

USED ZINC-COATING
PLANT FOR PIPES

manufacturer: 'LOECO' Germany
'VOEST ALPINE' Austria

CONTENT:

- 1. Line General Specification**
- 2. Equipment List**
- 3. Plant Performance**
- 4. Line Functional Description**
- 5. Drawings & Documentations**
- 6. Foundation Plan & Schemes**
- 7. Photos**

1) LINE GENERAL SPECIFICATION

1.1 BASIC DATA

Year of construction	1981
Maximum capacity	60.000 t/year (16 t/h)
Producible dimensions	1/4" to 4"
Producible lengths	4 to 7 m
Zn layer	400 g/m ² according to DIN 2444

1.2 EQUIPMENT DATA

A) ADJUSTING SECTION

Leveller No.1

Diameter: from 1/2" to 4"
Manufacturer: VOEST ALPINE-Austria

Unit for electromagnetic pipe testing

Diameter: from 1/2" to 4"
Manufacturer: CENTRO TEST-Germany

End facing treatment of pipes No.1

Diameter: from 1/2" to 4"
Length: 8m
Manufacturer: VOEST ALPINE-Austria

End facing treatment of pipes No.2

Diameter: from 1/2" to 4"
Length: 6m
Manufacturer: VOEST ALPINE-Austria

Packing unit No.1

Diameter: from 1/2" to 4"
Length: 8m
Manufacturer: VOEST ALPINE-Austria

Packing unit No.2

Diameter: from 1/2" to 4"
Length: 6m
Manufacturer: VOEST ALPINE-Austria

Unit for tethering with wire No.1

Manufacturer: MACKLY-Italy

Unit for tethering with wire No.2

Manufacturer: MACKLY-Italy

Unit for tethering with strip (tape)

Manufacturer: SIGNODE-Germany

Weighing machine with automatic transporter

Length: 18m max.
Manufacturer: VOEST ALPINE-Austria

Leveller No.1

Diameter: ½" to 4"
Manufacturer: VOEST ALPINE-Austria

End facing treatment of pipes No.3

Diameter: ½" to 4"
Length: 6 to 8,5m
Manufacturer: LANDIS-Germany

End facing treatment of pipes No.4

Diameter: from ½" to 4"
Length: from 6 to 8,5m
Manufacturer: LANDIS-Germany

End facing treatment of pipes No.5

Diameter: from ½" to 4"
Length: from 6 to 8,5m
Manufacturer: LANDIS-Germany

End facing treatment of pipes No.6

Diameter: from ½" to 4"
Length: from 6 to 8,5m
Manufacturer: LANDIS-Germany

End facing treatment of pipes No.7
(thread)

Diameter: from ½" to 4"
Length: 6m
Manufacturer: KAGERER-Austria

Hydrostatic tester with 2 heads
No.1

Diameter: up to 1"
Manufacturer: VOEST ALPINE-Austria

Hydrostatic tester with 2 heads

No.2

Diameter: up to 2"
Manufacturer: VOEST ALPINE-Austria

Hydrostatic tester with 4 heads

Diameter: up to 4"
Manufacturer: VOEST ALPINE-Austria

B) CHEMICAL PRETREATMENT SECTION

Chemical pretreatment tunnel

Width: 8 m
Capacity: 35 ton
Transport system composed of : -transport cars 4pcs.
-hydra. pillars 26pcs.
-chemicals baths 11 pcs.
Entry & exit chamber capacity: 60000 ton/year
Manufacturer: VOEST ALPINE-Austria

Degreasing baths

2 pcs.
Bath volume: 18,5 m³
Bath temperature: 80°C – 90°C
Treatment time: 8 min.
Degreasing liquid: 5% NaOH or industrial detergent
Manufacturer: LOECO-Germany

Hot rinsing baths

2 pcs.
Bath volume: 15,5 m³
Liquid: Hot water
Manufacturer: LOECO-Germany

Pickling baths

4pcs.
Bath volume: 14,6 m³
Concentration: 15-20% HCL
Temperature: 30 to 40°C
Treatment time: 8 min. per bath
Manufacturer: LOECO-Germany

Cold rinsing baths

2 pcs.
Bath volume: 14,6 m³
Manufacturer: LOECO-Germany

Flux bath

1 pc.
Bath volume: 14,6 m³
Bath temperature: 55°C
Density: 30 Be
pH: 4 to 4.5
Manufacturer: LOECO-Germany

Neutralization station

Capacity: 6 m³/h
Manufacturer: OSKO-Austria

Vertical transporter

Capacity: 60000 ton/year
Manufacturer: VOEST ALPINE-Austria

Pipe dryer

Temperature: 100 – 180°C
Capacity: 60000 ton/year
Manufacturer: LOECO-Germany

Wet scrubber

Fan No.1

Capacity: 23.000 m³/h

Fan No.2

Capacity: 10.000 m³/h

Chimney

Diameter: 1.000 mm
Manufacturer: OSKO-Austria

Traverse for return transport

Pipe bundle weight: max. 2.500 kg dry pipes
Lifting speed: 5/1 m/min
Longitudinal travel speed for the
main crane runway: 20/5 m/min
Hoist load group: FEM V
Feed rate of the bundle feed: 5 m/min
Crane design by: DIN 15018 H 2/ B 3
Throughput: min. 1 bundle/h
max. 8 bundle/h

