SANITSER

SANITSER LIFE12 ENV/IT/001095
Deliverable Action B9
Design for industrial VSW plant

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INTRODUCTION

The production parameters for introducing the SLG and pitcher in sanitary ware are established, allowing for treatment in regime of lower temperature and shorter time, SE.TE.C. srl, in the phase of the project, design a plant for the production of VSW-pieces tailored to these new parameters of time-temperature.

Two main objectives are envisaged by this activity:

1. Today's operating VSW plants show relevant differences from each other. In many cases such state of affairs makes it necessary to tailor some process features to the specific plant. In the context of the introduction of a glass-based technology, allowing to contract time-temperature of firing, it is important to fix a reference VSW-plant type, which defines somewhat of a milestone for sanitary-ware production relying on the innovations here discussed.
2. During the project, the furnaces of the end-users, though having a high temperature potential, are run on a much lower temperature in accordance with the project objectives. This means anyhow that some of the achievable results, are lost by working on a furnace not tailored to such much lower temperature. A newly designed VSW plant, on the basis of the project results, allows to exploit at best the opportunities offered by the contraction of time-temperature due to the glass based technology:

1. Environmental preservation (CO_2 emissions)
2. Energy saving (gas consumption)
3. General improvement of yield
4. Cost reduction

To this end all the plant units are to be revised in order to match the requirements of the glass based technology for sanitary-ware. We expect the design to proof that the improvement we shall observe in traditional plants (used for preindustrial and industrial tests) are largely amplified by means of a properly designed new plant.

The new plant is meant to be provided with:

- Slip preparation area;
- Glaze preparation area;
- Casting area;
- Drying Area;
- Spraying Area,
- Firing Area;
- Quality Check Area.

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With a set production capacity of 1,000 pieces/day, sub-divided into five typical articles (WC, bidet, basin, pedestal, and cistern), a plant lay-out shall be produced with 10 technical sheets and four project designs in 3D (autocad and pro-e).

SANITARY WARE PLANT

The plants and the machines have been designed for a capacity of:

- N.300.000 pcs/year of production (equivalent to abt 6.630 tons/year) composed o different typologies:
  WASHBASIN - PEDESTAL - WATER CLOSET - BIDET - WATER TANK

Project data, technical considerations, production planning, determination of quantities and description of the technological cycle are reported in the next pages.

PRODUCT:	Sanitary porcelain “Vitreous China”
RAW MATERIAL:	LOCAL ORIGIN and/or Imported.
REQUIREMENT OF CERAMIC BODY(dry):	Gross requirement abt. 19,5 tons/day.
REQUIREMENT OF GLAZE (dry):	Gross requirement abt.2000 kg/day.
GLAZE COLOURS:	100% white
ELECTRICITY:	380/220 V - 50 Hz
INSTALLED POWER:	Approx abt.400 Kw
CONSUMPTION OF WATER	approx 4,6 m³/day
CONSUMPTION OF COMPRESSED AIR:	At 6 bar with peak consumption of abt. 6.000 lt/min
CONSUMPTION OF CH_4 FUEL with 8000 Kcal/Nm3 assumed :	Approx 7.200 Nm3/day
WORKING DAYS:	Firing dept: 330 days/year Other depts.: 300 days/year

LABOUR and STAFF REQUIREMENTS WORKER and UNSKILLED LABOURERS:

DEPARTMENT	**Number of shifts**				
For production:	**1st**	**2nd**		**weekend**	**TOTAL**
BODY PREPARATION	3	3		-	6
GLAZE PREPARATION	2	2		-	4
MOULD MAKE	3	3		-	6
CASTING	12	12		-	24
DRYING	2	2		-	4
INSPECTION	4	4		-	8
GLAZING	6	6		-	12
FIRING	4	4		-	8
SORTING and PACKING	3	3		-	6
TOTAL PRODUCTION DEPT.:	**39**	**39**		**-**	**78**
For Auxiliary Service:					
WAREHOUSE FINISHED PRODUCTS	4	4		-	8
MAINTENANCE	1	1		-	2
LABORATORY	1	1		-	2
VARIOUS PERSONNEL	2	2		-	4
TOTAL AUXILIARY SERVICE:	**8**	**8**		**-**	**16**
FOREMEN/SUPERVISORS:					
-MOULD MAKING	1	1		-	2
-BODY SLIP, FORMING, DRYING and INSPECTION	1	1		-	2
-GLAZE, GLAZING and FIRING	1	1		-	2
-SORTING, PACKING and WAREHOUSE FINISHED PRODUCTS	1	1		-	2
TOTAL FOREMEN/SUPERVISORS:	**4**	**4**		**-**	**8**

(*) Not included % addition for absence, due to illness and vacation.

WORKING TIMES

- RAW MATERIAL (Dosing and weighing) 2 shifts/day - 300 days/year
- BODY PREPARATION DEPT. 2 shifts/day - 300 days/year
- GLAZE PREPARATION DEPT. 2 shifts/day - 300 days/year
- MOULDS PREPARATION DEPT. 2 shifts/day - 300 days/year

- CASTING DEPT. 2 shifts/day - 300 days/year
- DRYING DEPT. 2 shifts/day - 300 days/year
- INSPECTION DEPT. 2 shifts/day - 300 days/year
- GLAZING DEPT. 2 shifts/day - 300 days/year
- FIRING DEPT. 2 shifts/day - 330 days/year
- SORTING DEPT 2 shifts/day - 300 days/year

TECHNICAL CONSIDERATION

CALCULATION OF MACHINERY AND EQUIPMENT FOR THE PRODUCTION:

When calculating the following production programme we based on assumed losses in the various production departments and on assumed weights referred to the typologies to produce. It might be possible that if the assumed figures change, also the assumed amounts of raw and operating materials and energy as well as the calculated machinery can change. The data reported below are to be considered indicative, elaborated to determine the quantity to produce for each working phase and to dimension the respective plants.

1) Amount of pieces per year:

Typologies	CASTING	% Loss	DRYING	% Loss	GLAZING and FIRING	% Loss	SALEABLE WARE
WASH BASINS	55354	4	53140	3	51546	3	50000
PEDESTAL	55354	4	53140	3	51546	3	50000
BIDET	56518	5	53693	4	51546	3	50000
WATER CLOSETS	57108	5	54253	4	52083	4	50000
WATER TANKS with cover	55930	4	53693	3	51546	3	50000
TOTAL	**280264**		**267919**		**258267**		**250000**

NOTE: Water tank + cover is considerated a sole piece.

RAW MATERIAL:

The chemical-physical characteristics of the raw material to be used for the CERAMIC BODY preparation have to correspond to the different working needs and to determine the amount of right properties in the final product.
A typical raw materials composition of Vitreous china body for Sanitary ware is as follows:

"PLASTIC RAW MATERIALS"	24-26% of BALL CLAYS
	29-30% of KAOLINS
"HARD RAW MATERIALS"	20-25% of FB60PB-VF (Granite)
	9.0-10% of GS-VF (silicate waste glass)
	7-8% of BVC-VF (pitcher)
	2-3% of Talc

Considering an assumed loss of ignition from dried to fired pieces of 6% the total annual consumption of raw materials on dry basis amounts to:
FORMING: 280264 Required pcs/year

Unitary medium weight (fired)	: 16 Kg/pieces
Loss of ignition	: 0.94

CONSUMPTION OF RAW MATERIALS	: 4.770 Tons/year (dry basis)
Working days/year : 300	

CONSUMPTION OF RAW MATERIALS (dry basis)	: 15,9 Tons/day = 15,9 Tons/day

1. BODY PREPARATION

The Sanitary wares are made by SLIP CASTING at the liquid state in watery suspension.
The "VITREOUS CHINA" slip has a density of abt. 1.8 Kg/l and a solid content of 72%.
The SLIP PREPARATION is possible for the use of deflocculant which work on BALL CLAYS, giving to the batch composition a particular fluidity, indispensable to a regular filling of moulds.
There are various possibilities for the preparation of the sanitary ware casting slip. They depend mainly on the fineness in which mainly the hard raw materials (Quarts, Feldspar and possibly scrap of fired articles) are available. We have supposed that the RAW MATERIALS have been previously pre-crushed and are available for the slip preparation in the following conditions:

-SOFT RAW MATERIAL: below 50 mm diameter, with water content not higher than 15%
-HARD RAW MATERIAL: below 3 mm size, with screeing and iron elimination

The proposed slip preparation system is mainly composed of three phases:

- 1st Phase: DISSOLUTION of BALL CLAYS pre-dosed + GS-VF (silicate waste glass) in the water with TURBO BLUNGER
- 2nd Phase: FINAL MIXING of CLAY SOLUTION with F60BP-VF, BVC-VF, Talc, and Kaolins with TURBO BLUNGER

DETERMINATION OF RAW MATERIAL AND SLIP CASTING CONSUMPTION:

- BALL CLAYS: max 24% of total consumption 15,9 tons/day = 3,816 tons/day
- KAOLINS: max 30% of total consumption 15,9 tons/day = 4,770 tons/day
- F60BP-VF (FELD.): max 26.12% of total consumption 15,9 tons/day = 4,154 tons/day
- GS-VF: max 9.5% of total consumption 15,9 tons/day = 1,511 tons/day
- BVC-VF: max 8% of total consumption 15,9 tons/day = 1,272 tons/day
- Talc : max2.4% of total consumption 15,9 tons/day = 381,6 tons/day

SLIP CASTING:

RAW MATERIALS (dry weight)	5,9 tons	= (72%)
WATER	6,1 m^3	= (28%)
SLIP DAILY CONSUMPTION	**22,0 tons**	**= 12,20 m^3** (density ± 1.8 Kg/l)
RECOVERY SLIP (*)	18,0 tons	= 10,00 m^3
SLIP DAILY NEED	40,0 tons	= 22,20 m^3 (density ± 1.8 Kg/l)

(*): SLIP RECOVERY = abt. the 45% of the slip daily need
Just to determine the BODY PREPARATION PLANT we have supposed the BODY composition:

- BALL CLAYS: 3816 Kg
- KAOLINS: 4770 Kg
- F60PB-VF (FELDSPAR) : 4154 Kg
- GS-VF+BVC-VF+Talc: 3165 Kg

TOTAL (dry weight): 15905 Kg =
WATER : 6100 l =

TOTAL: 22000 Kg = 12,20 m^3 (SLIP DAILY CONSUMPTION)

DEFLOCCULANTS: not necessary

In relation to what above indicated, we have determined the Body preparation plant with the following sequence of preparation:

a) DOSING and WEIGHING: "BALL CLAYS" and "KAOLINS"

-abt. 3816 Kg/day of BALL CLAYS (dry weighing)
-abt. 4770 Kg/day of KAOLINS (dry weighing)
It is proposed:
N.1 FEEDING HOPPER cap. 5 m³/each
N.1 CONVEYOR BELTS: NO. 01 MOTORIZED – NO. 01 BIDIRECTIONAL

b) DOSING and WEIGHING: -F60PB-VF (FELDSPAR) + GS-VF+BVC-VF+Talc
-abt. 3165 Kg/day (dry weighing) of GS-VF+BVC-VF+Talc
-abt. 4154 Kg/day (dry weighing) of FELDSPAR
It is proposed:
N.1 FEEDING HOPPER cap. 5 m³/each
N.1 CONVEYOR BELT
N.1 CONVEYOR BELTS: NO. 01 MOTORIZED – NO. 01 BIDIRECTIONAL

c) DISSOLUTION: BALL CLAYS+GS-VF
-abt. 3816 Kg/day (dry weighing)
-abt. 1511 Kg/day (dry weighing)
-abt. 2106 l/day of WATER

TOTAL: 7433 Kg/day (3,7 m³)
-Slip density: ± 1.6 Kg/l and solid content of 60.75%

It is proposed:
N.1 TURBO BLUNGER type TDL 5000 **cap. 5 m³**
N.1 TANK WITH SLOW STIRRER type AGT 30/C **cap. 10,5 m³**

d) FINAL MIXING
-abt. 7433 Kg/day = c)Clays solution 3,70 m³/day
-abt. 5807,6 Kg/day = F60BP-VF+BVC-VF+Talc = 5,81 m³/day
-abt. 4770 Kg/day of KAOLIN = 1,77 m³/day
-abt. 934 l/day of Remaining part of WATER = 0,93 m³/day

TOTAL 22000 Kg/day of FINAL SLIP **Total = 12,20 m³/day**

-Slip density: ± 1.8 Kg/l

It is proposed:
N.1 TURBO BLUNGER TYPE TDL 15.000 with OCTAGONAL TANK = cap.15 m³

e) SLIP HOMOGENISATION and STORAGE

-abt. 22000 Kg/day of SLIP CONSUMPTION = cap. 12,20 m³/day
-recovery slip abt. 18000 Kg/day = cap. 10,00 m³/day
TOTAL cap. 22,20 m³/day

It is proposed:
-N.1 Circular TANK with SLOW STIRRER type AGT 75/A of capacity 55 m³

f) FINAL SLIP STORAGE

-abt. 22000 Kg/day of SLIP CONSUMPTION = cap. 12,20 m³/day
-abt. 18000 Kg/day of SLIP RECOVERY = cap. 10,00 m³/day

TOTAL: 40000 Kg/day of SLIP NEED Total = cap. 22,20 m³/day

It is proposed:
-N.2 Circular TANK with SLOW STIRRER Type AGT 75/A capacity 55 m³/each

g) SLIP RECOVERY

-abt. 18000 Kg/day of SLIP RECOVERY = cap. 10,00 m³/day

It is proposed:
-N.1 Circular TANK with SLOW STIRRER Type AGT 50/B capacity 15,7 m³

h) RETURN SCRAP (dry and humid casting scrap)

-abt. 1173 Kg/day of SCRAP (*)
-abt. 456 l/day of WATER

TOTAL: 1629 Kg/day of SLIP RECOVERY = 0,90 m³/day

It is proposed:
N.1 OCTAGONAL TANK with STIRRER = cap. 1 m³

Remark:

- If the physycal conditions of the raw materials will be different from the supposed one, it will be necessary to review the proposed preparation system.

2. GLAZE PREPARATION

The glazes of Sanitary wares are composed of the same raw materials of the Ceramic Body (Kaolin, Quartz and Feldspar with granulometry lower than 200 meshes), but in different proportions and with the adding of other components in powders: Wollastonite, Calcium carbonate, Zinc oxide, Barium carbonate and Zirconium silicate as opacifier.
For the coating of Sanitary wares in Vitreous china, "White and Coloured" glazes are used.
The preparation procedure is the same; the Coloured glazes differentiate from the white glaze because the foresee the addition of a variable quantity (according to the colours) of coloured oxides.
All the glaze are prepared for wet grinding, using BALL MILLS with lining and grinding balls in Alumina.
All the raw materials should be packed in bags and piled up on pallets which are located in raw material boxes. The raw materials of greater share in the glaze composition are weighed on a platform weighing scale and for small quantity on an electronic weighing scale.

CONSUMPTION OF RAW MATERIALS FOR GLAZE:

REQUIRED GLAZED PIECES per year:101.773 VITREOUS CHINA

Working days/year: 300

GLAZED PIECES/day:	**1034**
Glaze consumption/piece (dry basis):	**2.0 Kg**
CONSUMPTION OF RAW MATERIAL (dry basis):	**2068 Kg/day**
-WHITE GLAZE (100% of product) = amount of:	
RAW MATERIAL (dry basis) abt.:	2068 Kg/day
WATER abt.:	1018 l/day
GLAZE CONSUMPTION(*) abt.:	**3086 Kg/day = 1,8 m³**

(*) Glaze density: ± 1.75 Kg/l and solid content of 67%

-**DEFLOCCULANTS/GLUE POWDER/COLORANTS**:
-DEFLOCCULANTS: abt.0.10% of raw materials consumption (dry basis)=abt. 2,06 Kg/day
-GLUE POWDER: abt.0.30% of raw materials consumption (dry basis)= =abt. 6,20 Kg/day

(*): Indicative consumption, referred to the 30% of coloured product, variable according to the colours to produce.

In relation to what above indicated, we have determined the GLAZE PREPARATION PLANT:

a) DOSING and WEIGHING: "TOTAL RAW MATERIALS"
abt. 2068 Kg/day (dry weighing)

It is proposed:
N. 1 WEIGHING UNIT, COMPLETE WITH BALANCE AND ELECTRIC HOIST FOR SKIPS

b) GLAZE PREPARATION

-for WHITE GLAZE		2068 Kg/day of raw materials (dry)
		1018 Kg/day of water
	Total:	**3086 Kg/day of glaze = 1,8 m³/day**

It is proposed:
N.1 BALL MILL 5.000 lt., load capacity 2300 Kg (dry)
N.1 SIEVING GROUP, equipped with: Vibrating sieve, Iron removing electromagnetic filter and pneumatic pump for the transfer of the glaze to storage containers.

c) GLAZE STORAGE
N.8 CONTAINERS in P.V.C. - capacity 0.25 m³ each, for STORAGE GLAZE

d) GLUE PREPARATION
N.1 STIRRER - Type with wall suspension and vertical displacement, to prepare glue solution.

