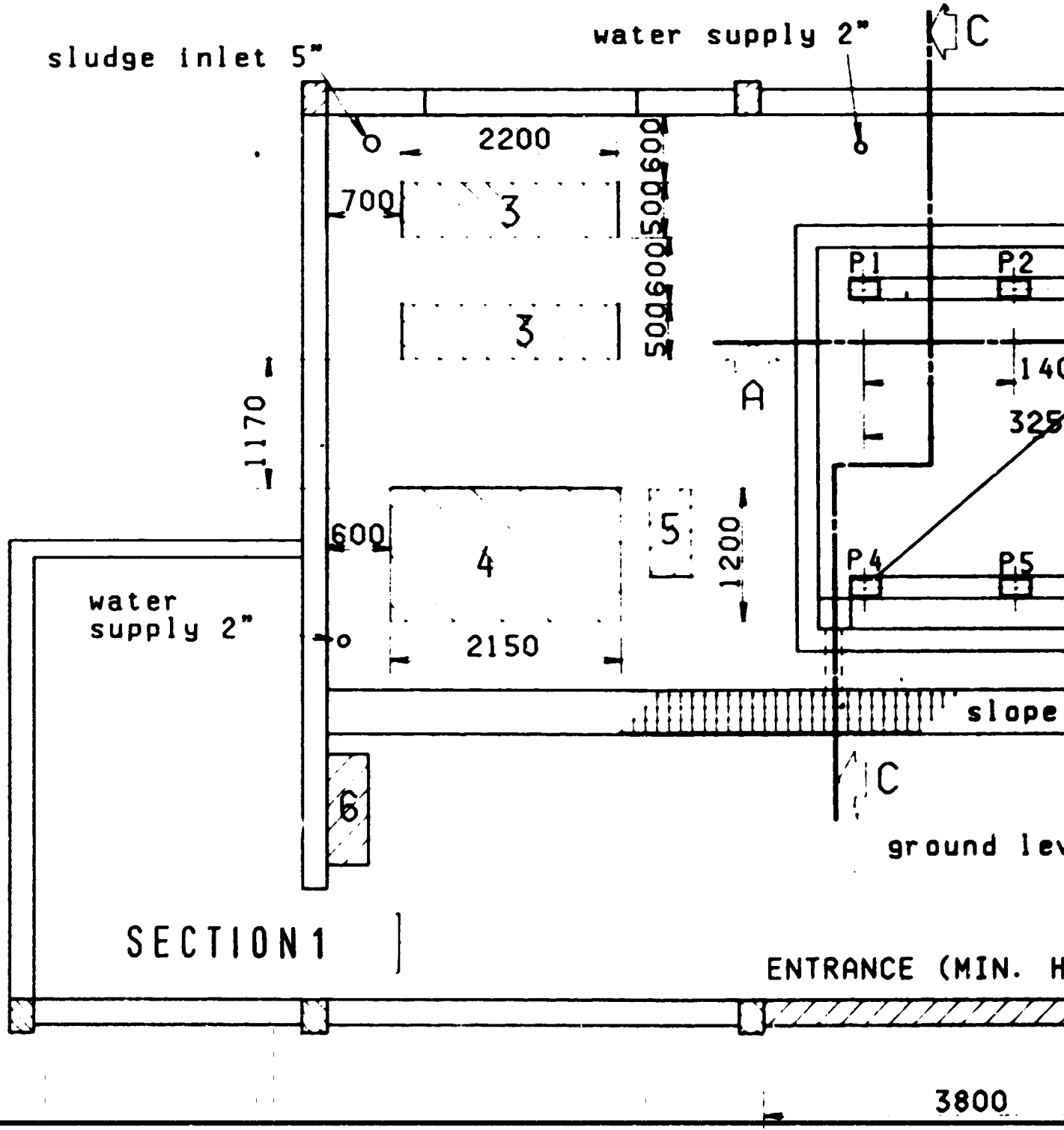
DATI TECNICI - TECHNICAL DATA	FILTRO TIPO - FILTER MODEL		2200	2700
Cap.serbatoio flocc.-Mixing tank capacity	1-B	l. 96	l. 96
Sviluppo nastro inf. - Lower belt lenght	1-F	16430	16430
Sviluppo nastro sup. - Upper belt lenght	1-G	12950	12950
Pot.compress. aria - Air compressor power	1-C	kW 1.5	kW 1.5
Pot.avanzamento nastri - Belt drive power	1-A	kW 2.2	kW 3
Potenza floccolatore - Mixing tank power	1-B	kW 0.37	kW 0.37
Potenza pompa lavaggio-Washing pump power	1-D	kW 4	kW 5.5
Scarico pannello essuto - Cake discharge	1-E	-	-
Sup.sgrondo per gravità - Gravity dewicing surface		m² 6.47	m² 8.20
Sup.disidratazione soffice-Soft dehydration surface		m² 8.71	m² 10.73
Sup.disidratazione spinta-Pressed dehydration surface		m² 13.40	m² 16.50
Superficie totale - Total surface		m² 28.78	m² 35.43
Vel.avanzamento nastri - Belt drive speed		2.21-13.28 m/min	1.82-10.86 m/min
Acqua rete lavaggio nastri - Belt washing fresw.		3 atm 5.5 l/min	15 atm 5.2 l/min
Pressione aria esercizio - Operation air pressure		6-8 bar	8-10 bar
Peso macchina - Weight		kg 4200	kg 4900

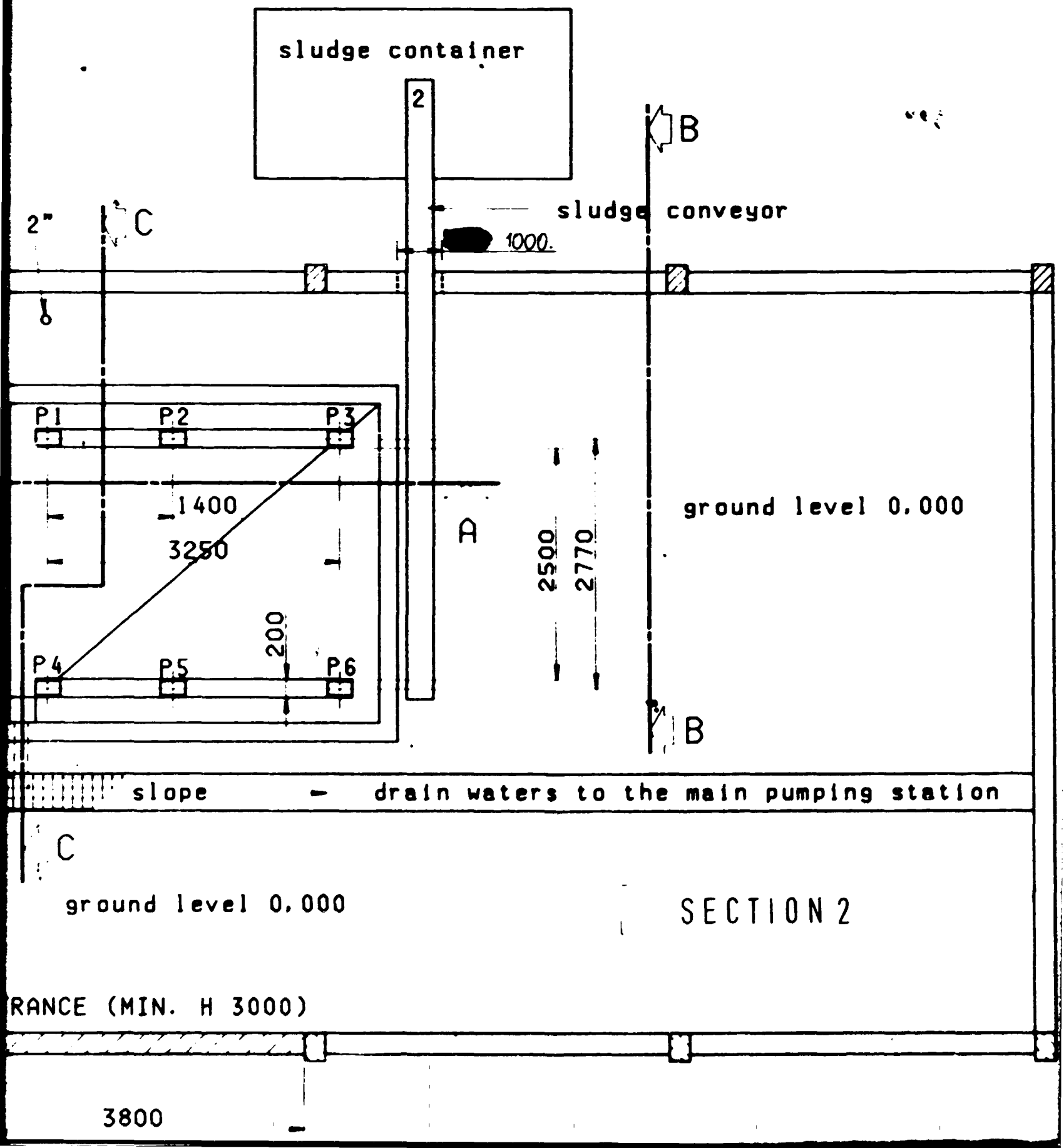
FPN 2200-2700

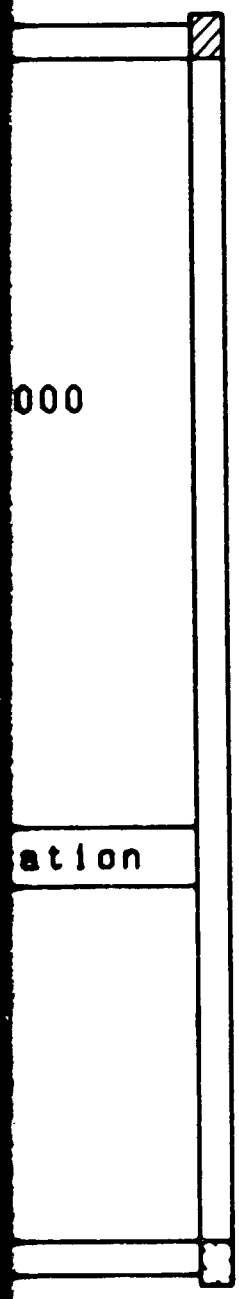
SCHEMA - SCHEME

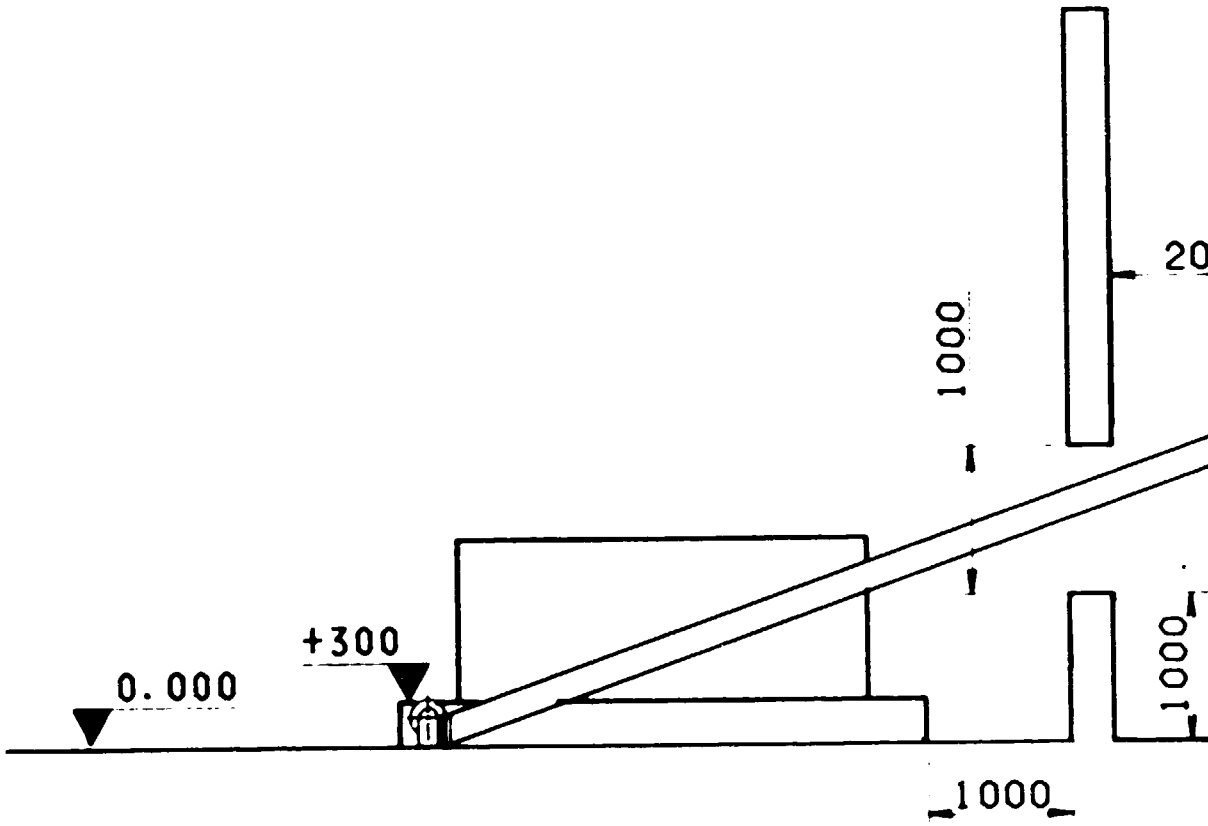
1:20

DIEMME

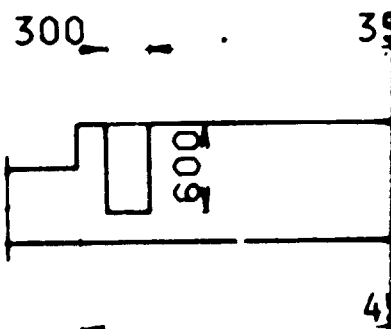

sludge inlet 5"
water supply 2"
C
2200
700
3
3
600
500
600
500
P1
P2
1170
A
140
325
600
4
5
1200
P4
P5
water
supply 2"
2150
slope
C
6
ground lev
SECTION 1
ENTRANCE (MIN. H
3800

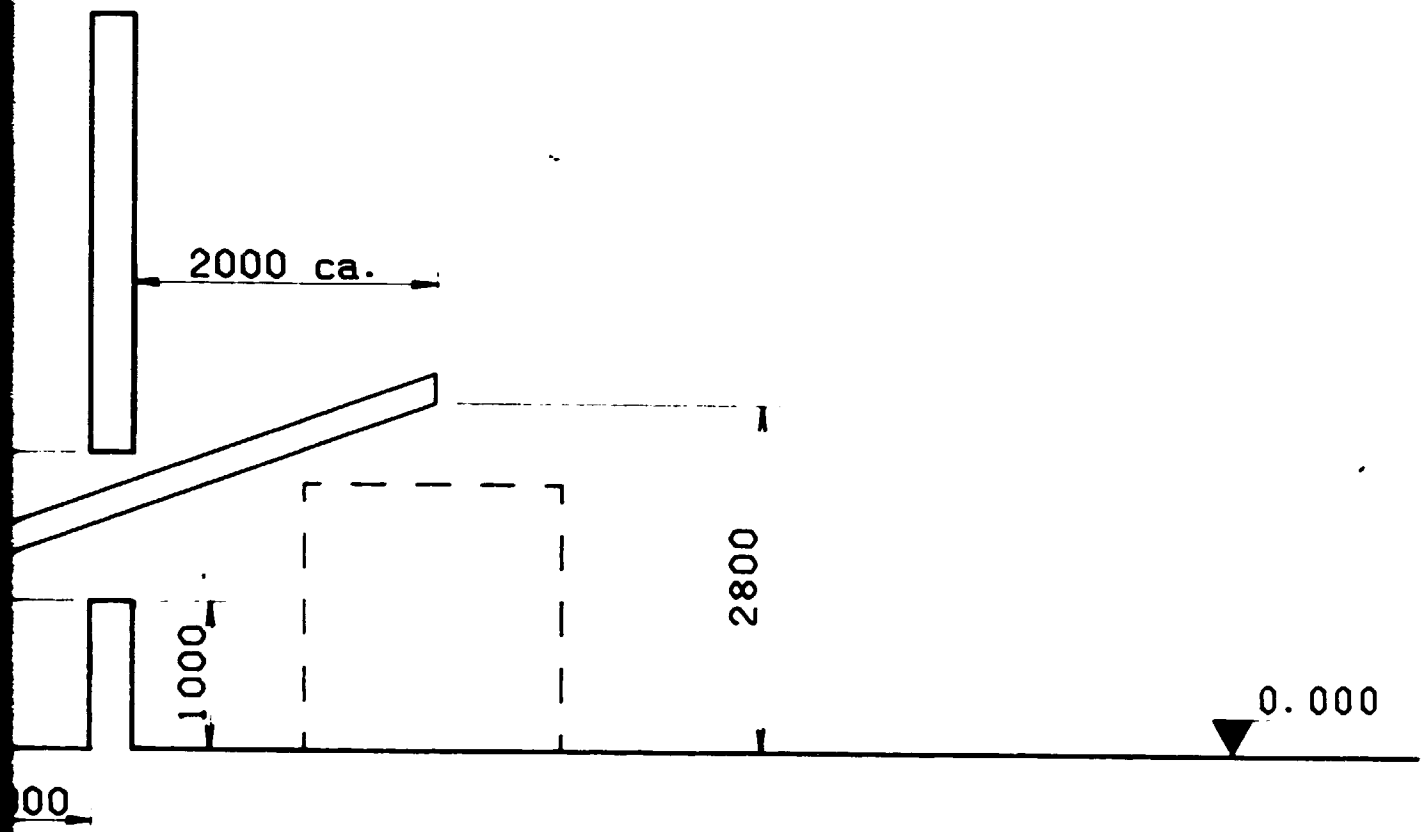

sludge container
2
B
C
2"
sludge conveyor
1000.
P1
P2
P3
1400
3250
A
2500
2770
ground level 0.000
200
P4
P5
P6
B
slope
drain waters to the main pumping station
C
ground level 0.000
SECTION 2
RANCE (MIN. H 3000)
3800



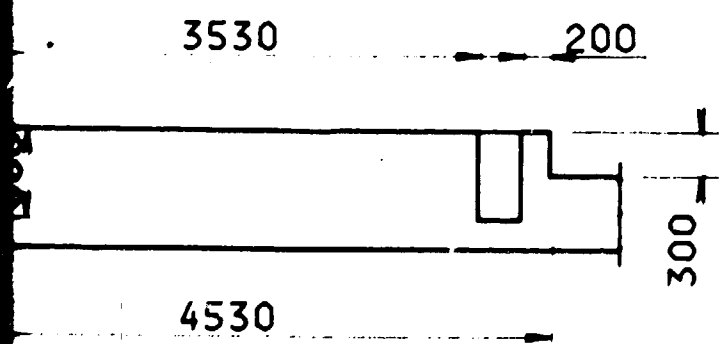


SECTION 3

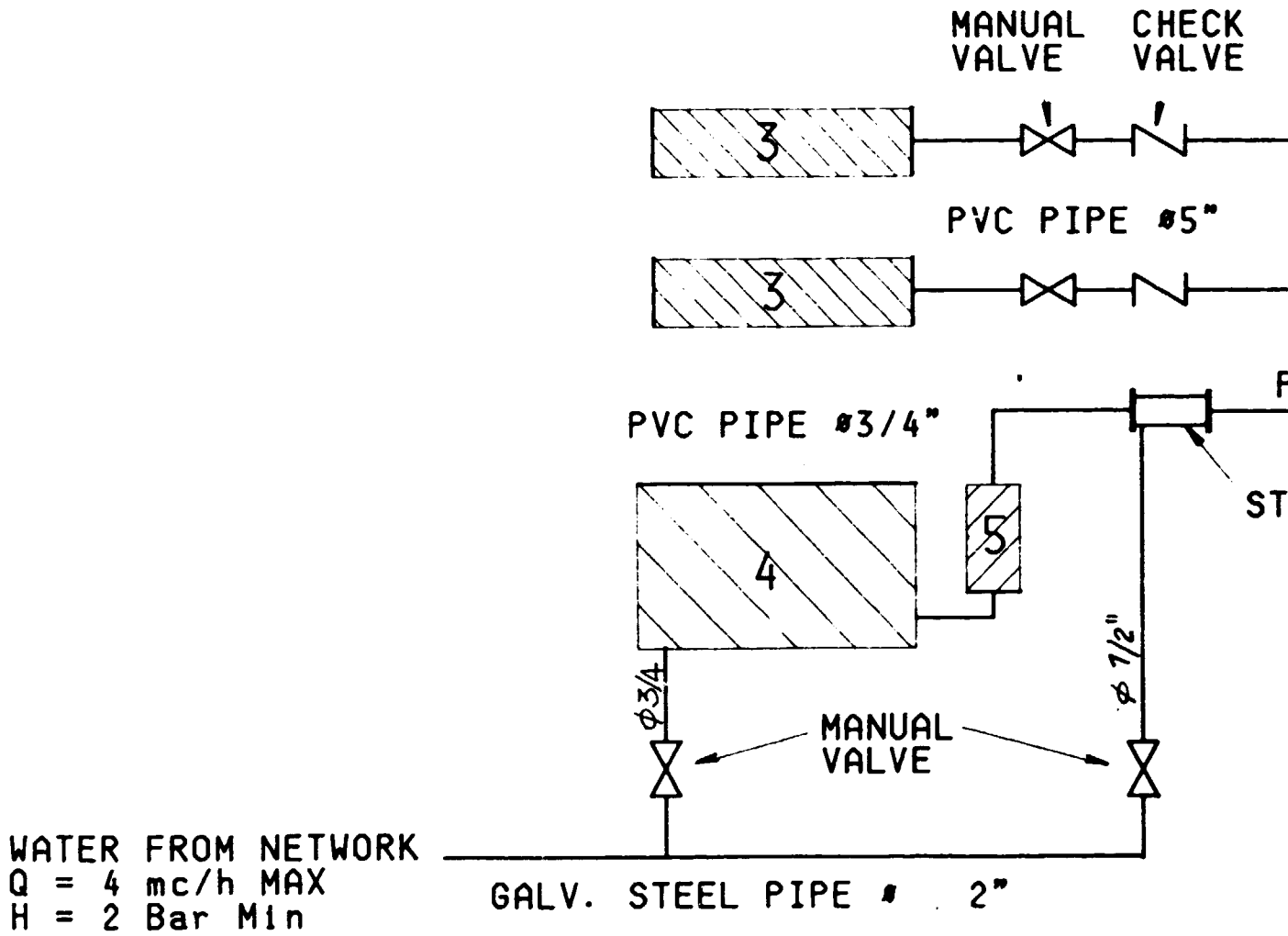




VIEW B-B

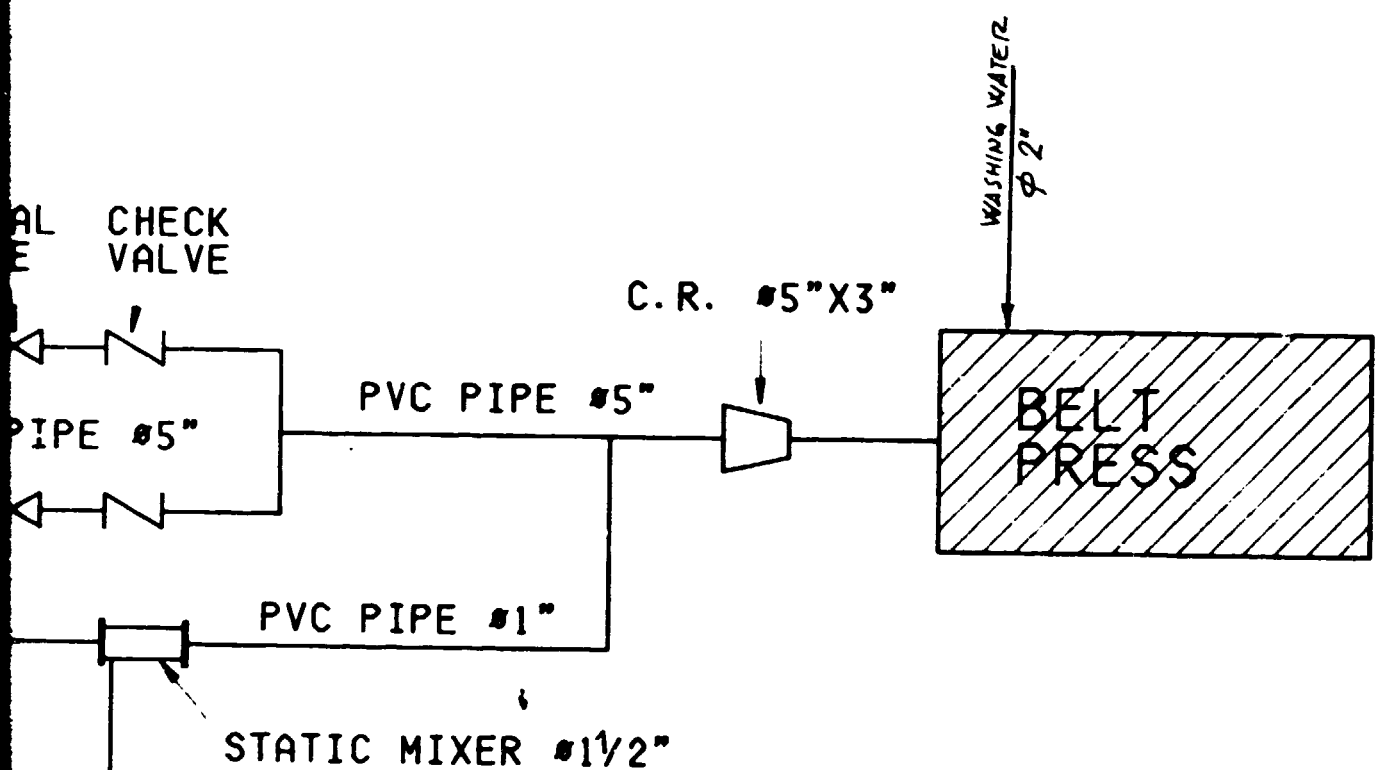


SECTION 4



BELT PRESS FEEDING

SECTION 5



BELT PRESS : wat
Q =

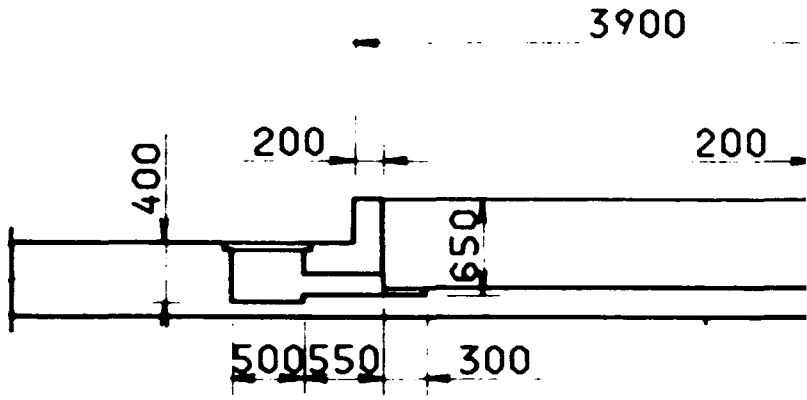
Net
wit
les

SECTION 6

EEDING SCHEME

POLY AUT... UNIT :
Q =

VIE



VIEW C-C

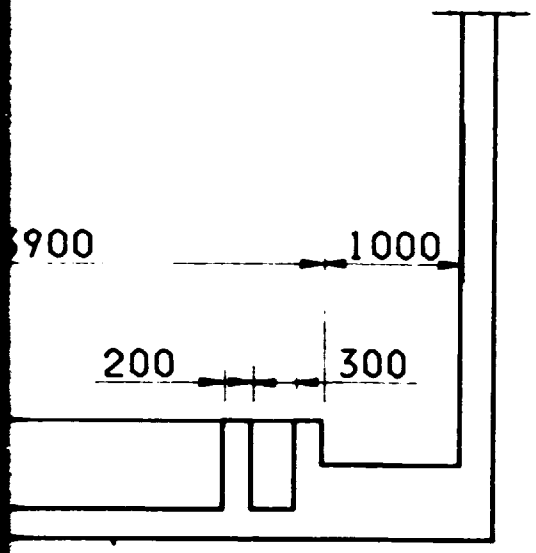
S : water for washing belts
Q = 12 mc/h, H = 1 Bar MIN

Network water or water
with suspended solids
less than 0.5 mm

UNIT : feeding water (pure water)
Q = 2 mc/h, H = 2.5 Bar MIN

SECTION 7

VIEW A-A



EW C-C

SECTION 8

1. BELT PRESS TYPE DM 2000
2. BELT CONVEYOR
3. BELT PRESS FEEDING PUMPS
4. POLYMER AUTOMATIC FEEDING UNIT
5. DOSING PUMP
6. ELECTRICAL MAIN BOARD

P1=P2=P3=P4=P5=P6=1200 kg (TOTAL WGT. Kg 7200.)