C) ZINC COATING SECTION

Zinc coating bath for pipes

Dimensions: 1,8 x 1,6 x 8m
Temperature of molten zinc: 460 – 464°C
Zn layer: 400 g/m² according to DIN 2444
Immersion time: 40 – 300 sec
Manufacturer: PILING-Germany

Zinc heating system

Composed of: -brenners gas/mazut 8pcs.
-exhaust chimneys 2pcs.
-suction lines 4pcs.
-distribution channel for heat gas & fresh air 1pc
Manufacturer: LOECO-Germany

Filter station

Filter No.1

Type of filter: IFJC 45/5-2
Type of application: dust removal hood above the galvanizing
Type of gas: air
Type of dust: Zinc oxide
Effective air throughput: 23.000 m³/h
Temperature: 65°C
Cycle time: 10 sec.
Bags diameter: 160 mm
Bags length: 2250 mm
Bags quantity: 225 pcs.
Bags quality: PP-V 600
Filtering area: 255 m²
Manufacturer: INTENSIV FILTER-Germany

Filter No.2

Type of filter: IFJC 45/3-2
Type of application: dust removal from two pipe discharging hoods
Type of gas: air
Type of dust: Zinc dust
Effective air throughput: 21.000 m³/h
Temperature: 30 °C
Cycle time: 10 sec
Bags diameter: 160 mm
Bags length: 2250 mm
Bags quantity: 135 pcs.
Bags quality: PEA-V 550
Filtering area: 153 m²

Chimney

Diameter: 1.200 mm
Manufacturer: INTENSIV FILTER-Germany

Pipe extracting machine

Diameter: ½" to 4"
Length: 3 to 7,5m
Saturated steam temperature: 300°C
Pressure: max. 15 bar
Manufacturer: LOECO-Germany

Unit for automatic dipping, cooling
down & transport of zinc pipes

Diameter: ½" to 4"
Length: 3 to 7,5m
Manufacturer: LOECO-Germany

D) FINISHING SECTION

Passivation unit with own transport
system (Chromating of pipes)

Diameter: 3/8" – 4"
Length: 4m – 7m
Chromating (1/2"): max 800 pcs/h
Pipe sequence: 4,5 sec
Manufacturer: VOEST ALPINE-Austria

End facing treatment & threading
unit

Diameter: ½" to 4"
Width: 6 to 8,5m
Capacity: LANDIS-Germany
Manufacturer:

Packing unit

Manufacturer: VOEST ALPINE-Austria

Electrical room

Manufacturer: VOEST ALPINE-Austria

BOILER ROOM

Steam boiler with secondary steam heating No.1

Capacity: 3 ton/h of overheated steam
Pressure: 16 bar
Manufacturer: LOOS-Germany

Steam boiler with secondary steam heating No.2

Capacity: 5 ton/h of overheated steam
Pressure: 16 bar
Manufacturer: DIMCE BANJAROT-Macedonia

Degasser unit No.1

Manufacturer: LOOS-Germany

Degasser unit No.2

Manufacturer: DIMCE BANJAROT- Macedonia

Water softener

Manufacturer: DIMCE BANJAROT- Macedonia

Tank for hard fuel (mazut)

Capacity: 350 m³
Manufacturer: DIMCE BANJAROT- Macedonia

Pump station

Manufacturer: DIMCE BANJAROT- Macedonia

1.3 CONSUMPTION DATA

HCL	8 -11 kg/t
Electrical Energy	Chemical treatment ca. 135 KWh/h, Tunnel lighting ca. 20 kWh/h
Coating material – Zn	60 – 80 kg/t
Natural Gas	487 Nm ³ /h
Compressed air	1.300 Nm ³ /h
Water	Average 5 m ³ /h; Max 8 - 10 m ³ /h

2) EQUIPMENT LIST

A) ADJUSTING SECTION

Leveller No.1
Unit for electromagnetic pipe testing
End facing treatment of pipes No.1
End facing treatment of pipes No.2
Packing unit No.1
Packing unit No.2
Unit for tethering with wire No.1
Unit for tethering with wire No.2
Unit for tethering with strip (tape)
Weighing machine with automatic transporter
Leveller No.1
End facing treatment of pipes No.3
End facing treatment of pipes No.4
End facing treatment of pipes No.5
End facing treatment of pipes No.6
End facing treatment of pipes (thread) No.7
Hydrostatic tester with 2 heads No.1
Hydrostatic tester with 2 heads No.2
Hydrostatic tester with 4 heads
Transport system

B) CHEMICAL PRETREATMENT SECTION

Chemical pretreatment tunnel
Chain Transporters
Degreasing baths
Hot rinsing baths
Pickling baths
Cold rinsing baths
Flux bath
Neutralization station
Vertical transporter
Pipe dryer
Hydraulic unit No.1
Wet scrubber
Traverse for return transport

C) ZINC COATING SECTION

Zinc coating bath (for pipes)
Zinc coating bath (other constructions)
Dipping device
Lifting device
Pipe extracting machine
Filter station