3. MOULDS PREPARATION

LOW PRESSURE MECHANIZED CASTING PLANT: PLASTER MOULDS

Regarding the plaster with suitable characteristics for the sanitary ware casting, it is supposed this is locally availabled in bags.The proposed plant for the plaster preparation foresees a movable stirrer for plaster mixing.

The movement system of the containers, where there is the mixture, is effectuated manually for the transfer to the moulds casting dept.

The drying of the mould in normal plaster is made through an intermittent chamber dryer lenght mt.10 and width mt.5.

A) LOW PRESSURE MECHANIZED CASTING PLANTS MOULDS: made of PLASTER

PRODUCTS:	BIDET+WATER CLOSETS	WATER TANKS	WASHBASINS, PEDESTAL W.TANK'S LIDS
TYPE OF CASTING PLANT	BVV 40	BCC 60	BCL 70
INSTALLED MOULDS/PLANT	40	60	70
N. OF CASTING PLANTS	5	2	2
TOTAL INSTALLED MOULDS	200	120	140
AVERAGE LIFE OF MOULDS	120 **(*)**	120 **(*)**	120 **(*)**
CASTING CYCLES/DAY	2	2	2
MOULDS WORKING LIFE/DAY	60	60	60
REQUIRED MOULDS/DAY	3,3	2	2,3
WORKING DAYS/YEAR	300	300	300
REQUIRED MOULDS/YEAR	990	600	690

TOTAL MOULDS/YEAR COMPLETE LOW PRESSURE MECHANIZED CASTING PLANTS: 2280

(*): Approximate datum, variable according to the used PLASTER characteristics.

Below are quoted the characteristics of the "Plaster" used to produce moulds for mechanized casting plants and for manual casting.

Plaster: R-41(trade denomination)

CHEMICAL ANALYSIS (*):

- Loss at 850 °C: H_2O 7,45%
- Calcium carbonate: $CaCO_3$ 0,30%
- Sulphuric anhydride: SO_3 52,50%
- Calcium oxide CaO 39,30%
- Iron and aluminium oxides $Al_2O_3+FeO_3$ 0,30%
- Silica oxide SiO_2 0,15%

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PHYSICAL-CHEMICAL FEATURES (*)

- Residual on sieve microns (humid)	0,2÷0,3%
- Bending strenght60-	65 Kg/cm²
- Water absorption	40-42
- Semi-hydrate	85%
- Carbonates	0.2-0.3%
- Castability	10 mins
- Hardening time	23-33 mins.
- Temperature developed during hardening process	35-50 °C
- Bending strenght (humidity 45%)	24-26 Kg/cm
- Plaster/Water ratio	1,35:1 - 1,5:1
- PH	6,80

- **(*)** Data supplied by the italian producer

4. CASTING

Casting technology:
LOW PRESSURE CASTING PLANTS with PLASTER MOULDS
For production of:

- WASH BASINS = Casting production required: 55.354 pcs/year
- WC CLOSETS= Casting production required: 57.108 pcs/year
- WATER TANKS= Casting production required: 55.930 pcs/year
- BIDETS= Casting production required: 56.518 pcs/year
- LIDS WATER TANK= Casting production required: 56.518 pcs/year

LOW PRESSURE CASTING PLANTS - CASTING PRODUCTION REQUIRED:

	WATER CLOSETS	WASHBASINS	WATER TANK	BIDET	COVERS	PEDESTAL
PIECES/YEAR: N.	**57.108**	**55.354**	**55.930**	**56.518**	**55.930**	**55.354**
WORKING DAYS/YEAR:N.	300	300	300	300	300	300
PIECES/DAY: N.	**190**	**185**	**186**	**188**	**186**	**185**
SHIFTS/DAY: N.	2	2	2	2	2	2

PRODUCTIVITY and CHARACTERISTICS of the PLANT:

TYPE OF PLANT:.	BVV 40	BCL 70	BCC60	BVV 40	BCL70	BCL70
MOULDS/PLANT: N.	**40**	**70**	**60**	**40**	**70**	**70**
PIECES/MOULD: N.	1	1	1	1	3	2
CASTING PIECES/PLANT: N.	**40**	**70**	**60**	**40**	**210**	**140**
CYCLES/DAY N.	2	2	2	2	2	2
CASTING PIECES/SHIFT: N.	**40**	**70**	**60**	**40**	**210**	**140**
CASTING PIECES/DAY: N.	**80**	**140**	**120**	**80**	**630**	**280**
REQUIRED CASTING PLANTS: N.	2,38	1,32	1,55	2,35	0,30	0,66

Practically:
-n.04 BVV 40 with dryer for Water Closets and Bidets
-n.02 BCC 60 for Water Tanks
-n.02 BCL 70 with dryer for Washbasins and Covers

In fact, with BVV 40 is possible to put in the same casting bench Bidet and Water Closets while with the BCL 70 is possible to put in the same casting bench Washbasins, Pedestal and Covers.

REMARK:

1. Microclimatic environmental condition required for the Casting dept.:
   i. **"Low Pressure casting"**
      room temperature: day = 28 °C night = 34 °C
      room humidity: day = 50/60 % r.h. night = 45/50 % r.h.
      For "**Low Pressure casting dept.**", we suggest: **Air-heating plant**.

2. Characteristics of the "PLASTER" used for the making of the MOULDS for Low Pressure Mechanized Casting plants.
3. Efficiency of the casting plants skilled workers.

SUMMARY OF PROPOSED CASTING PLANTS:

LOW PRESSURE MECHANIZED CASTING PLANTS

Type of plant

- BVV 40 for production of WC and BIDETS = No.4 benches with dryer
- BCC 60 for production of WATER TANKS = No.2 benches
- BCL 70 for production of WASHBASINS, PEDESTAL and LIDS = No.2 benches with dryer

5 - DRYING

The pieces produced for every shifts from the **CASTING DEPT**, after having been subjected to the finishing operations, are stored in **MOVABLE CARS** at more loading planes and transferred to suitable **STATIONS** for loading-unloading of the **CARS**.
At the end of the drying cycle, the dried pieces on cars are manually moved to the cars storage station. Afterwards a worker provides to transfer manually the cars into suitable areas near the Green inspection booth.

The dimensioning of the DRYER has been determined as follows:

-**REQUIRED DAILY PRODUCTION TO DRY** : No.1073 pieces (322.172 pcs/year: 300 days)
To share out:

- Wash basins No. 177 pieces/day
- WC: No. 180 pieces/day
- Water tanks: No. 179 pieces/day (included W.T.'s Cover)
- Bidets: No. 179 pieces/day

- No. cars/cycle = $\frac{1073 \text{ pcs/cycle}}{12 \text{ pcs/car}}$ = 90 cars/cycle

It is proposed:
No.1 CHAMBER DRYER, containing **No.90 cars**
Dimensions of n.1 CHAMBER DRYER
-width abt. = 10 **m**
-length abt. = **20 m**

Main characteristics:

- Whole production/cycle max No. **1073** pcs
- Total cars into drier No.90
- Load capacity/car No.**12** pieces **(*)**
- Drying cycle **16-18** hours
- Inlet pieces humidity **16÷17%**
- Outlet piece humidity **< 1%** (after drying)

-**No.360 CARS** with more loading planes:

Cars dimensions: Length 2000 mm. - width 600 mm.
Type with two planes: Height 1500 mm.
Type with three planes: Height 1800 mm.

6 - GREEN INSPECTION - GLAZING

1 - GREEN INSPECTION

After drying, the pieces are put onto the cars and inspected, controlled, finished and cleaned in inspection cabins. These operations are carried out manually by specialized personnel.

-Required pieces to be inspected per day: no. 1073(322.172 pcs/year: 300 days)
-Foreseen work shifts (8 hours each): no. 2
-Pieces per shift: no. 536
It is proposed: **No. 2 INSPECTION BOOTH with two opposite working stations**

2 – GLAZING

When the inspection operations are finished, pieces are subjected to GLAZING with spraying to Ceramic glaze (white or coloured). This operation can be carried out manually with a spray gun by specialized personnel for coloured glaze in automatically, with robot, for white glaze.
After glazing the pieces are put onto the CARS at more loading planes and transferred to the parking area in proximity of the FIRING KILN.

- Required pieces to be glazed per day no. 1034(310.350 pcs/year; 300 days)
- Foreseen work shifts (of 8 hours each) no. 2
- Pieces per shift no. 517

It is proposed: **No. 3 GLAZING BOOTH with double working station**

7 - FIRING

The glazed pieces are drawn manually and loaded on the firing cars, the kiln is Type INTERMITTENT.
The cars movement system is regulated manually by motion group and relevant tracks. After the firing, the pieces are unloaded manually from the cars and placed in suitable a area beside the kiln. The loading/unloading operations have been foreseen according to 2 working shifts for 6 weekly days, with a sufficient supply of cars to guarantee an independence of about 4 hours.

The **KILN** capacity has been calculated as follows:

-**REQUIRED PRODUCTION**:

YEARLY: **No. 310.350 pieces**
DAILY: **No. 940 pieces** (referred to No. 330 working days/year)

It is proposed:

No.2 INTERMITTENT KILN VULCANO 60 m³/each with cars suitable for firing and refiring of sanitary ware

8 - SORTING AND PACKING

After the firing, the pieces are manually unloading from the kiln cars and put on pallets in an appointed area, subdivided in models, types and colours. Subsequently the personnel loads the pieces manually on to appointed sorting stations where the products are visually analyzed and classified.
Some articles: WATER CLOSETS, WATER TANKS and BIDET are subject to a “flushing test” with the aid of a special equipment and a water recovery tank.
Packing can be done in cartons, wooden creates or in pallets with retractable plastic sheet.
The sorted articles are put on pallets and conveyed to the storage area. Here they are separately piled up according to their model, type and colour. To move the pallets we propose a fork lift truck.

9 - TECHNOLOGICAL LABORATORY EQUIPMENT

The suggested laboratory equipment allows to make controls on the raw materials, on the composition of the ceramic body and the glazes, as well as the parameters of the production technology, on the semifinished products and on the finished ones.

The equipment is to be considered indispensable for a constant control of the productive cycle, to assure a qualitative constancy of the product according to the specification for QUALITY of Vitreous China SANITARY WARE appliance.

MACHINERY LIST

1 BODY PREPARATION DEPT.

A)CLAY KAOLIN DOSING and WEIGHING
B)F60BP-VF+GS-VF+BVC-VF+Talc DOSING and WEIGHING

1.01 1 TRACTOR LOADER

skip capacity 1,5 cum.
loading height 2.300 mm.

1.02 1 WEIGHING PLANT

-No.1 hopper in varnished sheet-steel, capacity abt.5 cu.m
-No.1 extractor band with rubber carpet, 1,5 HP
-No.1 static weighing system composed of n. 4 loading cells
-Capacity kg. 10000
-No.1 general electric switchboard (with possibility of manual and/or automatic operation)

1.03 1 CONVEYOR BELT

-lenght 5 mt.
-Power 0,75 kW

1.04 1 SLOPING BELT CONVEYOR

-Lenght 22 mt
-Width 0,6 mt
-Installed power 1,5 HP

1.05 1 BI-DIRECTIONAL BELT CONVEYOR

-Lenght 12 mt
-Width 0,5 mt
-Installed power 1,5 HP

C)CLAYS +GS-VF DISSOLVER

1.06 1 MECHANICAL LITER COUNTER

-capacity pre-determination device
-capacity 10.000 lt/h

1.07 1 TURBO BLUNGER TYPE TDL 5000

- Tank in electro-welded steel sheet with bottom in special anti-wear steeel, complete with lid, support bases to ground in iron.
- Dimension of tank : diam. 2200 x 1900 h mm.
- Useful capacity : 5000 litres
- Joint for loaging of water : DN 80 PN 10
- Joint for discharge of slip : DN 80 PN 10
- Joint for slip drawing : 2”
- Discharge outlet for heavy foreign bodies : DN 150
- dissolving unit, composed of:
    - impeller on bottom of tank, exchangeable, with blades in anti-wear steel (d. 980 mm)
    - r.p.m. of impeller 140
    - breakwaters, exchangeable, fixed to the bottom of tank, with blades in anti-wear steel
- Motorization, composed of:
    - reducer with conoc gears
    - pulleys, hydraulic coupling, V-belts and protection crankcase
    - motor of 40 kW

1.08 1 SERVICE PLATFORM for the TURBO BLUNGER

Steel structure, complete of access stairs, security protection etc.

1.09 1 VIBRATING SIEVE 600x900

- Sieving capacity 6000 litres/h
- Useful surface 0,54 m²
- Total installed power 0,495 kW
- n.2 deferrizators

D) MIXING: CLAY +GS-VF SOLUTION (C) + F60BP-VF+BVC-VF+Talc + KAOLIN AND WATER

1.18 1 TURBO BLUNGER cap. 15 m³

The dissolver is mainly composed of:

- supporting frame with main cylinder block whose shaft is driven by the electric motor by means of a V-belt;
- splined shafts connected to reducer by means of a non-flexible coupling;
- three-blade propeller.

TECHNICAL CAHARACTERISTICS

- Propeller diameter 1500 mm

- Speed 90 r.p.m.
- Unit installed power 75 kW
- Diameter 3100 mm
- Height 2350 mm

1.19 2 DIAPHRAGM PUMP 2”

For transferring slip from one tank to another. It consists of:

- two diaphragm chambers with two flexible diaphragms fixed as a “sandwich” on their external side;
- ball valves to open and close alternatively suction and delivery
- pulsation damper to regulate output flow and pressure.

TECHNICAL CHARACTERISTICS

- Operating pressure: 7 bar
- Max flow rate: 22 m³/h
- Compressed air consumption: 2200 Nl/min
- Approx. unit weight: 30 Kg

1.20 2 VIBRATING SIEVES 600x900

- Sieving capacity 6000 litres/h
- Useful surface 0,54 m²
- Total installed power 0,495 kW
- n.2 deferrizators

E)SLIP HOMOGENEIZATION and STORAGE

1.21 1 CIRCULAR ANK

The tank is suitable to process ceramic slip: it is buried at floor level and tiled inside.

TECHNICAL CHARACTERISTICS

-Working capacity: 55 m³
-Diameter: 5100 mm
-Depth: 3550 mm

1.22 1 SLOW STIRRER 55 m³

The stirrer is designed to keep the slip suspended in the tank and mixing with slip recovery.

It is essentially composed of:

- driving unit with speed reducer
- highly resistant steel shaft connected to the reducer by means of a steady joint
- bottom support equipped with guide bushes
- agitating element with special shaped blades
- stainless steel double vane shaft

TECHNICAL CHARACTERISTICS

- Blade impeller: No. 2
- Speed: 12,5 rpm
- Unit installed power: 12 kW

1.23 1 DIAPHRAGM PUMP 2”

For transferring slip from one tank to another.
It consists of:

- two diaphragm chambers with two flexible diaphragms fixed as a “sandwich” on their external side; -ball valves to open and close alternatively suction and delivery
- pulsation damper to regulate output flow and pressure.

TECHNICAL CHARACTERISTICS

Operating pressure max 7 bar
Max flow rate: 22 m³/h
Compressed air consumption: 2200 Nl/min
Approx. unit weight: 30 Kg

F)SLIP STORAGE and DISTRIBUTION

1.24 2 CIRCULAR TANK

The tank is suitable to process ceramic slip: it is buried at floor level and tiled inside.

TECHNICAL CHARACTERISTICS

Working capacity: 55 m³
Diameter: 5100 mm
Depth: 3550 mm

1.25 2 SLOW STIRRER 55 m³

The stirrer is designed to keep the slip suspended in the tank and mixing with slip recovery.
It is essentially composed of:

- driving unit with speed reducer
- highly resistant steel shaft connected to the reducer by means of a steady joint
- bottom support equipped with guide bushes
- agitating element with special shaped blades
- stainless steel double vane shaft

TECHNICAL CHARACTERISTICS

-Blade impeller: No. 2
-Speed: 12,5 rpm

-Unit installed power: 12 kW

1.26 1 VIBRATING SIEVE 600x900

-No.1 vibrating body in inox steel
-No.1 net carrying frame in inox steel
-Sieving capacity 6000 litres/h
-Total installed power 0,495 kW

1.27 2 DIAPHRAGM PUMP 3"

For transferring slip from slip department to casting dept.
It consists of:
-two diaphragm chambers with two flexible diaphragms fixed as a "sandwich" on their external side;
-ball valves to open and close alternatively suction and delivery
-pulsation damper to regulate output flow and pressure.