ITALPROGETTI
engineering

SAN ROMANO (PI) ITALY TEL. 0571 450477
TELEX 501827 TELEFAX 0571 450301

Cliente:
UNIDO VIENNA
.

Sost. 1 PREL. 1 | Sost. del

Oggetto: .
E.T.P. AT PALLAVARAM MADRAS (INDIA)

Particolare: BELT PRESS

Disegno Contr. Visto	Firma	Data	Scala	F.to	Disegno N.	Mod.
	L. CANDI	25-09-93	1:50	A.1	PRELIMINARY 2	1

4.6. AUTOMATIC POLYELECTROLYTE PREPARATION AND DOSAGE UNITS (Items 17a & 22)

Impianti automatici per la preparazione di soluzioni di polielettrolita

L'IMPIANTO IDEALE PER
THE IDEAL PLANT FOR EVE
LA PIU' AMPIA GAMMA DI MOD
THE WIDEST RANGE OF MO

Descrizione di funzionamento

La polvere e l'acqua confluiscono nell'imbuto diluitore

● La polvere proveniente dalla tramoggia, tramite la coclea a velocità variabile, cade nell'imbuto di diluizione.

● L'acqua proveniente dalla linea di alimentazione attraversa una serie di controlli : manometro, pressostato, riduttore di pressione, elettrovalvola, flussimetro e giunge nell'imbuto di diluizione .

● La soluzione che si forma cade nella prima vasca, attraverso la parete a sifone si trasferisce nella seconda vasca; quindi sempre tramite parete a sifone, giunge nella terza vasca.

● La soluzione viene mantenuta in movimento costante da tre agitatori a basso numero di giri.

● Durante il trasferimento descritto la soluzione giunge a maturazione .

● Le sonde nell'ultima vasca determinano il processo di automazione dell'impianto.

Processo acqua/polvere

L'acqua é la costante .
● La polvere é la variabile.

L' acqua è mantenuta costante come segue :

Nella serie ***PL:*** Dalla pompa centrifuga e dalla registrazione del flussimetro.

- Nella serie ***PLR - PLC:*** Dal riduttore di pressione e dalla registrazione del flussimetro.

- Nella serie ***PLS - PLE:*** Dal riduttore di pressione e dalla registrazione del flussimetro.

● La polvere viene erogata in quantità variabile dalle differenti velocità della coclea .

La miscelazione acqua/polvere avviene quindi in modo contemporaneo e parallelo .

Automatic plants for preparation of polyelectrolyte solutions

Principle of operation.

Powder and water meet in the dilution funnel.

● [illegible]

● [illegible]

● [illegible]

● [illegible]

● [illegible]

● [illegible]

Water/powder mixing process.

Water is the constant.
● Powder is the variable.

[illegible]

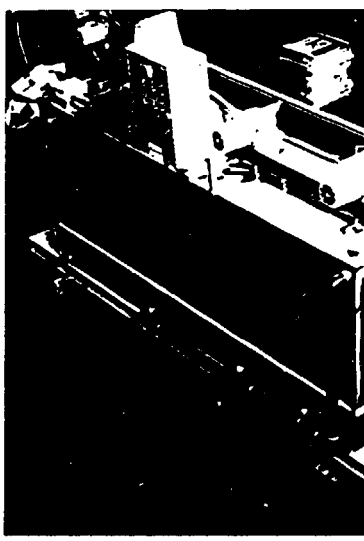
- ***PL*** : [illegible]

- ***PLR - PLC*** [illegible]

- ***PLS - PLE*** [illegible]

● [illegible]

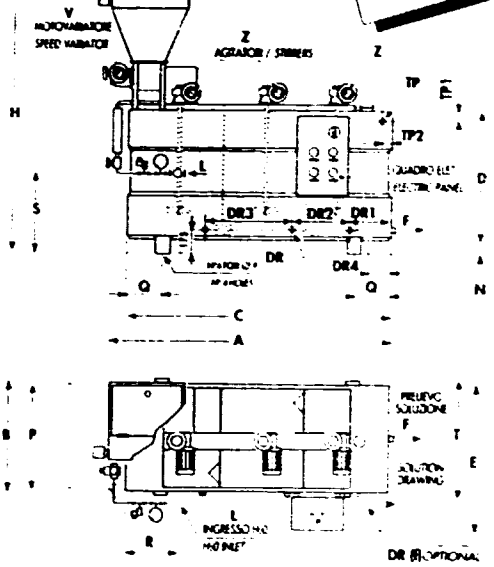
[illegible]



Particolare: Impianto PL 3500 completo di pompe di dosaggio soluzione su unico basamento.

ACTERISTICS

2000	4000	5500
0,75	0,25	0,75
0,5	1	1
550	650	780
2950	3200	3700
1000	1150	1200
2800	3000	3500
1100	1200	1390
1350	1500	1550
190	110	110
1040	1190	1240
720	810	1100
320	360	400
90	90	100
100	80	150
355	430	445
727	720	855
933	1000	1150
141	200	240
2170		
2270	2400	2670
2540	2590	2950
[illegible]	2m	2m
19	19	[illegible]
[illegible]	2m	2m
[illegible]	[illegible]	[illegible]
990	1140	1190
470	525	625



Per le coclee vedi tabella PL / For screw feeder see PL table

Caratteristiche generali:

- Pressione acqua alimentazione non inferiore a 0,5 BAR.
- Buona dissoluzione della polvere
- Riduttore di pressione dell'acqua
- Condotto di diluizione acqua/polvere che determina una buona dissoluzione
- N° 3 agitatori nel PLS, N° 2 agitatori nel PLE, Tutti a pale larghe ed a basso numero di giri.
- Sonde di minimo livello in acc. inox con isolante in materiale plastico
- Collettore drenaggio e troppo pieno (OPTIONAL)
- Quadro elettrico (STANDARD) in accordo alle ACF-CEI 1713, CEI 64-8 varianti: CEI 64-8 V CEI 64-8.V;

Main features:

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

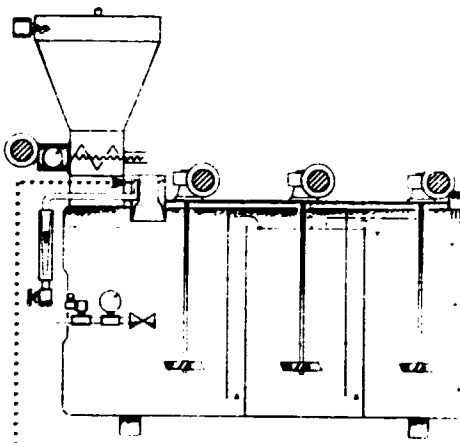
CARATTERISTICHE *PLS*

MECCANICHE:

- [illegible]
- [illegible]
- [illegible]
  [illegible]
- [illegible]

ELETTRICHE:

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]



Pressione minima
0,5 bar
Minimum pressure

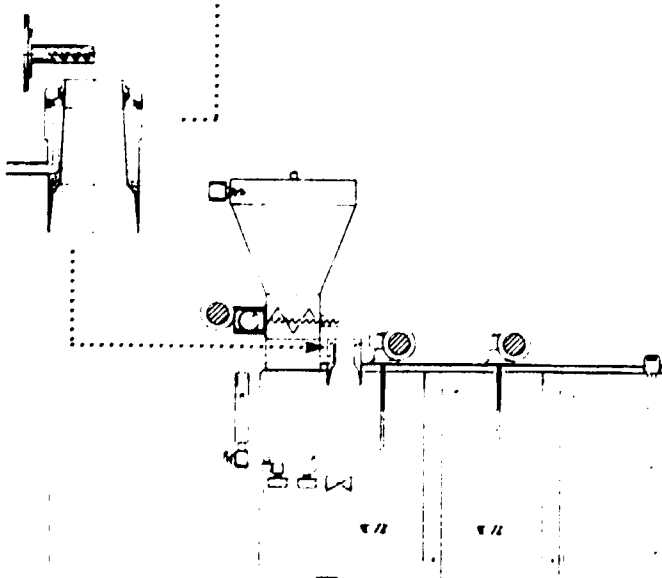
CARATTERISTICHE *PLE*

MECCANICHE:

- [illegible]
- [illegible]
- [illegible]
  [illegible]
- [illegible]

ELETTRICHE:

- [illegible]
- [illegible]
- [illegible]

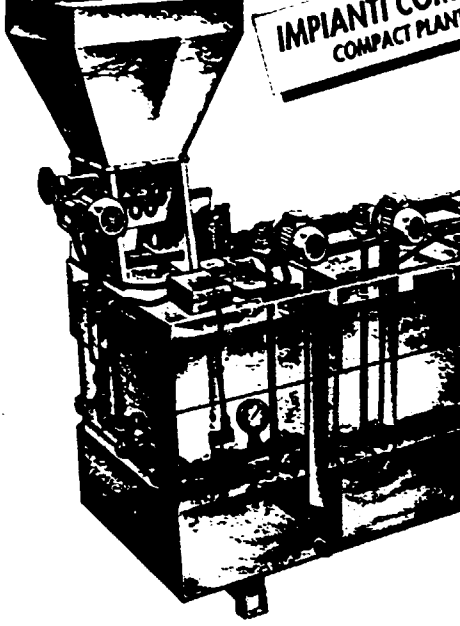


Caratteristiche generali:

- Pressione acqua alimentazione non inferiore a 2,5 BAR
- Ottima dissoluzione della polvere con totale assenza di grumi.
- Riduttore di pressione dell'acqua di alimentazione
- Imbuto di diluizione acqua/polvere che determina una perfetta dissoluzione.
- N° 3 agitatori nel PLR, N° 2 agitatori nel PLC, tutti a pale larghe e a basso numero di giri.
- Sonde di minimo livello in acc. inox con isolante in materiale plastico
- Coperchi delle vasche, (OPTIONAL).
- Collettori di drenaggio e troppo pieno, (OPTIONAL)
- Quadro elettrico (STANDARD) in accordo alle ACF-CEI 1713; CEI 64-8 varianti: CEI 64-8,V CEI 64-8,V;

Main features:

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]



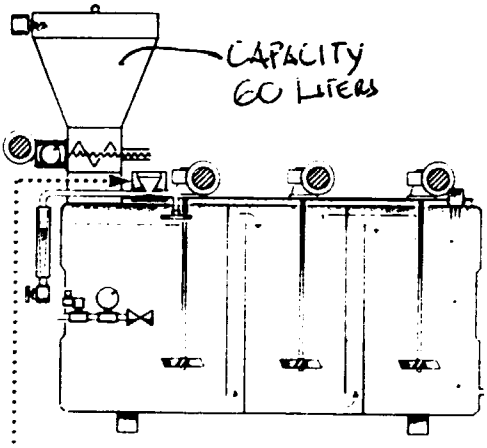
CARATTERISTICHE *PLR*

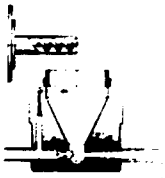
MECCANICHE:

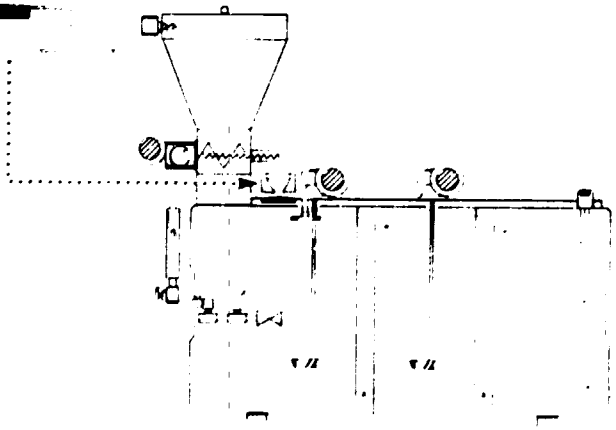
- [illegible]
- [illegible]
- [illegible]

ELETTRICHE:

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]







CARATTERISTICHE *PLC*

MECCANICHE:

- [illegible]

ELETTRICHE:

4.7. DOSING PUMPS FOR CATIONIC POLYELECTROLYTE (Item 17b)

POMPE
HYDRA

SERIE E-EM-VE SERIES

POS. 5 DWG: PRELIMINARY 2

POMPE MONOVITE A ROTORE ELICOIDALE

HELICAL ROTOR PROGRESSING CAVITY PUMPS

dati caratteristici elettropompe monoblocco "EM"

selection chart "EM" enbloc pumps

POMPA TIPO PUMP TYPE	Ø BOCCHE NOZZLESS Ø	MOTORE-MOTOR				PREVALENZA m.c.a - TOTAL HEAD m.w.c.									
		CV	KW	POLI POLES	GIRI RPM	10	20	30	40	50	60	70	80	90	100
						PORTATA L/ora - CAPACITY L/h									
EM 28	3/4"	0.35	0.25	4	1380	300	280	270	255	230	205	185	170	150	
		0.25	0.18	6	900	180	167	162	155	145	135	125	114	105	
EM 24	"3/4"	0.35	0.25	4	1380	600	530	475	430	380	340	300			
		0.25	0.18	6	900	380	345	310	280	250	220	200			
EM 48	1"	0.75	0,55	4	1380	1090	980	890	800	710	630	550			
		0,5	0,33	6	900	700	640	570	510	470	420	375			
		0.33	0,25	8	680	540	490	445	400	370	330	300			
EM 44	1"	0.75	0.55	4	1380	2420	2130	1890	1680	1450	1300				
		0.5	0.33	6	900	1580	1400	1210	1090	930	830				
		0.33	0.25	8	680	1200	1070	920	810	705	630				
EM 68	1¼"	1.5	1.1	4	1400	2900	2650	2350	2100	1850	1670	1500	1300	1150	
		1	0,75	6	900	1870	1700	1500	1350	1180	1080	950	870	740	
		0.75	0.55	8	700	1450	1320	1150	1040	900	830	750	650	560	
EM 64	1¼"	1,5	1.1	4	1400	3500	3250	3000	2750	2510	2300	2100			
		1	0,75	6	900	2210	2100	1900	1760	1600	1470	1350			
		0.75	0.55	8	700	1720	1600	1480	1380	1240	1150	1050			
EM 88	1½"	3	2,2	4	1400	4030	3610	3200	2800	2400	2030	1700	1430	1180	
		2	1,5	6	900	2600	2320	2030	1800	1550	1300	1100	910	760	
		1	0,75	8	700	2000	1800	1600	1400	1200	1000	830	710	590	
EM 84	1½"	3	2,2	4	1400	5500	5000	4500	4100	3760	3300	2900			
		2	1,5	6	900	3550	3200	2900	2620	2400	2100	1850			
		1	0,75	8	700	2800	2500	2270	2020	1820	1620	1400			

POMPE

SERIE E-EM-VE

GENERALITÀ

Si tratta di pompe volumetriche nelle quali il rotore metallico elicoidale a filetto costituito da una vite a un principio, ruota in uno statore elastico flottante costituito da una vite a due principi.
La pompa può, in pratica, convogliare qualsiasi tipo di liquido anche sporco, abrasivo, viscoso o con piccole parti in sospensione.
I fluidi vengono convogliati senza turbolenza e agitazione in modo da non comprometterne le caratteristiche fisiche, chimiche ed organolettiche.

APPLICAZIONI

Liquidi densi e viscosi in genere, oli minerali e vegetali, oli alimentari, paste dentifricie, melasso, creme di bellezza, vini, fanghi da impianti di depurazione, latte, panna, impasti vari, succhi di frutta, acque minerali, impasti ceramici argillosi, ecc, ecc.

LIMITI DI IMPIEGO

Portate sino a 6 mc/h
Prevalenze sino a 90 m.c.a.
Velocità di rotazione massima 1750 g/1'
Temperatura di esercizio massima 90 °C
Massima pressione di esercizio 10 Kg/cmq

VERSIONI

E – pompa completa di organi di sopportazione, adatta per essere accoppiata a motori elettrici, o motoriduttori o motovariatori a mezzo di giunti elastici oppure con cinghie e pulegge.
EM – pompa monoblocco con organi di sopportazione comuni al motore elettrico direttamente accoppiato.
VE – pompa completa di organi di sopportazione adatta per essere accoppiata a motori elettrici flangiati (forma B5), oppure a motoriduttori o motovariatori flangiati.
In questo modo viene evitato il basamento metallico.

ESECUZIONI

- **Esecuzione "C"** - Corpo in ghisa, rotore in AISI 304 lucidato, albero pompa in AISI 431, statore in gomma acrilonitrilica, tenuta meccanica adatta al liquido convogliato, by-pass in ottone
- **Esecuzione "B"** - Corpo in bronzo BZN7, rotore in AISI 304 lucidato, albero pompa in AISI 316, statore in gomma acrilonitrilica alimentare, tenuta meccanica adatta al liquido convogliato, by-pass in ottone.
- **Esecuzione "D"** - Corpo in AISI 316, rotore in AISI 304 lucidato, albero pompa in AISI 316, statore in gomma acrilonitrilica alimentare, tenuta meccanica adatta al liquido convogliato, by-pass in AISI 316.
- **Esecuzione "G"** - Corpo in MOPLEN, rotore in AISI 304 lucidato, albero in AISI 316, statore in gomma acrilonitrilica alimentare, enuta meccanica adatta al liquido convogliato, non e possibile il by-pass

Su richiesta sono possibili statori con mescole di altro tipo come l'etilene-propilene, la gomma naturale, ed il viton (questo ultimo solo in alcuni modelli).
Esistono anche possibilità di materiali diversi per i rotori come: AISI 316, acciai trattati, cromati, ecc.
I motori elettrici normalmente previsti sono con protezione IP 44 E con tensione 220/380V-50Hz. trifase
Su richiesta sono possibili protezioni, tensioni e frequenze differenti. È possibile anche l'esecuzione antideflagrante Ex-d.

GENERALITIES

The E - EM - VE are positive displacement pumps and are based on a metal single-thread helical rotor, turning within a rubber double-thread helical stator.
The pump will handle pratically all fluids also dirties, abrasives, viscouses and with suspended particles.
Fluids are handled without turbulence and agitation so the physical, chemical and intrinsic properties are preserved.

APPLICATIONS

Dense end viscous liquids, mineral oils, vegetable oils, alimentary oils, tooth paste, molasses, beauty creams, wines, sludge, milk, cream, mixtures, fruit juices, mineral water, ecc, ecc.

WORK'S LIMIT

Capacity up to 6 mc/h
Total head up to 90 m.w.c
Speed of rotation max. 1750 r.p.m.
Max. work temperature 90°C
Max. work pressure 10 Kg/cmq

VERSIONS

E – pump with bracket, able for coupling to electric motor, speed reducer or speed change lever with flexible coupling or with belt and pulley.

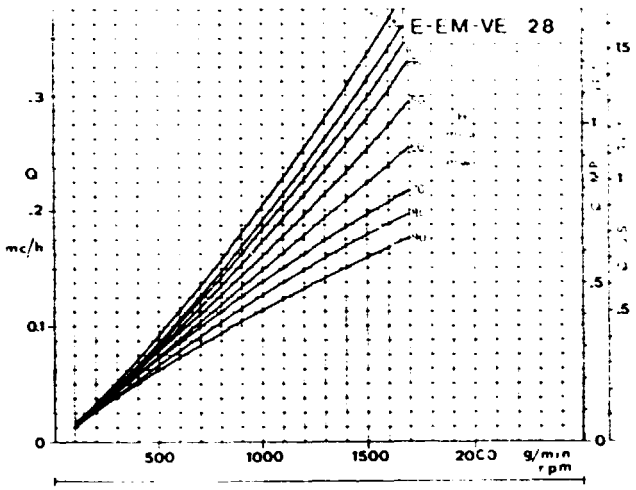
EM – monobloc pump with electric motor directly coupled.

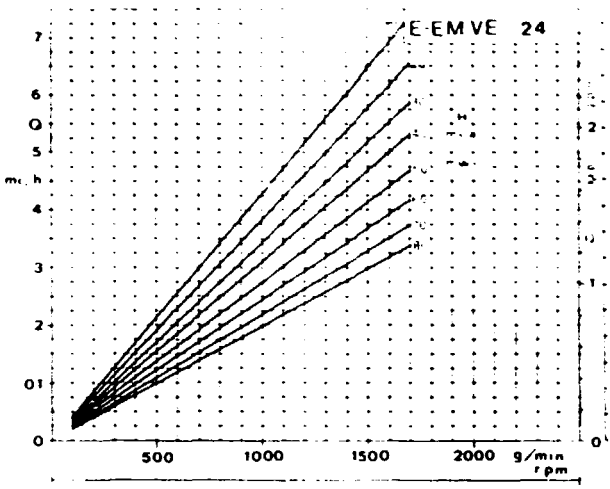
VE – pump with bracket, able for coupling to flanged electric motor (B5 or V1) or to flanged speed reducer or to speed change lever.
The common base-plate is not necessary.

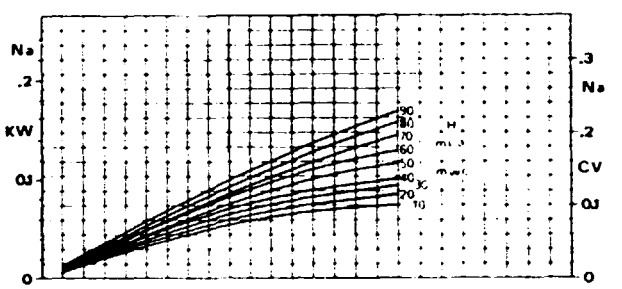
EXECUTIONS

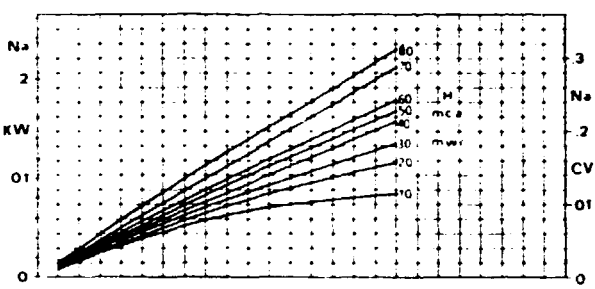
- **Execution "C"** - Casing in cast-iron, rotor in polished AISI 304 SS, shaft in AISI 431 SS, stator in acrylonitrilic rubber, mechanical-seal able to pumped fluid, by-pass in brass.
- **Execution "B"** - Casing in BZN7 bronze, rotor in polished AISI 304 SS, shaft in AISI 316 SS, stator in alimentary acrylonitrilic rubber, mechanical seal able to pumped fluid, by-pass in brass.
- **Execution "D"** - Casing in AISI 316 SS, rotor in polished AISI 304 SS, shaft in AISI 316 SS, stator in alimentary acrylonitrilic rubber, mechanical-seal able to pumped fluid, by-pass in AISI 316 SS.
- **Execution "G"** - Casing in MOPLEN, rotor in polished AISI 304 SS, stator in acrylonitrilic alimentary rubber, shaft in AISI 316 SS, mechanical seal able to pumped fluid, without by-pass.