D) FINISHING SECTION

Chain radial transporter
Roller axial transporter
Passivation unit
End facing treatment unit
Coupling tubular threaded connecting unit
Packing unit
Hydraulic unit No.2

BOILER ROOM

Steam boiler No.1
Steam boiler No.2
Degasser unit No.1
Degasser No.2
Water softener
Tank for hard fuel
Pump station

3) PLANT PERFORMANCE

PIPE GALVANIZING – supply by LOECO Germany

(Capacity for performance test based on 120 sec. pipe galvanizing)

Pipe ø "	Strip thickness mm	Pipe weights		Annual production		Plant performance			
		kg/mm	kg/pipe gal.	%	t/year	pcs./h	t/h	h/year	
	1/4"	2,35	0,65	3,90	0,061	19,276	760	2,964	6,5
	3/8"	2,35	0,852	5,11	0,857	270,812	810	4,139	65,429
R	1/2"	2,65	1,22	7,32	24,300	7678,8	810	5,929	1295,126
R	3/4"	2,65	1,58	9,48	21,565	6814,54	810	7,679	877,425
	1"	3,25	2,44	14,64	18,181	5745,196	810	11,858	484,500
	1 1/4"	3,25	3,14	18,84	9,985	3155,26	540	10,174	310,13
R	1 1/2"	3,25	3,61	21,66	9,434	2981,144	540	11,696	254,886
	2"	3,65	5,10	30,6	8,819	2786,804	500	15,3	182,144
	2 1/2"	3,65	6,51	39,06	1,575	497,7	270	10,546	47,193
	3"	4,05	8,47	50,82	3,392	1071,872	270	13,721	78,12
R	4"	4,5	12,10	72,6	1,835	579,86	210	15,246	38,034
						31601,264	ø ÷ 4"	9,932	363,487

R = Reference dimension for performance test (1/4" warrantless)

Utilization rate (maturity factor 75%)

Utilization rate (maturity factor 100%)

Pipes according to DIN 2440

Pipes length 6 m

Galvanizing according to DIN 2444

Dipping time 120 sec.

Production time 360 Tg/year – 2 layers = 5.760 h/year

Company holidays and other days stoppage = 240 h/year

Net production time = 5.520 h/year

Maturity factor 75%

4) LINE FUNCTIONAL DESCRIPTION

Production sequence

- Adjusting
- Chemical pretreatment
- Zinc coating
- Finishing

A) ADJUSTING SECTION

In this section, the pipes are going into a process of preparation for zinc coating. There is straightening of pipes, treatment of pipes ends and their hydrostatic testing on pressure. Also, there is electromagnetic testing of pipes.

The equipment for preparation and testing the pipes is composed by 5(five) working batteries, on which there can be treated pipes with diameter from ½” to 4” with length of 12m.

In this section, also, there is unit for marking examined pipes. The location of adjusting line is north part of the production hall.

B) CHEMICAL PRETREATMENT SECTION

The tubes to be prepared in the pretreatment stage in order to assure high-quality zinc coating. The tubes, still bearing scale and light greases, are treated fully into:

1. Degreasing baths...2pcs
2. Hot rinsing baths...2pcs
3. Pickling baths...4pcs
4. Cold rinsing baths...2pcs
5. Flux bath...1pc
6. Pipe dryer

- The process of degreasing of pipes is happening in the first two baths. The working area of those baths is 5% NaOH or industrial detergent. The liquid heated temperature is 80°C - 90°C. The waste fats that float on the surface of the liquid, by free flowing are collected into a tank where on the end of the process they're burned. The worn out working liquid throw the waste water station, flows into the egalization pool, then into a neutralization and final control pools, and in the end it goes into a process of deposition.

Degreasing baths

Formed of: sheet steel construction

Consisting of:

- tank of sheet steel design with outside reinforcing ribs, surrounding flat iron frame and the section steel base construction,
- support ridges of section steel construction,
- run-off nozzles with flange and shut-off valve,
- welded overflow conduit with connection flange,

- outside double protective coat of paint,
- necessary accessories like screws, nuts, gaskets, etc.

- After degreasing, starts the process of hot rinsing. The tubes bundles are rinsed in two hot-water rinsing baths, in order to prevent the carry-over of alkaline fluids into the pickling bath. In the first stage the pipes are rinsed into a bath on 80°C, and in the second stage into a bath with flowing water.

Hot rinsing bath

Formed of: sheet steel construction

Consisting of:

- tank of sheet steel design with outside reinforcing ribs, surrounding flat iron frame and the section steel base construction,
- support ridges of section steel construction,
- run-off nozzles with flange and shut-off valve,
- welded overflow conduit with connection flange,
- outside double protective coat of paint,
- necessary accessories like screws, nuts, gaskets, etc.

- Pickling is performed using hydrochloric acid in four pickling baths with 20%, 18% & 15% of concentration. Two bathes have the same concentration. The liquid is heated up to 50°C. The worn out working liquid throw the waste water station, flows into the tank, then into a neutralization and final control pools, and in the end it goes into a process of deposition.