TECHNICAL CHARACTERISTICS

-Operating pressure	max 7 bar
-Max flow rate:	40 m³/h
-Compressed air consumption:	2700 Nl/min
-Approx. unit weight:	50 Kg

1.28 1 PRESSURE TANK Cap. 4000 lt

G)SLIP RECOVERY

1.29 1 CIRCULAR TANK for SLOW STIRRER cap. 15,7 m³

1.30 1 SLOW STIRRER for UNDERGROUND TANK cap. 15,7 m³

The stirrer is designed to keep the slip suspended in the tank and mixing with slip recovery.
It is essentially composed of:
-driving unit with speed reducer
-highly resistant steel shaft connected to the reducer by means of a steady joint
-bottom support equipped with guide bushes
-agitating element with special shaped blades
-stainless steel double vane shaft

TECHNICAL CHARACTERISTICS

-Capacity	15,7 m³
-Diameter	3.200 mm.
-Blade impeller:	No. 2
-Speed:	13 rpm

-Unit installed power: 6 kW

1.31 1 DIAPHRAGM PUMP 2”

For transferring slip from one tank to another.
It consists of:
-two diaphragm chambers with two flexible diaphragms fixed as a “sandwich” on their external side; diaphragms are connected between a shaft and move contemporaneously along a parallel line
-ball valves to open and close alternatively suction and delivery
-pulsation damper to regulate output flow and pressure.

TECHNICAL CHARACTERISTICS

Operating pressure max	7 bar
Max flow rate:	24 m³/h
Compressed air consumption:	2200 Nl/min
Approx. unit weight:	30 Kg

H)SCRAP RECOVERY (dry and humid)

1.32 1 Blunger 1 m³

The dissolver is mainly composed by:

- Supporting frame with main cylinder block whose shaft is driven by the electric motor by means of a V-belt;
- Splined shafts connected to reducer by means of a non-flexible coupling;
- Blade propeller.

1.33 1 DIAPHRAGM PUMP 2”

For transferring slip from one tank to another.
It consists of:

- two diaphragm chambers with two flexible diaphragms fixed as a “sandwich” on their external side;
- ball valves to open and close alternatively suction and delivery
- pulsation damper to regulate output flow and pressure.

TECHNICAL CHARACTERISTICS

Operating pressure max	7 bar
Max flow rate:	22 m³/h
Compressed air consumption:	2200 Nl/min
Approx. unit weight:	30 Kg

ADDITIONAL MAIN EQUIPMENT - "BODY PREPARATION DEPT."

1.34 1 SET of SUPPORTS for the various equipment: Pumps, Vibrating sieve, Iron removing filter etc.

1.35 1 SET of PVC SLIP PIPINGS and CONNECTIONS

1.36 1 SET OF PARA RUBBER SLEEVE DIAPHRAGM VALVES, QUICK CONNECTIONS, FLEXIBLE PIPINGS and VARIOUS ACCESSORIES for COMPRESSED AIR DISTRIBUTION to the equipment

1.37 1 SET OF GALVANIZED PIPINGS, BALL VALVES, PRESSURE REDUCER, AIR FILTER, POLYETHYLENE PIPES and VARIOUS ACCESSORIES for COMPRESSED AIR DISTRIBUTION to the equipment

1.38 1 ELECTRIC-SYNOPTIC BOARD

1.39 1 SET OF ELECTRIC CABLES from the ELECTRIC-SYNOPTIC BOARD to the equipment

2. GLAZE PREPARATION DEPT.

A)AUTOMATIC DOSING AND WEIGHING

2.01 1 WEIGHING UNIT WITH BALANCE AND ELECTRIC HOIST FOR SKIPS
2.02 1 MECHANICAL LITER COUNTER

-Capacity: pre-determination device
-Capacity 10000 lt/h

B)WET GRINDING

2.03 1 BALL MILL 5000 lt.

Suitable for the glaze grinding.
The grinding process is obtained by impacts and rollings between the lining and flint pebbles and the product during the drum rotation.
The mill is mainly composed of:

- electric welded carbon steel cylindrical structure with central manhole, a central mouth for the loading and a central mouth for the unloading with incorporated gate
- flat bottom reinforced by means of carbon steel sections
- special steel hubs and cast iron supports with self aligning double row barrel-roller bearings
- motorization system both for starting and for the normal functioning, driven by means of an electrical motor.

The mill is complete with an electric board with automatic stopping device when the number of the revolutions programmed will be obtained.

TECHNICAL CHARACTERISTICS

Load capacity dry:	2000 Kg
Drum diameter:	1800 mm
Drum lenght:	2000 mm
Net capacity:	5000 l
Speed:	22 rpm
Unit installed power:	22 kW

2.06 1 SERVICE PLATFORM FOR 1 BALL MILL
2.07 1 SET OF ELECTRIC CABLES for the connection from the Electric board to the Ball mills

D)STORAGE AND DISTRIBUTION

2.08 1 SIEVING GROUP

The group is composed of:

- Vibrating sieve 600x900 MIT 2 in steel AISI 304.
- Net surface: 0.54 m²
- Unit installed power: 1.1 kW
- Stainless steel bell jar tank.
- Electromagnetic deferrizator.
- Diaphragm pump for the glaze transfer.
- The pump is composed of two diaphragm chambers with two flexible diaphragms "sandwich" fixed; the diphragms are mechanically linked to a shaft. It is complete with ball valves which open and alternatively close aspiration and delivery.
- Max. capacity: 24 m³/h
- Compressed air consumption: 2200 Nl/min at 3,5 bar
- Car with pivot wheels.

2.09 8 P.V.C. CONTAINER -cap.250 l

2.10 1 COLUMN STIRRER

(for glue preparation and for mixing glazes into containers)
Composed of:
-C- shaped base
-Agitating element adjustable in height
-Stainless steel shaft and blade
-Electric board

TECHNICAL CHARACTERISTICS

Speed:	320 r.p.m.
Unit installed power:	1.7 kW
Impeller diameter	280 mm
Approx. weight	350 Kg

2.11 1 PVC GLAZE PIPING DISTRIBUTION and CONNECTIONS (Excluded supporting structures)

2.12 1 SET OF BALL VALVES, QUICK CONNECTIONS, FLEXIBLE PIPING VARIOUS ACCESSORIES

2.13 1 SET OF GALVANIZED PIPING, PRESSURE REDUCERS, BALL VALVES, AIR FILTER and VARIOUS ACCESSORIES FOR COMPRESSED AIR DISTRIBUTION TO THE EQUIPMENT

2.14 1 ELECTRONIC BOARD for glazes distribution

2.15 1 SET OF ELECTRIC CABLES for the connection from the electric board to the equipment

3 MOULDS PREPARATION DEPT.

A)PLASTER PREPARATION

3.01 1 MOVABLE STIRRER FOR PLASTER MIXING
3.02 1 SET OF CABLES AND ELECTRIC CONNECTIONS

B)MOULDS CASTING

3.03 1 SERIES OF WORKING BENCHES in section steel for moulds casting

DIMENSIONS
-Lenght: 4000 mm
-Height 600 mm
-Width 500 mm

C)MODELS AND CASE MOULDS MAKING

3.04 1 WORKING TABLE

Made in metallic structure with working plane in lapped marble (thickness 40/60 mm).
Dimensions: W 2000, L 1200, H 700/800 mm

D)CASE MOULDS AND WORKING MOULDS STORAGE

3.05 5 METALLIC SHELVING at three planes
3.06 1 SET OF PALLETS
3.07 1 CHAMBER DRYER for plaster moulds drying

-Dimensions: L = 10 m W = 5 m
-Capacity: 60-80 moulds
-Foreseen drying cycle: 07 days
-Drying temperature: abt. 40-50 °C

The DRYER is composed of:
- **No.1 CHAMBER** realized with self-carrying panels, insulated inside
- **No.1 DOUBLE DOOR** with manual opening
- **No.1 GAS** hot air generator, complete with modular valves for the control of the combustion - Thermical power: 80000 kcal/h

4 CASTING DEPT

CENTRAL SLIP FEEDING SYSTEM to the CASTING PLANTS:

4.01 1 RING DISTRIBUTION SYSTEM

For SLIP transfer and recycle from SLIP PREPARATION DEPT to CASTING DEPT and to FEEDING TANKS.

4.02 1 SERIES OF PIPING and VALVES

For the connection from the SLIP FEEDING TANKS to the CASTING PLANTS.

4.03 1 SERIES OF FLEXIBLE PIPINGS and VALVES

For the connection from the slip ring distribution system to moulds feeding on benches.

LOW PRESSURE MECHANIZED CASTING PLANTS:

4.04 4 Casting Benches type BVV 40 (with dryer) (WC+BIDETS)

The machine is suitable to cast up to a maximum of 40 moulds. The casting bench is battery type, vertical de-moulding. The working cycle of the machine includes:

- closing of the moulds, by means of suitable clamping group;
- casting of all moulds simultaneously and automatic refilling of the slip;
- empting of moulds from slip and hardening of the pieces by means of inlet of compressed air (or blown) in the moulds;
- opening of the moulds and extraction of casted pieces (one by one).

The machine is composed of:

- **no.1** steel table deck for supporting moulds.
- **no.1** sliding mould locking group;
- **no.2** rectified guides to enable the bearing sliding of the cars.
- **no.40** still cars to support the moulds, complete of bearings. Each car is equiped with a fixed notch to lock the mould.
- **no.1** conveyor belt for storage pieces.
- **no. 1** car to transfer the pieces from the bench to the conveyor belt
- **no.1 casting circuit composed**
- **no.1 compressed air circuit**
- **no.1 automatic system for lifting the upper part of the moulds by means of motorized bridge.**
- **no.1 electrical control board complete of productions required by the safety rules.**

2. DESCRIPTION OF THE MACHINE

2.1. Casting Bench.

This bench, built in prewelded moduls, in order to grant maximum stiffness,is composed of a fixed basis ensured to the ground by means of distribution plates and expansion screws and is complete of the necessary supports for the casting implant's pipe system.
The grinding guides are fixed to the ramp in order to allow the mould-supporting carriages to slide as well as the movable seal headpiece.The fixed headpiece,built of a metal plate, appropriately reinforced, is fixed in the diametrically opposed position to the movable headpiece and has the function of being a leaning surface for the mould sealing operations.
All movements effected on these guides take place on bearings to assure maximum regularity in movement.

2.2 Mould support carriages.

These carriages are built in welded section beams and are supported by 4 bearings which also assure lateral stress holding.In order to allow the carriages to operated in aggressive ambients too (dust - dampness),they are integrally thickly galvanic zinc plated.

2.3 Dryer.

The drier has purpose of allowing use of the moulds again in due time for a double cast per day. It is built of a supporting structure in steel tubular of medium section, assembled together in moduli and integrated with a thermoinsulating structure made of insulating pannels "sandwiches" type. Two PVC sheet are fixed to the sides, they can be rolled-up by means of proper cilindric motoreducers placed inside the winding tubes.
The warm air necessary to dry the moulds is produced by a thermoventilating group which is composed of a centrifugal outlet fan and of air burner (thermic power 120.000 kcal/h); the warm air is therefore forced into the drier through and appropriate zinc-plated cast iron canalization provided with diffusion gates set at regular intervals. The damp air is then ejected through a second canalization connected to a recovery end float fan.
An optimate diffusion of the warm air is granted by the presence of a series of stratificating blade fans positioned over the moulds.

2.4. Casting circuit.

The casting plant is integrally built in pasted PVC pipes in order to avoid any form of pollution of the slip or of corrosion of the pipes run by heighly abrasive substances. It is straight form and is connected to a feed and recovery tank. The casting circuit is connected together in various intermediate points in order to grant maximum uniformity in the mould filling process; the moulds themselves are connectable to the circuit by means of a series of flexible rubber tubes. An inlet valve is provided for the entrance of the water necessary for the rinsing process.

2.5. Compressed Air Circuit.
It is composed of a principal branch in PVC.
The flexible tubes, transparent in order to allow visioning of the level gained by the slip during the casting process, lead from these last valves and are connected to single moulds. When the casting operation has come to end compressed or blown air is force through these tubes in order to facilitate draining of the moulds and hardening of the casted pieces. The air forced into the moulds must be clean and free from impurities such as oil or condense.

2.6. Electric Circuit.
The electric circuit of the casting bench acts on the electrovalves which allow the feed of the slip and the recovery of it into the tank itself.

3. TECHNICAL CHARACTERISTICS

3.1 Technical data (referred to n. 2 BVV 40 with conveyor belt for pieces' stockage and dryer)

Number of operators/bench	2
Electric power installed	2,2 KW (Casting Bench)
Compressed air consumption	It is equipped with an autonomous air blower
Compressed air pressure	6 bar
Production capacity/cast	80 wc/bidet
Cast / day	2
Thermic power	120.000 Kcal/h
Electric power installed	9 KW (Dryer)
Drying cycle	2-3 hours
Fuel	LPG or natural gas

3.2 Casting benches' dimensions including dryer (referred to n. 2 BVV 40 with conveyor belts for pieces' stockage)

Width	Abt. 5.000 mm.
Length	Abt. 18.000 mm.
Height	Abt. 5.000 mm.

4.05 2 LOW PRESSURE CASTING PLANTS - Type BCL 70 (with dryer) (wash basins, pedestal, lids)

The machine is suitable to cast up to a maximum of 70 moulds. The casting bench is battery type, vertical de-molding. The working cycle of the machine includes:

- automatic closing of the moulds, by means of suitable clamping group;
- casting of all moulds simultaneously and automatic refilling of the slip;
- empting of moulds from slip and hardening of the pieces by means of inlet of compressed aire (or blown) in the moulds;
- opening of the moulds and extraction of the casted pieces.
- deposit of casted pieces on the conveyor by means of roller device

The machine is composed of:

- steel table deck for supporting moulds.
- sliding mould locking group;
- no.70 still cars to support the moulds, complete of bearings. Each car is equiped with a fixed notch to lock the mould.

- n.01 Demoulding roller device composed of 2 car with runs near the casting bench equipped with a set of free roller able to facilitate the transfer of the casted piece on the deposit conveyor.
- casting circuit
- Compressed air circuit(low pressure 0,3 bar)
- electrical control board complete of productions required by the safety rules.
- no.1 conveyor belts;

Dryer

The dryer is installed directly onto the casting bench for to permit the dry of moulds to make more cast in a day. The heating system of air is centralize type made with an air burner able to regule the power, connected with a centrifugal fan for feeding. The hot air diffusion is also constitued with piping in zincate steel with appropriate gates so to send the air directly on the moulds. The moist air is aspirated by axial fans. Inside there are the air stratificator fans for to move air.
The dryer is so composed by:

- Insulator panels on the top of dryer
- n.2 Sets of lenghts in PVC to close the working zone
- Metallic carpentry for to support panels, lenghts and air pipeline
- Pipeline in zincate steel complete of gates of diffusion and register
- Electric board
- n.1 Thermoventilating group
- n.2 Axial fans
- n.1 Set of air stratificator fans

TECHNICAL CHARACTERISTICS

Technical data (casting bench)

Number of operators/bench	1
Electric power installed	2,2 KW
Compressed air consumption (low pressure)	It is equipped with an autonomous air blower
Compressed air pressure	6 bar (high pressure)
Production capacity/bench	70 washbasin (for cast)
Cast/day	2
Slip connection	Ø 2”
Compressed air connection	Ø ½”

Technical data(dryer)

thermic power	120.000 Kcal/h
fuel connection	ø 1”
fuel type	GPL or CH4
installed power	7,5Kw abt
drying cycle	2-3 hours
working temperature	50°C

Casting bench dimensions (n.2 BCL 70)

Width	2.800 mm.
Length	27.000 mm.
Height	2.800 abt mm.

Dryer Dimensions

Width	4.000 abt mm.
Length	30.000 abt mm.
Height	3.000 max mm.

4.06 2 LOW PRESSURE CASTING PLANTS - Type BCC 60 (WATER TANKS)

The machine has a capacity to cast of 60 cisterns with obligate tickness for casting.
The work cycle of this machine is composed by this phases:

- automatic closing of all moulds contemporaneously;
- automatic locked of these;
- automatic casting with respose-system;
- automatic opened and contemporaneously of all the moulds;

The machine is so composed:

- bench in steel for bearing half-moulds inferiors with capturing for fixing.
- moving-bridge in steel for half-moulds superiors with capturing for moulds fixing.
- casting circuit composed by:
  - tubes by 2" and 3" in PVC;
  - ball valves of supply;
  - curves and unions;
  - 1 tank of supply in inox steel diameter ca. 500 mm.;
  - 1 pneumatic valve enslave at an probes a level system for automatic casting;
  - 1 regolation system of pneumatic valve opened.

-electric control board with emergency stop buttom and the protections laws in force.

DIMENSIONS:
-Lenght 11 mt.
-Width 1,80 mt.
-Heigth 3,50 mt.

TECHNICAL DATA
Production capacity.....60 pieces/cast
Electric power.....3 Hp
Compressed air consumption.....it has an autonomous unit
Compressed air pressure..... max 0,4 bar
The bench is not provided of storing belts. The demoulded pieces are stored on trolley.

4.07 8 ROTATING DISCS FOR FINISHING

Composed of:
-metallic structure with rotating plate
-water container in stainless steel
-feeding and water unloading connections and valves.

4.08 70 CARS for deposit and movement casted pieces

Size of the cars: L = abt 2000 mm., W = abt 600 mm., H = abt 1500 mm.