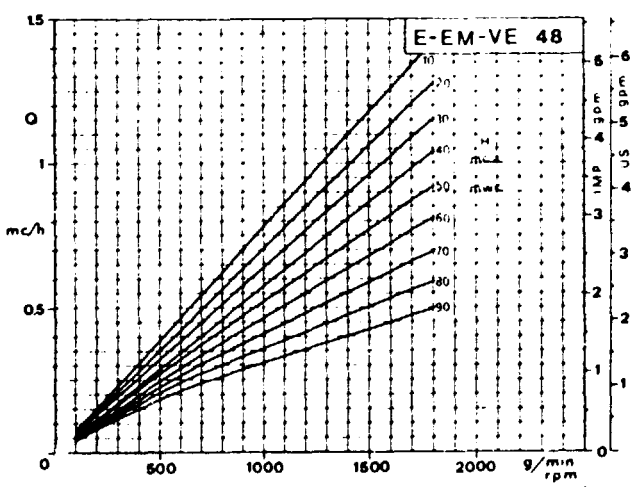
On request different materials for stators as EPDM, natural rubber, or Viton, are expected.
Also for rotors some of options as AISI 316 SS, hardened steel, chromium plated steel, are expected.
T.E.F.C. motors, IP 44 protection, 220/380 volts, 50 Hz are normally expected. On request different protections, voltages and frequencies are possible. Also explosion proof Ex-d execution is expected.

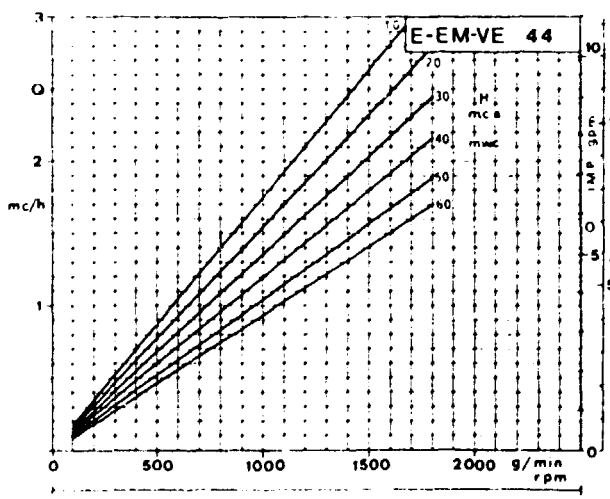

E-EM-VE 28
Q
mc/h
500
1000
1500
2000
g/min
rpm

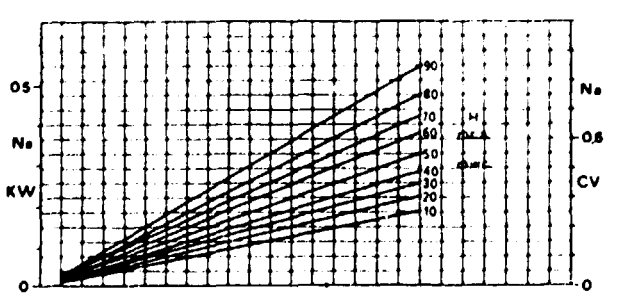

E-EM VE 24
Q
mc/h
500
1000
1500
2000
g/min
rpm

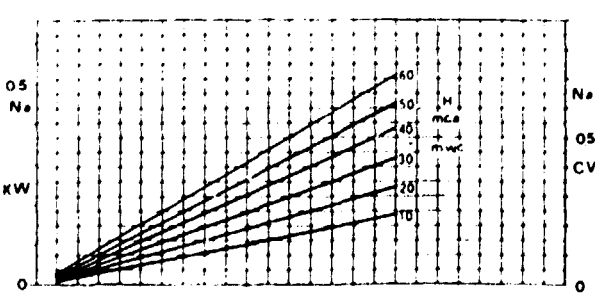

Na
KW
CV

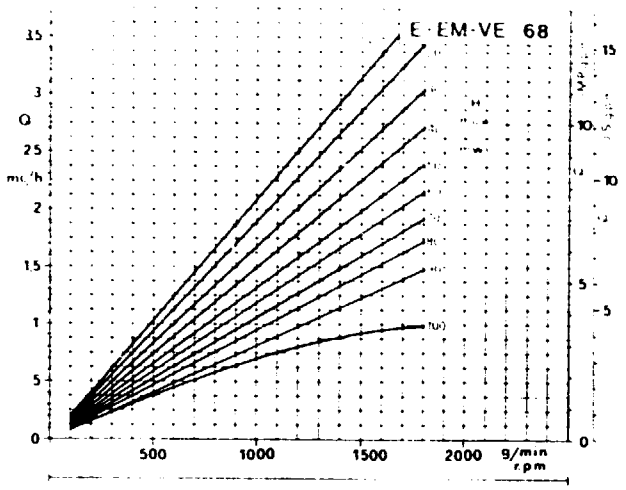

Na
KW
CV

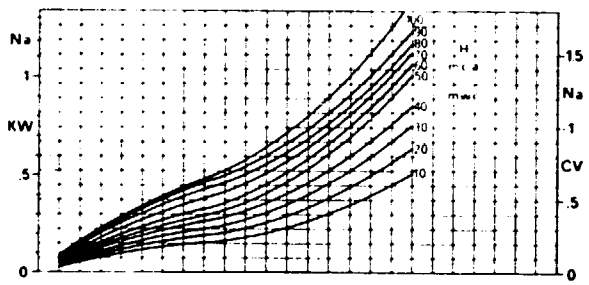

E-EM-VE 48
Q
mc/h
500
1000
1500
2000
g/min
rpm

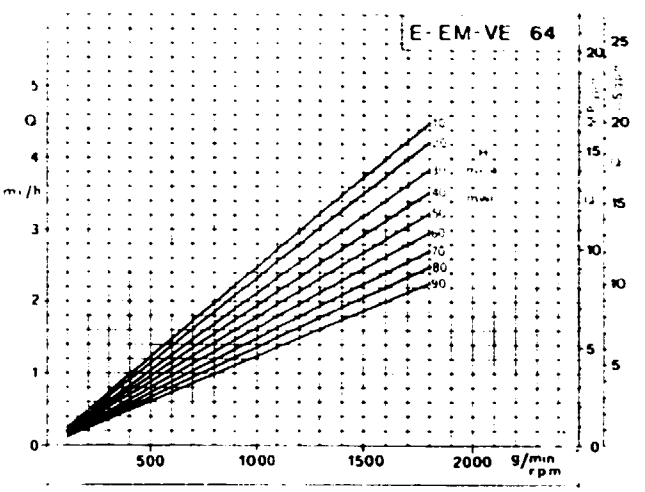

E-EM-VE 44
Q
mc/h
500
1000
1500
2000
g/min
rpm

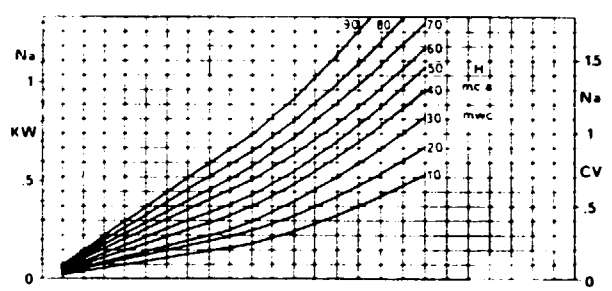

Na
KW
CV

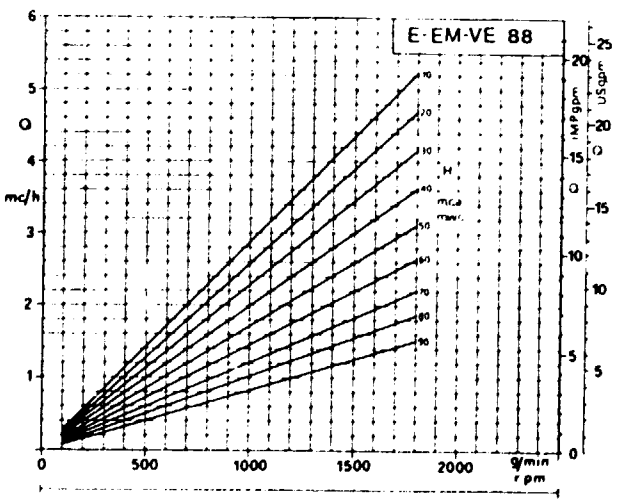

Na
KW
CV

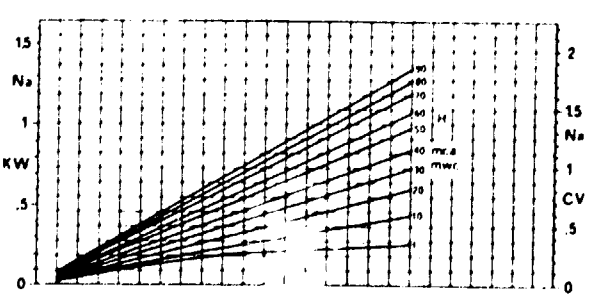

E-EM-VE 68
Q
mc/h
H
mca
mwc
9/min
rpm
500
1000
1500
2000

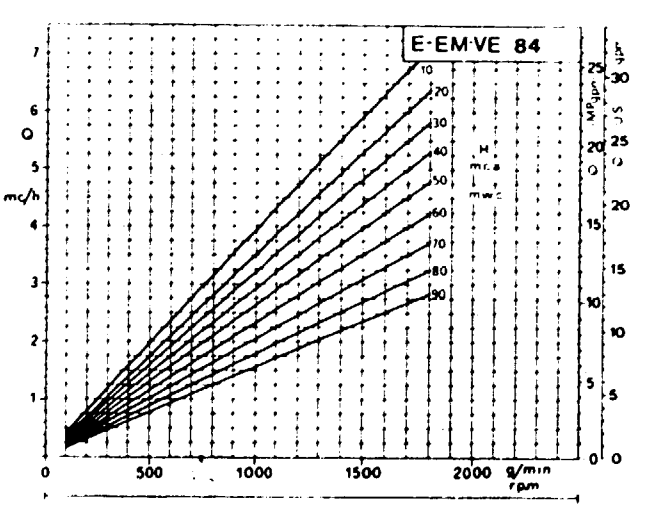

Na
KW
CV
H
mca
mwc


E-EM-VE 64
Q
m³/h
H
mca
mwc
9/min
rpm
500
1000
1500
2000


Na
KW
CV
H
mca
mwc


E-EM-VE 88
Q
mc/h
H
mca
mwc
9/min
rpm
500
1000
1500
2000


Na
KW
CV
H
mca
mwc


E-EM-VE 84
Q
mc/h
H
mca
mwc
9/min
rpm
500
1000
1500
2000

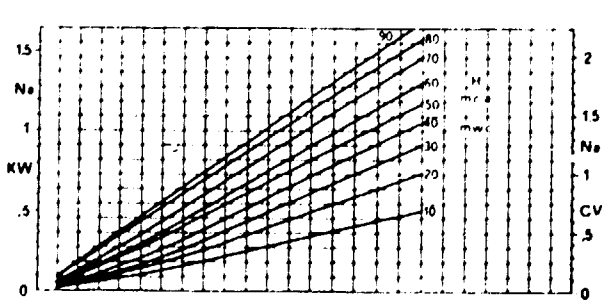
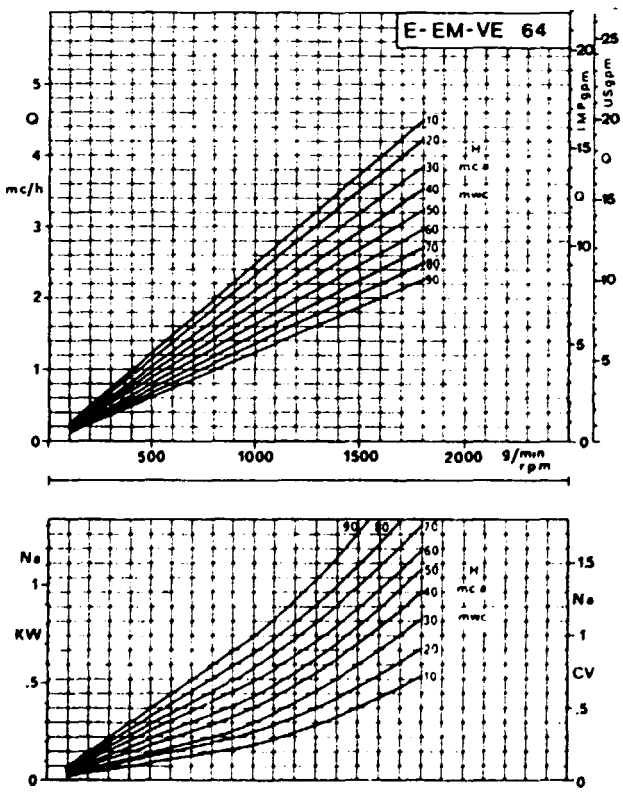

Na
KW
CV
H
mca
mwc

TABELLA DI SELEZIONE POMPE E-EM-VE IN FUNZIONE DELLA VISCOSITÀ E ABRASIONE

TABLE IN CONNECTION WITH VISCOSITY AND ABRASION

POMPA TIPO / PUMP TYPE	VISCOSITA - VISCOSITY Cps	20	50	100	500	1 000	2 500	5 000	10 000	25 000	40 000	100 000	Ø MASSIMO CORPI SOLIDI / MAX Ø OF SOLIDS mm
	°E	3	6 5	13	65	130	320	650	1 300	3 200	5 200	13 000	
	MASSIMA VELOCITA DI ROTAZIONE g/min. - MAX SPEED r.p.m												
28		1800	1700	1600	1250	1000	750	580	460	360	225	130	3
24		1800	1650	1550	1080	870	650	500	380	260	200	110	4
48		1800	1600	1500	1000	800	580	450	340	230	170	95	5
44		1800	1550	1450	900	730	525	400	300	200	150	85	8
68		1700	1500	1400	830	660	470	360	270	180	135	75	6
64		1700	1450	1350	750	580	420	320	240	160	120	70	8
88		1500	1450	1300	680	530	380	290	220	140	110	60	6
84		1500	1450	1250	600	460	340	260	190	125	95	55	8
	LIQUIDI NON ABRASIVI NON ABRASIVE LIQUIDS			LIQUIDI POCO ABRASIVI LOW ABRASIVE LIQUIDS			LIQUIDI ABRASIVI ABRASIVE LIQUIDS			LIQUIDI MOLTO ABRASIVI HEAVY ABRASIVE LIQUIDS			
	ESEMPI: acqua, acqua e olio, vino, olio di oliva ecc. EXAMPLE: Water, oily water, wine, olive oil ecc.			ESEMPI: acqua sporca, fanghi biologici ecc. EXAMPLE: Dirty water, biological sludge, ecc.			ESEMPI: Fanghiglia, latte di calce, scagliola di gesso, impasto di argilla ecc. EXAMPLE: Slurry, lime milk, gypsum slurries, wet mixing, ecc.			ESEMPI: Fanghiglie molto dense, fanghiglie con smeriglio, composti per smerigliatura EXAMPLE: Heavy abrasive, liquids heavy slurries, emery slurries, emery compounds			

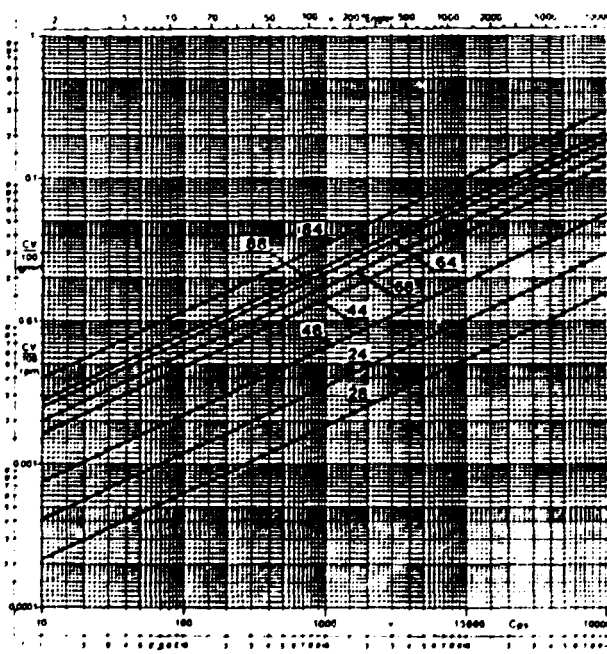
ESEMPIO DI CALCOLO DELL'INCREMENTO DELLA POTENZA ASSORBITA IN FUNZIONE DELLA VISCOSITÀ - EXAMPLE OF CALCULATION OF THE ABSORBED POWER INCREASE AS A FUNCTION OF VISCOSITY



Tab. 1

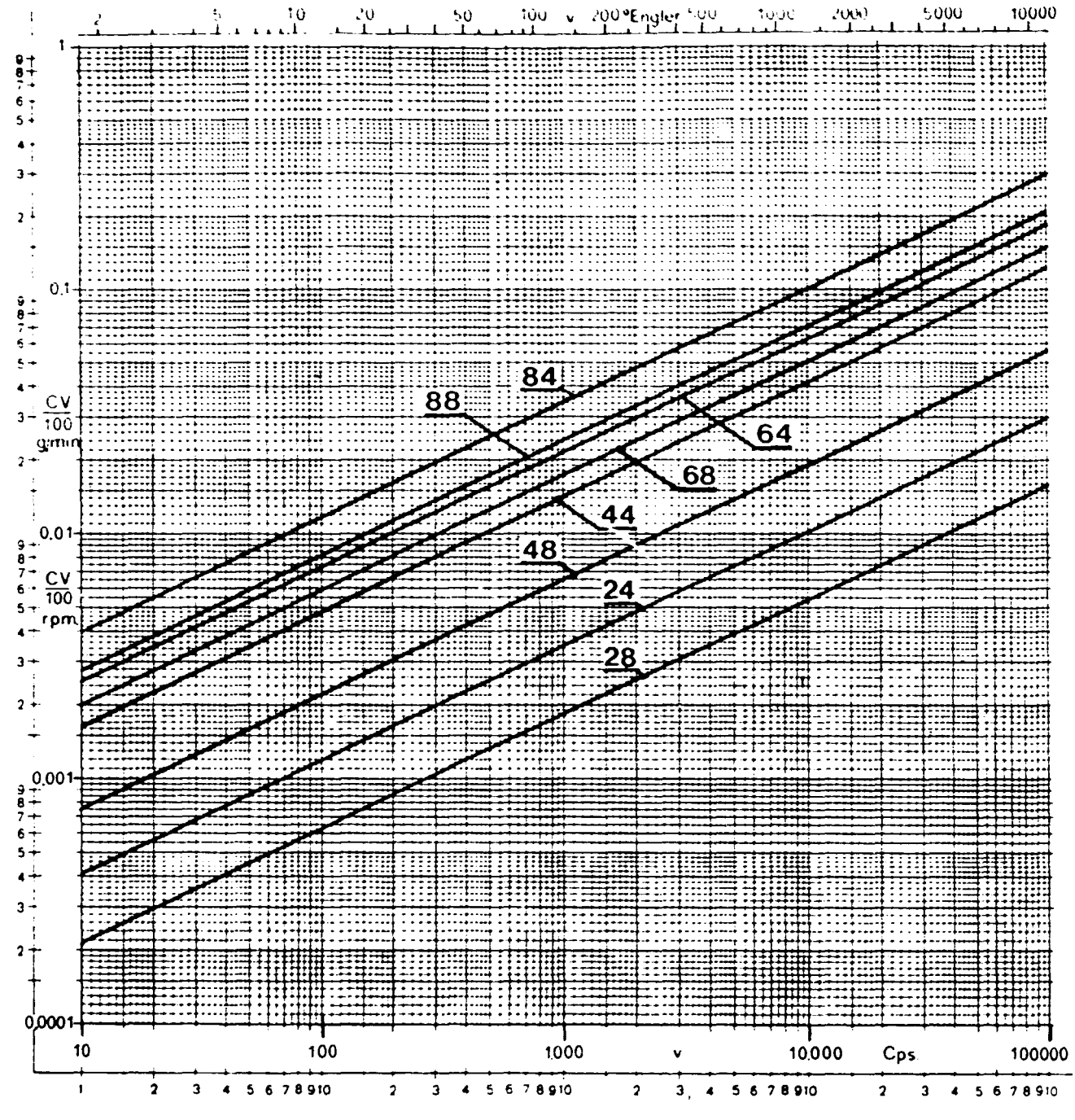
Dalle tabelle n. 1, 2 e 3 ricaviamo in base ai dati di nostra conoscenza, il numero di giri: 580/min., la potenza assorbita Pa = 0,15 CV e il tipo di pompa: EM64.

Dati:
Portata/Capacity: Q = 1,4 m^3/h
Prevalenza/Total head = 10 m
Viscosità/Viscosity: 1000 cps



Tab. 2

From Tables n. 1, 2 and 3 we obtain, on the basis of the known data, the r.p.m. rate, which is 580 r/minute, the absorbed power is Pq = 0.15 Hp and the type of pump is EM64.



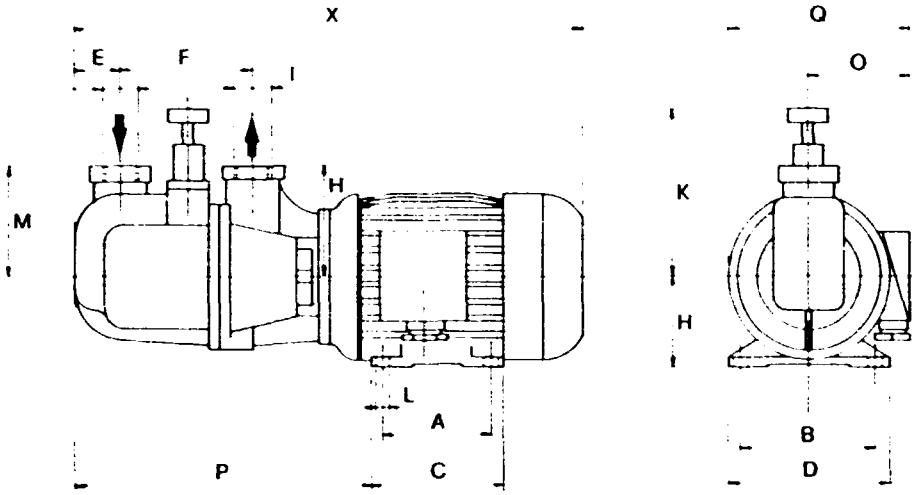
La tabella da l'incremento di potenza assorbita all'albero della pompa per ogni 100g/1', in funzione della viscosità del liquido convogliato.
La potenza ricavata da questa tabella va sommata alla potenza assorbita dalla pompa indicata sulla curva caratteristica (vedi pagg. 4 e 5).