Pickling bath

Consisting of:

- heavy steel frame construction of section steel, with surrounding upper rim, the face walls being especially stiffened, the complete steel construction is sandblasted and coated with synthetic resin,
- PE-treatment tank made of 20mm PE-plate material as extruder welding construction with upper rim reinforcements, protection ribs welded to the equipment prevent a mechanical damage of the tank walls,
- overflow conduit with connection flange,
- let-off flange with valve,
- necessary accessories like screws, nuts, gaskets, etc.

- In the next two baths, there is cold rinsing process. The acid is rinsed off here in two stages. The first one is with standing, and the second one with flowing water.

Cold Rinsing bath

Consisting of:

- heavy steel frame construction of section steel, with surrounding upper rim, the face walls being especially stiffened, the complete steel construction is sandblasted and coated with synthetic resin,

- PE-treatment tank made of 20mm PE-plate material as extruder welding construction with upper rim reinforcements, protection ribs welded to the equipment prevent a mechanical damage of the tank walls,
- overflow conduit with connection flange,
- let-off flange with valve,
- necessary accessories like screws, nuts, gaskets, etc.

- The fluid used in the flux bath consists zinc chloride and ammonium chloride and is intended to permit transfer of the tube surfaces to the zinc-coating bath in metallurgically clean state.

Flux bath

Consisting of:

- heavy steel frame construction of section steel, with surrounding upper rim, the face walls being especially stiffened, the complete steel construction is sandblasted and coated with synthetic resin,
- PE-treatment tank made of 20mm PE-plate material as extruder welding construction with upper rim reinforcements, protection ribs welded to the equipment prevent a mechanical damage of the tank walls,
- overflow conduit with connection flange,
- let-off flange with valve,
- necessary accessories like screws, nuts, gaskets, etc.

-In the last stage before zinc coating, the pipe dryer, the wet, metallurgically bright tubes are dried internally and externally at 100 to 180°C prior to zinc coating. Because of the preparing treatment of working liquid and rinsing the pipes for zinc coating, in every single bath there is flow of water. All baths are housed into a tunnel and connected with ventilation equipment, so that there is lower pressure than atmospheric, and the prevention of entering acidic steam is higher. The air in the tunnel is filtered by a water scrubber and exhaust outside. Combustion gases along with zinc dust are collected over the zinc bath, and throw out 2 suction pipelines and 2 filters where the zinc dust separates, the purified air goes to the atmosphere.

C) ZINC COATING SECTION

Zinc coating is performed fully automatically. The tubes are dipped by means of immersion screws in two lines into zinc bath, which has a temperature of 460 to 464°C, and then automatically removed on a controlled time-cycle and fed by means of magnetic rollers to a compressed-air exterior wiping nozzle. Internal blowing out is accomplished on a blow-down unit using saturated steam at temperatures of approx. 300°C and pressures of maximum of 15 bar. A loss-type steam boiler complete with an accumulator is available for this purpose.

The Zn layer thickness is controlled by means of immersion time in the Zn bath, bath temperature and blow-down parameters.

For example: In accordance with DIN 2444, the Zn layer in the interior of the tubes must be not less than 400 g/m² on the flat surface.
The tubes are then cooled, straightened and marked on a marking unit.

For instance (tube marking as per EN 12 240)

1. Manufacturer's mark or code
2. Company name
3. Code for inspection by DVGW, "D2"
4. Production standard for the starting tube, "DIN 2440"
5. Tube type ("Welded" or "Seamless")
6. Zinc coating standard, "EN 10 240"
7. Third party supervisory body code, "DVGW"
8. Tube type inspected by DVGW, "21 – 24"

DVGW registration No., "009"

C) FINISHING SECTION

This section provides additional protection of galvanized surfaces with passivation, and galvanized and black tested products storage.
The tubes are subjected to a external and internal visual inspection on a discharge roller table and the Zn layer is measured using electronic instruments. The tubes are subsequently bundled and are then ready for shipment.

Field of application for the tubes processed:

- a) Water-transmission pipes with zinc coating as per EN 10 240

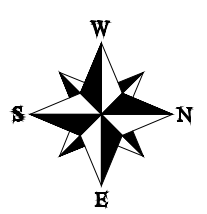
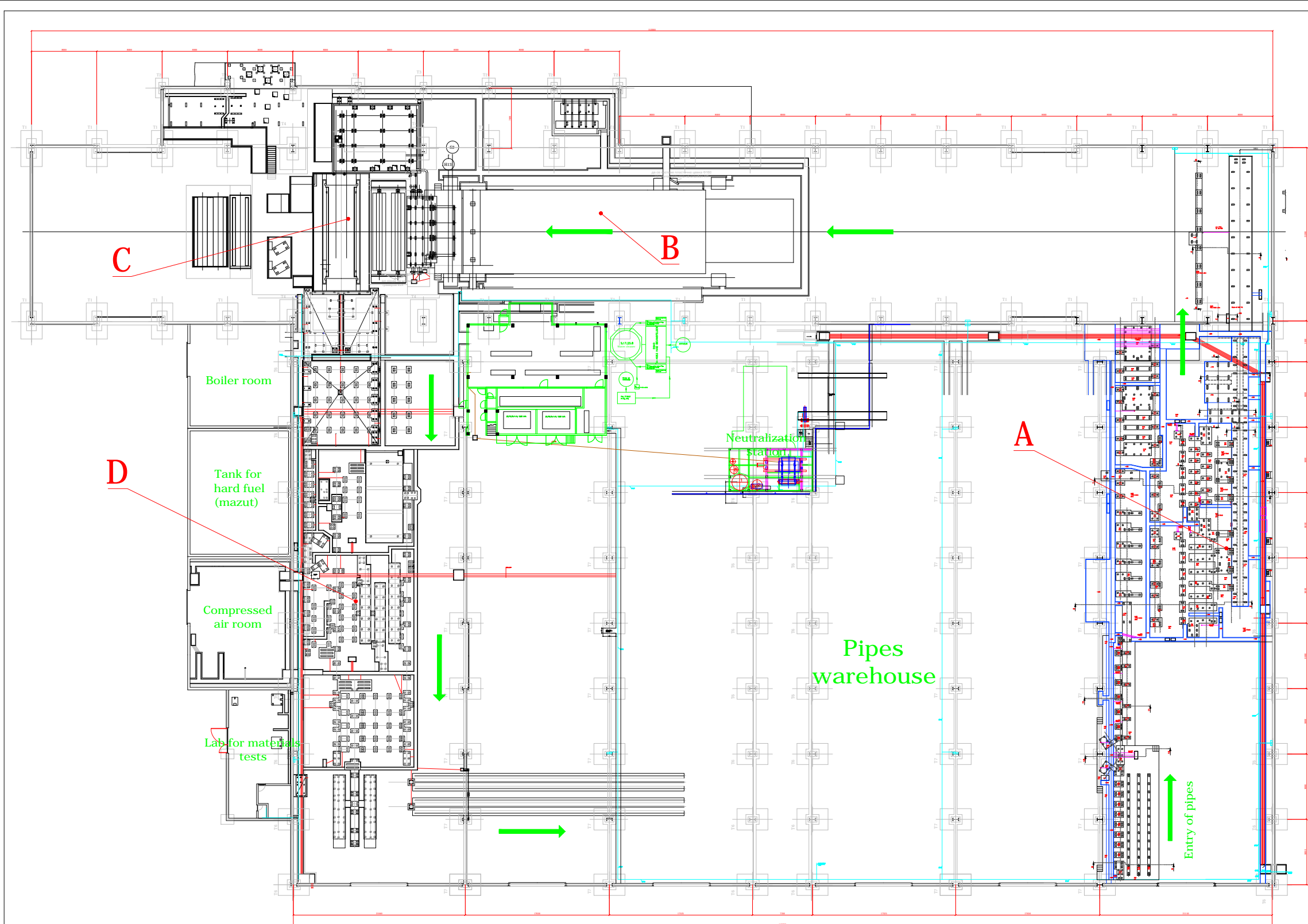
Adherence to this standard is monitored not only by plant (in the form of quality assurance provisions) but also by third-party supervisory body (in the form of the DVGW = Deutscher Verein des Gas und Wasserfaches = German Gas and Water industry Confederation).

- b) Structural tubes for a range of application


5) DRAWINGS & DOCUMENTATION

1. Plant scheme
2. Installation drawings of equipment
3. Foundation plan
4. Electrical documentation
5. Assembly documentation
6. Operation & Maintenance manual
7. Spare part list