Height of the load plane: first plane = abt 350 mm., second plane = abt 1150 mm.

Piece on the car = 14 (referred to mix of production)

4.09 4 SLIP RECOVERY SYSTEM

For the slip recovery from the emptying moulds in the CASTING PLANT and transfer to the SLIP PREPARATION DEPT.

4.10 4 UNDERGROUND TANK for SLIP RECOVERY

SLIP RECOVERY TANKS = Capacity: abt. 1 m^3

Planted in armored concrete with tiled inside wall.

4.21 1 AIR HEATING SYSTEM

Remark:

The above mentioned plants are necessary in order to guarantee the conditions, which are required by the forming technological cycle for sanitary ware that we proposed.

Main plant characteristics:

- To maintain the environmental microclimatic conditions mentioned of the present offer.
- Uniform temperature diffusion
- Low air speed
- Circulating air
- Ambient air exchange rate 3 per hour
- Uniform drying of the formed product

The Air treatment unity is normally composed of:

- hot air generator group
- fans for air delivery and regain
- distribution channels with air diffusor and adjustable nozzle

5 DRYING DEPT

5.01 1 CHAMBER DRYER

Intermittent drying rooms , forced conveyance type composed of:
-zincate steel structure; pannels built in zincate steel sheets zinc and coated with expanded polyurethane;
-channels in zinc plated sheets for warm air distribution and for partial damp air recycling;
-2 fans for air flux circulation;
-1 warm air generator composed of a burner in flux, connected to an automatic system of temperature adjustment;
-electric control and comand pannel complete of the necessary instruments and of the required saftyguards;
-2 doors for the insert and extraction of the carriages;

TECHNICAL CHARACTERISTICS

- Load capacity for carriage.....14 pcs
- Number of cars in the dryer.....68
- Carriage dimensions.....mt 0,6 x 2,0 x 1,5 height
- Drier dimensions.....10 x 20 x 2,20 mt.
- Drying cycle.....16-18 hours
- Thermic power.....640.000 kcal/h
- Electric power.....26 kw

5.02 90 **CARS** for deposit and movement dried pieces

Size of the cars: L = abt 2000 mm., W = abt 600 mm., H = abt 1500 mm.
Height of the load plane: first plane = abt 350 mm., second plane = abt 1150 mm.
Piece on the car = 12 (referred to mix of production)

6 INSPECTION AND GLAZING DEPT.

6.01 2 INSPECTION BOOTH CCA2 WITH TWO OPPOSITE WORKING STATIONS

Very easy to use and efficacious, this cabin surely represents the most adequate means of facing the production exigencies of a modern ceramic industry, as well as refers to the problems regarding the presence of polluting substances (in this case essentially dusts)in the discharge of a ceramic producingsanitaryware. It is entirely built is zincate steel and is composed by three distinguished parts; the first two, sides, that consist the finishing and testing stations (the cabin is type with double position of work) consisting from presence of turning where is possible to make all the manual operations; on testing piece, in the thirol part there are all the sistems for to pull down the suctioned dust. The turning lathe for the rotation of the piece is positioned on a grill bottom under which a tub containing water is found where the dust produced by the test operations deposits.
Lightningis assured by means of a neon lamp fixedoverthe operating area.
The suction cowl and the centrifugal fan are, at end, positioned on the shelter of the cabin connected together by means of a antivibrating joint in rubber finished canvas.
The electric pannel is supplied separately from the cabin and it is complete of all the safety guards according to the current regulations.

Knock-down dust system
The dust knock-down system is composed of the following:
a) Veil water filter
b) Nozzle water nebulizing filter
c) Labyrinth filter (composed of zincate steel sheet appropriately shaped for to slow down the aspirated air flux and allow the pulling down of polluting particles with nebulized water.

Principles of running.
1st phase: the piece is tested by and with the aid of small accessories (scrapers, sponges, etc), the dust produced by this operation, mostly the excess eliminated with the air compressor, is suctioned by means of the fan positioned on the shelter of the cabin.

2nd phase:the greatest quantity of the suctioned dust comes into contact with the first knock-down system made up of a veil of water fed by a recircling pump, which makes the polluting substances still present in the air precipitate and deposit in the water containing tub.

3rd phase:subsequently the air flux brings the residual particles of dust into contact with the water nebulizing battery which neutralize this last quantity of polluting dust with the help of a labyrinth system consisting of bent sheetsthat impose a fixed course on the fluid.

Technical data
-total weight..... 1.150 Kg
-electric power installed..... 6 kw
-recircle pump delivery..... 290 lt/1'

Dimensions
-Width.(max)..... 1.890 mm.
-Height (max)..... 3.500 mm.
-Depth..... 3.000 mm.

6.02 4 COMPRESSED AIR DISTRIBUTION GROUP for INSPECTION BOOTH

Composed of:
-Piping
-Compressed air regulators and reducers
-Filters
-Ball valves and fittings

6.03 3 GLAZING BOOTH TYPE CSX2 WITH DOUBLE WORKING STATION (for manual glazing)

Very easy to use and efficacious, this cabin surely represents the most adequate means of facing the production exigencies of a modern ceramic industry, as well as refers to the problems regarding the presence of polluting substances in the discharges of glazing implants in sanitaryware ceramics. It is essentially composed of two distinguished parts; the first, fore (glazing station) built in inox cast-iron which is in direct contact with the glaze and a second, hind , that comprises all the various systems of knock-down of the suctioned dusts.In the operating zone the operator finds the turning lathes for the rotation of the pieces placeds on a hopper bottom for the recovery of the glaze in eccess. The recovery of the glaze is effected with the aid of a trolley tub placed under the hopper,while the rotation of the turning lathe is obtained by hand by means of belts. The lightning is assured by two neon lampsplacedover the operator. In the back of the cabin the water recovery tuband the battery of nozzles take place, as well as the labyrinth knock-down system.
The suction cowl and the centrifugal fan are, at last, situated on the shelter of the cabin connected together by a antivibration joint in rubber finished canvas.
Separately tocabin, is supplied a double group of feeding glaze, each constitued by a resin-glass tank with cover, a membrane pneumatic pump in inox steel and a spray gun for glaze application, complete of pression reducer.

The supply is supplied with an electric pannel, complete of all safety guards according to the current regulations.

Knock-down system
The dust knock-down system is composed as follows:
a) veil water filter
b) labyrinth filter (builted of cast-iron sheets-zinc appropriately shaped for to slow down the aspirated air flux and allow the pulling down of polluting particles with nedulized water.
c) nozzle water nebulizing filter
d) dry glaze recovery pannel.

Principles of running.
1st phase: the eccess of glaze, in form of nebulized particles, is suctioned by means of the fan placed on the cover of the cabin.

2nd phase:the greatest part of the suctioned glaze is captured by a first filter (recovery of dry glaze) built in inox cast-iron sheets-zinc appropriately, that must collect the glaze disperse, during glazing of pieces.

3rd phase:the air flux subsequently comes into contact with the second knock-down system,made out of a veil of water and of a battery of water nebulizing nozzles feeded by a recircle centrifugal pump, that leads the particles of polluting substances still present in the air to precipitate and makes them deposit in the water recovery tub.
A series of sheets-zinc press-bent contributes to avoid the escape of glaze particles by forcing the air through a labyrinth path. The air flux, so depurated ,then comes into contact with the suction cowl and therefore with the outlet mouth of the centrifugal fan, for to be expelled from flue.

TECHNICAL DATA

-electric power installed..... 5 kW
-recircle pump delivery..... 180 lt/1'
-recycle water tank capacity..... 0,8 cu.m

DIMENSIONS

-Width..... 2.020 mm
-Height (max)..... 3.400 mm
-Depth..... 1.660 mm

6.04 6 COMPRESSED AIR DISTRIBUTION GROUP for GLAZING BOOTH

Composed of:

-Panel
-Compressed air reducers and regulators
-Filters
-Lubrication machines
-Ball valve and fitting

6.05 6 MANUAL SPRAYING EQUIPMENT

Each equipment is composed of:
-a spray gun
-a glaze supply pump - Type PN 20
-connection pipes

6.06 90 CARS for deposit and movement glazed pcs (*) (Customer's supply)

Size of the cars: L = abt 2000 mm., W = abt 600 mm., H = abt 1500 mm.
Height of the load plane: first plane = abt 350 mm., second plane = abt 1150 mm.
Piece on the car = 12 (referred to mix of production)

7 FIRING DEPT

7.01 2 INTERMITTENT KILNS TYPE BY 60 CUBIC METER

7.02 90 CARS for deposit and movement fired pcs (*) (Customer's supply)

Size of the cars: L = abt 2000 mm., W = abt 600 mm., H = abt 1500 mm.
Height of the load plane: first plane = abt 350 mm., second plane = abt 1150 mm.
Piece on the car = 12 (referred to mix of production)
Metallic construction, with rubber planes, complete of 4 rubber wheels of which 2 steering.

8 SORTING - TESTING - PACKING DEPT

8.01 2 INSPECTION TABLES WITH ROTATING DISC

Dimensions
-width 800 mm
-lenght 800 mm
-height 700 mm

8.02 1 CONCRETE TANK for hydraulic test

Composed of:

-concrete tank; dim. 6x0.7x0.8 m
-bolster in wood for the deposit of the pieces

-series of piping, valves and connections
-Series of Lamps

9 TECHNOLOGICAL LABORATORY EQUIPMENT

9.01 1 SERIES OF EQUIPMENT

Composed by:
N.1 Jar mills on rollers with 2 jars of 5 lt
N.1 Fast mills with jar of 250 cc.
N.1 Laboratory mechanical stirrer
N.1 Viscosimeter Gallenkamp
N.1 Ford Cup viscosimeter
N.1 Pocket dial micrometer (thickness gauges)
N.1 Thermometer –50 +170 °C
N.3 Set of Seger cones
N.2 Set of Bayer cones
N.1 Electronic weight
N.2 Picnometers
N.7 Sieves of different sizes
N.1 Set of various plastic and glass container for laboratory
N.1 Set of laboratory benches (*)(Customer's supply)

10 MODELS - FIRST MOULDS – MATRIX- WORKING MOULDS - AUXILIARY and COMPLEMENTARY EQUIPMENT

MATRIX made of Plaster rubber
LOW PRESSURE MECHANIZED CASTING

- **MATRIX made of Plaster rubber(for moulds production):**

10.01 1 Matrix for WASH BASIN(VITREOUS)
10.02 1 Matrix for BIDET (VITREOUS)
10.03 1 Matrix for WC MONOBLOCK (VITREOUS)
10.04 1 Matrix for WATER TANK (VITREOUS)
10.05 1 Matrix for COVER of WATER TANK(VITREOUS)triple print
10.06 1 Matrix for PEDESTAL (VITREOUS)

11 COMPRESSED AIR

11.01 1 PRODUCTION UNIT for COMPRESSED AIR composed by:

-n.2 rotary compressor
-n.2 dryers for compressed air
-n.2 pressure cooker
-n.1 distribution net realized with tubes in galvanized steel, complete of valves and accessories.

12 GENERATOR SET

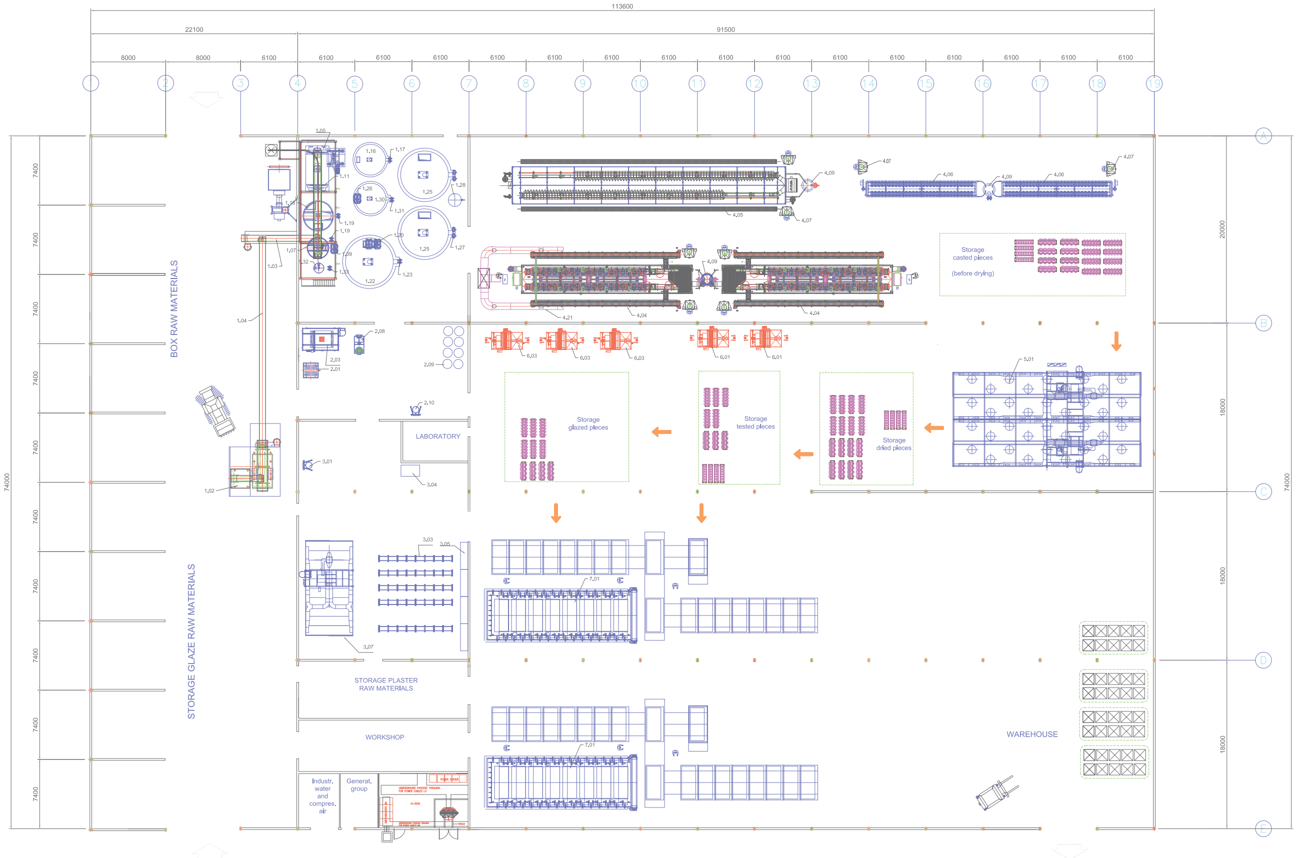
12.01 1 GENERATOR SET – Capacity 300 KVA

Expected results:

1 design for industrial VSW plant with the following characteristics:

MECHANISED PLANT PRODUCTION PHASE	m^2 in the initial project	m^2 in lay out plant	Time in hours	No. of shifts
Storage of raw materials	1,000	1600	/	/
Preparation of bodies and glazes	350	340+430	/	1
Mould preparation and storage	500	580	/	2
Casting	1,400	1460	4	2
Drying	300	630	20	2
Inspection	150	230	/	2
Glazing	175	430	/	2
Drying of glazed pieces	500		6	2
Firing	1,000	1800	16	3
TOTAL	**5,375**	7500	46	15

- 2D and 3D pictures showing the plant's architecture in attached file.