The table provides additional BHP by pump every 100 r.p.m. for viscous liquid
The BHP drawed out of this table must be addended to BHP by pump indicated in CHARACTERISTIC curve (see page 4 & 5)

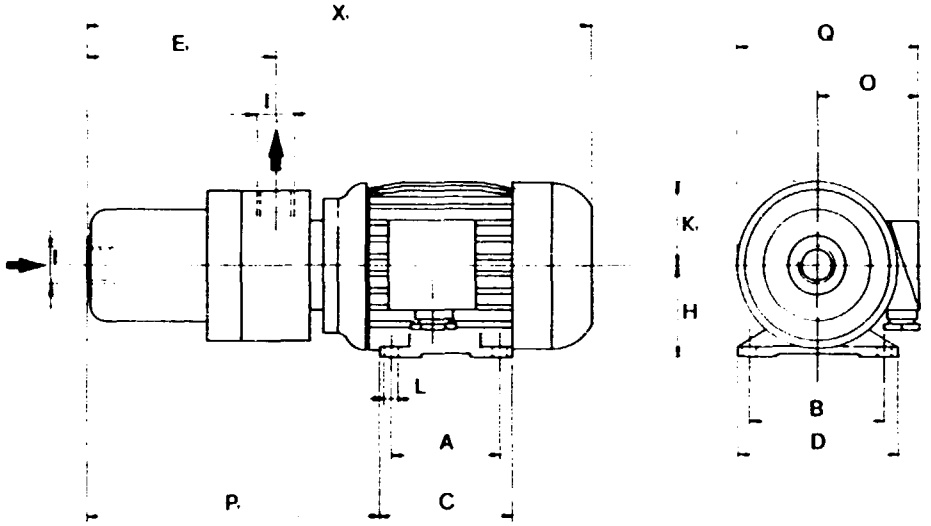
dimensioni d'ingombro pompe "EM"

overall dimensions "EM" pumps

ESECUZIONE EXECUTION **C-B**

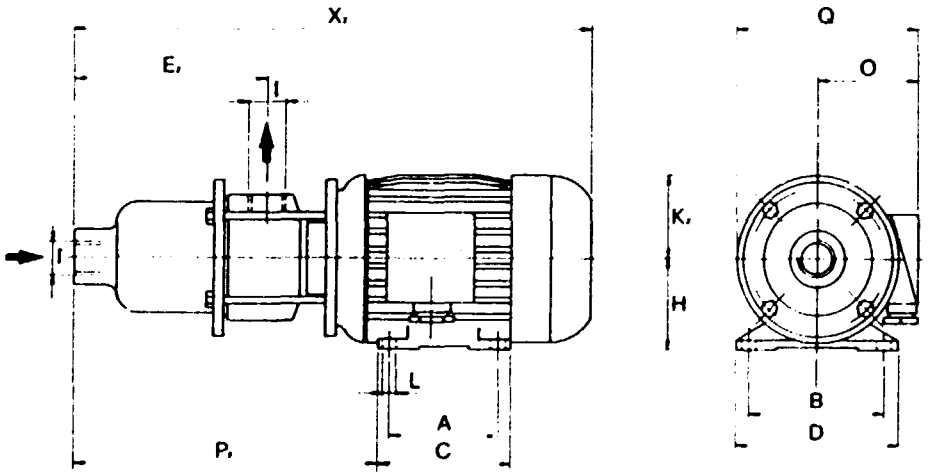


ESECUZIONE EXECUTION **G**



ESECUZIONE EXECUTION **D**

Solo modelli
EM 44 - 48
84 - 88



POMPA TIPO PUMP TYPE	A	B	C	D	E	E_1	E_2	F	H	K	K_1	K_2	I	L	M	N	O	P	P_1	P_2	Q	X	X_1	X_2	PESO WEIGHT C	B	G	D
EM 24-28	90	112	109	135	53	142,5	-	96	71	130	72		¾"	7	84	84	108,5	239	236	-	180	414	411	-	14	15	12	-
EM 44-48	100	125	125	154	55	164,5	174	121	80	142	81	81	1"	9	101	101	131	285	272	278	211	477	464	470	21	22	18	22
EM 64-68	100	140	125	170	60	225	-	155	90	164	91	-	1¼"	9	125	125	139,5	342	346	-	230	547	551	-	33	35	26	-
EM 84-88	140	160	166	192	65	269	266	255	100	172	101	101	1½"	11	140	140	147	446	460	465	246	710	724	710	50	53	43	52

ESEMPIO DI CALCOLO / EXAMPLE OF CALCULATION

POMPA TIPO / PUMP TYPE	VISCOSITA' VISCOSITY											Ø MASSIMO CORPI SOLIDI / MAX Ø OF SOLIDS mm
	Cps	20	50	100	500	1 000	2 500	5 000	10 000	25 000	40 000	100 000	
	°E	3	6 5	13	65	130	320	650	1 300	3 200	5 200	13 000	
	MASSIMA VELOCITA' DI ROTAZIONE r/min / MAX SPEED r.p.m.												
26		1800	1700	1600	1250	1000	750	580	460	300	225	130	3
24		1800	1650	1550	1080	870	650	500	380	260	200	110	4
48		1800	1600	1500	1000	800	580	450	340	230	170	95	5
44		1800	1550	1450	900	730	525	400	300	200	150	85	8
69		1700	1500	1400	830	660	470	360	270	180	135	75	6
64		1700	1450	1350	750	580	420	320	240	160	120	70	8
89		1500	1450	1300	680	530	380	290	220	140	110	60	6
84		1500	1450	1250	600	460	340	260	190	125	95	55	8
	LIQUIDI NON ABRASIVI NON ABRASIVE LIQUIDS ESEMPI: acqua, acqua e olio, vino, olio di oliva ecc. EXAMPLE: Water, oily water, wine, olive oil ecc.			LIQUIDI POCO ABRASIVI LOW ABRASIVE LIQUIDS ESEMPI: acqua sporca fanghi biologici ecc. EXAMPLE: Dirty water, biological sludge, ecc.			LIQUIDI ABRASIVI ABRASIVE LIQUIDS ESEMPI: Fanghiglia, latte di calce, sciaglola di gesso, impasto di argilla ecc. EXAMPLE: Slurry, lime milk, gypsum slurries, wet mixing, ecc.			LIQUIDI MOLTO ABRASIVI HEAVY ABRASIVE LIQUIDS ESEMPI: Fanghiglie molto dense, fanghiglie con smeriglio, composti per smerigliatura EXAMPLE: Heavy abrasive, liquids heavy slurries, emery slurries, emery compounds		

Tab 3

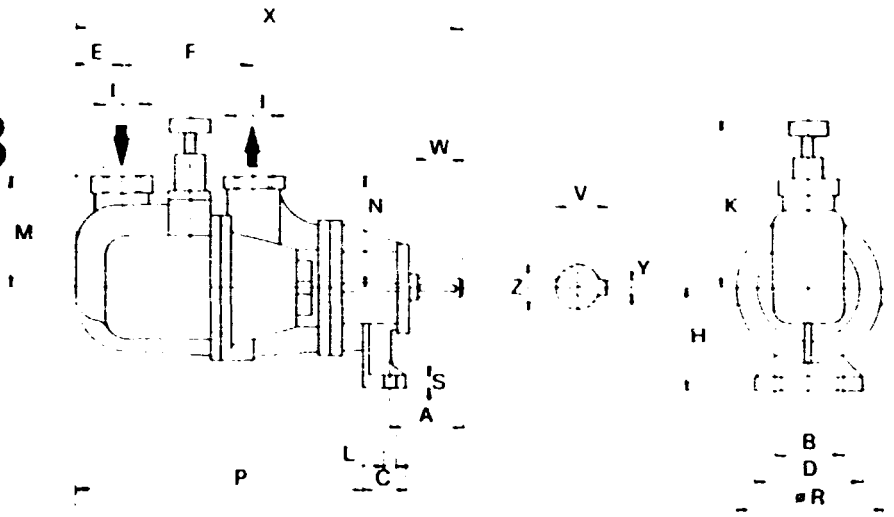
Utilizzando la tabella 2 ricaviamo: l'incremento di potenza 0,022 CV ogni 100 giri/min moltiplicando il valore ricavato dalla tabella 3 per il numero di giri, otteniamo l'incremento di potenza $\frac{0{,}022 \times 580}{100} = 0{,}127$ CV che sommato alla potenza assorbita (Tab. 1) darà la potenza totale assorbita dalla pompa: 0,15 x 0,127 = 0,277 CV

By consulting Table 2 we find a power increase of 0.022 Hp for every 100 r.p.m. By multiplying the value obtained from Table n. 3 by the r.p.m. figure, we obtain the power increase as follows: $\frac{0.022 \times 580}{100} = 0.127$ HP that, added to the absorbed power (Table n. 1), will give the total power absorption of the pump. 0.15 x 0.127 = 0.277 Hp

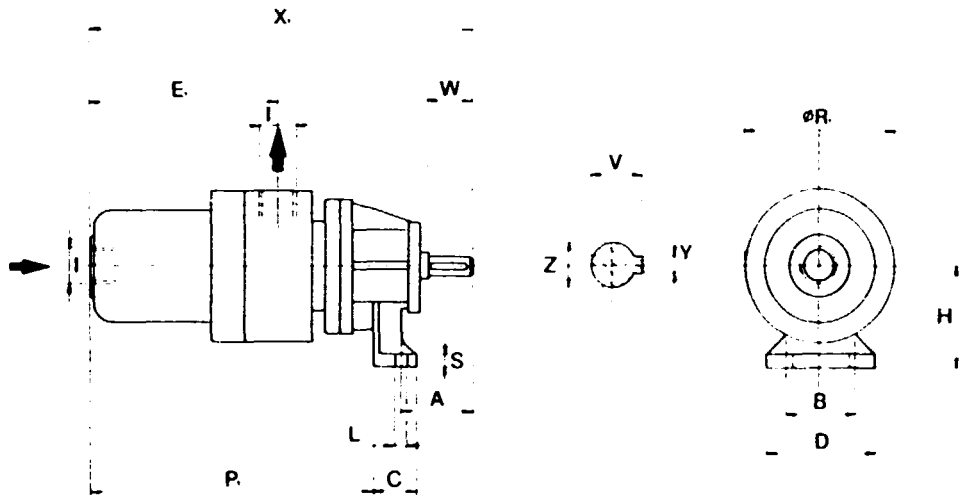
dimensioni d'ingombro pompe "E"

overall dimensions "E" pumps

ESECUZIONE EXECUTION **C-B**

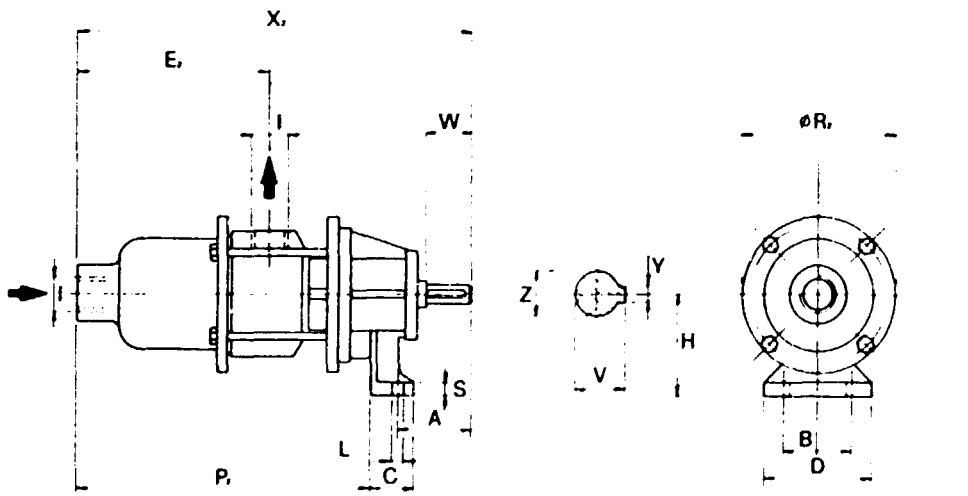


ESECUZIONE EXECUTION **G**



ESECUZIONE EXECUTION **D**

Solo modelli
E 440 - 480
840 - 880

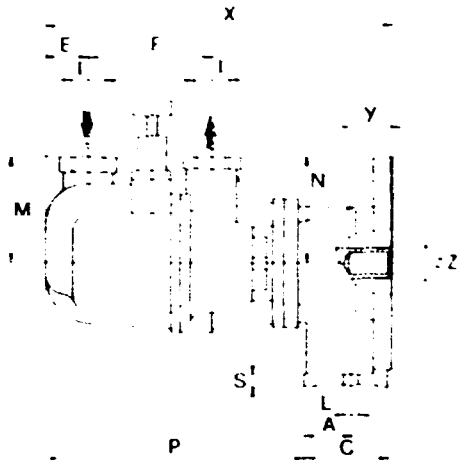


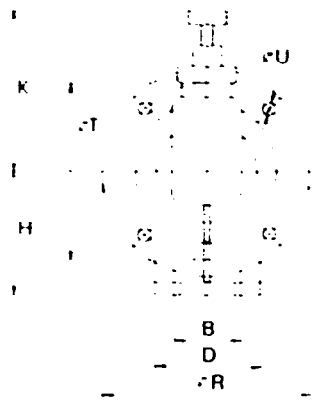
POMPA TIPO PUMP TYPE	A	B	C	D	E	E₁	E₂	F	H	K	I	L	M	N	P	P₁	P₂	øR	øR₁	øR₂	S	V	W	Y	Z	X	X₁	X₂	PESO - WEIGHT C	B	G	D
EM 240-280	55	88	40	110	53	142,5	-	96	80	130	¾"	10	84	84	252	249	-	112	120	-	10	16	30	5	14	331	328	-	9	9	7	-
EM 440-480	65	88	40	110	55	164,5	174	121	80	142	1"	10	101	101	294	281	287	125	135	140	10	20,5	40	6	18	383	370	376	11	12	8	11
EM 640-680	98	95	45	125	60	225	-	155	112	164	1¼"	12	125	115	353	357	-	179	179	-	12	27	50	8	24	479	483	-	17	19	10	-
EM 840-880	105	95	45	125	65	269	266	255	112	172	1¼"	12	140	125	454	468	473	195	199	192	12	29	60	8	26	587	601	587	26	27	17	26

dimensioni d'ingombro pompe "VE"

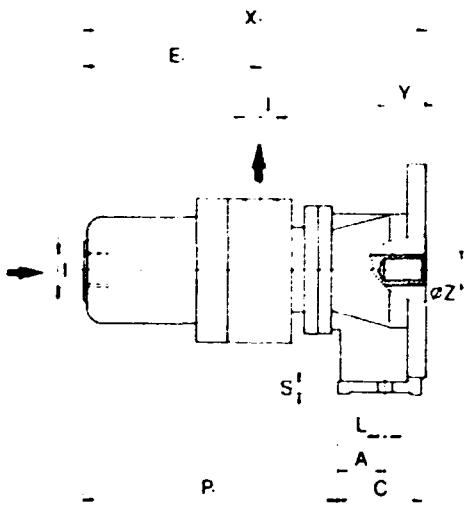
overall dimensions "VE" pumps

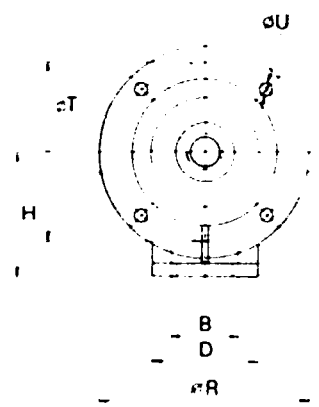
ESECUZIONE EXECUTION **C-B**





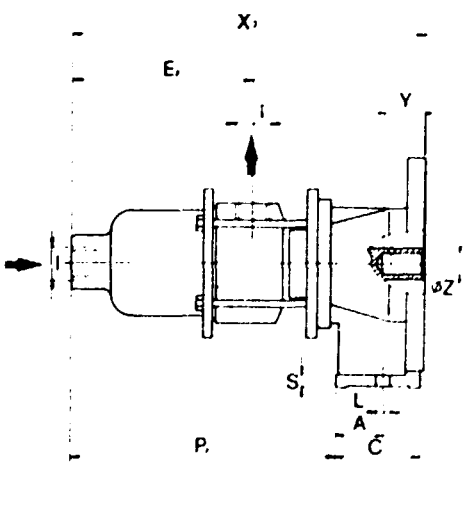
ESECUZIONE EXECUTION **G**

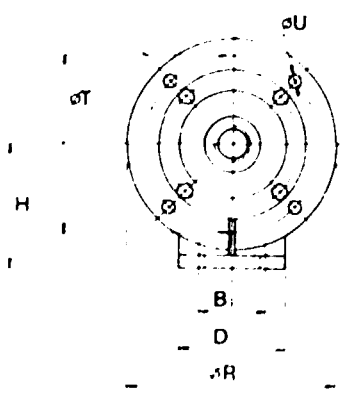




ESECUZIONE EXECUTION **D**

Solo modelli
VE 445 - 485
845 - 885

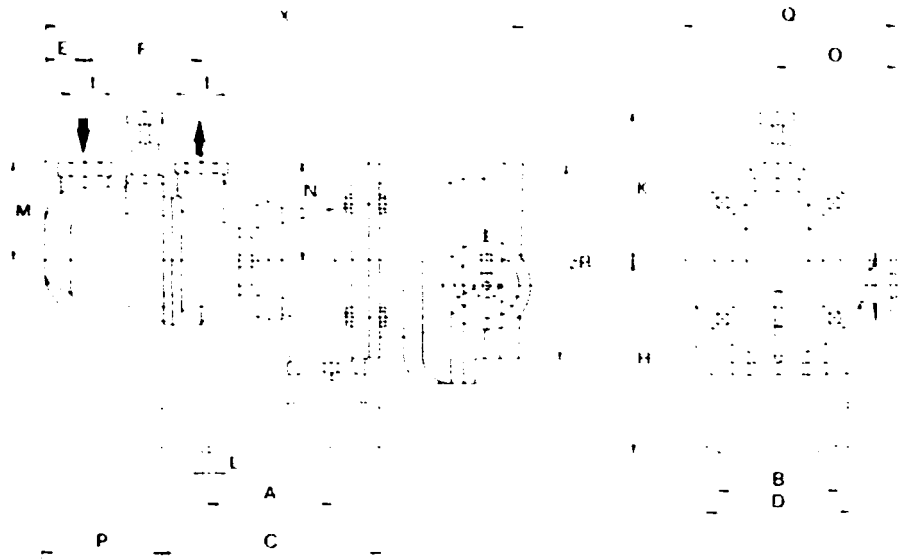




POMPA TIPO PUMP TYPE	A	B	C	D	F	E_1	E_2	F	H	K	I	L	M	N	P	P_1	P_2	øR	S	øT	øU	X	X_1	X_2	Z	Y	PESO WEIGHT C	B	G	D
VE 245-285	38	45	64	80	53	142,5		96	95	130	½"	12	84	84	217	214		100	11	136	4	295	282		14	35	9	9	8	
VE 445-485	45	64	80	100	55	164,5	174	121	115	142	1"	14	101	101	262	249	255	200	13	165	11	337	334	340	19	45	15	16	12	15
VE 645-685	45	64	80	100	60	225	-	155	115	164	½"	14	125	115	317	321		200	13	165	11	403	407		24	58	22	24	15	
VE 845-885	45	74	85	125	65	269	266	255	140	172	1½"	14	140	125	413	427	432	250	15	215	14	503	517	503	28	65	31	32	22	31

dimensioni d'ingombro pompe "VE"

overall dimensions "VE" pumps

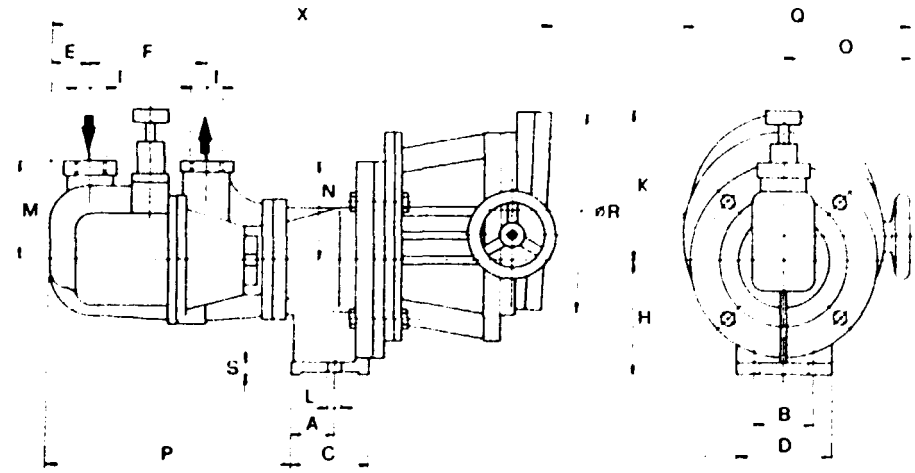


CON VARIATORE TIPO "00" 290 ÷ 1440 GIRI/1'

WITH SPEED CHANGE LEVER "00" TYPE 290 ÷ 1440 RPM

POMPA TIPO PUMP TYPE	A	B	C	D	E	F	H	K	I	K	M	N	O	P	Q	ø R	X	GRANDEZZA MOTORE DA ACCOPPIARE MOTOR SIZE	LUNGH TOTALE CON MOTORE TOTAL LENGTH WITH MOTOR
VE 245-285 *	38	45	64	80	53	96	95	130	¾"	12	84	84	135	217	215	140	418	63	609
																160		71	637
VE 445-485	155	168	275	190	55	121	220	142	1"	14	101	101	152	107	252	160	505	71	718
																200		80	742
VE 645-685	155	168	275	190	60	155	220	164	1"¼	14	125	115	172	162	297	200	598	80	834
																200		90 S	854
																200		90 L	869
VE 845-885	155	168	275	190	65	255	245	172	1"½	14	140	125	195	258	344	200	728	90 S	987
																200		90 L	1002
																250		100	1026

* Non viene utilizzato il basamentino
Without base plate



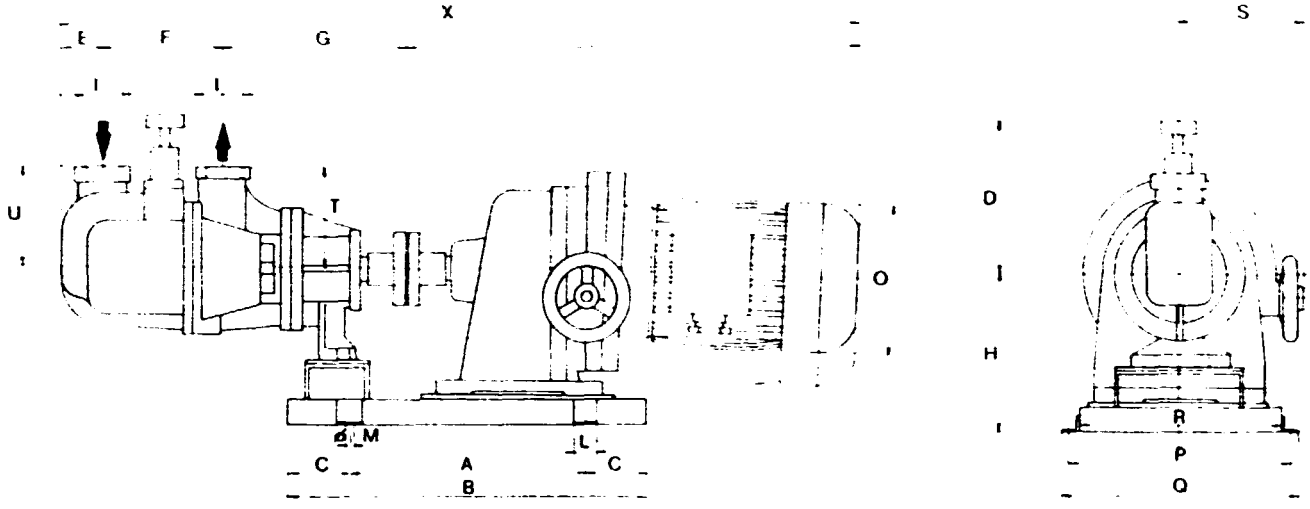
CON VARIATORE TIPO "01" 35 ÷ 175 O 82 ÷ 410 O 195 ÷ 970 GIRI/1'

WITH SPEED CHANGE LEVER "01" TYPE 35 ÷ 175 OR 82 ÷ 110 OR 195 ÷ 970 RPM

POMPA TIPO PUMP TYPE	A	B	C	D	E	F	H	K	I	L	M	N	O	P	Q	ø R	S	X	GRANDEZZA MOTORE DA ACCOPPIARE MOTOR SIZE	LUNGHEZZA TOTALE CON MOTORE TOTAL LENGTH WITH MOTOR
VE 245-285	38	45	64	80	53	96	95	130	¾"	12	84	84	135	217	215	140	11	490	63	681
																160			71	703
VE 445-485	45	64	80	100	55	121	115	150	1"	14	101	101	152	262	252	160	13	578	71	791
																200			80	815
VE 645-685	45	64	80	100	60	155	115	175	1"¼	14	125	115	172	317	297	200	13	700	80	937
																200			90 S	957
																200			90 L	982
VE 845-885	45	74	85	125	65	255	140	200	1"¼	14	140	125	195	413	345	200	15	863	90 S	1120
																200			90 L	1145
																250			100	1176

dimensioni d'ingombro pompe "E" con motovariatore

"E" type pumps with motor-variator

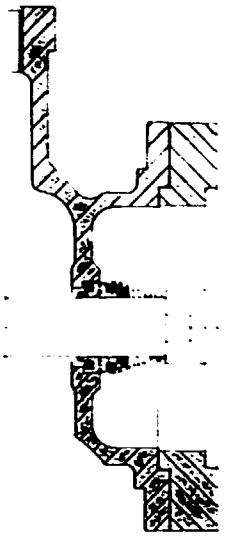


TIPO POMPA PUMP TYPE	290 ÷ 1440 giri/1' Mod.	HP	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q	R	S	T	U	X
E 240-280	100	0.33÷0.5	310	460	75	130	53	96	184	176	¾	50	11	360	119	230	280	180	135	84	84	509
E 440-480	200	0.75÷1	310	460	75	142	55	121	209	196	1"	50	11	407	147	230	280	180	152	101	101	792
E 640-680	300	1.5÷2	362	662	150	164	60	155	266	245	1¼	50	13	480	170	290	340	240	172	115	125	961
E 840-880	400	3÷2	362	662	150	172	65	255	283	245	1½	50	13	536	194	290	340	240	195	125	140	1139
TIPO POMPA PUMP TYPE	195 ÷ 970 giri/1' Mod.	HP	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q	R	S	T	U	X
E 240-280	101	0.33	310	460	75	130	53	96	184	160	¾	50	11	390	119	230	280	180	135	84	84	732
E 440 480	201	0.75	310	460	75	142	55	121	209	160	1"	50	11	534	147	230	280	180	152	101	101	919
E 640-680	301	1.5	362	662	150	164	60	155	266	192	1¼	50	13	626	170	290	340	240	172	115	125	1107
E 840-880	401	2	362	662	150	172	65	255	283	196	1½	50	13	716	194	290	340	240	195	125	140	1305

tenute meccaniche per montaggio esterno

external mechanical seals

Fig. A

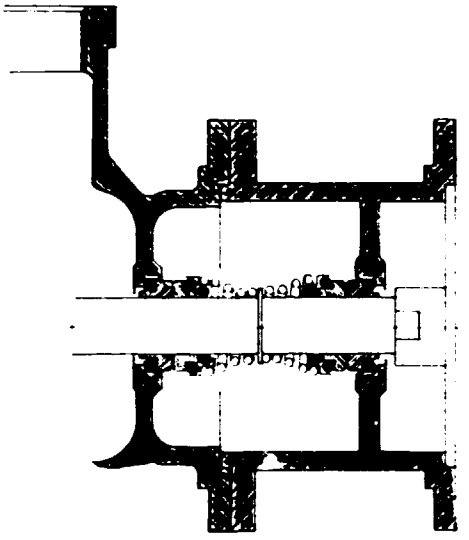


ESECUZIONE
EXECUTION **TE**

Tenuta meccanica per montaggio esterno (fig. A). Il liquido da contenere, circolante nella pompa, non viene a contatto ne con la molla ne con il manicotto di trascinamento.
La tenuta, in casi particolari, può essere fornita dell'apposita camera di lavaggio.