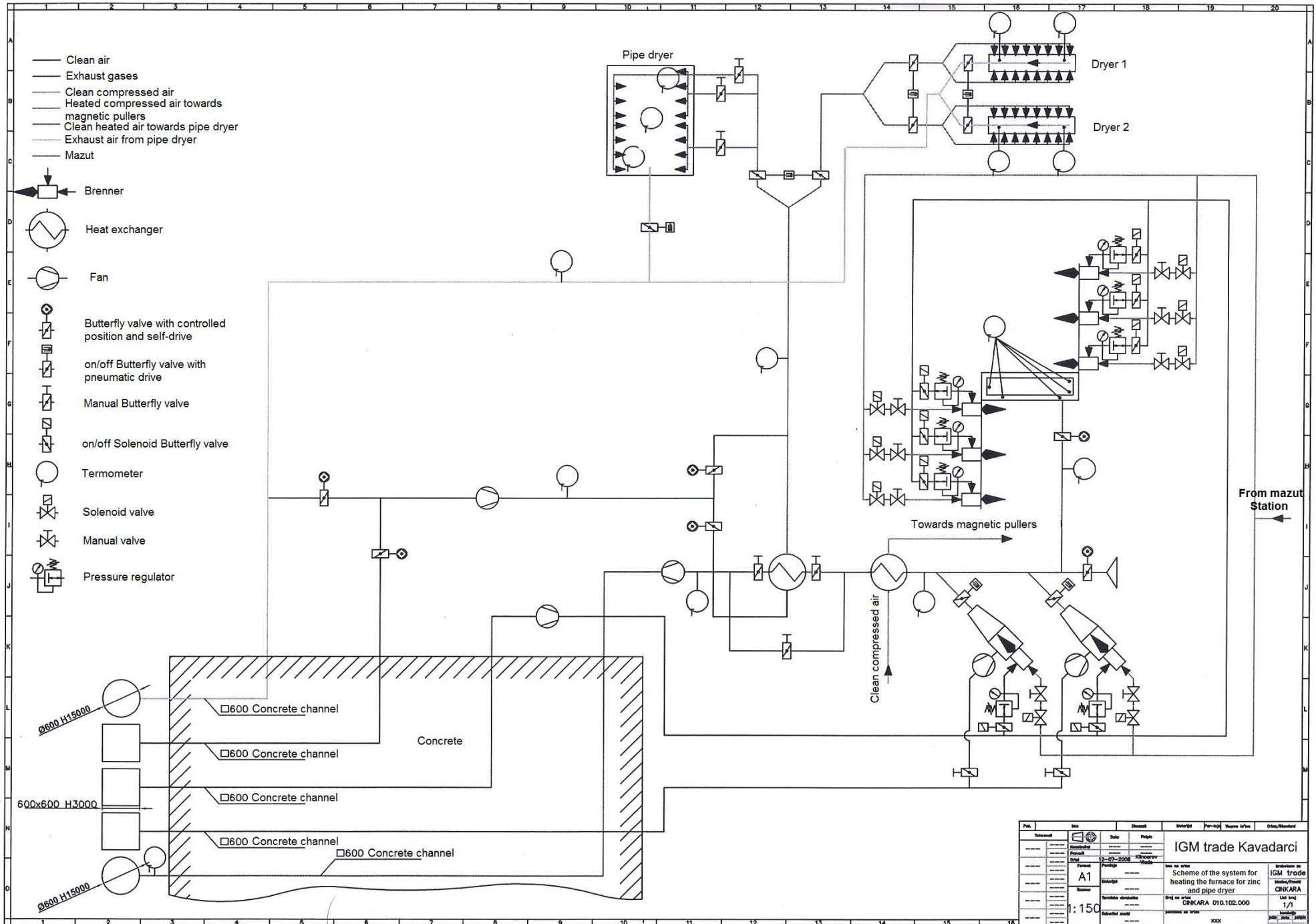
6) FOUNDATION PLAN & SCHEMES



LEGEND	
Pos.	Section
A	Adjusting
B	Pretreatment
C	Zinc coating
D	Finishing

 IGM Construction - Kavadarci Company for engineering, design and supervision of construction	
Investor:	IGM - Trade, Kavadarci
Building:	Production hall "Zinc coating plant for tubes"
Drawing:	Schedule for production lines
size:	techn. number:
date:	designation:
dwg number:	
IGM Zinc coating plant for tubes - 12	

Scheme of the system for heating the furnace for zinc and pipe dryer



№	Име	Димензи	Материал	Пр-к/М	Успоред. на/До	Ориент./Наклон
1	Титановид
2	Кремниевид
3	Френел
4	Дис
5	Против
6	А1
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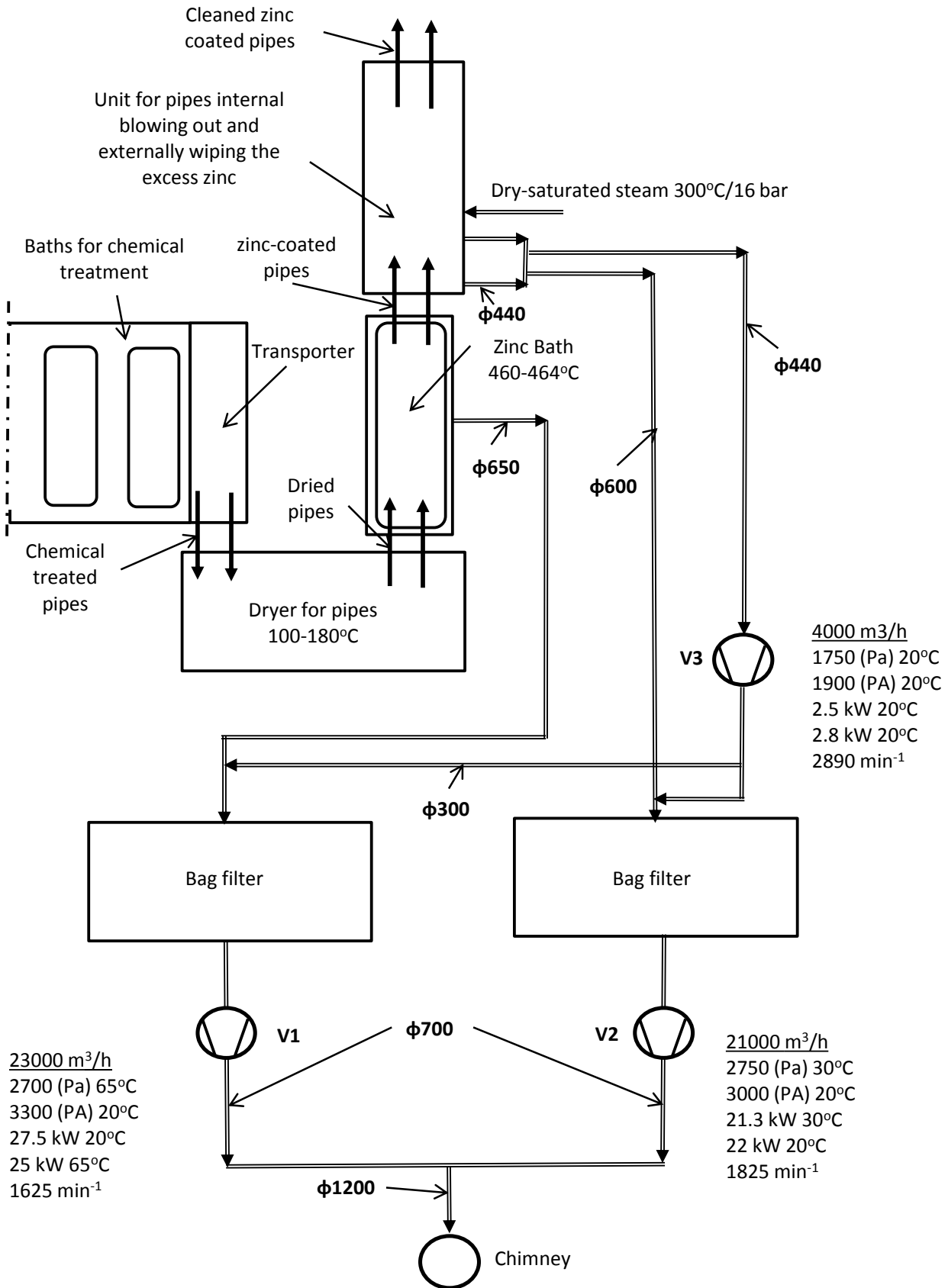
IGM trade Kavadarci