Pos.	Q.ty	DESCRIPTION	Material	Kg/U	Code
7.01	02	INTERMITTENT KILN VULCANO TYPE			
6.03	03	GLAZING BOOTH TYPE CSX2			
6.01	02	INSPECTION BOOTH CCA2	--	--	--
5.01	01	CHAMBER DRYER	--	--	--
4.21	01	AIR HEATING SYSTEM	--	--	--
4.18	01	SLIP RECOVERY SYSTEM	--	--	--
4.16	02	ROTATING DISCS FOR FINISHING	--	--	--
4.15	01	CASTING BENCH BSO 100 / S.T.	--	--	--
4.09	03	SLIP RECOVERY SYSTEM	--	--	--
4.07	08	ROTATING DISC FOR FINISHING	--	--	--
4.06	02	CASTING PLANTS TYPE BCC 60	--	--	--
4.05	02	CASTING PLANTS TYPE BCL 70 WITH DRYER	--	--	--
4.04	04	CASTING BENCHES TYPE BVV 40 WITH DRYER	--	--	--
3.07	01	CHAMBER DRYER	--	--	--
3.05	05	METALLIC SHELVING	--	--	--
3.04	01	WORKING TABLE	--	--	--
3.03	01	SERIERS OF WORKING BENCHES	--	--	--
3.01	01	MOVABLE STIRRER FOR PLASTER MIXING	--	--	--
2.10	01	COLUMN STIRRER	--	--	--
2.09	08	PVC CONTAINERS	--	--	--
2.08	01	SIEVING GROUP	--	--	--
2.03	01	BALL MILL 5000 LT	--	--	--
2.01	01	WEIGHING PLANT	--	--	--
1.33	01	DIAPHRAGM PUMP 2"	--	--	--
1.32	01	BLUNGER 1 MC	--	--	--
1.31	01	DIAPHRAGM PUMP 2"	--	--	--
1.30	01	SLOW STIRRER CAP. 15.7 MC	--	--	--
1.28	01	PRESSURE TANK CAP 4000 LT	--	--	--
1.27	02	DIAPHRAGM PUMP 3"	--	--	--
1.26	01	VIBRATING SIEVE 600X900	--	--	--
1.25	02	SLOW STIRRER CAP. 55 MC	--	--	--
1.23	01	DIAPHRAGM PUMP 2"	--	--	--
1.22	01	SLOW STIRRER CAP 55 MC	--	--	--
1.20	02	VIBRATING SIEVE 600X900	--	--	--
1.19	02	DIAPHRAGM PUMP 2"	--	--	--
1.18	01	TURBO BLUNGER CAP. 15 MC	--	--	--
1.17	01	DIAPHRAGM PUMP 2"	--	--	--
1.16	01	SLOW STIRRER CAP. 15.7	--	--	--
1.11	01	BALL MILL TYPE 16000 LT	--	--	--
1.09	01	VIBRATING SIEVE 600X900	--	--	--
1.07	01	TURBO BLUNGER TYPE TDL 5000	--	--	--
1.05	01	BI-DIRECTIONAL BELT CONVEYOR	--	--	--
1.04	01	SLOPING BELT CONVEYOR	--	--	--
1.03	01	CONVEYOR BELT	--	--	--
1.02	01	WEIGHING PLANT	--	--	--

Date	Modify	Date --.--.--	Scale 1:200
--	--	Commande n° ----/-	Disigner
		Replace the drawing --------	N° Drawing
		Replaced by drawing --------	
Customer		Title	COMPLETE PLANT FOR PRODUCTION OF 300.000 PCS /YEAR

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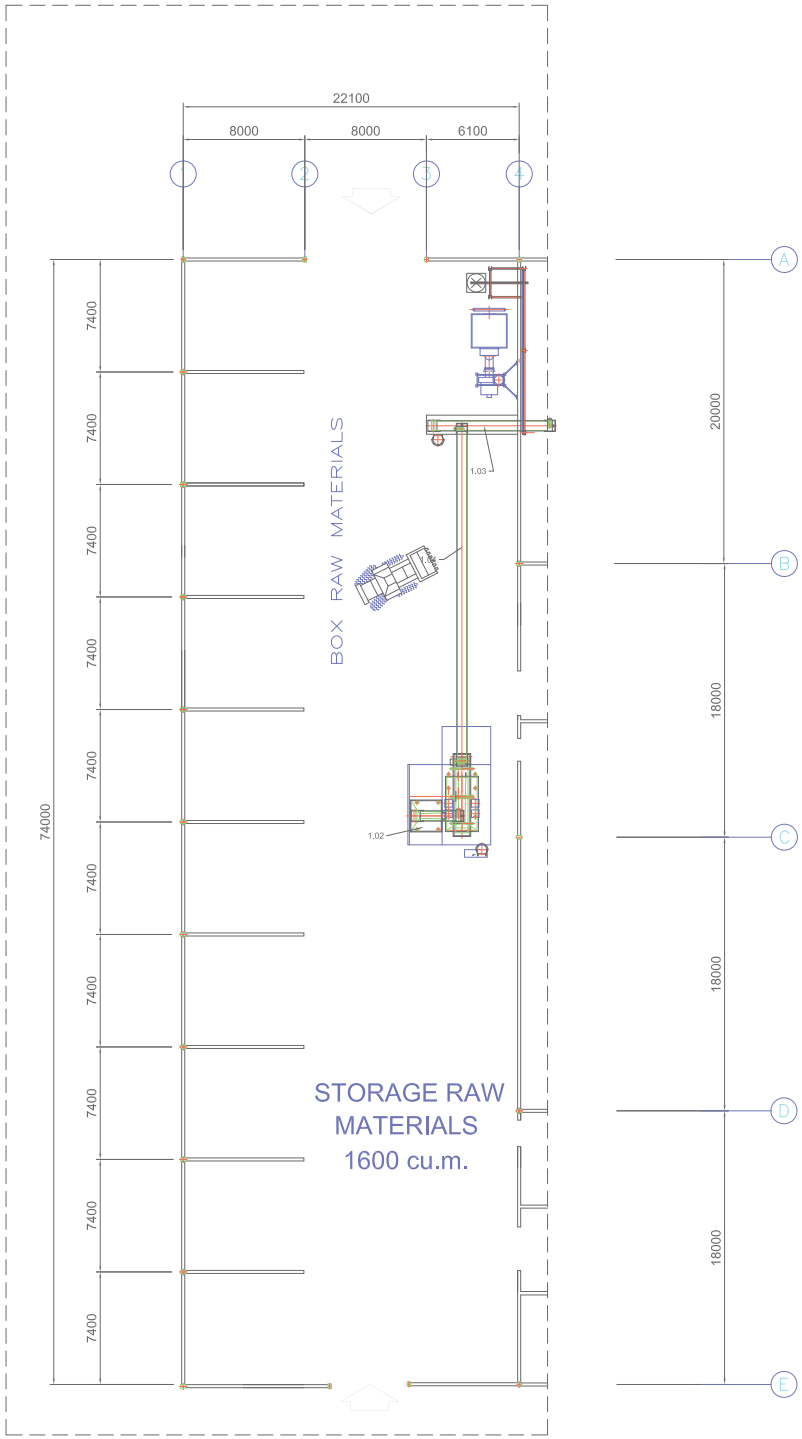

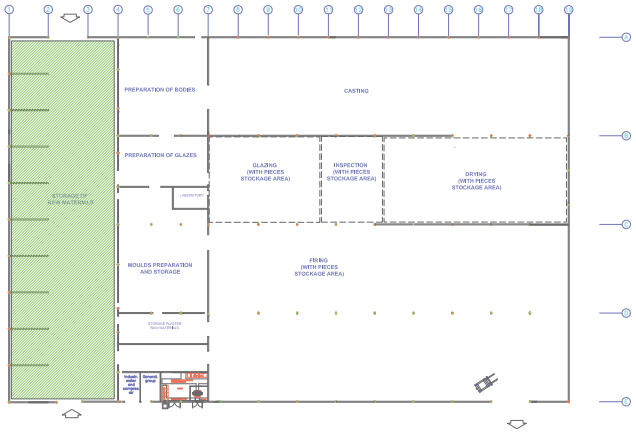

Pos.	Q.ty	DESCRIPTION	Material	Kg/U	Code
1.04	01	SLOPING BELT CONVEYOR	--	--	--
1.03	01	CONVEYOR BELT	--	--	--
1.02	01	WEIGHING PLANT	--	--	--

Date	Modify	Date	Scale
--	--	--.--.--	1:250
		Commande n° ----/-	Disigner
		Replace the drawing --------	N° Drawing
		Replaced by drawing --------	

Customer

Title

RAW MATERIALS DEPT.

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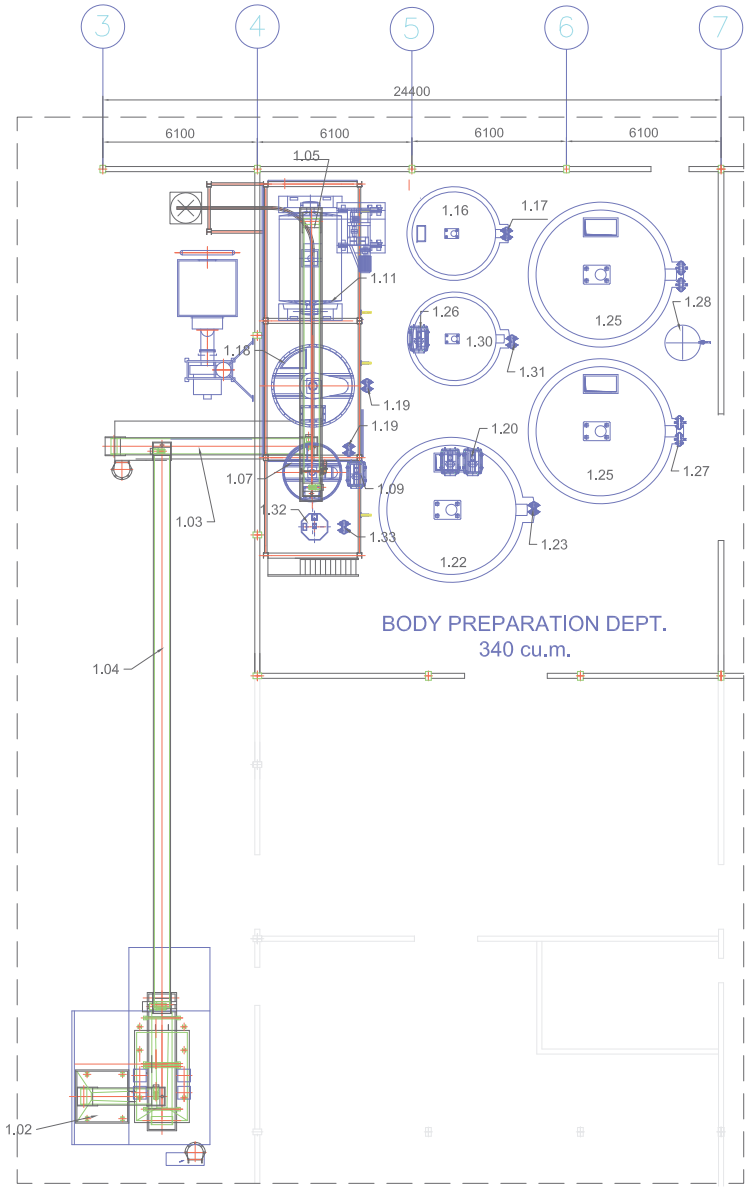

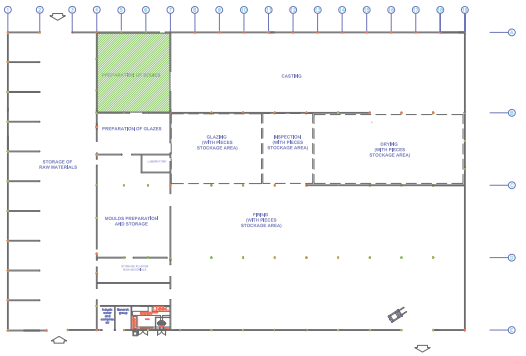

Pos.	Q.ty	DESCRIPTION	Material	Kg/U	Code
1.33	01	DIAPHRAGM PUMP 2"	--	--	--
1.32	01	BLUNGER 1 MC	--	--	--
1.31	01	DIAPHRAGM PUMP 2"	--	--	--
1.30	01	SLOW STIRRER CAP. 15.7 MC	--	--	--
1.28	01	PRESSURE TANK CAP 4000 LT	--	--	--
1.27	02	DIAPHRAGM PUMP 3"	--	--	--
1.26	01	VIBRATING SIEVE 600X900	--	--	--
1.25	02	SLOW STIRRER CAP. 55 MC	--	--	--
1.23	01	DIAPHRAGM PUMP 2"	--	--	--
1.22	01	SLOW STIRRER CAP 55 MC	--	--	--
1.20	02	VIBRATING SIEVE 600X900	--	--	--
1.19	02	DIAPHRAGM PUMP 2"	--	--	--
1.18	01	TURBO BLUNGER CAP. 15 MC	--	--	--
1.17	01	DIAPHRAGM PUMP 2"	--	--	--
1.16	01	SLOW STIRRER CAP. 15.7	--	--	--
1.11	01	BALL MILL TYPE 16000 LT	--	--	--
1.09	01	VIBRATING SIEVE 600X900	--	--	--
1.07	01	TURBO BLUNGER TYPE TDL 5000	--	--	--
1.05	01	BI-DIRECTIONAL BELT CONVEYOR	--	--	--
1.04	01	SLOPING BELT CONVEYOR	--	--	--
1.03	01	CONVEYOR BELT	--	--	--
1.02	01	WEIGHING PLANT	--	--	--

Date	Modify	Date	Scale
--	--	--.--.--	1:150
		Commande n° ----/-	Disigner
		Replace the drawing --------	N° Drawing
		Replaced by drawing --------	

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Customer

Title

BODY PREPARATION DEPT.

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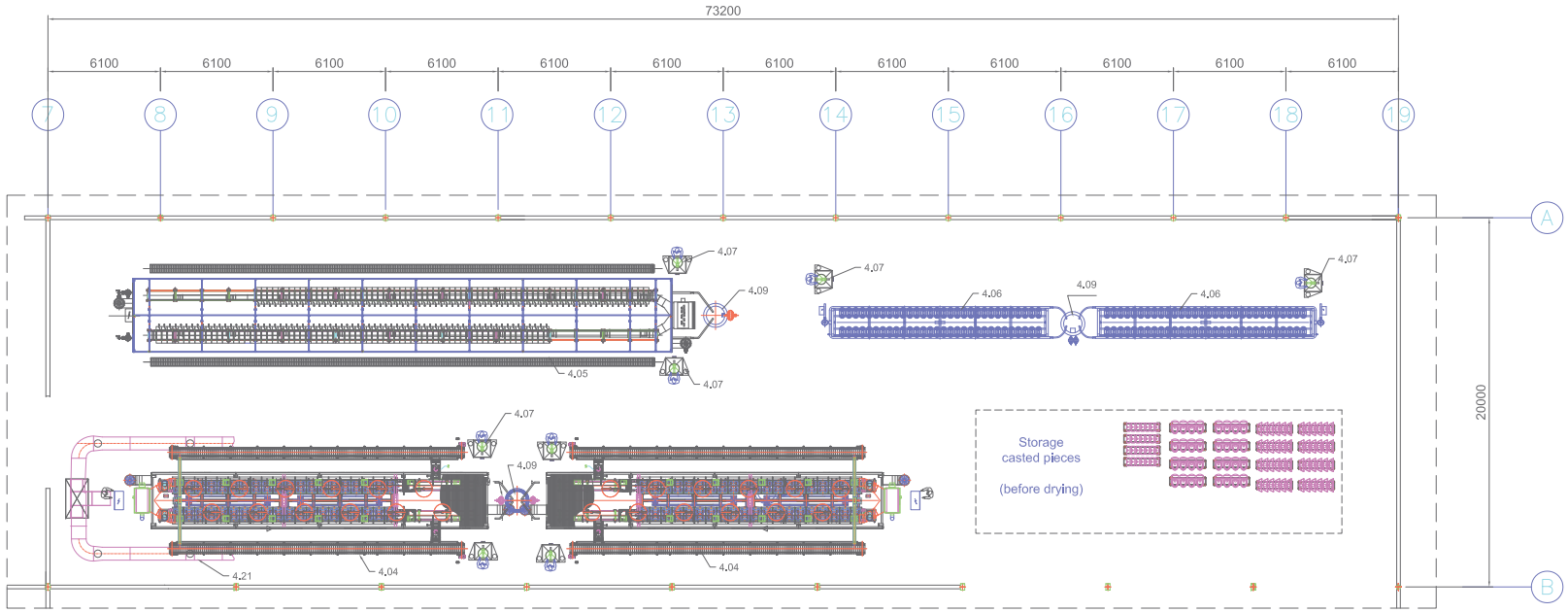
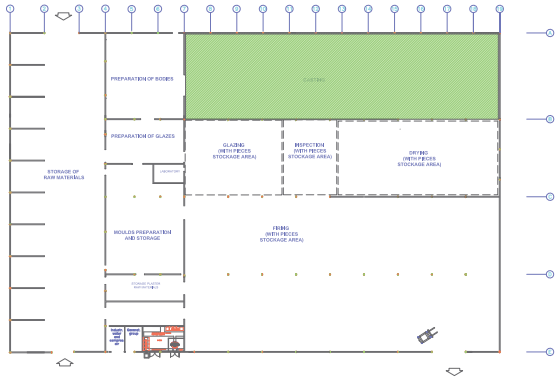


CASTING DEPT.
1460 cu.m.



4.21	01	AIR HEATING SYSTEM	--	--	--
4.18	01	SLIP RECOVERY SYSTEM	--	--	--
4.16	02	ROTATING DISCS FOR FINISHING	--	--	--
4.15	01	CASTING BENCH BSO 100 / S.T.	--	--	--
4.09	03	SLIP RECOVERY SYSTEM	--	--	--
4.07	08	ROTATING DISC FOR FINISHING	--	--	--
4.06	02	CASTING PLANTS TYPE BCC 60	--	--	--
4.05	02	CASTING PLANTS TYPE BCL 70 WITH DRYER	--	--	--
4.04	04	CASTING BENCHES TYPE BVV 40 WITH DRYER	--	--	--

Date	Modify
--	--

Date: --.--.--
Scale: 1:200
Commande n°: ----/-
Disigner:
Replace the drawing: --------
N° Drawing:
Replaced by drawing: --------
Customer: - - -
Title: CASTING DEPT.