External mechanical seal (fig. A). The liquid circulating within the pump does not come into contact with either the spring or the sleeve.
In special cases, the external seal may be provided with a flow chamber.

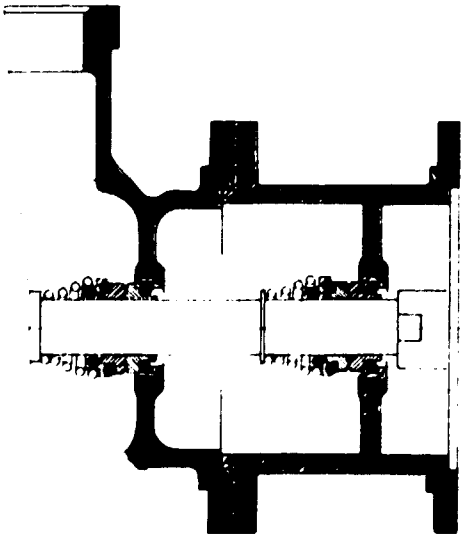
Fig. B



ESECUZIONE
EXECUTION **TDE**

Tenuta meccanica per montaggio doppio contrapposto (fig. B) o in serie (fig. C).
- Il montaggio doppio contrapposto viene indicato nel caso di liquidi adesivi, caldi, aventi tendenza a formare cristalli, gas, ecc. Con questo tipo di montaggio si evita il contatto tra la molla e il liquido pompato. Il raffreddamento/lavaggio è ottenuto mediante la circolazione del liquido ausiliario, che deve essere compatibile con il liquido pompato, tale liquido deve essere a una pressione di almeno 0,5 Bar superiore a quella esistente nella pompa.
- Il montaggio doppio in serie serve quando non si ha a disposizione liquido di raffreddamento e lavaggio sotto pressione. Con questo montaggio il liquido pompato può variare di pressione indipendentemente da quello ausiliario, mentre quest'ultimo non deve essere superiore a quella esistente nella pompa.

Fig. C



ESECUZIONE
EXECUTION **TDI**

Double opposed (fig. B) or series-mounted (fig. C) mechanical seals.
Opposed seals are used for hot tacky liquids which tend to form crystals or generate gas. Contact between spring and pumped liquid is avoided. Cooling/washing is carried out by the auxiliary liquid circulation. The auxiliary liquid must be compatible with the pumped liquid and its pressure must exceed by at least 0.5 bar the pressure inside the pump.
The double series mounted seals are used when no pressurized cooling or washing liquid is available. The pumped liquid pressure may change regardless of the auxiliary liquid pressure. The latter need not exceed the pressure inside the pump.

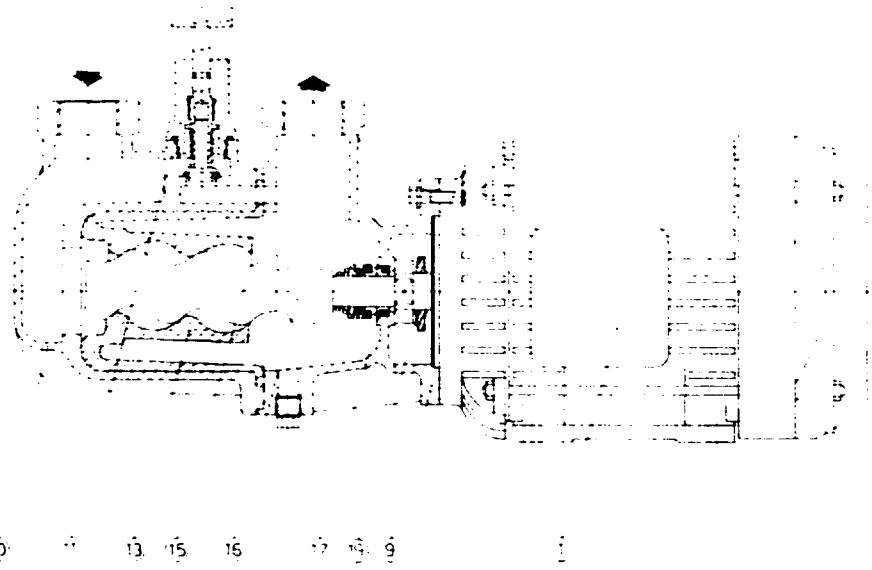
ESECUZIONE EXECUTION C-B

NOMENCLATURA POMPE "EM"

1 Motore
9 Corpo premente
10 Corpo aspirante
11 By-pass
13 Statore
15 Rotore
16 Giunto cardanico
17 Tenuta meccanica
19 Paraspruzzi

SPARE PARTS "EM" PUMPS

1 Motor
9 Pressure body
10 Suction body
11 Complet by-pass
13 Stator
15 Rotor
16 Cardan joint
17 Mechanical seal
19 Splash guard



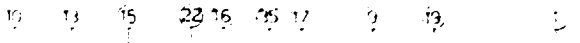
ESECUZIONE EXECUTION -G-D

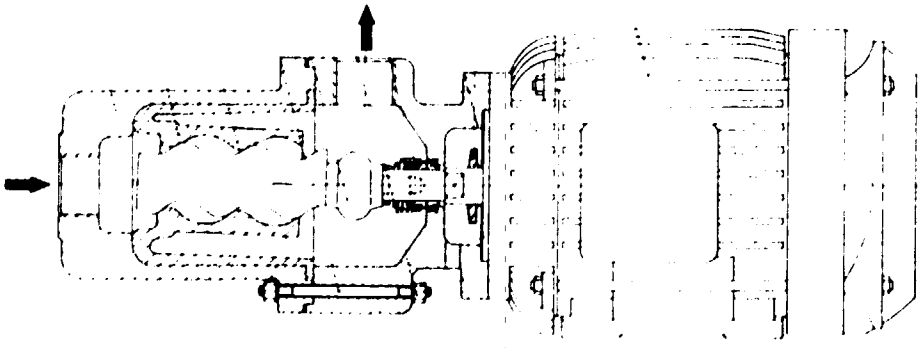
NOMENCLATURA POMPE "EM"

1 Motore
9 Corpo premente
10 Corpo aspirante
13 Statore
15 Rotore
16 Giunto cardanico
17 Tenuta meccanica
22 Tirante
35 Dado
19 Paraspruzzi

SPARE PARTS "EM PUMPS"

1 Motor
9 Pressure body
10 Suction body
13 Stator
15 Rotor
16 Cardan joint
17 Mechanical seal
22 Stay
35 Nut
19 Splash guard





HP 1 (kW 0,75) 4P Hz 50 V 220/380 — **GR 80 B5**

n_2 = /1'		M_2 [daNm]		i	
$n_{2\,min}$	$n_{2\,max}$	M_2 ($n_{2\,min}$)	M_2 ($n_{2\,max}$)		
155	1000	1.6	0.6	–	VB 1 (LB 1)
22.1	142.8	9.07	3.61	7	
15.5	100	12.48	4.98	10	
10.3	66.7	17.52	7.11	15	
8.2	52.6	* 15	8.77	19	VB 1 + VF 63 (LB 1 + VF 63)
6.5	41.7	* 15	10.65	24	
5.2	33.3	* 18	12.42	30	
7.8	50	23.04	9.24	20	
6.2	40	27.2	11.1	25	
5.2	33.3	* 30	12.96	30	VB 1 + VF 72
3.9	25	* 29	15.36	40	
3.1	20	* 24	18.6	50	
5.2	33.3	29.76	12.96	30	
3.9	25	39.04	17.04	40	
3.4	21.7	43.42	19.04	46	
2.8	17.8	49.28	21.84	56	VB 1 + VF 86 (LB 1 + VF 86)
2.4	15.6	49.61	24.19	64	
1.9	12.5	*44.33	28.32	80	
1.6	10	*39.45	*30.99	100	

HP 1,5 (kW 1,1) 4P Hz 50 ~~220/380~~ 440V. — **GR 90 B5**

n_2 = /1'		M_2 [daNm]		i	
$n_{2\,min}$	$n_{2\,max}$	M_2 ($n_{2\,min}$)	M_2 ($n_{2\,max}$)		
155	1000	2.4	0.9	–	VB 2 (LB 2)
22.1	142.8	13.77	5.41	7	
15.5	100	19.44	7.56	10	
10.3	66.9	* 27	10.81	15	VB 2 + VF 72
7.8	50	* 28	13.86	20	
22.1	142.8	13.77	5.48	7	
15.5	100	18.96	7.65	10	
10.3	66.9	26.64	10.93	15	
7.8	50	35.04	14.4	20	
6.7	43.4	39.74	16.35	23	VB 2 + VF 86 (LB 2 + VF 86)
5.2	33.3	44.64	19.44	30	
3.9	25	58.56	25.56	40	
3.4	21.7	*57.75	28.56	46	
22.1	142.8	13.77	5.48	7	
15.5	100	19.2	7.74	10	
10.3	66.6	27	11.20	15	
7.8	50	36	14.76	20	
6.7	43.4	40.84	16.76	23	
5.2	33.3	46.08	19.98	30	VB 2 + VF 110 (LB 2 + VF 110)
3.9	25	61.44	26.28	40	
3.4	21.7	68.44	29.39	46	
2.8	17.8	76.8	34.27	56	
2.4	15.6	84.48	38.01	64	
1.9	12.5	*84.18	44.64	80	
1.6	10	*75.64	52.2	100	

*I valori di M contrassegnati con * sono superiori a quelli sopportabili dal riduttore*

HP 2 (kW 1,5) 4P Hz 50 V 220/380 — **GR 90 B5**

n_2 = /1'		M_2 [daNm]		i	
$n_{2\,min}$	$n_{2\,max}$	M_2 ($n_{2\,min}$)	M_2 ($n_{2\,max}$)		
155	1000	3.2	1.2	–	VB 2 (LB 2)
22.1	142.8	18.37	7.69	7	
15.5	100	25.92	10.86	10	
10.3	66.7	* 27	14.40	15	VB 2 + VF 72
7.8	50	* 28	18.48	20	
22.1	142.8	18.36	7.68	7	
15.5	100	25.28	10.2	10	
10.3	66.7	35.52	14.58	15	
7.8	50	46.72	19.2	20	VB 2 + VF 86 (LB 2 + VF 86)
6.7	43.5	52.99	21.80	23	
5.2	33.3	59.52	25.92	30	
3.9	25	*61.41	34.06	40	
22.1	142.8	18.36	7.36	7	
15.5	100	25.6	10.32	10	
10.3	66.6	36	14.94	15	
7.8	50	48	19.68	20	
6.7	43.5	54.46	22.35	23	VB 2 + VF 110 (LB 2 + VF 110)
5.2	33.3	61.44	26.64	30	
3.9	25	81.9	35.04	40	
3.4	21.7	91.26	39.19	46	
2.8	17.8	*100.85	45.69	56	
3.9	25	79.36	35.04	40	
3.4	21.7	91.26	40.29	46	
2.8	17.8	105.72	47.04	56	VB 2 + VF 130 (LB 2 + VF 130)
2.4	15.6	116.73	52.22	64	
1.9	12.5	133.12	61.44	80	
1.6	10	153.6	72	100	

HP 2,5 (kW 1,8) 4P Hz 50 V 220/380 — **GR 90 B5**

n_2 = /1'		M_2 [daNm]		i	
$n_{2\,min}$	$n_{2\,max}$	M_2 ($n_{2\,min}$)	M_2 ($n_{2\,max}$)		
155	1000	3.5	1.4	–	VB 2 (LB 2)
22.1	142.8	20.09	8.42	7	
15.5	100	* 27	11.76	10	VB 2 + VF 72
10.3	66.7	* 27	16.80	15	
22.1	142.8	20.09	8.52	7	
15.5	100	27.65	11.9	10	
10.3	66.7	38.85	17.01	15	
7.8	50	51.1	22.4	20	VB 2 + VF 86 (LB 2 + VF 86)
6.7	43.4	57.96	25.43	23	
5.2	33.3	65.1	30.24	30	
3.9	25	*61.41	39.76	40	
22.1	142.8	20.09	8.52	7	
15.5	100	28	12.04	10	
10.3	66.6	39.37	17.43	15	
7.8	50	52.5	22.96	20	
6.7	43.4	59.75	26.08	23	VB 2 + VF 110 (LB 2 + VF 110)
5.2	33.3	67.2	31.08	30	
3.9	25	89.6	40.88	40	
3.4	21.7	99.82	45.72	46	
2.8	17.8	*100.85	53.31	56	
3.4	21.7	99.82	47.01	46	
2.8	17.8	115.64	54.88	56	
2.4	15.6	127.68	60.92	64	VB 2 + VF 130 (LB 2 + VF 130)
1.9	12.5	145.6	71.68	80	
1.6	10	157.38	84	100	

*The values M indicated * are the max values [illegible]*

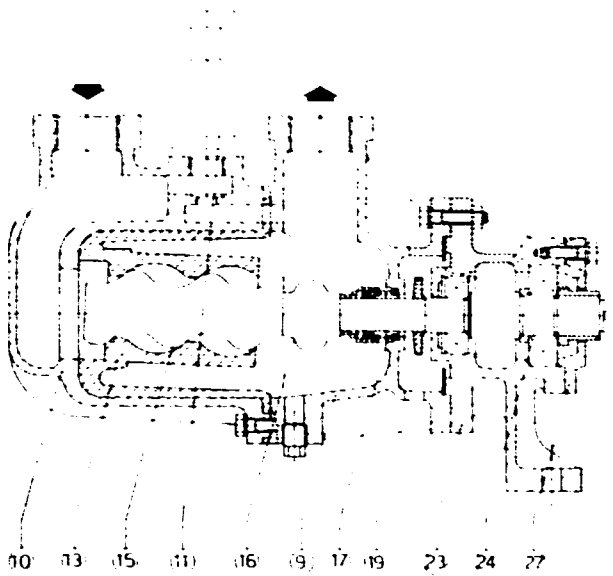
VB

NOMENCLATURA POMPE "E"

2 Cuscinetto reggispinta
3 Cuscinetto di linea
9 Corpo premente
10 Corpo aspirante
11 By-pass
13 Statore
15 Rotore
16 Giunto cardanico
17 Tenuta meccanica
19 Paraspruzzi
23 Supporto
24 Albero
26 Distanziale
27 Coperchietto
28 Ghiera filettata

SPARE PARTS "E" PUMPS

2 Thrust bearing
3 Line bearing
9 Pressure body
10 Suction body
11 Complete by-pass
13 Stator
15 Rotor
16 Cardan joint
17 Mechanical seal
19 Splash guard
23 Support
24 Shaft
26 Spacing collar
27 Bearing cover
28 Threaded ring



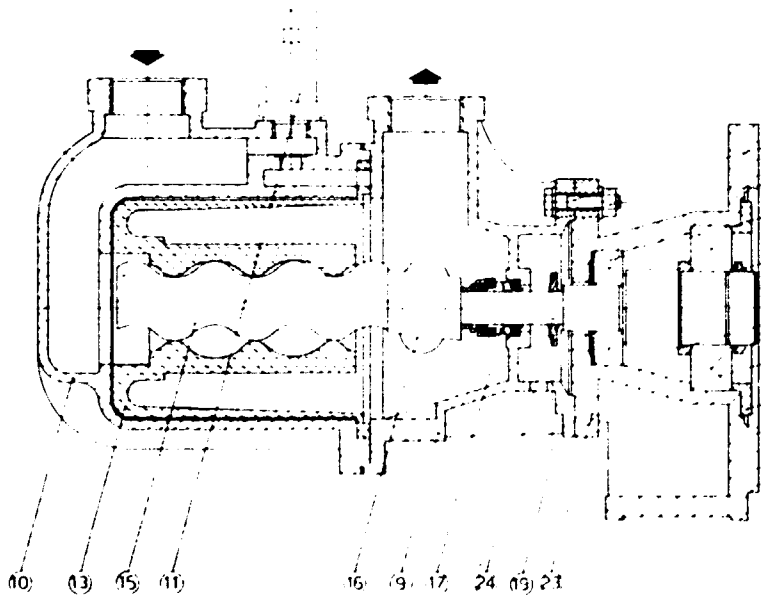
NOMENCLATURA POMPE "VE"

2 Cuscinetto reggispinta
3 Cuscinetto di linea
9 Corpo premente
10 Corpo aspirante
11 By-pass
13 Statore
15 Rotore
16 Giunto cardanico
17 Tenuta meccanica
23 Supporto
24 Albero
26 Distanziale
27 Coperchietto
28 Ghiera filettata
35 Dado
93 Vite T.E.
19 Paraspruzzi

SPARE PARTE "VE" PUMPS

2 Thrust bearing
3 Line bearing
9 Pressure body
10 Suction body
11 Complete by-pass
13 Stator
15 Rotor
16 Cardan joint
17 Mechanical seal
23 Support
24 Shaft
26 Spacing collar
27 Bearing cover
28 Threaded ring
35 Nut
93 T.E. Screw
19 Splash guard

SERIE **VE**



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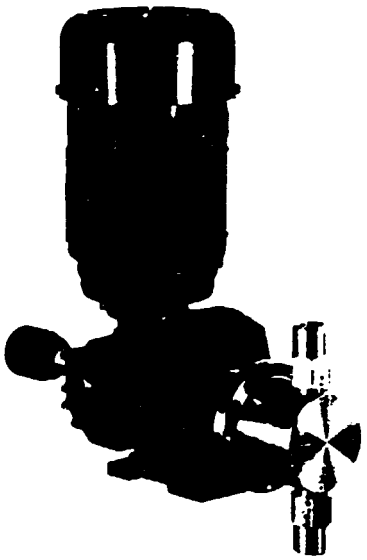
TELEX 321497 API PER POMPEHYDRA (945)

4.8. DOSING PUMPS FOR ANIONIC POLYELECTROLYTE (Items 23 & 24)

OBL POMPE DOSATRICI

Tipo RCA

Corsa *Stroke* : 15mm
Motore *Motor* : 0,5 HP standard
Pompa: singola
Pump single
Materiale corpo pompa alluminio
Aluminium casing



La pompa **RCA** e la grandezza media (insieme alla RC) della serie "R" ed è la terza delle sei grandezze:
RBE, RB, **RCA**, RC, RH, RM

Dalla grandezza **RCA** in avanti sono installati sulle pompe motori con attacchi standard grandezza 71 forma B14

RCA *pumps (together with RC) a medium size pump and is the third of the six sizes of the "R" series RBE RB* ***RCA*** *RC RH RM From RCA size onwards all pumps are equipped with motors with standard connections size 71 Form B14*

CARATTERISTICHE COSTRUTTIVE

MAIN FEATURES

Testata pompante:

- L'esecuzione prevede valvole a sfera singole e doppie
- Gli anelli di tenuta del pistone sono del tipo automatico con sezione a V realizzate in teflon caricato. Gli anelli sono registrati nel serraggio dal premitreccia
- Gli attacchi di aspirazione e mandata sono normalmente filettati a richiesta flangiati
- I materiali impiegati sono quelli esposti nella tabella (esecuzioni speciali possono essere fornite su richiesta)
- Valore minimo NPSH richiesto 6 mt in condizioni ottimali di installazione
- Temperature max del liquido dosato
  - Testata in acc. inox 90 °C
  - Testata in acc. inox e pistone in ceramica 90 °C
  - Testata in PVC 40 °C
  - Testata in PVDF 70 °C

Materiale meccanismo:

Il meccanismo è racchiuso in carter di alluminio con lubrificazione a bagno d'olio, comune al riduttore. La lanterna porta testata è in ghisa.

Sistemi di regolazione:

Manuale - sia a pompa ferma che in moto
Automatico ELETTRICO mediante servocomando OBL tipo Z3
PNEUMATICO mediante servocomando tipo WA

Pump head:

- *Execution with single ball and double ball valves*
- *Plunger seal rings are of the automatic type with "V" section and made of reinforced teflon. The compression of the seal rings is obtained by means of the packing gland*
- *Suction and discharge connections normally threaded on request flanged*
- *The standard materials used are those listed in the table. Executions in special materials can be supplied on request*
- *Minimum NPSH required 6 m in optimum installation conditions*
- *Max. temperature of metered liquid*
  - *with stainless steel heads 90 °C*
  - *with stainless steel heads and ceramic piston 90 °C*
  - *with PVC heads 40 °C*
  - *with PVDF heads 70 °C*

Mechanism :

The mechanism and the reduction gear are enclosed in an aluminium casing with oil bath lubrication. The head holder is made of cast iron.

Flow rate control systems:

Manual *- both when pump at rest and in operation*
Automatic *- ELECTRIC by means of OBL Z3 actuator*
PNEUMATIC by means of WA type actuator

MATERIALI DI COSTRUZIONE / *MATERIALS OF CONSTRUCTION*

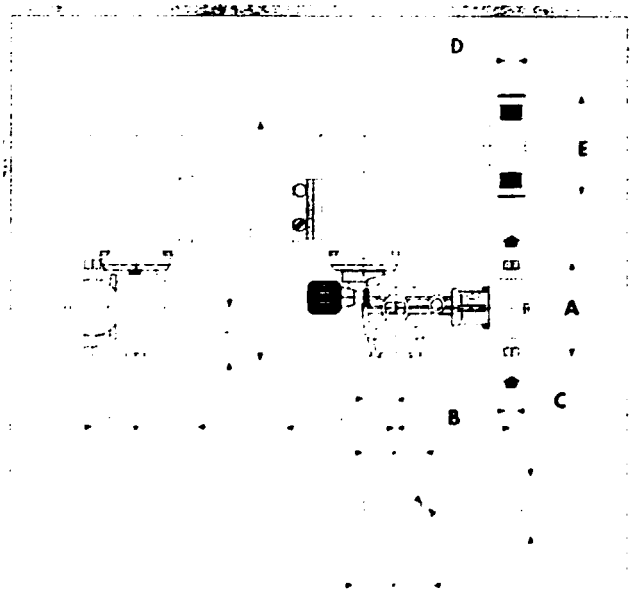
PARTICOLARI / *PARTS*	A	P	H	ACV	AC
CORPO *HEAD BODY*	AISI 316	PVC	AISI 316	AISI 316	AISI 316
PISTONE *PISTON*	...	CERAMICA	CERAMICA	CERAMICA	CERAMICA
TENUTA PISTONE *PACKING*	TEFLON	TEFLON	TEFLON	ADIPRENE	TEFLON
SEDI VALVOLE *VALVE SEAT*	...	PVC	20 30 %	AISI 316	AISI 316
VALVOLE *VALVES*	AISI 316	PIREX	CARPENTER 20	AISI 316	AISI 316
TENUTA VALVOLE *VALVE SEAL*	...	...	...	...	...