Scheme of the system for heating the furnace for zinc and pipe dryer

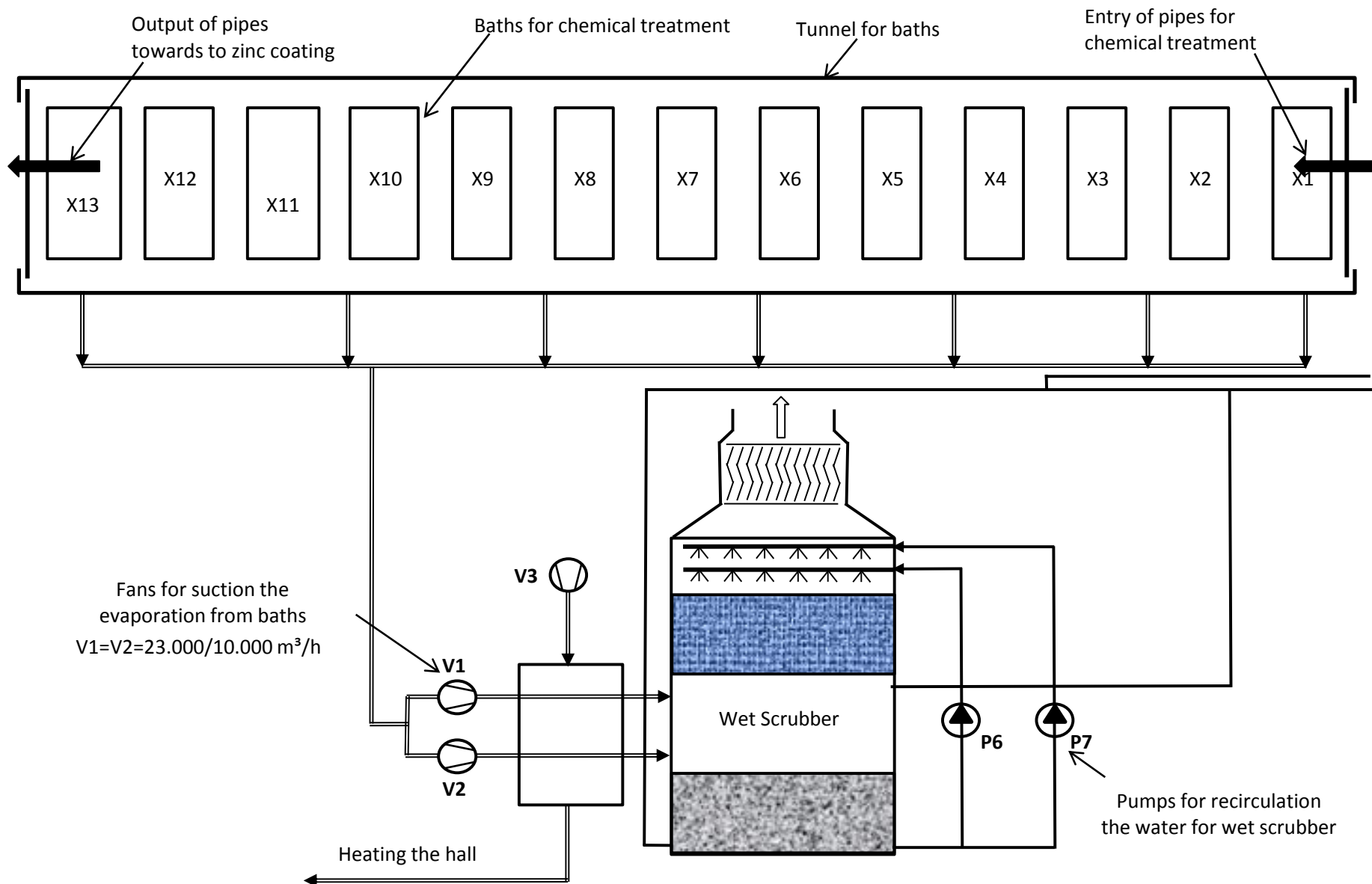
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SCHEME FOR SUCTION AND TREATMENT OF THE ZINC STEAM AND SEPARATING THE ZINC DUST BY BAG FILTERS