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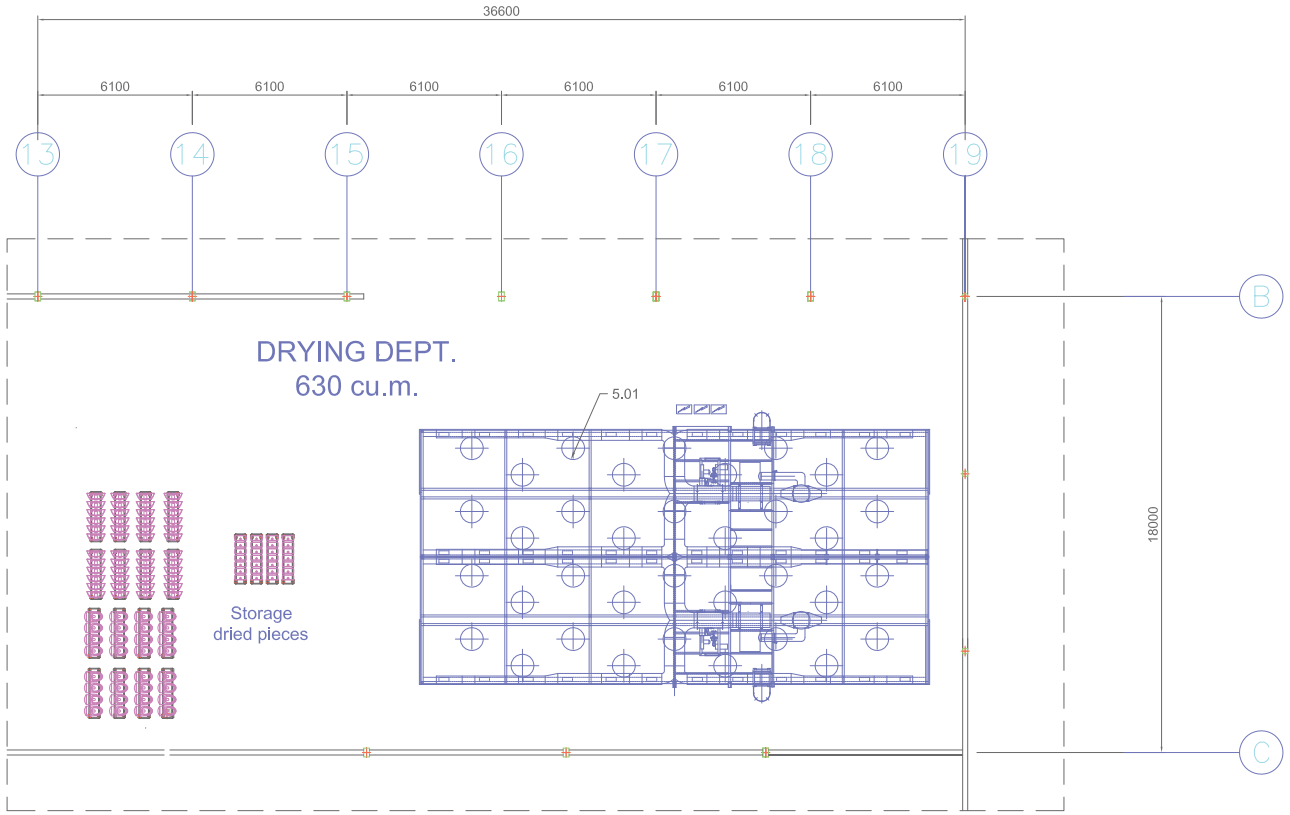

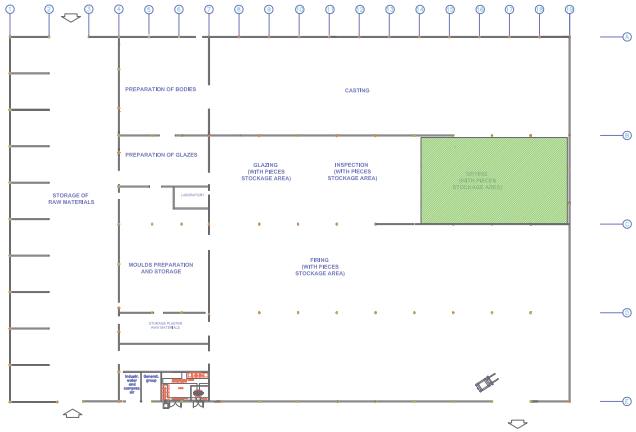

5.01	01	CHAMBER DRYER		-- -- --
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			Commande n° ----/-	Disigner
			Replace the drawing --------	N° Drawing
			Replaced by drawing --------	
			Customer ---	Title DRYING DEPT.

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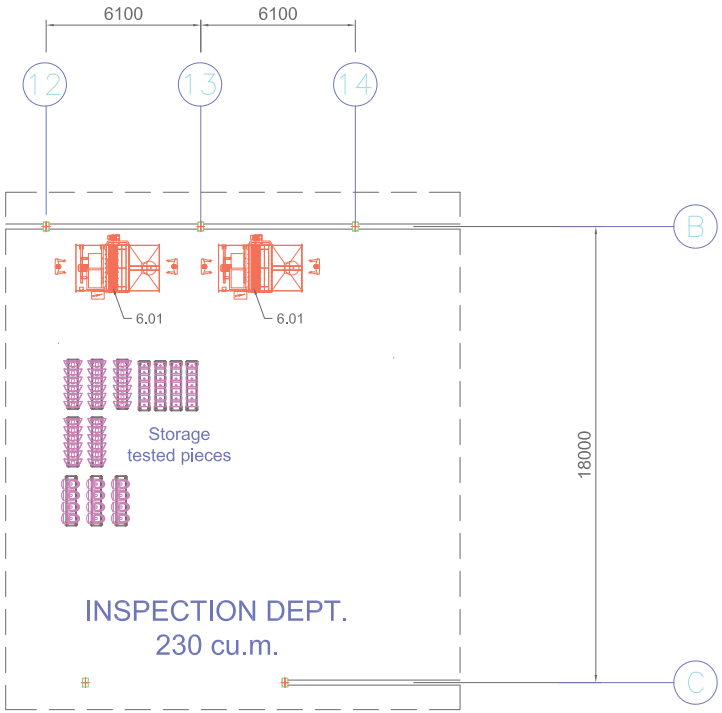

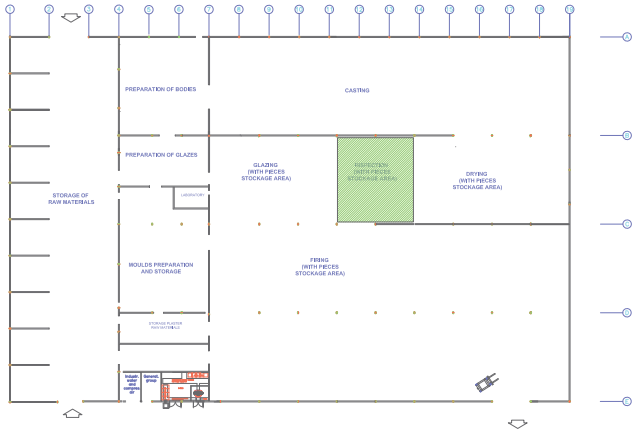

6.01	02	INSPECTION BOOTH CCA2		-- -- --	
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		--	--	--.--.--	
				Commande n° ----/-	Disigner
				Replace the drawing --------	N° Drawing
				Replaced by drawing --------	
		Customer		Title	
		---		INSPECTION DEPT.	

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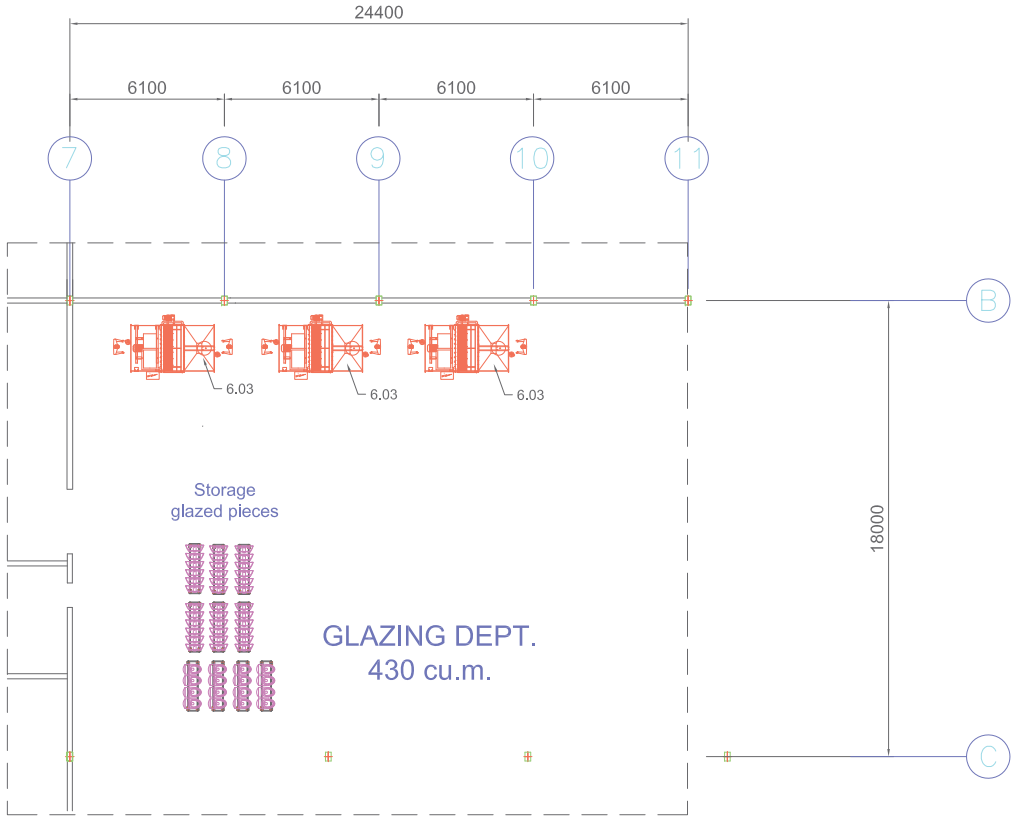

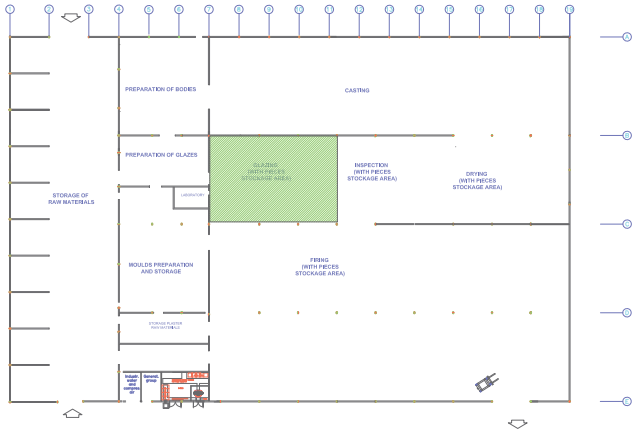

6.03	03	GLAZING BOOTH TYPE CSX2		-- -- --	
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		--	--	--.--.--	
				Commande n° ----/-	Disigner
				Replace the drawing --------	N° Drawing
				Replaced by drawing --------	
		Customer		Title	
		---		GLAZING DEPT.	

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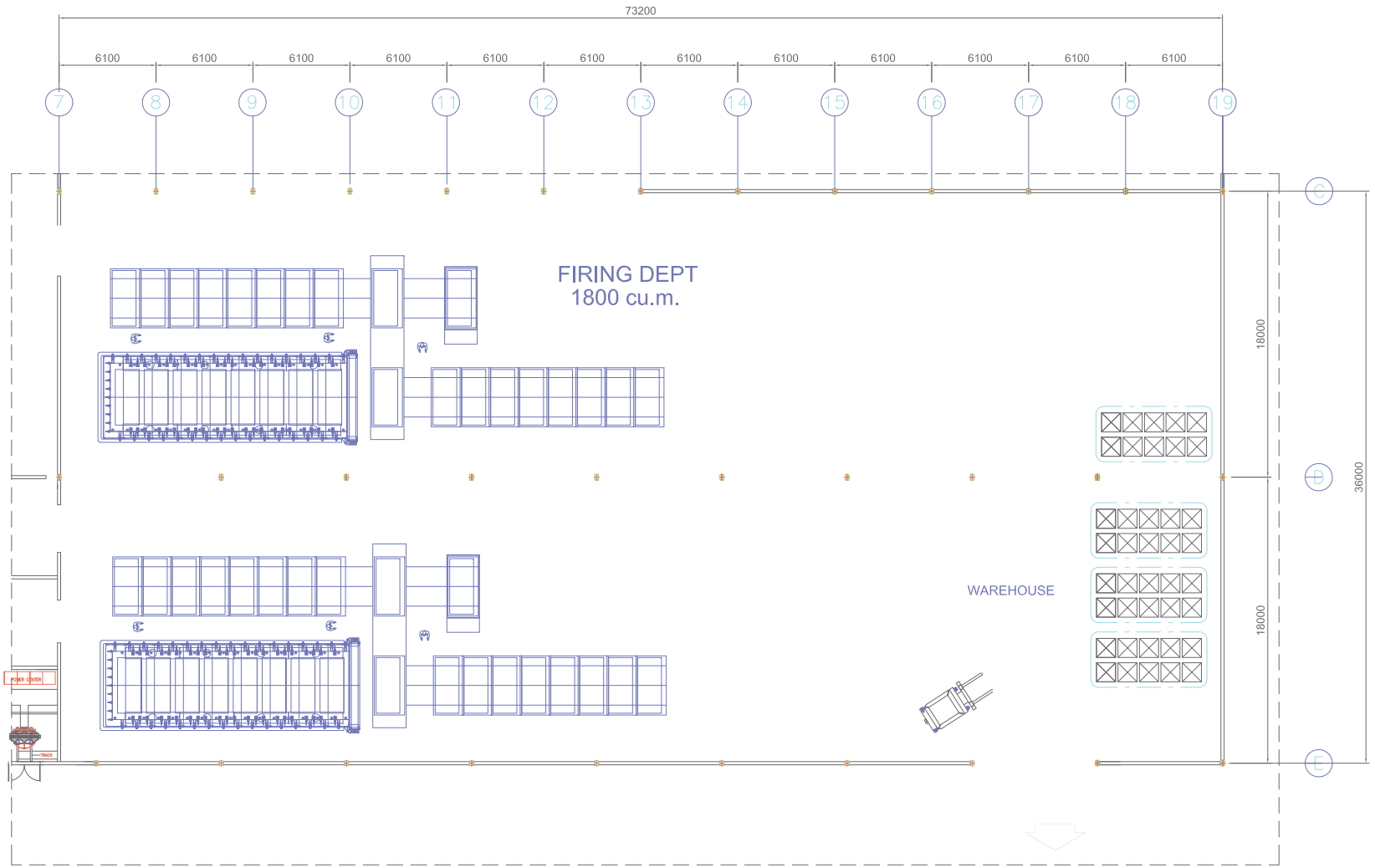

7.01	02	INTERMITTENT KILN VULCANO TYPE			
		Date	Modify	Date	Scale 1:200
		--	--	--.--.--	
				Commande n°	Disigner
				----/-	
				Replace the drawing	N° Drawing

				Replaced by drawing	

		Customer		Title	
		---		FIRING DEPT.	