CARATTERISTICHE COSTRUTTIVE / *TECHNICAL DATA*

TIPO *TYPE*	COLPI AL'	PORTATA	PRESSIONE MAX BAR		ATTACCHI FILETTATI		ATTACCHI FLANGIATI	
			AISI	PVC	AISI	PVC	UNI	ANSI
RCA 6		0,8 1,2 1,8 2,2						
RCA 10		2 3 4 5,5 7						
RCA 16		5 7 11 15 18						
RCA 25		15 20 30 38 45						
RCA 30		20 30 40 55 65						
RCA 43		40 55 90 115						
RCA 50		150 58 86 120 160 200						
RCA 62		90 125 175 250 300						

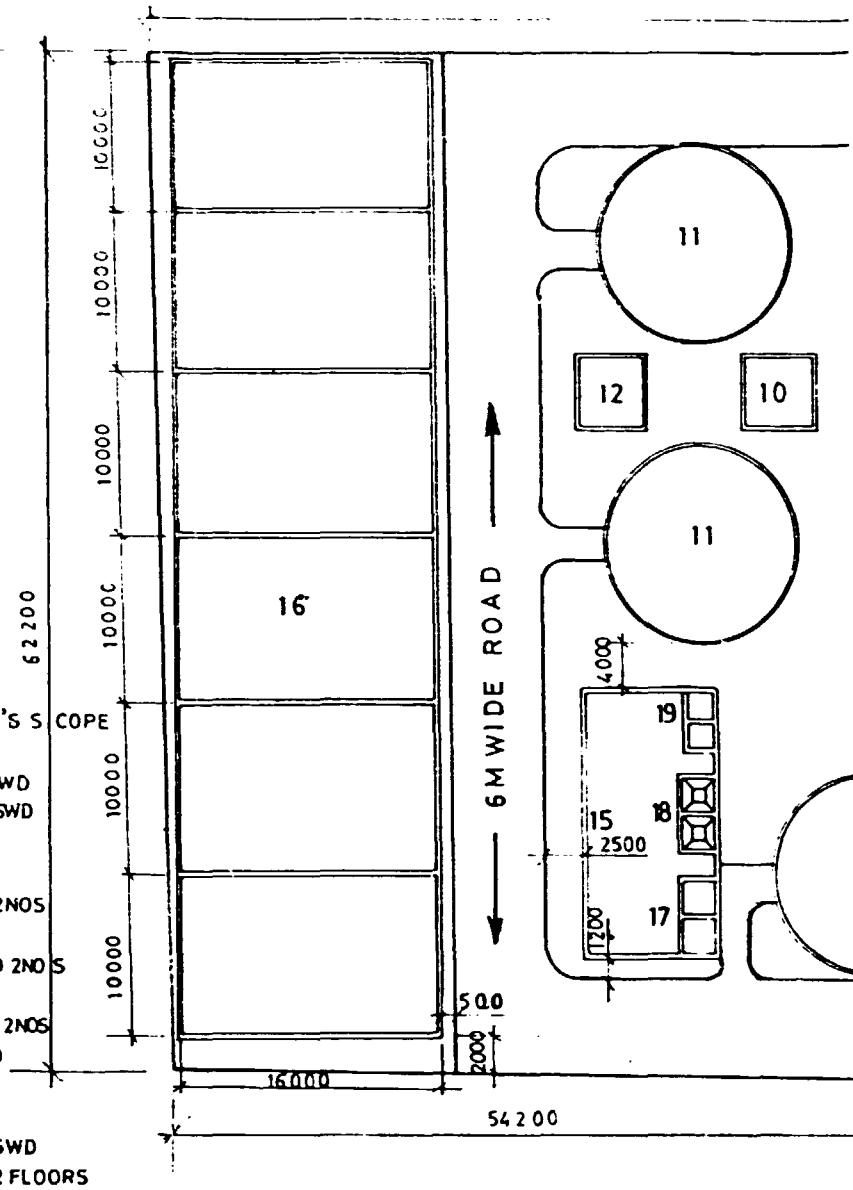
Testata in acciaio inox Esecuzione "A" Attacchi filettati

Testata in PVC Esecuzione "P" Attacchi filettati



MISURE D'INGOMBRO / *OVERALL DIMENSIONS*

TIPO	AISI 316							PVC						PVDF				D
	A	Adv	B	Bn	C	E	Edv	A	Adv	B	C	E	Edv	A	B	C	E	UNI
RCA 6		159	173	195		125	135											
RCA 10																		
RCA 16	121	159	173	195		125	135		213	174		160		180	190		180	
RCA 25																		
RCA 30	121	159	176	195		125	135	184	213	174		160	160	186	190		186	
RCA 43																		
RCA 50	156	210	180			160	198	245		190		205		196	190		206	
RCA 62																		

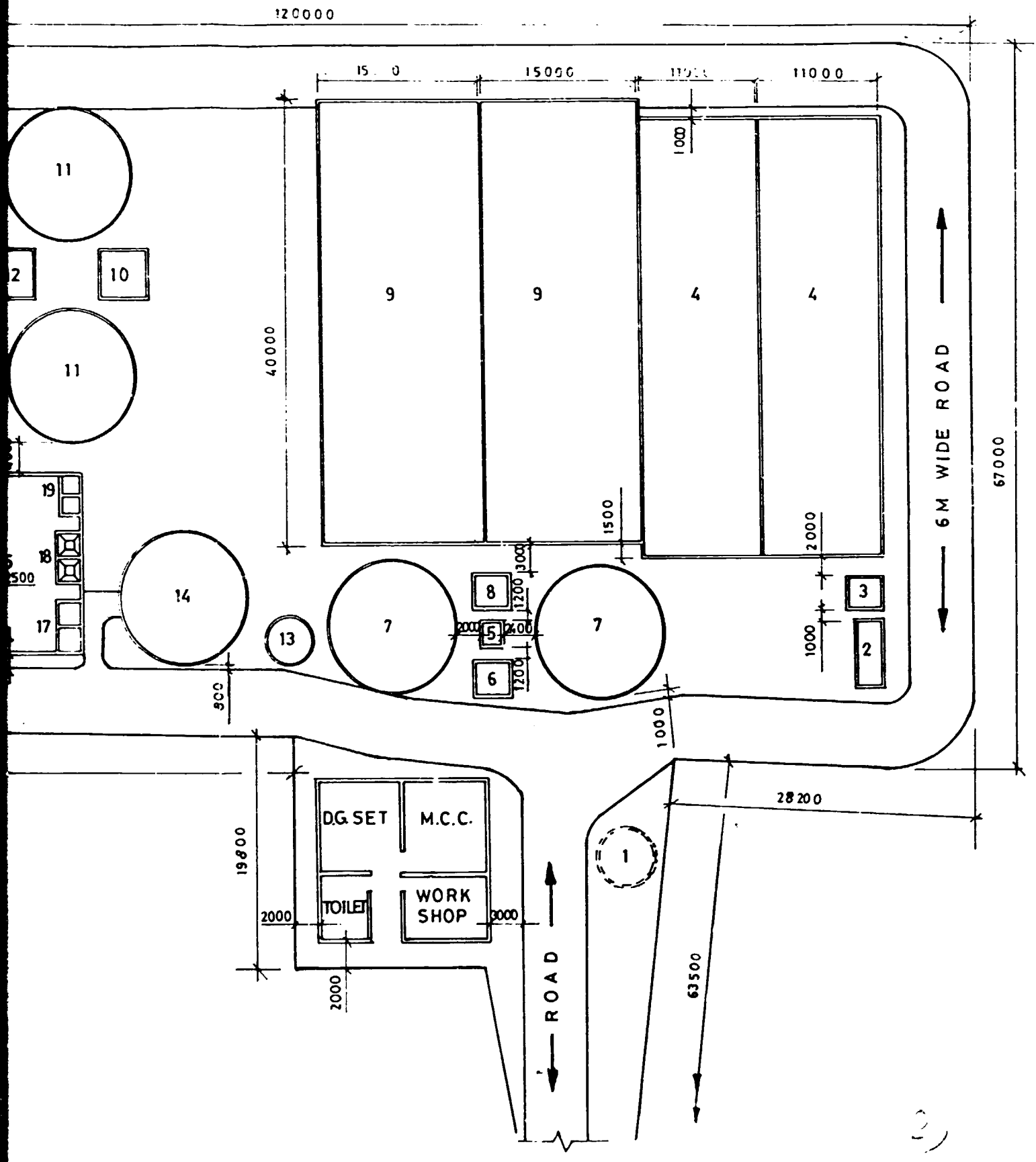


LEGEND

1	RECEIVING SUMP	6·0 M ϕ OWNER'S SCOPE
2	SCREEN CHAMBER	6·0x2·0x1·0M
3	GRIT CHAMBER	3·0x3·0x12M SWD
4	EQUALIZATION TANK 2 NOS	40·0x11·0x3·0M SWD
5	FLASH MIXER	2·0x2·0x2·0M
6	DISTRIBUTION CHAMBER I	3·0x3·0x1·0M
7	CLARIFLOCCULATORS	12·0x3·0M SWD 2NOS
8	DISTRIBUTION CHAMBER II	3·0x3·0x1·0M
9	AERATION TANK	40·0x15·0x4·5TD 2NOS
10	DISTRIBUTION CHAMBER III	4·0x4·0x1·0M
11	SECONDARY CLARIFIER	12·0ϕx2·2M SWD 2NOS
12	SECONDARY SLUDGE SUMP	4·0x4·0x2·2M SWD (2·5M TD)
13	PRIMARY SLUDGE SUMP	4·0ϕx3·0M TD
14	THICKNER	12·0ϕx3·0ϕM SWD
15	FILTER HOUSE	16·0x8·0M IN 2 FLOORS
16	SLUDGE DRYING BEDS	16·0x10·0M 6NOS
17	LIME TANK (2 NOS)	2·0x2·0x2·0M
18	ALUM TANK (2 NOS)	2·0x2·0x2·0M
19	DAP TANK (2 NOS)	1·5x1·5x1·5

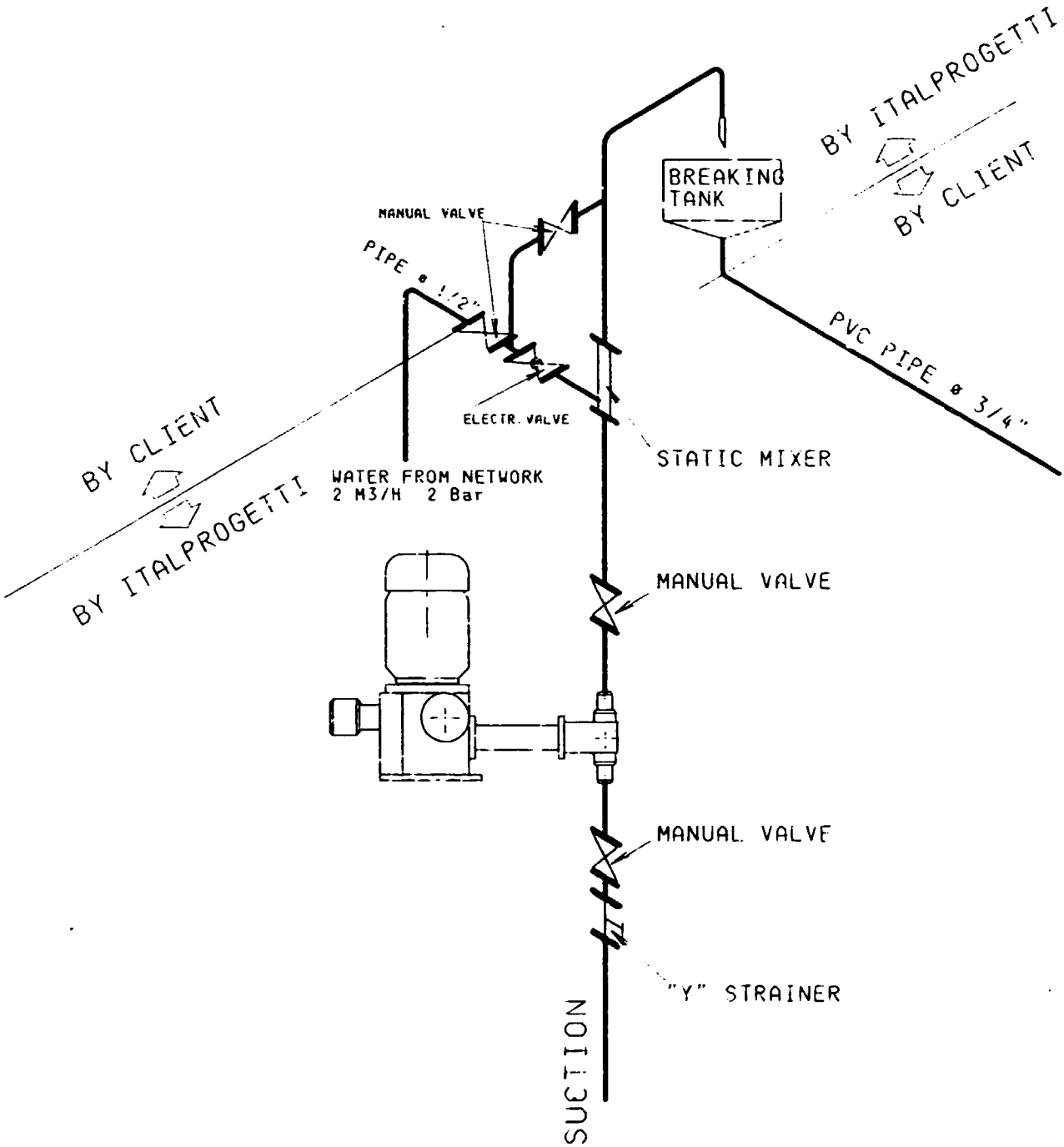
1)

UEM (P) LTD. NEW DELHI-110048	PTIET CO. PVT. LTD. (MADRAS)	LAY

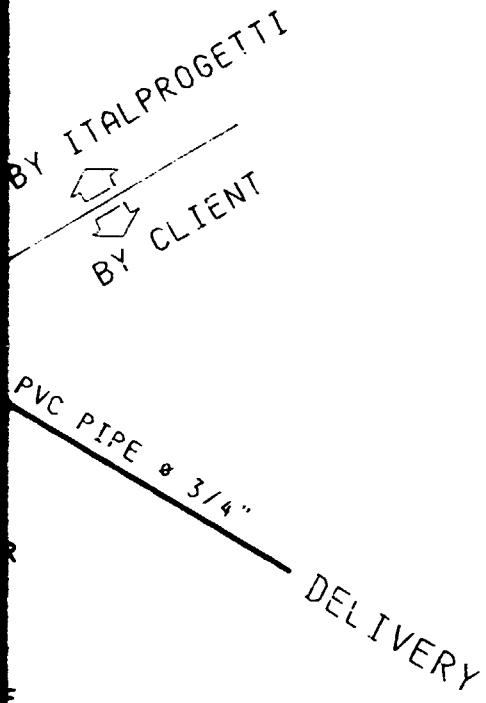


LAYOUT PLAN

DRG.NO. UEM/93/PTE/02A	DRN. BY JCN &RCP	20-9-93
PROJ. NO UEM/9303	CHD. BY	
REVISION.	SCALE :- NTS	


BY ITALPROGETTI
BY CLIENT
BREAKING TANK
MANUAL VALVE
PIPE ø 1/2"
ELECTR. VALVE
PVC PIPE ø 3/4"
BY CLIENT
BY ITALPROGETTI
WATER FROM NETWORK
2 M3/H 2 Bar
STATIC MIXER
MANUAL VALVE
MANUAL VALVE
"Y" STRAINER
SUCTION

1)



REMARKS

1. OPERATION OF THIS PUMP MUST BE INTERELATED WITH OPERATION OF THE EQUALIZATION PUMPS (N° 3 CENTRIFUGAL PUMPS)

2. OPERATION OF ELECTROVALVE MUST BE INTERELATED WITH OPERATION OF THE DOSING PUMP

2

ITALPROGETTI
engineering
SAN. ROMANO (PI) ITALY TEL. 0571 450477
TELEX 501827 TELEFAX 0571 450301

Cliente:
PALLAVARAM TANNERY
INDIA

Sost. il: _____ Sost. dal _____

Oggetto: .
EFFLUENT WATER TREATMENT PLANT
DOSING PUMP INSTALLATION

	firma	Data	Scala	F.to	Disegno N.	Mod.
Diseg.	F. RIDOLFI	07-10-93	1 : 5	A2	WTP0730-93SC0	0
Contr.						

DRAWINGS

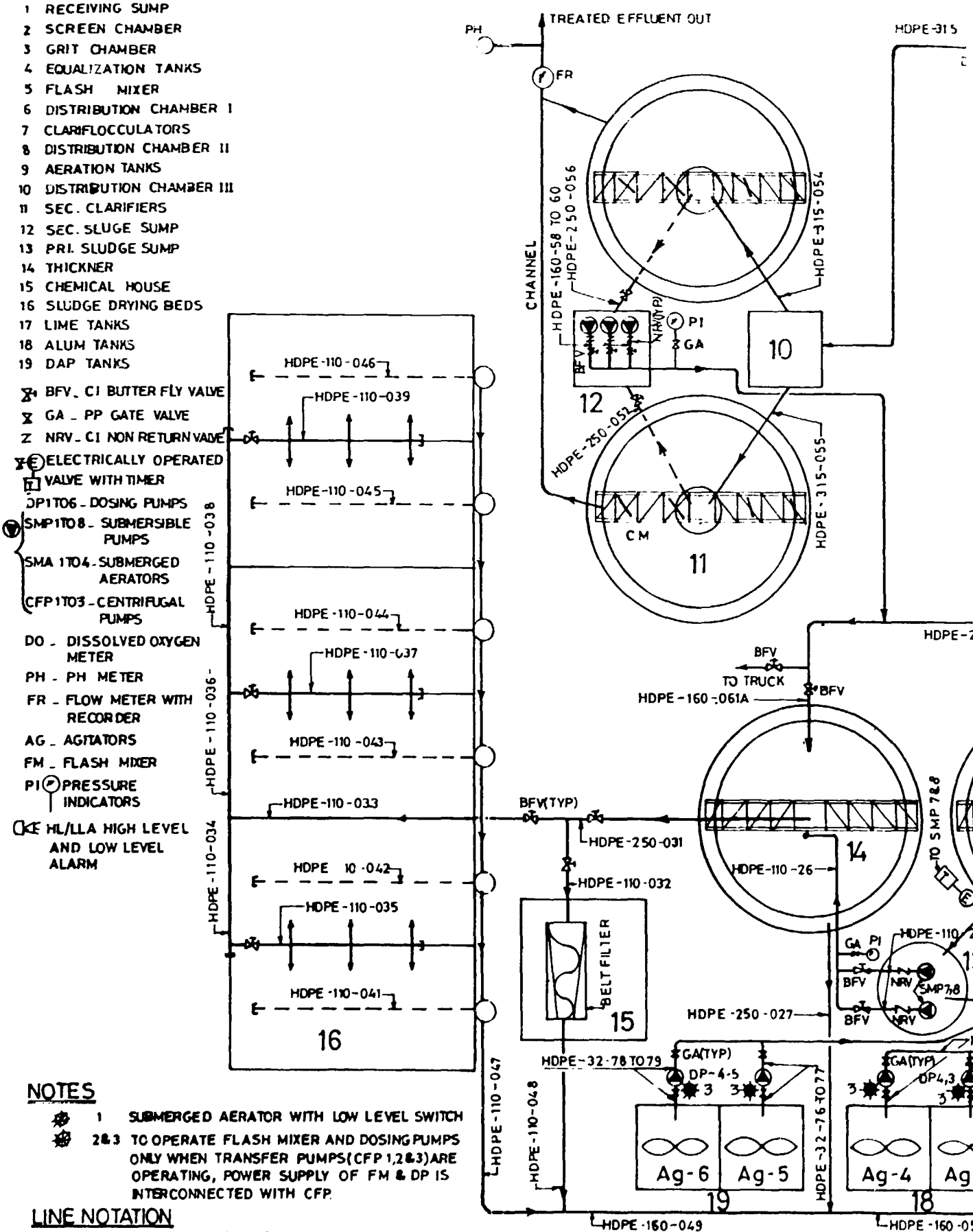
1. GENERAL LAY-OUT OF THE CETP-PALLAVARAM

2. P & I DIAGRAM OF THE CETP-PALLAVARAM

LEGEND

1 RECEIVING SUMP
2 SCREEN CHAMBER
3 GRIT CHAMBER
4 EQUALIZATION TANKS
5 FLASH MIXER
6 DISTRIBUTION CHAMBER I
7 CLARIFLOCCULATORS
8 DISTRIBUTION CHAMBER II
9 AERATION TANKS
10 DISTRIBUTION CHAMBER III
11 SEC. CLARIFIERS
12 SEC. SLUGE SUMP
13 PRI. SLUDGE SUMP
14 THICKNER
15 CHEMICAL HOUSE
16 SLUDGE DRYING BEDS
17 LIME TANKS
18 ALUM TANKS
19 DAP TANKS

BFV - CI BUTTER FLY VALVE
GA - PP GATE VALVE
NRV - CI NON RETURN VALVE
ELECTRICALLY OPERATED VALVE WITH TIMER
DP1TO6 - DOSING PUMPS
SMP1TO8 - SUBMERSIBLE PUMPS
SMA 1TO4 - SUBMERGED AERATORS
CFP1TO3 - CENTRIFUGAL PUMPS
DO - DISSOLVED OXYGEN METER
PH - PH METER
FR - FLOW METER WITH RECORDER
AG - AGITATORS
FM - FLASH MIXER
PI - PRESSURE INDICATORS
HL/LLA HIGH LEVEL AND LOW LEVEL ALARM



NOTES

1 SUBMERGED AERATOR WITH LOW LEVEL SWITCH
2&3 TO OPERATE FLASH MIXER AND DOSING PUMPS ONLY WHEN TRANSFER PUMPS(CFP 1,2&3)ARE OPERATING, POWER SUPPLY OF FM & DP IS INTERCONNECTED WITH CFP.

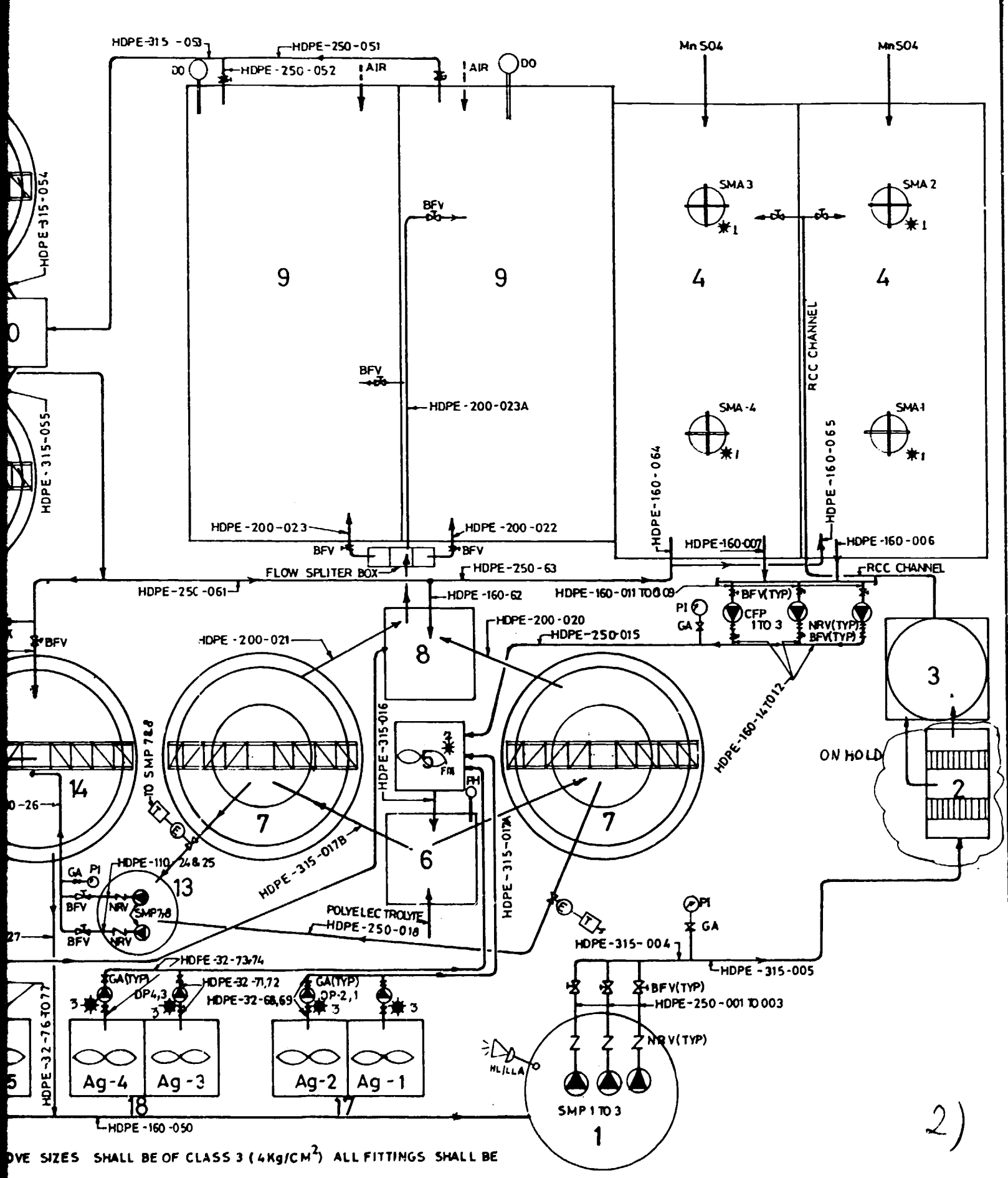
LINE NOTATION

- MATERIAL OF CONST - SIZE - LINE NO

1 ALL PIPES ARE HDPE PIPES. PIPE SIZE UPTO 40 OD SHALL BE CLASS 4 (6Kg/CM^2) AND ABOVE SIZES SHALL BE OF 6 Kg/CM^2 PRESSURE THICKNESS OF THE PIPE IS AS PER IS 4984 -1987

2 VALVES UP TO 40NB SHALL BE POLYPROPELYNE AND ABOVE SIZES SHALL BE WAFER TYPE CI BUTTER FLY VAL

U E M (P) LTD.	PTIET CO. PVT. LTD.	PROCESS & I
NEW DELHI -40	MADRAS	



2)