SCHEME FOR CIRCULATION OF SUCTION OF EVAPORATION FROM BATHS AND TREATMENT TROUGH WET SCRUBBER



7) PHOTOS

Photos of zinc coating plant for pipes



Zinc – coating Plant for Pipes



Zinc – coating Plant for Pipes



Chemical pretreatment



Chain transporters - Entry section



Traverse – for return transport



Traverse – for return transport



Traverses



Chemical pretreatment - Baths



Chemical pretreatment - Baths



Chemical pretreatment - Exit section



Hydraulic unit No.1



Vertical Transporter



Vertical Transporter



Pipe dryer



Pipe dryer



Pipe dryer - Transporters



Zinc bath



Dipping device



Lifting device



Dipping device



Zinc bath for other constructions



Magnetic rollers and pipe extraction machine



Magnetic rollers and pipe extraction machine



Magnetic rollers



Pipe extracting machine



Zinc – coating Section



Finishing Section



Chain - Radial Transporter



Chain - Radial Transporter



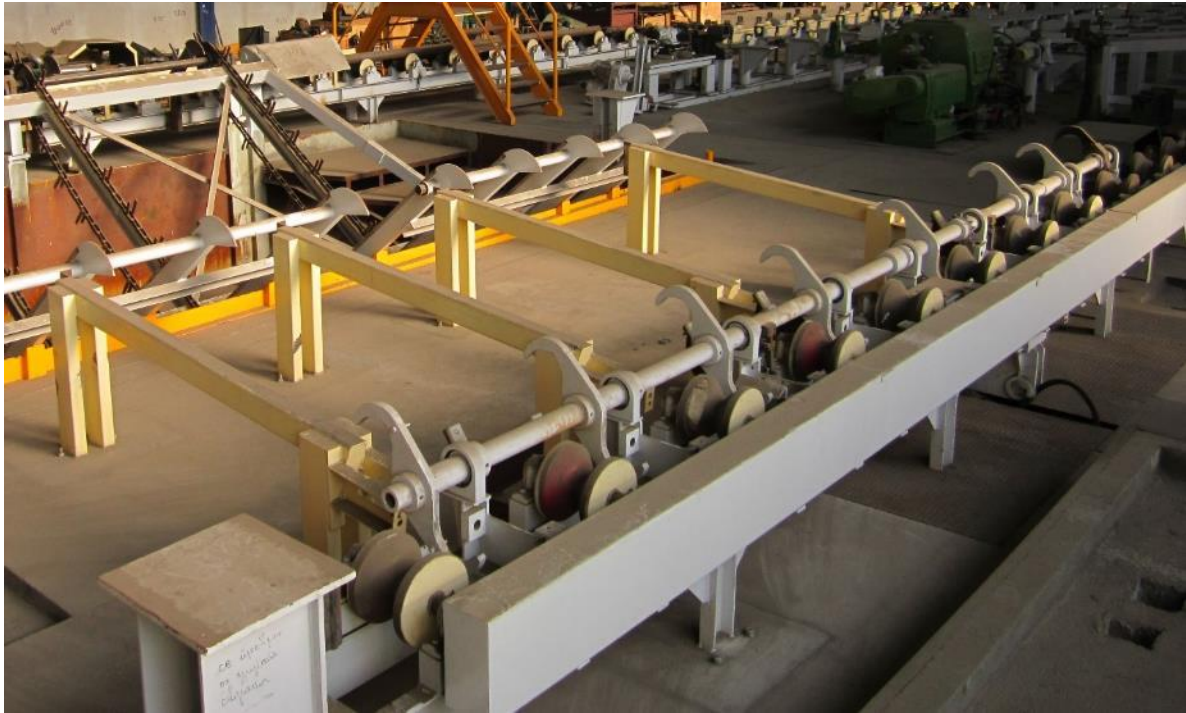
Roller - Axial Transporter



Roller - Axial Transporter



Transporters



Transporters



Chroming bath and chain transporter



Chroming bath, chain transporter and roller transporter



End facing treatment & threading unit



End facing treatment & threading unit



Coupling tubular threaded connecting unit



Chain - Radial transporter



Chain - Radial transporter



Packing unit



Packing unit



Finishing Section



Hydraulic unit No.2



Bag Filter No.1



Bag Filter No.2



Bag Filter No.1



Chimneys



Wet Scrubber & recuperator



Wet Scrubber & recuperator



Unit for heating the hall



Water neutralization plant



Filter press – Water neutralization plant



Tank for acid



Tank for acid



Fans



Tank for hard fuel (mazut)



Boiler - LOOS



Boiler – Dimce Banjarot



Degasser unit



Water softener



Control Panel



Control Panel



Electrical Cabinets



Electrical Cabinets