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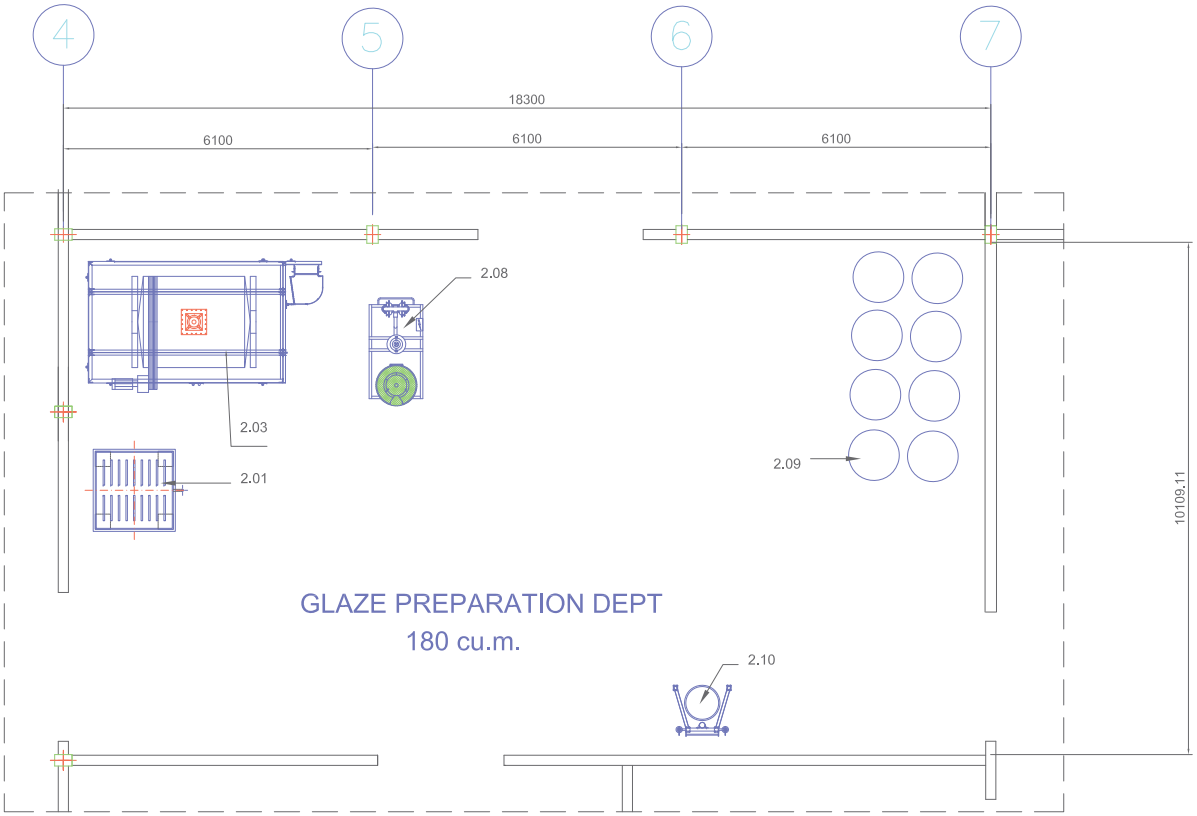

2.10	01	COLUMN STIRRER	--	--	--
2.09	08	PVC CONTAINERS	--	--	--
2.08	01	SIEVING GROUP			
2.03	01	BALL MILL 5000 LT			
2.01	01	WEIGHING PLANT			

Date	Modify	Date	Scale
--	--	--.--.--	1:75
		Commande n° ----/-	Disigner
		Replace the drawing --------	N° Drawing
		Replaced by drawing --------	

Customer — — —

Title

GLAZE PREPARATION DEPT

Società del gruppo SETEC

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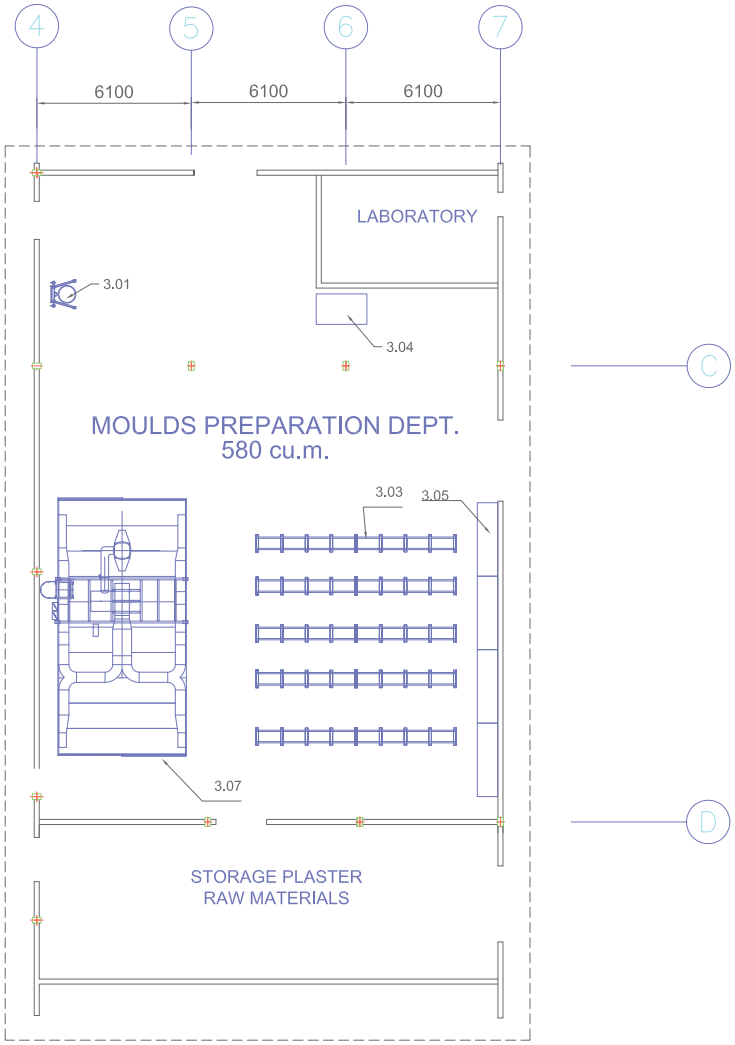
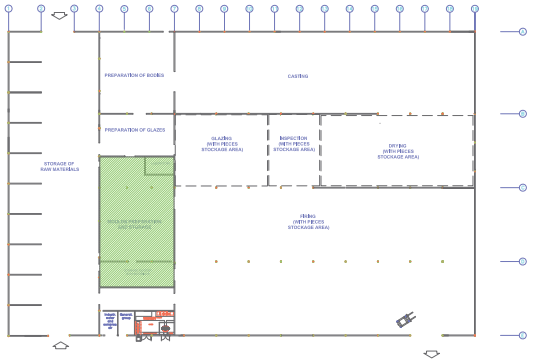
VICENTINI





3.07	01	CHAMBER DRYER	--	--	--
3.05	05	METALLIC SHELVING	--	--	--
3.04	01	WORKING TABLE	--	--	--
3.03	01	SERIERS OF WORKING BENCHES	--	--	--
3.01	01	MOVABLE STIRRER FOR PLASTER MIXING	--	--	--

Date	Modify	Date	Scale
--	--	--.--.--	1:150
		Commande n° ----/-	Disigner
		Replace the drawing --------	N° Drawing
		Replaced by drawing --------	

Customer — — —

Title

MOULDS PREP. DEPT

Società del gruppo SE.TE.C. s.r.l.

SETEC
SE.TE.C. s.r.l.
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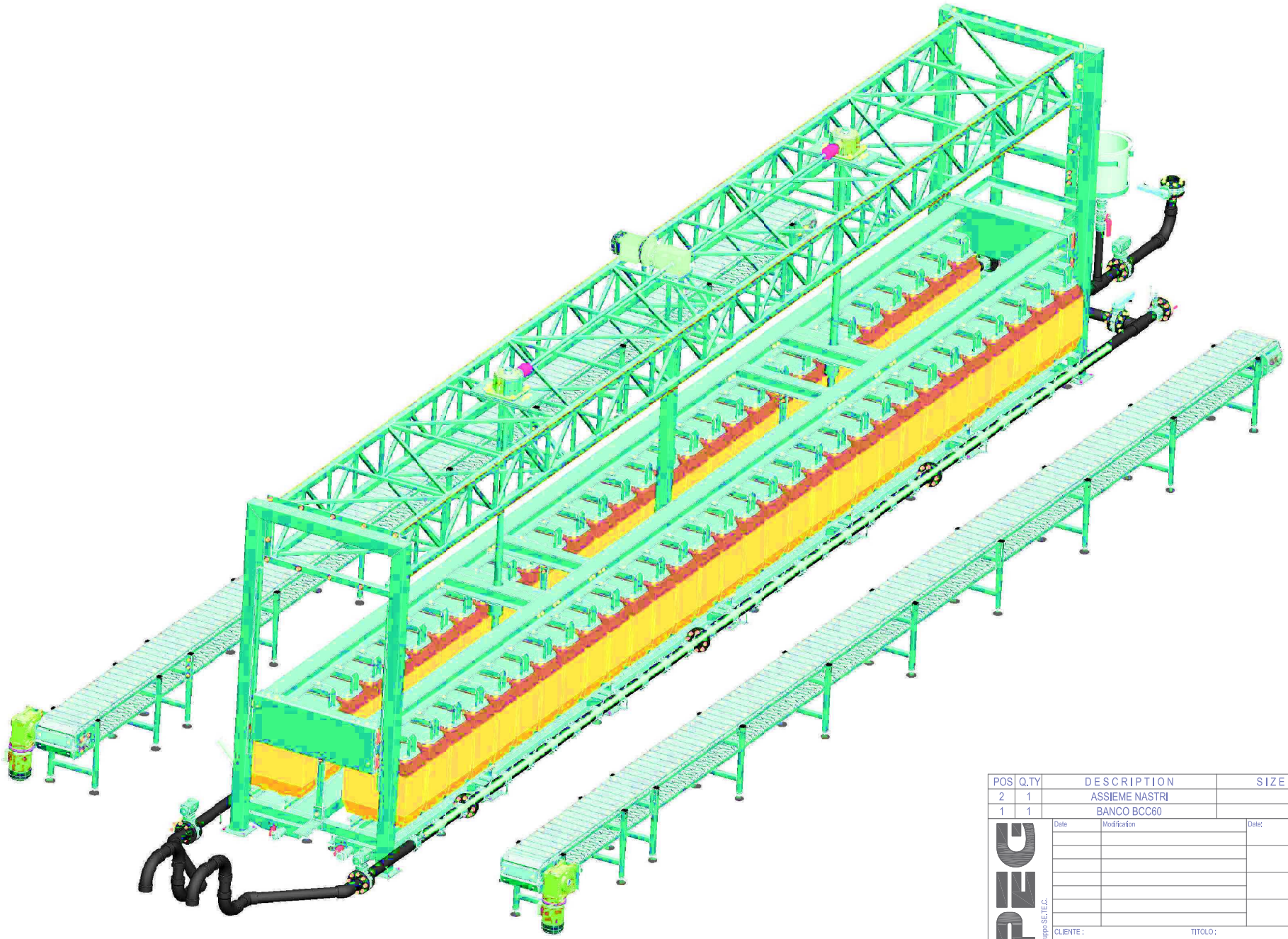
VICENTINI



SCALA 9/200

POS	Q.TY	DESCRIPTION	SIZE	TAV	MATERIAL	KG./ U
2	1	ASSIEME NASTRI		A12-13MC-00	3360280.659	
1	1	BANCO BCC60		D03-13MC-00	14831070.092	

Date	Modification	Date:	Scale : 1/1
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Società del gruppo SE.TE.C.

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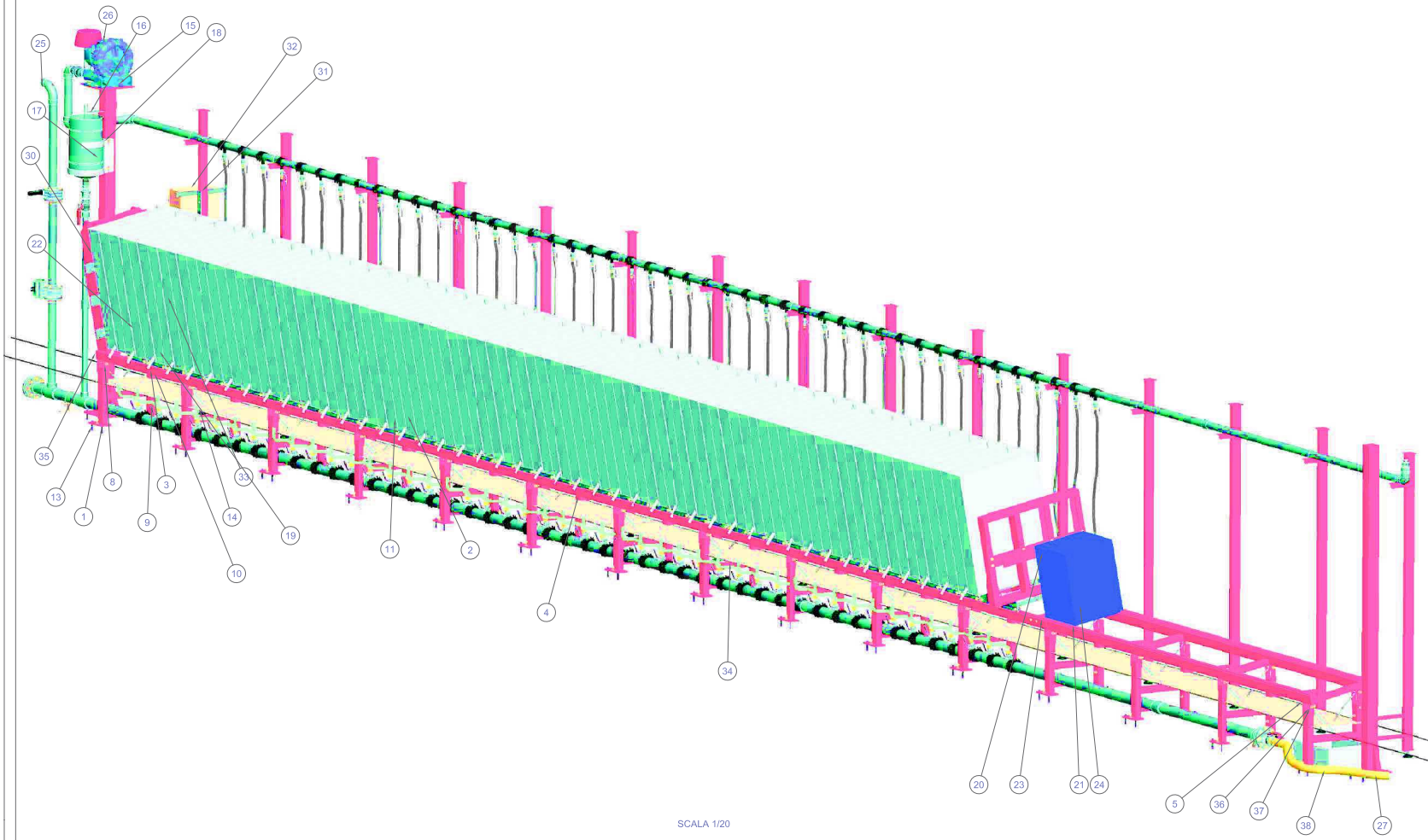

SCALA 1/20

POS	Q.TY	DESCRIPTION	SIZE	TAV	MATERIAL	KG/U
38	1	VASCA RACCOLTA ACQUA SPAGLESS	600X400XH200	——	PVC	10,585
37	30	CATENA GENOVESE		I8721102		0,016
36	30	GRILLO STANDARD	1/4" 6mm A48	W6150124		823,527
35	2	TAPPO PER PROFILATO	80X60	H50B42XO	PVC	0,021
34	1	ASSIEME TELO IN PVC		A213-16L		18,782
33	1	QUADRO PNEUMATICO	TYPE	GW44211 GW44619	PVC	33,591
32	1	QUADRO ELETTRICO	TYPE	——	FE360	13,681
31	1	SUPPORTO QUADRO ELETT. E PNEUMAT.		A215-16L		8,042
30	45	MOULD AND ACCESSOIRES		U01-16L		634,482
29	92	Rondella	10	I7800007		0.004
28	92	Vite a testa esagonale	M10 x 30 - 8.8	I7014093	8_8	0,030
27	1	PALINA TENDI FILO		A210-16L		24,890
26	1	IMPIANTO SVUOTAMENTO BCL		D27-16L		104,317
25	1	IMPIANTO DI COLAGGIO BCL		D26-16L		855,661
24	4	Vite a testa esagonale	M12 x 90	I7004096	8_8	0,096
23	1	RISCONTRO SPINTORE		A209-16L		3,300
22	3	TRAVETTO TESTATA FISSA		A208-16L		9,885
21	1	SPINTORE	TYPE	A139-08L	FE360	56,974
20	1	ASSIEME TELAIO DI CONTRASTO		A199-16L		75,803
19	46	CARRELLO COMPLETO		A18-10M		9,582
18	2	Vite a testa esagonale	M12 x 140	I7014328	8_8	0,141
17	1	SUPPORTO SERBATOIO BARB.		N17-15L_TAV18	AISI304	7,564
16	1	PORTA SONDA		A20-16L	AISI304	0,412
15	1	PALINA PER SERBATOIO E SOFFIANTE BCL		A207-16L		31,228
14	15	ELEMENTO DI LIVELLAMENTO 308331	LV.A-80-14-AS-M12X98	C00965AC	FE360	0,697
13	68	TASSELLO	M10x85	I8451135	FE360	0,038
12	40	Vite a testa esagonale	M12 x 40	I7014115	8_8	0,052
11	6	Vite senza dado	M12 x 45	I7024411	8_8	0,059
10	30	Vite a testa esagonale	M12 x 80	I7014123	8_8	0,087
9	15	PALINA LATERALE BCL		A205-16L		12,894
8	127	Dado esagonale	M12 - 8	I7613007	8	0,017
7	220	Rondella	12	I7800008		0,007
6	45	Vite a testa esagonale	M12 x 130	I7004100	8_8	0,132
5	1	MODULO FINALE BCL		A198-16L		94,950
4	2	MODULO CENTRALE BCL		A204-16L		121,916
3	30	PIASTRA GIUNZIONE CAVALLETTO		A206-16L		0,621
2	1	MODULO INIZIALE BCL		A203-16L		164,908
1	15	CAVALLETTO BCL		A202-16L		12,442