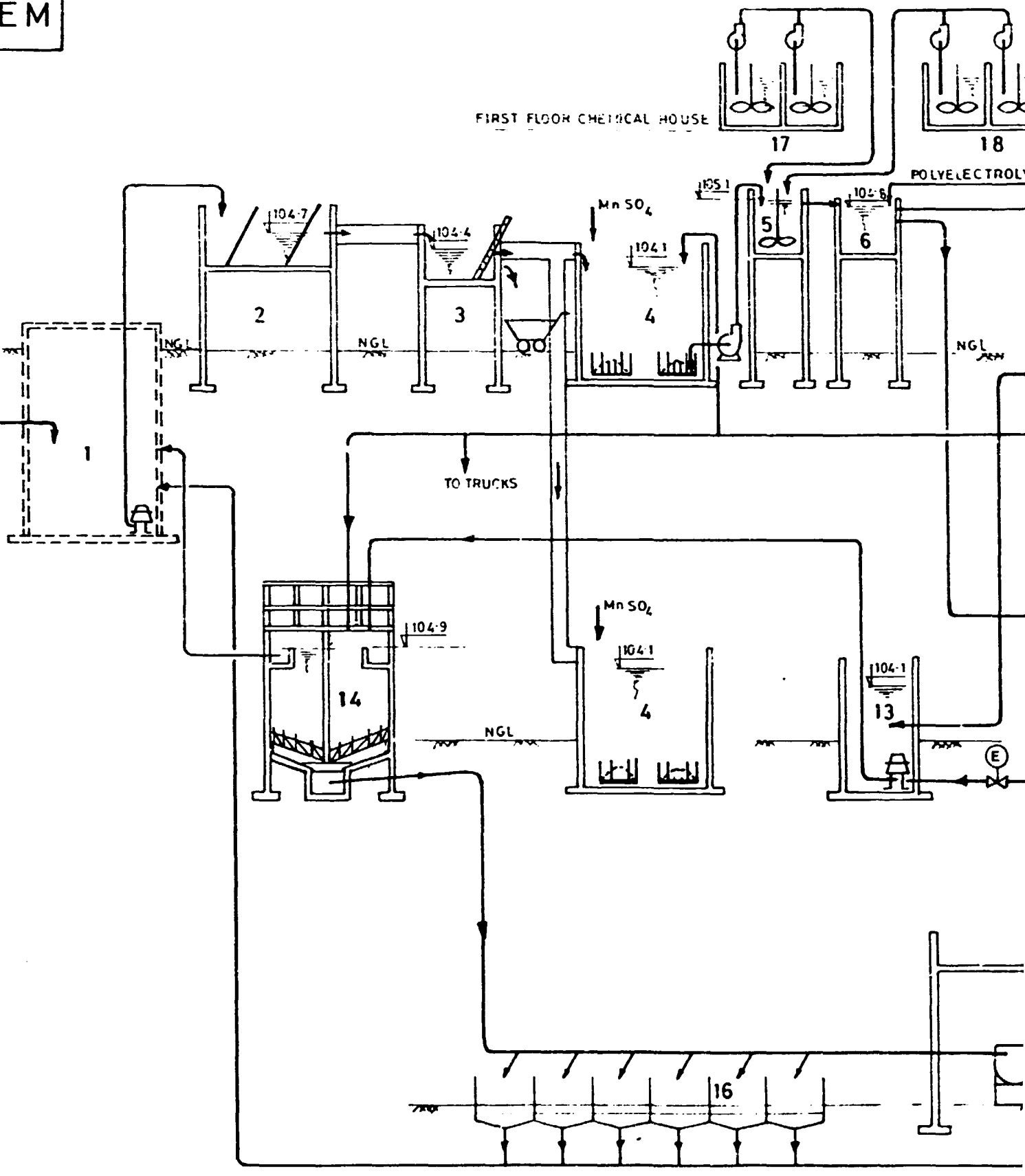
OVE SIZES SHALL BE OF CLASS 3 (4Kg/CM^2) ALL FITTINGS SHALL BE

TYPE CI BUTTER FLY VALVE

PROCESS & INSTRUMENTATION DIAGRAM	PROJ NO UEM/9303	DRN BY R.C. Prajapati
	DRG NO UEM/93/PTE/017A	CHD BY
	SCALE	APPD BY

3. HGL DIAGRAM OF THE CETP-PALLAVARAM

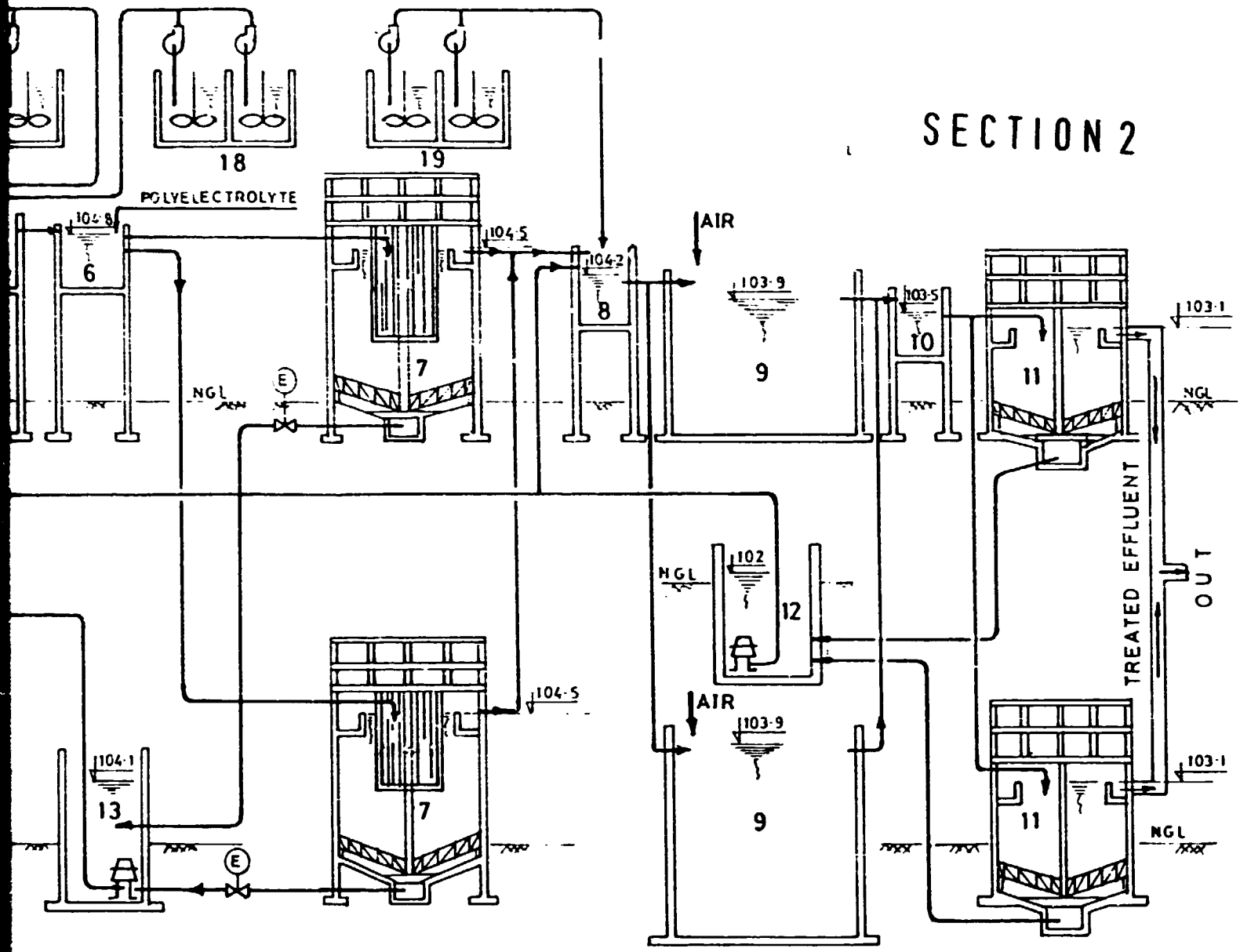
UEM

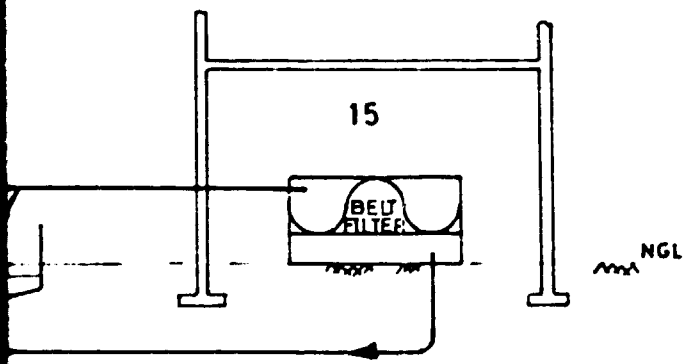


SECTION 1

UEM. PVT. LTD. NEW DELHI-110048	P T I E T (MADRAS)	HGL DIA

SECTION 2





LEGEND

1	RECEIVING SUMP	6·0M ϕ OWNER'S SCOPE
2	SCREEN CHAMBER	6·0x2·0x 1·0 M
3	GRIT CHAMBER	3·0x3·0x 1·2 M SWD
4	EQUALIZATION TANK(2 NOS)	40·0x11·0 x3·0M SWD
5	FLASH MIXER	2·0x2·0x 2·0 M
6	DISRIBUTION CHAMBER I	3·0x3·0x1·0 M(OWNER'S SCOPE)
7	CLARIFLOCCULATORS	12·0x3·0M SWD(2 NOS)
8	DISTRIBUTION CHAMBER II	3·0x3·0x1·0M (OWNER'S SCOPE)
9	AERATION TANK(2 NOS)	OWNER'S SCOPE
10	DISTRIBUTION CHAMBER III	4·0x4·0x1·0M (OWNER'S SCOPE)
11	SECONDARY CLARIFIER	12·0 ϕ2·2 M SWD (2 NOS)
12	SECONDARY SLUDGE SUMP	4·0x4·0x 2·2 M SWD(2·5M TD) (OWNER'S SCOPE)
13	PRIMARY SLUDGE SUMP	4·0 ϕx3·0M T D
14	THICKNER	12·0 ϕ 3·0M SWD
15	FILTER HOUSE	15·0 x 8·0 IN 2 FLOORS
16	SLUDGE DRYING BEDS	10·0 x 16·0 M (6 NOS)
17	LIME TANK(2 NOS)	2·0x2·0x2·0M
18	ALUM TANK (2 NOS)	2·0x2·0x2·0 M
19	DAP TANK (2 NOS)	1·5x1·5x1·5 M

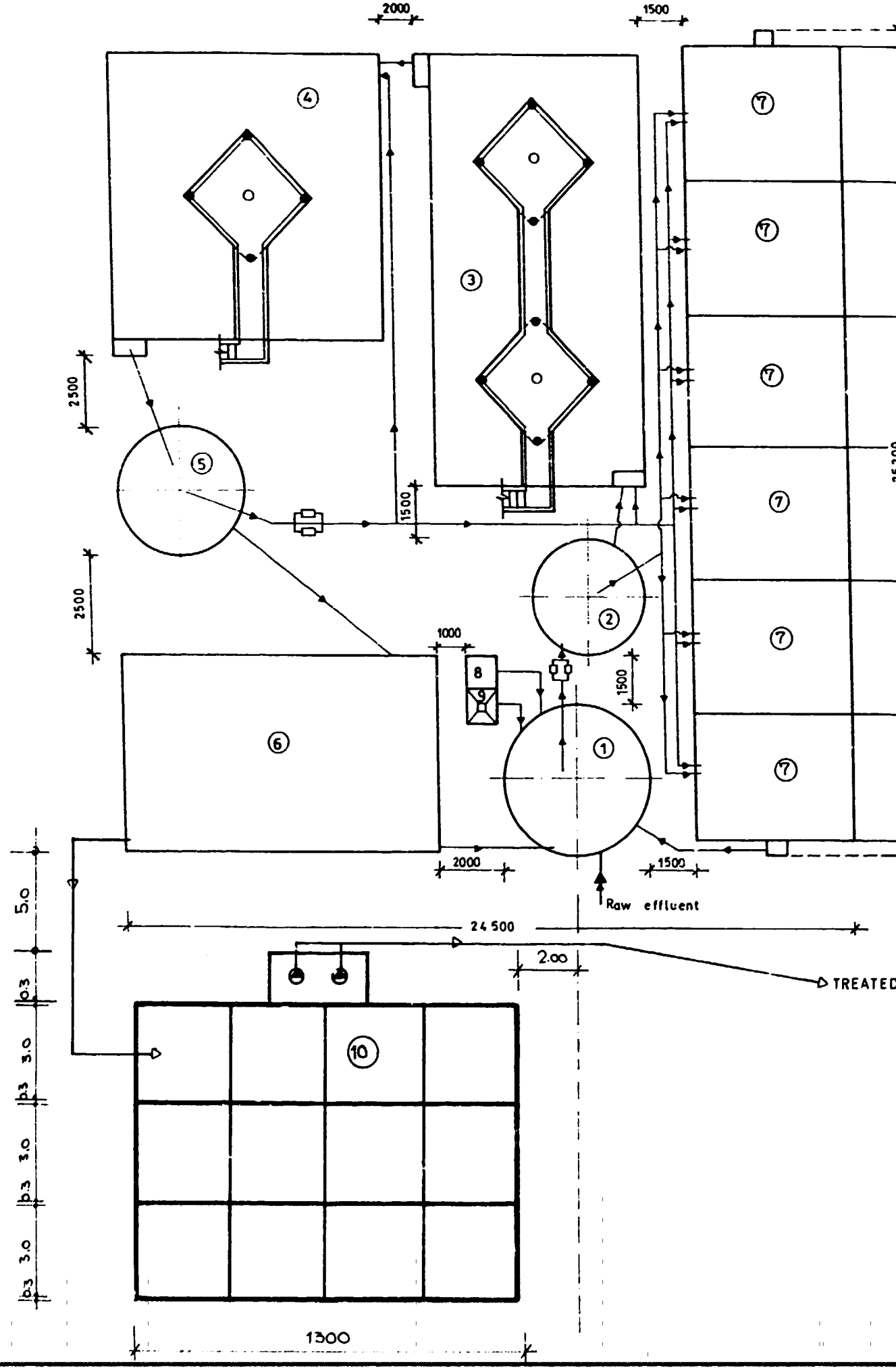
NOTES:

ALL THE HYDRAULIC LEVELS SHOWN IN DRG. ARE IN REFERANCE WITH THE BENCH MARK ESTABLISHED AT SITE (RL – 103·98)

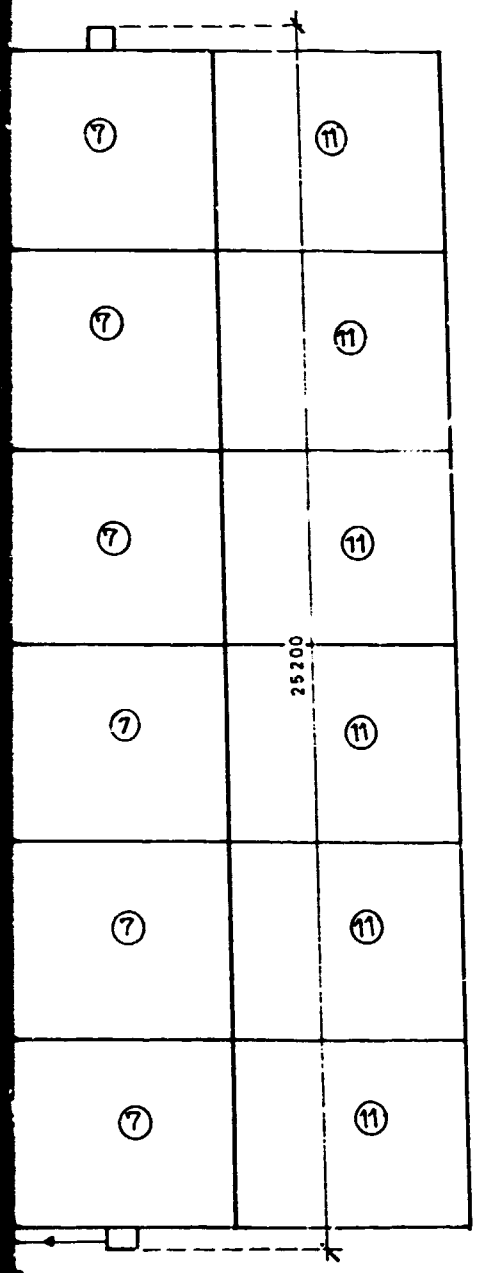
HGL DIAGRAM

DRG. NO. UEM/93/PTE/016 A	DRN. BY. JAGDISH NISHANA	17-8-9
PROJ. NO UEM/9303	CHD. BY.	
REVISION	SCALE: N.T.S	

4. GENERAL LAY-OUT OF THE PRESIDENCY KID ETP


2000
1500
4
3
7
2500
5
1500
2500
2
1000
8
9
1500
6
1
2000
1500
Raw effluent
24 500
2.00
TREATED
5.0
b3
3.0
b3
3.0
b3
3.0
b3
10
1300

SECTION 1



TREATED EFFLUENT

SPECIFICATION

1	COLLECTION TANK	6.0 ϕ x 2.0 m swd
2	PRIMARY SETTLING TANK	4.0 ϕ x 1.8 m swd
3	AERATION TANK I	13.0 x 6.5 x 3.0 m TD
4	AERATION TANK II	8.5 x 8.5 x 3.0 m TD
5	SECONDARY SETTLING TANK	4.0 ϕ x 1.8 m swd
6	POLISHING POND	10.0 x 6.0 x (1.5 - 1.0) m TD
7	SLUDGE DRYING BEDS (6 Nos)	5.0 x 4.0 x 0.8m TD
8	LIME TANK	1.0 x 1.0 x 1.0
9	ALUM TANK	1.0 x 1.0 x 1.0
10.	POLISHING TANKS (MODIFIED EXISTING TANK)	
11	ADITIONAL DRYING BED	

SECTION 2

ENKEM ENGINEERS PVT LTD.
515 POONAMALLEE HIGH ROAD,
MADRAS 84.

People Solving Environmental Problems

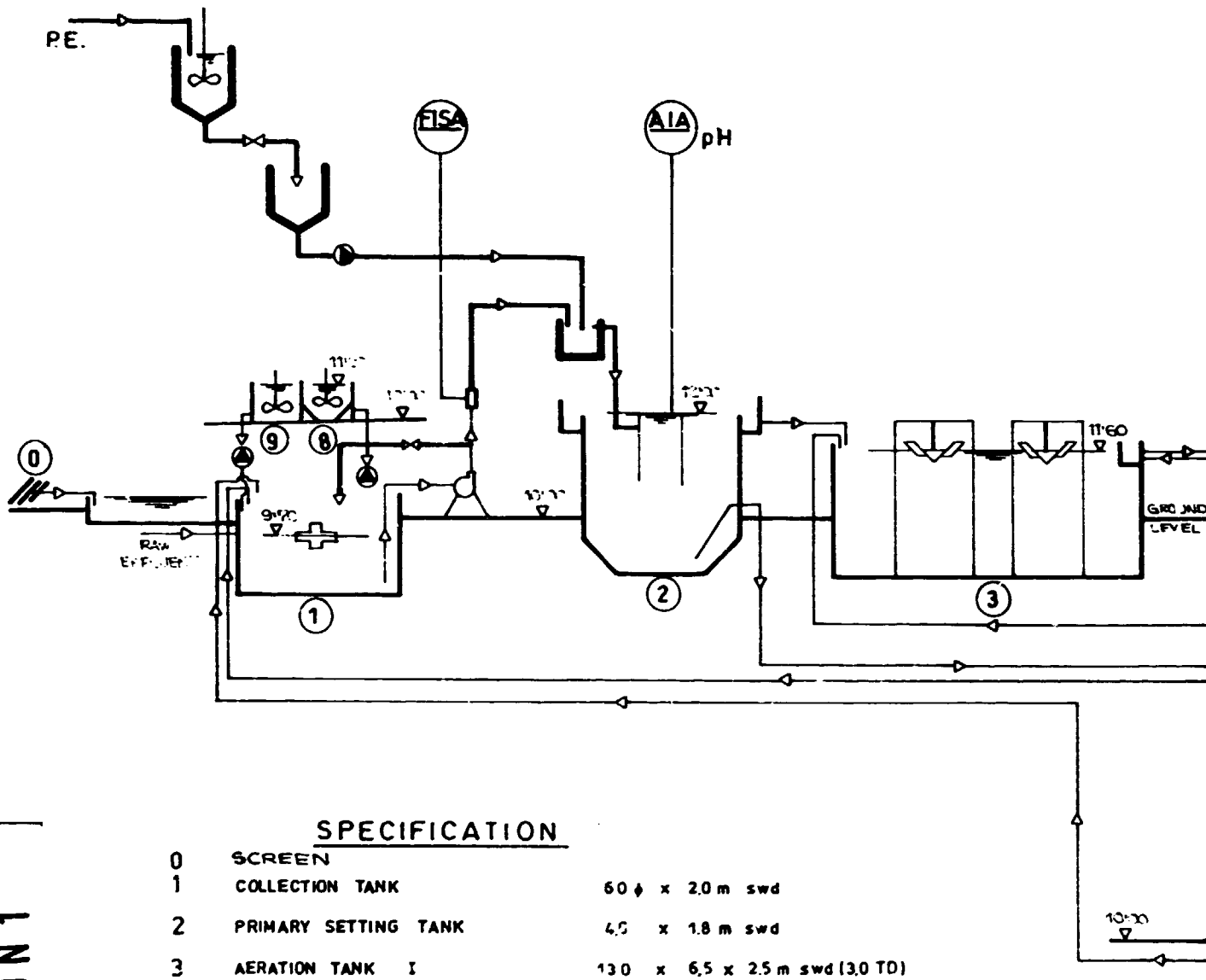
DESCRIPTION

LAYOUT (modified)

CLIENT

M/S PRESIDENCY KID LEATHERS

5. PROCESS DIAGRAM OF THE PRESIDENCY KID ETP



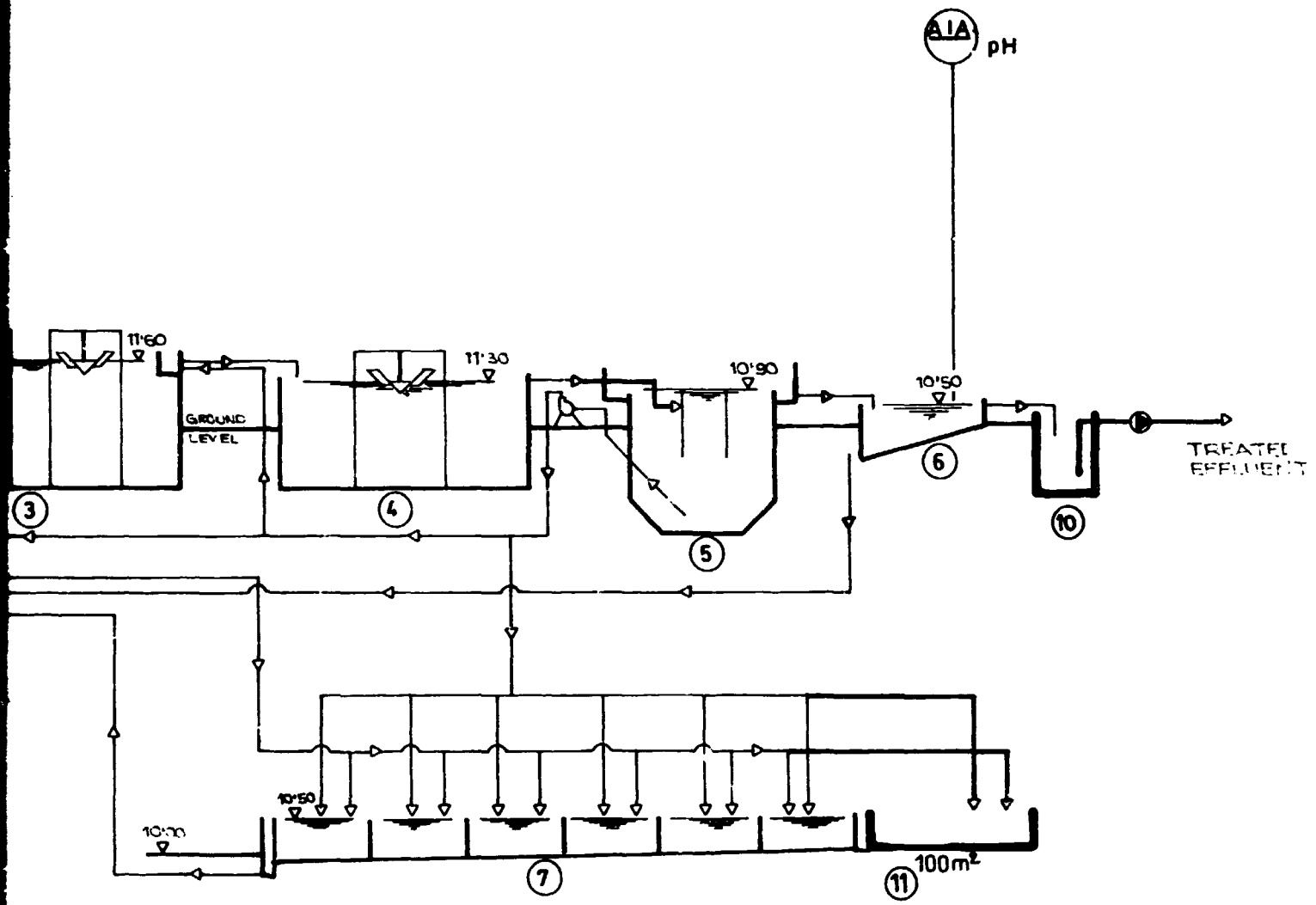
SECTION 1

SPECIFICATION

0	SCREEN	
1	COLLECTION TANK	6.0 ϕ x 2.0 m swd
2	PRIMARY SETTING TANK	4.0 x 1.8 m swd
3	AERATION TANK I	13.0 x 6.5 x 2.5 m swd (3.0 TD)
4	AERATION TANK II	8.5 x 8.5 x 2.8 m swd (3.3 m TD)
5	SECONDARY SETTLING TANK	4.0 ϕ x 1.8 m swd (2.1 m TD)
6	POLISHING POND	10.0 x 6.0 x (1.5 - 1.0) m swd (1.8 - 1.3) m TD
7	SLUDGE DRYING BEDS (6 Nos)	5.0 x 4.0 x 0.8 m TD
8	LIME TANK	1.0 x 1.0 x 1.0 m TD
9	ALUM TANK	1.0 x 1.0 x 1.0 m TD
10	POLISHING TANKS (MODIFIED EXISTING TANKS)	
11	ADDITIONAL DRYING BEDS	

REV. NO	AMENDMENTS	DATE	APPD

DESCRIPTION: PROCESS DIAGR
(MODIFIED)



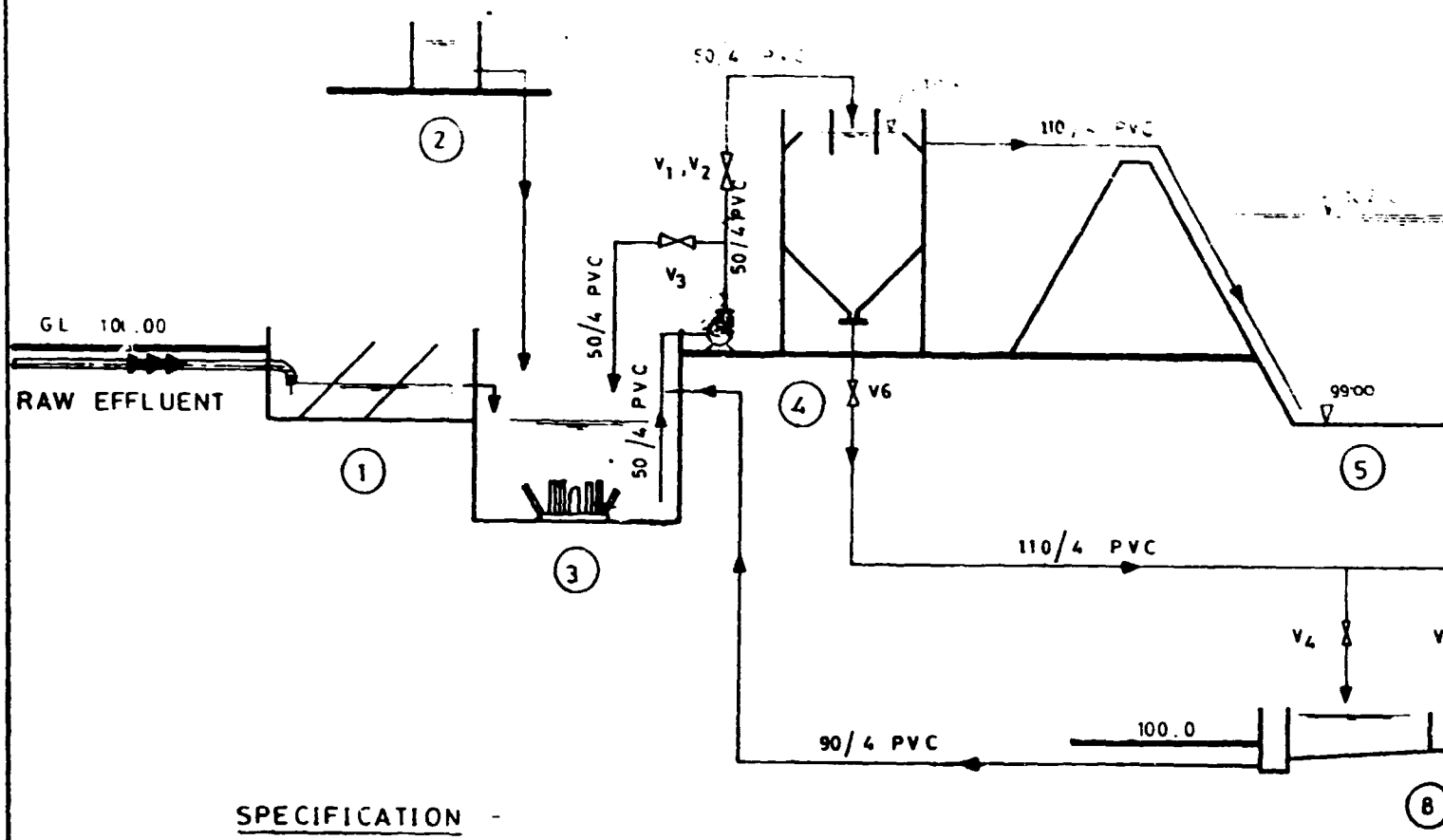
SECTION 2

ROCESS DIAGRAM (MODIFIED)	DATE	18th Aug 93
	SCALE	NTS
	JOB NO	
	DRAWN	JAR

ENKEM ENGINEERS PVT. LTD.,
824. POONAMALLEE HIGH ROAD
MADRAS - 10

6. PROCESS DIAGRAM OF THE MEERA HUSSAIN ETP

ALL LEVELS ARE IN M



SPECIFICATION -

1 SCREEN CHAMBER

2 CHEMICAL PREPARATION TANK

3 EQUALISATION TANK

4 SETTLING TANK (FRP)

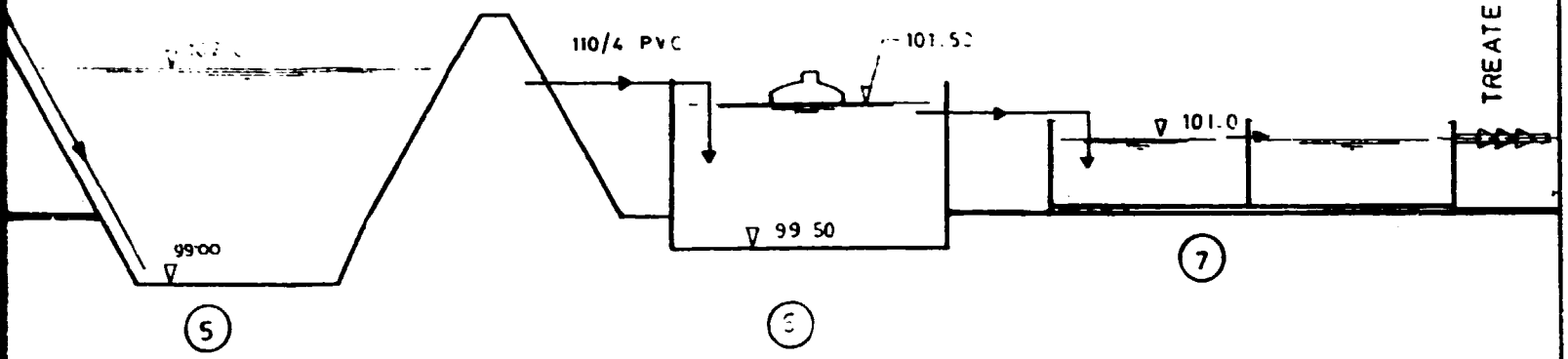
5 ANAEROBIC LAGOON

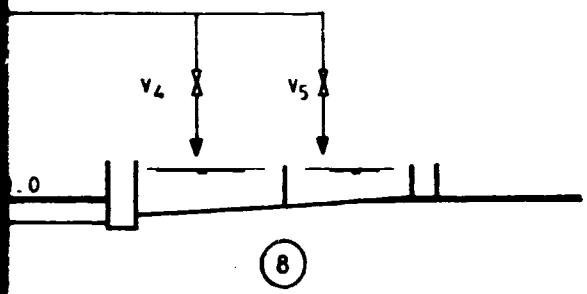
6 DEGASIFIED UNIT

7 OXIDATION POND

8 SLUDGE DRYING BEDS

REV.NO	AMENDMENTS	DATE	APPD	DESCRIPTION
				P & I DIAGRAM
				CLIENT





SECTION 2

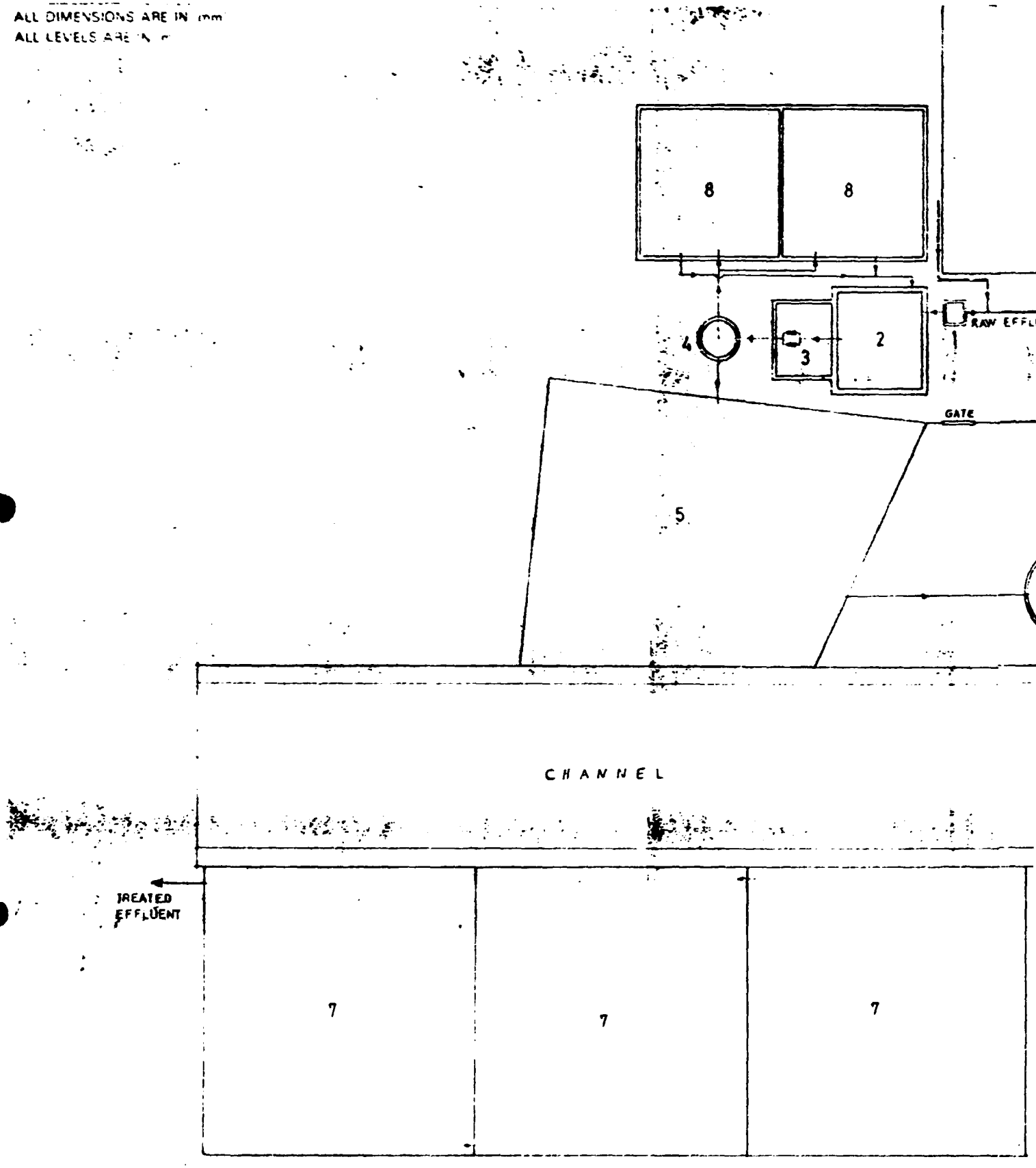
& I DIAGRAM	DATE	06th sept. 93
	SCALE	N.T.S.
	JOB NO.	
	DRAWN	AAR
	CHECKED	

ENKEM ENGINEERS PVT. LTD..
824, POONAMALLEE HIGH ROAD
MADRAS 10

People Solving Environmental Problems

7. GENERAL LAY-OUT OF THE MEERA HUSSAIN ETP

ALL DIMENSIONS ARE IN mm
ALL LEVELS ARE IN m

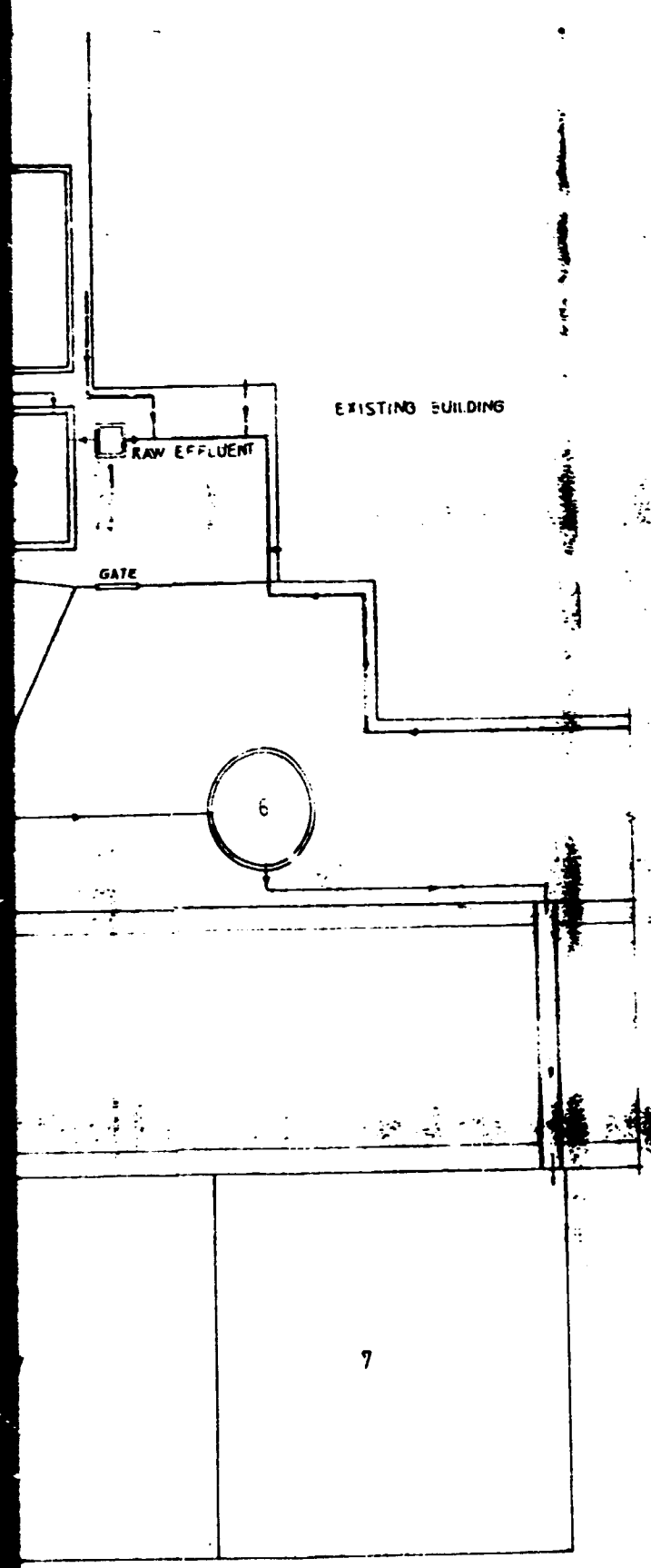


REV NO	AMENDMENTS	DATE	APPD

DESCRIPTION

LAYOUT

CLIENT



SPECIFICATION

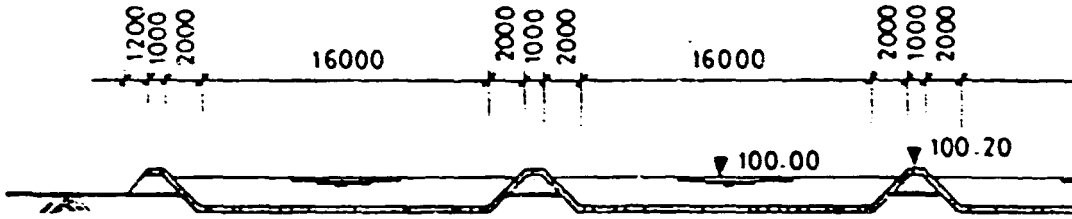
1	Screen chamber	1.3 x 1.3 x 1.2m TE Existing
2	Equalisation tank EXISTING TANK TO BE MODIFIED AS EQUALISATION TANK	
3	Pump house	Existing
4	Settling tank (FRP)	2.5 ϕ x 1.5m swd
5	Anaerobic lagoon	230 m² x 3.0m swd
6	Degassifying tank	6.0 ϕ x 2.0m swd (2.2m TD)
7	Oxidation pond & incl	19.2 m x 19.2 m x 1.8m swd 10 nos
8	Sludge drying beds 2 nos	Existing to be improved

SECTION 2

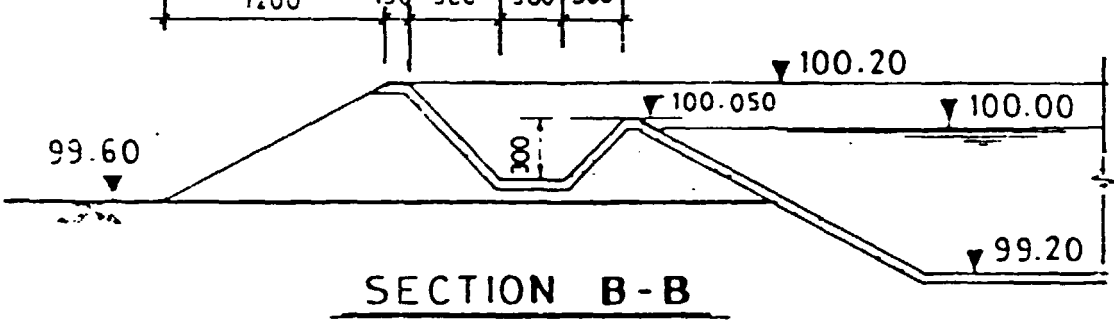
T	
DATE	06.09.93
SCALE	
JOB NO	224/93
DRAWN	GVK

ENKEM ENGINEERS PVT. LTD,
824 POONAMALLEE HIGH ROAD
MADRAS - 10

8. AEROBIC LAGOON SET-UP OF THE MEERA HUSSAIN ETP

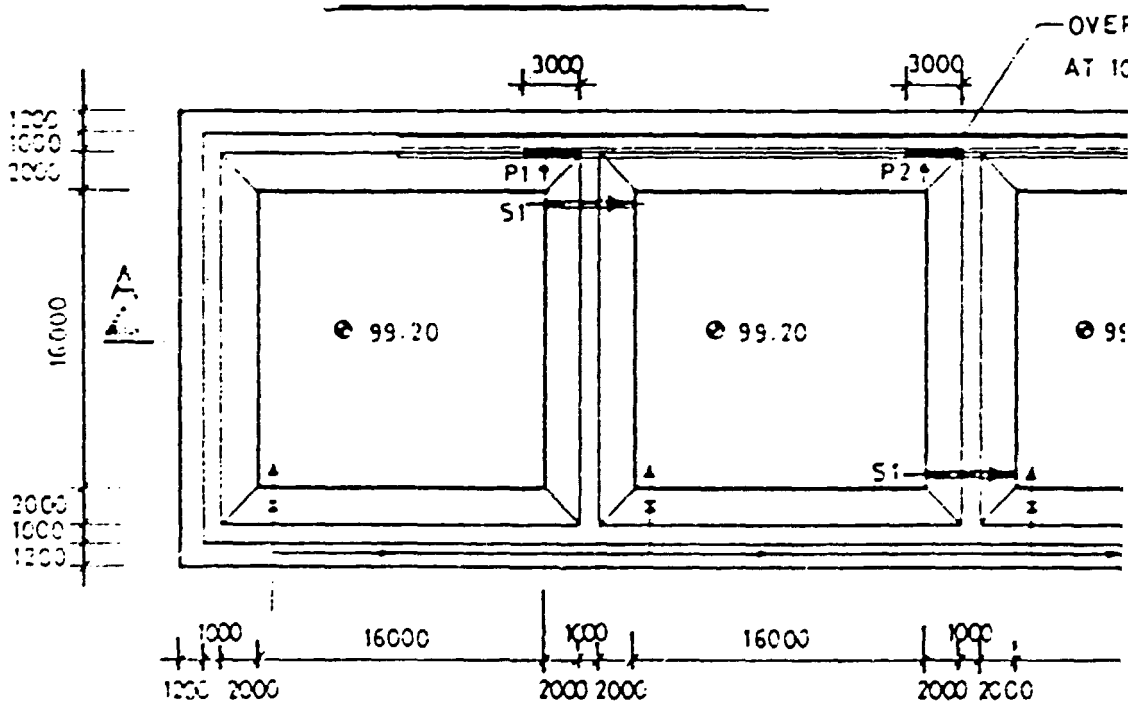


SECTION A



SECTION B-B

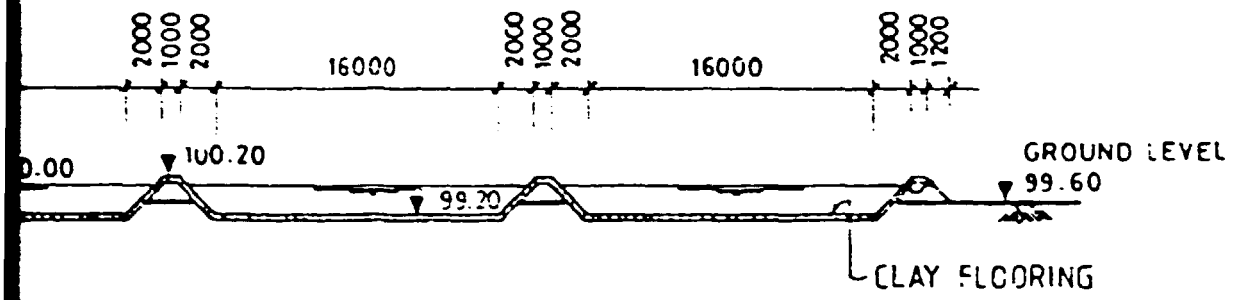
OUTLET CHANNEL



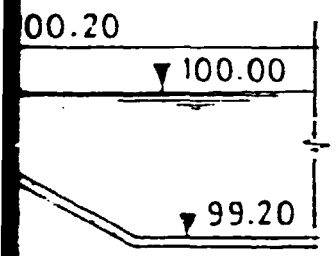
PLAN

SECTION 1

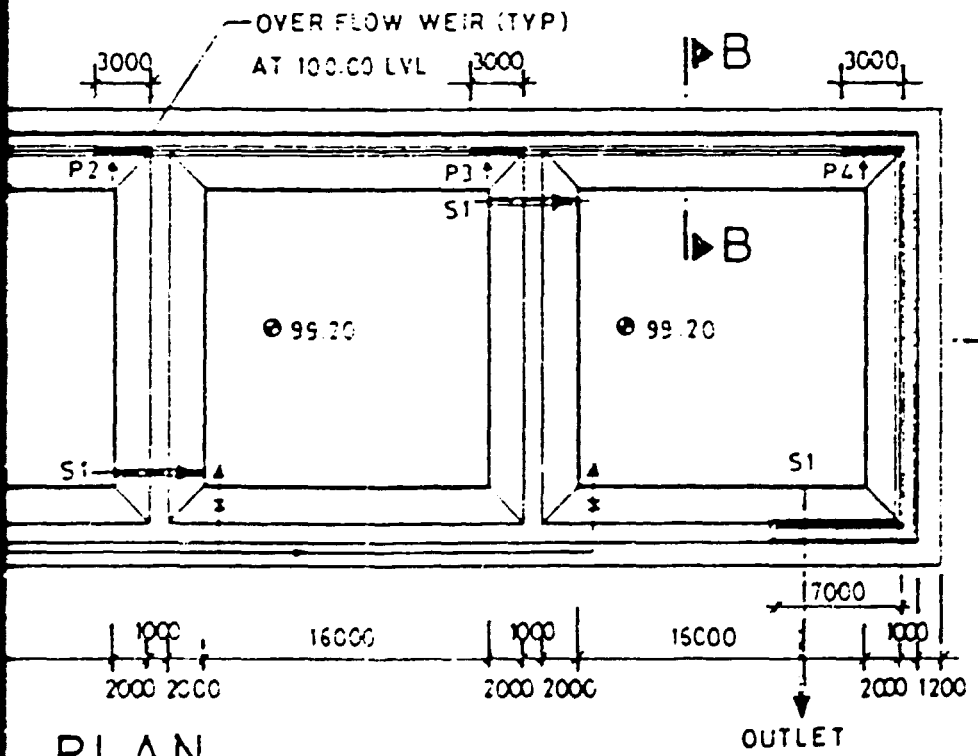
CLIENT M/s. MEERA HUSSAIN TANNERY	JOB NO. 224/93	DESI
	DRN. G V K	AEROBIC SET-
	CKD.	(OXIDATIO
	APP.	



SECTION A-A



SECTION 2



PLAN

LEGEND

S1	ALL EFFLUENT IN SERIES
P1	PARALLEL STREAM ONE
P2	PARALLEL STREAM TWO
P3	PARALLEL STREAM THREE
P4	PARALLEL STREAM FOUR

NOTE THE STRUCTURES ARE NOT DESIGNED FOR ANY UPLIFT

DESCRIPTION	DATE 04 10 93
AEROBIC LAGOONS SET - UP (OXIDATION POND)	SCALE 1:500
	DRG. NO.

ENKEM ENGINEERS PVT LTD,
824 POONAMALLEE HIGH ROAD,
MADRAS- 10.