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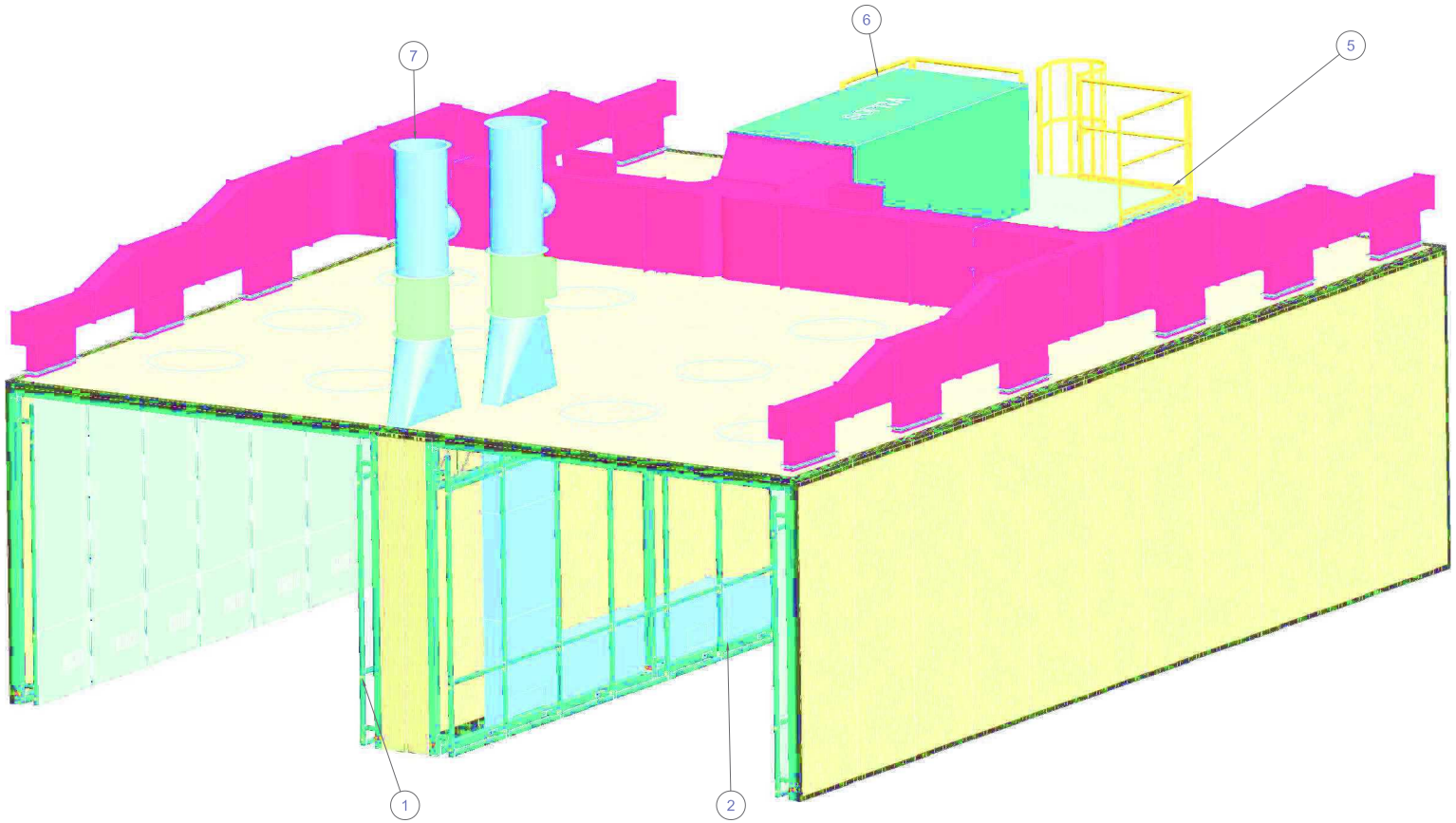

SCALA 3/100

POS	Q.TY	DESCRIPTION	SIZE	TAV	MATERIAL	KG./ U
7	1	COMPLESSIVO ESTRAZIONE ARIA UMIDA		F10-15F-00		719.392
6	1	COMPL. IMMISSIONE ARIA CALDA		F09-15F-00		817.289
5	1	PIANO DI SERVIZIO		A26-15F- TAV 00		1221.897
4	4	PORTA DX		A28-15F-TAV 00		3409.958
3	4	PORTA SX		A27-15F-TAV 00		3611.963
2	1	COMPLESSIVO TAMPONATURA		F08-15F-TAV 00		7527.545
1	1	COMPLESSIVO CARPENTERIA		A25-15F-TAV00		2856.880

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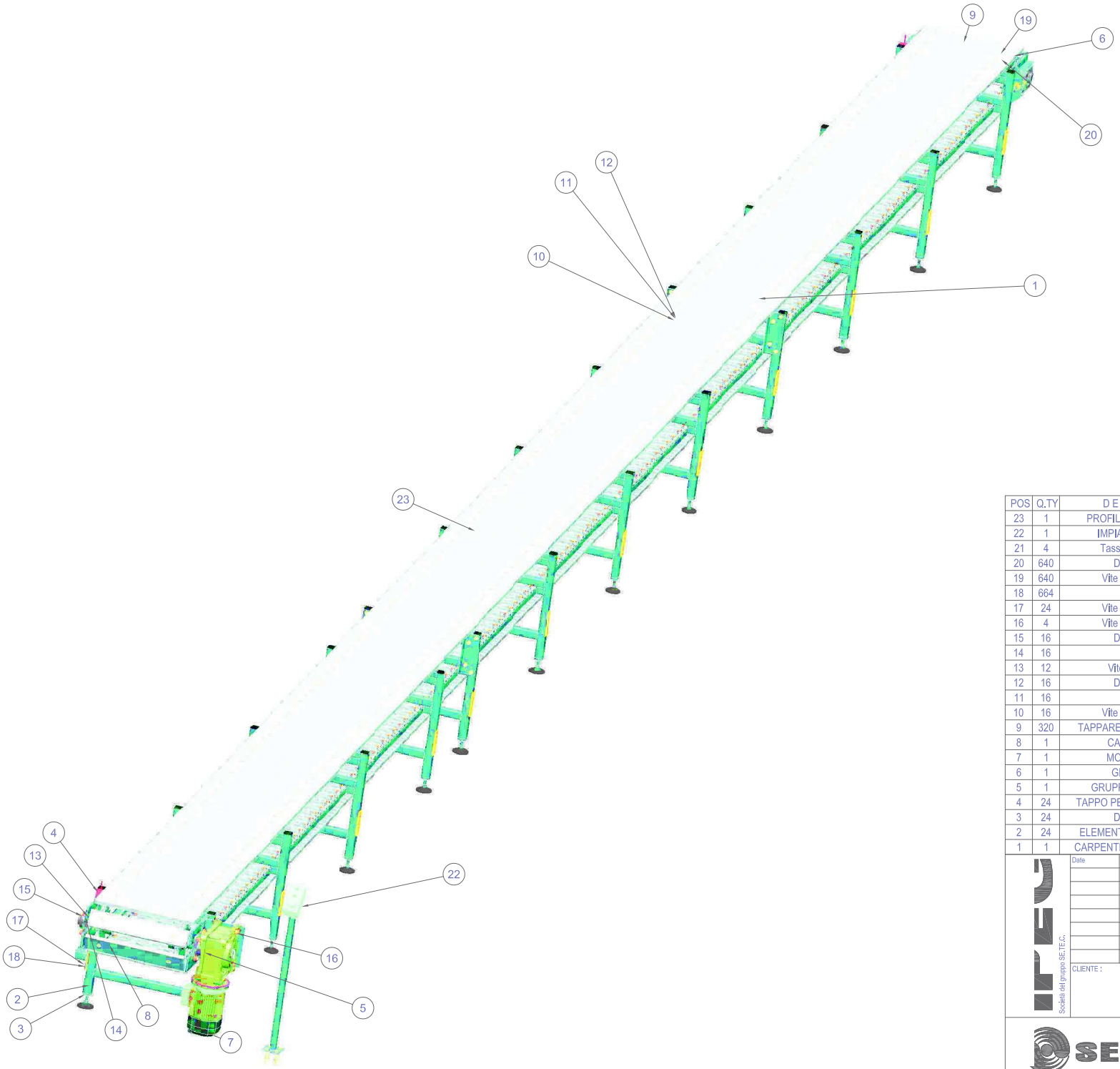

POS	Q.TY	DESCRIPTION	SIZE	TAV	MATERIAL	KG./ U
23	1	PROFILATO ANGOLO ZINC.	L 30x4	AT2011AC	STEEL	27.153
22	1	IMPIANTO ELETTRICO				7.135
21	4	Tassello a percussione	M8 x 85	I8451134	8_8	0.036
20	640	Dado esagonale	M8 - 6	I7613005	6	0.006
19	640	Vite a testa esagonale	M8 x 30 - 8.8	I7014071	8_8	0.018
18	664	Rondella	8	I7800006		0.002
17	24	Vite a testa esagonale	M8 x 20 - 8.8	I7014069	8_8	0.014
16	4	Vite a testa esagonale	M12 x 40 - 8.8	I7014115	8_8	0.052
15	16	Dado esagonale	M12 - 6	I7613007	6	0.017
14	16	Rondella	12	I7800008		0.003
13	12	Vite svasata TSPEI	M12 x 40 - 8.8	I7035123	8_8	0.044
12	16	Dado esagonale	M10 - 6	I7613006	6	0.011
11	16	Rondella	10	I7800007		0.002
10	16	Vite a testa esagonale	M10 x 60 - 8.8	I7014099	8_8	0.048
9	320	TAPPARELLA L=350mm x 90mm		E58150XA	POLIPROPILENE	0.363
8	1	CATENA ZINCATA	L=65mt + 13 MAGLIE GIUNZ.	E58138EA		135.628
7	1	MOTORIDUTTORE		RMA21005+E9030200		370.313
6	1	GRUPPO FOLLE		S8760100		26.178
5	1	GRUPPO TRASMISSIONE		S8760110		25.349
4	24	TAPPO PER PROFILATO 40 X 40		H50A38XO	PVC	0.103
3	24	Dado esagonale	M12 - 6	I7613007		0.014
2	24	ELEMENTO DI LIVELLAMENTO		C00965AC		0.192
1	1	CARPENTERIA NASTRO L=15700		YPC00040 TAV.00		282.542

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NASTRO BVV 40

SCALA 7/100

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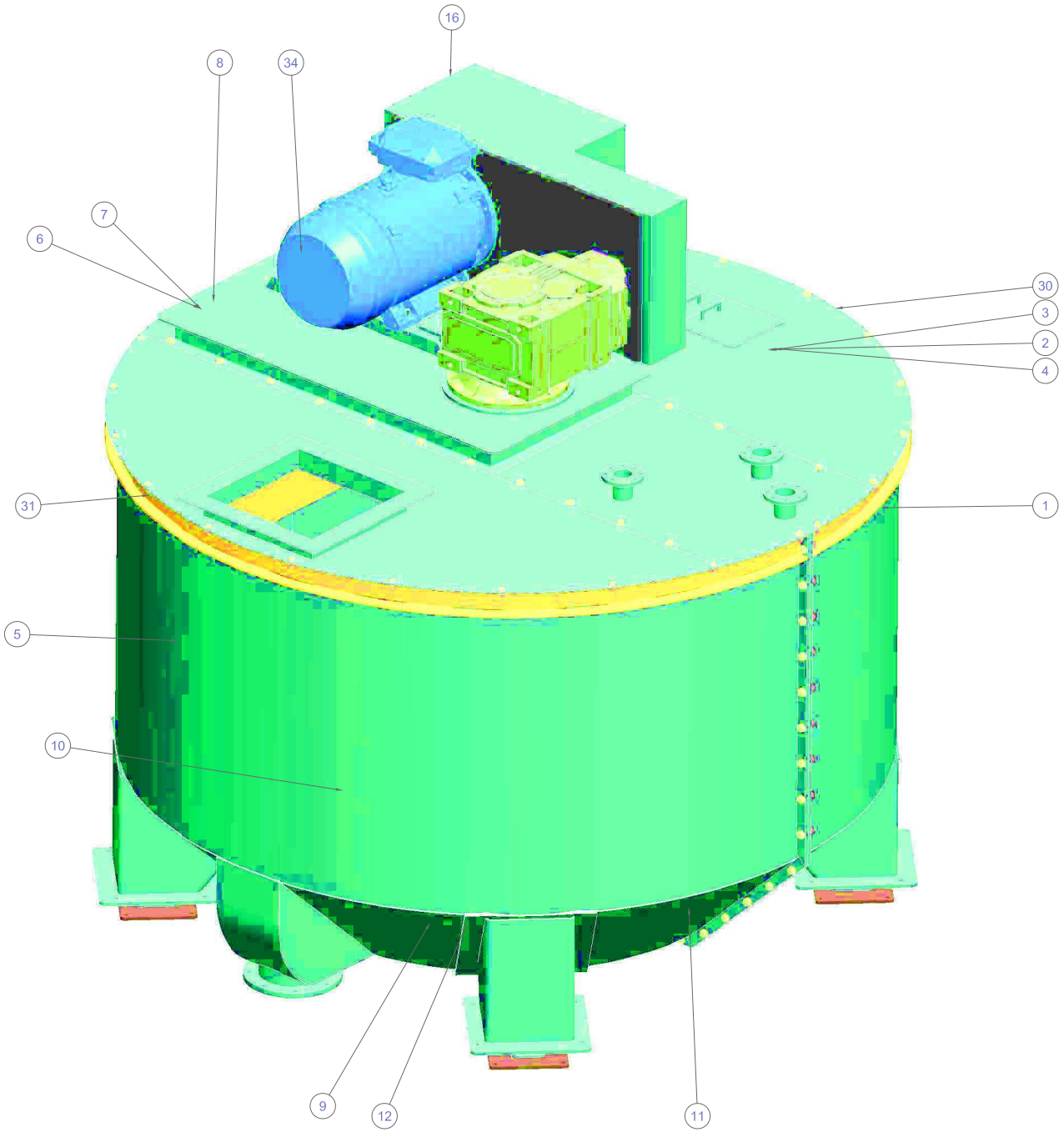

POS	Q.TY	DESCRIPTION	SIZE	TAV	MATERIAL	KG./U
41	16	Vite a testa esagonale	M12 x 30 - 8.8		8_8	0.043
40	3	Dado esagonale	M12 - 6		6	0.017
39	3	Rondella	12			0.003
38	16	Vite svasata	M12 x 40 - 8.8		8_8	0.044
37	4	Vite a testa esagonale	M10 x 25 - 8.8		8_8	0.026
36	16	Vite a testa esagonale	M18 x 30 - 8.8		8_8	0.116
35	16	Rondella	18		FE360	0.015
34	14	Vite a testa esagonale	M16 x 40 - 8.8		8_8	0.102
33	24	u-washer	13.5			0.018
32	1	LAMIERA SUPERIORE PICCOLA			FE360	6.756
31	1	COPERCHIO LATO TRAMOGGIA		0008		132.875
30	1	COPERCHIO LATO ISPEZIONE		0007		130.519
29	4	PIASTRA INFERIORE CELLA DI CARICO	TYPE	TAV 17	FE360	14.124
28	4	CELLA DI CARICO CBL 10000			FE360	6.768
27	4	PIASTRA SUPERIORE CELLA DI CARICO	TYPE	0018	FE360	14.070
26	1	LAMIERA SUPERIORE		0010	FE360	69.308
25	8	Vite a testa esagonale	M16 x 60 - 8.8		8_8	0.134
24	36	Dado esagonale	M16 - 8		8	0.040
23	80	Rondella	16			0.016
22	22	Vite a testa esagonale	M16 x 45 - 8.8		8_8	0.110
21	6	Rondella	10			0.004
20	2	Vite a testa esagonale	M10 x 20 - 8.8		8_8	0.023
19	8	Dado esagonale	M24 - 8		8	0.130
18	8	Rondella	24			0.024
17	8	Vite a testa esagonale	M24 x 80 - 8.8		8_8	0.415
16	1	TELAIO MOTORIZZAZIONE		0012		1382.432
15	18	Rondella	24			0.035
14	10	Vite a testa esagonale	M24 x 50 - 8.8		8_8	0.309
13	1	ALBERO PORTA GIRANTE		TAV 0001		150.279
12	1	ASSIEME GIRANTE		TAV 0002		337.811
11	68	Vite a testa esagonale	M20 x 40 - 8.8		8_8	0.175
10	16	ASSIEME PALETTE FISSE		TAV 00		16.731
9	5	LAMIERA FRANGIFLUTTI			FE360	55.420
8	81	Dado esagonale	M20 - 8		8	0.076
7	226	Rondella	20			0.019
6	77	Vite a testa esagonale	M20 x 65 - 8.8		8_8	0.236
5	1	SEMIVASCA B				1895.965
4	45	Dado esagonale	M12 - 8		8	0.017
3	69	Rondella	12			0.007
2	32	Vite a testa esagonale	M12 x 40 - 8.8		8_8	0.052
1	1	SEMIVASCA A				1913.559

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